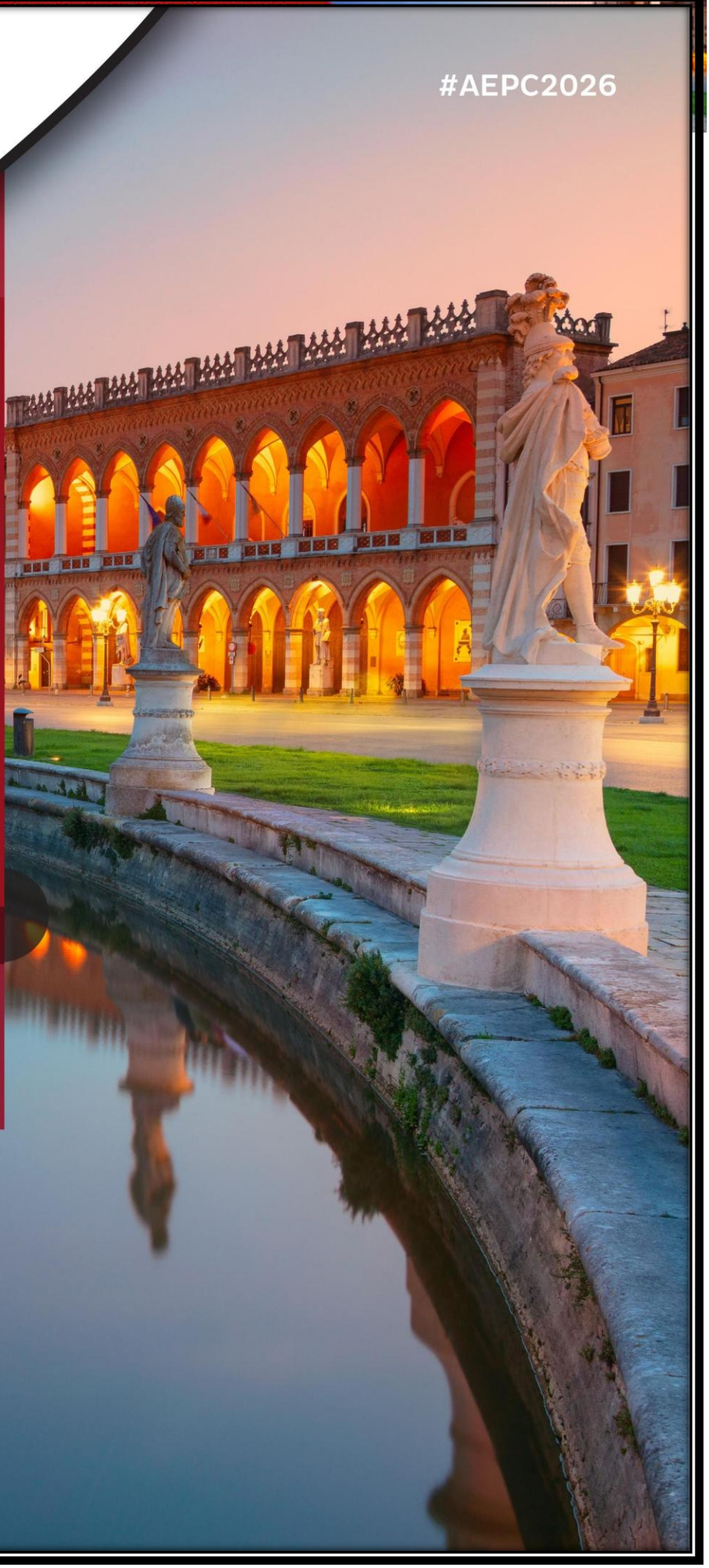
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ORAL ABSTRACTS



O-001 / #666

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

PREVALENCE AND CLINICAL SIGNIFICANCE OF CARDIAC AUTOANTIBODIES IN PAEDIATRIC MYOCARDITIS

Nele Rolfs[1,2,3,4,5], Andrea Silvio Giordani[6], Cristina Vicenzetto[7], Anna Baritussio[8], Elena Pontara[6], Elena Bison[6], Maria Grazia Peloso Cattini[6], Bernd Opgen-Rhein[1,2], Eicke Schwarzkopf[1,2], Thomas Pickardt[9], Felix Berger[1,2,5], Karin Klingel[10], Stephan Schubert[11], Alida Caforio[6], Franziska Seidel[1,2,3,4,5]
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Background and Aim: Paediatric myocarditis presents with a broad clinical spectrum, from mild symptoms to life-threatening cardiac dysfunction, yet the immunological mechanisms underlying this variability remain insufficiently defined. This study aimed to determine the frequency of anti-heart autoantibodies (AHA) and anti-intercalated disc autoantibodies (AIDA) in children with myocarditis and to evaluate whether their presence correlates with disease severity and outcome
Methods: A total of 76 patients with clinically suspected myocarditis (≥1 clinical presentation plus ≥1 diagnostic criterion typical of myocarditis) or cardiac MRI/biopsy-confirmed myocarditis were included, all enrolled in the multicentre, prospective *MYKKE* registry for paediatric myocarditis. Sera samples were collected at symptom onset and prior to immunomodulatory treatment. AHA and AIDA were assessed



by indirect immunofluorescence. Fulminant presentation was defined as heart failure necessitating inotropes and/or mechanical circulatory support (MCS). Major adverse cardiac events (MACE) included MCS, transplantation, and/or death. Clinical characteristics, diagnostic findings, and outcomes were compared between autoantibody-positive and autoantibody-negative patients. Logistic regression was performed, and MACE-free survival evaluated via Kaplan–Meier analysis.

Results: The cohort had a median age of 15.3 years (IQR 10.2–16.7), with 75% (n=57) being male. Myocarditis was confirmed by MRI and/or biopsy in 87% (n=66), while 13% (n=10) had clinically suspected myocarditis. AHA were detected in 8 children (11%) and AIDA in 21 (28%), with 26 patients (34%) testing positive for at least one of these autoantibodies. In logistic regression, cardiac autoantibodies were significantly associated with younger age (OR 0.891, 95% CI 0.816–0.973; p=0.010), left ventricular ejection fraction (LVEF) <40% (OR 3.429, 95% CI 1.216–9.668; p=0.020), and a fulminant presentation (OR 3.850, 95% CI 1.301–11.392; p=0.015). Kaplan–Meier analyses demonstrated lower MACE-free survival not only in patients with impaired LVEF (p<0.001) but also in those presenting with cardiac autoantibodies at admission (p=0.042); however, in multivariable analysis, only LVEF remained an independent predictor of MACE.

Conclusions: For the first time, our study detects AHA and AIDA in a substantial proportion of paediatric myocarditis patients and links their presence to more severe cardiac impairment and worse outcomes. These findings suggest that cardiac autoantibodies may serve as useful biomarkers for risk stratification in paediatric myocarditis.



O-002 / #656

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

RETHINKING PROGNOSIS IN GENETIC INFANT DCM: LONG-TERM OUTCOMES AFTER PAB

Thushiha Logeswaran[1], Blanka Steinbrenner[1], Hakan Akinturk[1], Bettina Reich[2], Matthias Müller[1], Sabine Recla[1], Christian Jux[1]
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Background and Aim: Pulmonary artery banding (PAB) is a targeted, physiology-based strategy for infants with dilated cardiomyopathy (DCM). Although growing evidence supports its role in ventricular reshaping and recovery, outcomes in genetically mediated DCM remain insufficiently characterized. This study assesses recovery potential and genotype–outcome patterns in infants with confirmed genetic DCM undergoing PAB within a standardized diagnostic and therapeutic framework.
Methods: We retrospectively analyzed 57 children <3 years who underwent PAB between 2006–2024. Among them, 20 patients (35%) had a confirmed pathogenetic genetic etiology. The majority underwent multimodal evaluation including echocardiography, cardiac MRI, invasive hemodynamics, endomyocardial biopsy (EMB), and genetic testing. PAB was integrated into a structured approach involving optimized heart failure therapy and, when indicated, creation of a restrictive atrial communication (rASD).
Results: Median age at PAB in the genetic DCM subgroup was 185 days; 10 patients were female. At presentation, mean LVEF was 22%, mean LVEDD 44 mm (z-score +6). Inotropic support was required in 60%. EMB (performed in 85%) demonstrated interstitial fibrosis in all samples. Hemodynamic assessment (90%) showed a median LVEDP of 14 mmHg. An rASD / PFO dilation was performed in 9 patients (45%). Overall survival was 95%. MCS was required in 3 patients (two bridged to HTx; one death on MCS). Functional recovery—defined as normalization or sustained improvement in LVEF—occurred in 60% of patients. Among responders (n = 12), mean LVEF reached 54%, mean LVEDD decreased to 37 mm (z-score +0.6). Recovery remained stable after partial transcatheter debanding in 10 patients; with two additional patients awaiting scheduled debanding. Median follow-up in the recovery group was 8 years. Genotypes traditionally linked to progressive disease—including MYH7, TTN, TNNT2, PRDM16, FLNC, BAG3—showed notably more recovery potential than generally assumed. In contrast, adverse outcomes tended to cluster in metabolic disorders and in patients with multihit sarcomeric variant constellations.
Conclusions: In infants with genetic DCM, rASD creation when indicated, and timely PAB



resulted in functional recovery in 60% of cases—including genotypes associated with progressive disease. The marked heterogenity underscores the importance of understanding variant-specific risk, penetrance and underrecognized recovery potential. Our results suggest that early physiology-guided reshaping strategies may modify disease trajectory.



O-004 / #318

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

ADJACENT N-TERMINAL SCN5A VARIANTS (LEU212PRO AND ARG222GLN) AND A NOVEL CLINICAL PHENOTYPE: A TWO-FAMILY COMPARATIVE CASE REPORT

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The Hospital for Sick Children, Division Of Cardiology, Toronto, Canada

Background and Aim: *SCN5A* variants are associated with a broad spectrum of inherited arrhythmia syndromes. Variants within the N-terminal domain of Nav1.5 (cardiac voltage-gated sodium channel encoded by *SCN5A*) are uncommon and their clinical significance remains challenging to interpret. We aim to describe the clinical and electrophysiological impact of *SCN5A* variants located near the N-terminal region.
Methods: We describe two families carrying distinct *SCN5A* variants situated in close proximity within the N-terminal domain (**Table 1**).



Table 1: Comparison of Clinical and Genetic Features of the Two N-Terminal *SCN5A* Variants.

Feature	p.Leu212Pro (Case 1 Family)	p.Arg222Gln (Case 2 Family)
Nucleotide change	c.635T>C	c.665G>A
Variant type	Missense, VUS	Missense, known pathogenic
Protein domain	Proximal N-terminal region of Nav1.5	Proximal N-terminal region of Nav1.5
Reported functional effects (literature)	Mild reduction in peak INa; altered gating kinetics; incomplete data	Abnormal INa, Purkinje cell hyperexcitability, strong loss-of-function features
Associated phenotypes in literature	Sick sinus syndrome; possible LQTS/Brugada	Sinus node dysfunction, atrial fibrillation, ventricular ectopy, particularly multifocal ectopic Purkinje-related premature contractions, DCM, malignant ventricular arrhythmias
Proband phenotype	Teen male with sinus bradycardia, first degree AV block, junctional & ventricular escape rhythms; normal structure & exercise test	Child with persistent junctional rhythm; early conduction involvement without structural disease
Family phenotype severity	Moderately variable: mother required pacemaker → ICD; others mild or asymptomatic	Broad & severe spectrum: ventricular fibrillation arrest, DCM, AF, frequent ectopy; but some asymptomatic carriers
Penetrance	Incomplete, age-dependent; variable expressivity across family	Incomplete but higher malignant potential; marked variability
Population frequency	Absent from databases	Rare; previously described and classified as pathogenic
Clinical implications	Monitoring for progressive conduction disease; uncertain pathogenicity	High-risk inherited arrhythmia; need for vigilant screening and early detection

Abbreviations: VUS – Variant of uncertain significance, INa – Peak sodium current, BrS – Brugada syndrome, DCM – Dilated cardiomyopathy, ICD – Implantable cardioverter-defibrillator, AF – Atrial fibrillation, LQTS – Long QT syndrome

Results: In the first family (**Figure 1**), a novel missense variant in *SCN5A*, c.635T>C (p.Leu212Pro), was identified in a 14-year-old male who demonstrated mild sinus bradycardia, first-degree atrioventricular block, and a novel finding of accelerated junctional and ventricular escape rhythms (**Figures 2-3**), with otherwise normal structural

heart and exercise performance His mother, who also carried the variant, developed significant sinus node dysfunction requiring pacemaker and ultimately an implantable cardiac defibrillator. In the second family (**Figure 4**), a 5-year-old boy with extended family history of the pathogenic *SCN5A* variant, c.665G>A (p.Arg 222Gln) and a wide arrhythmic spectrum, demonstrated an accelerated junctional rhythm with intermittent sinus capture beats (**Figure 5**), indicating early conduction system involvement despite being clinically asymptomatic.

Figure 1. Pedigree of the family carrying the *SCN5A* variant c.635T>C (p.Leu212Pro). The proband's mother exhibited significant sinus node dysfunction requiring pacemaker implantation and later ICD upgrade for atrial arrhythmia monitoring. The proband is indicated by the arrow.

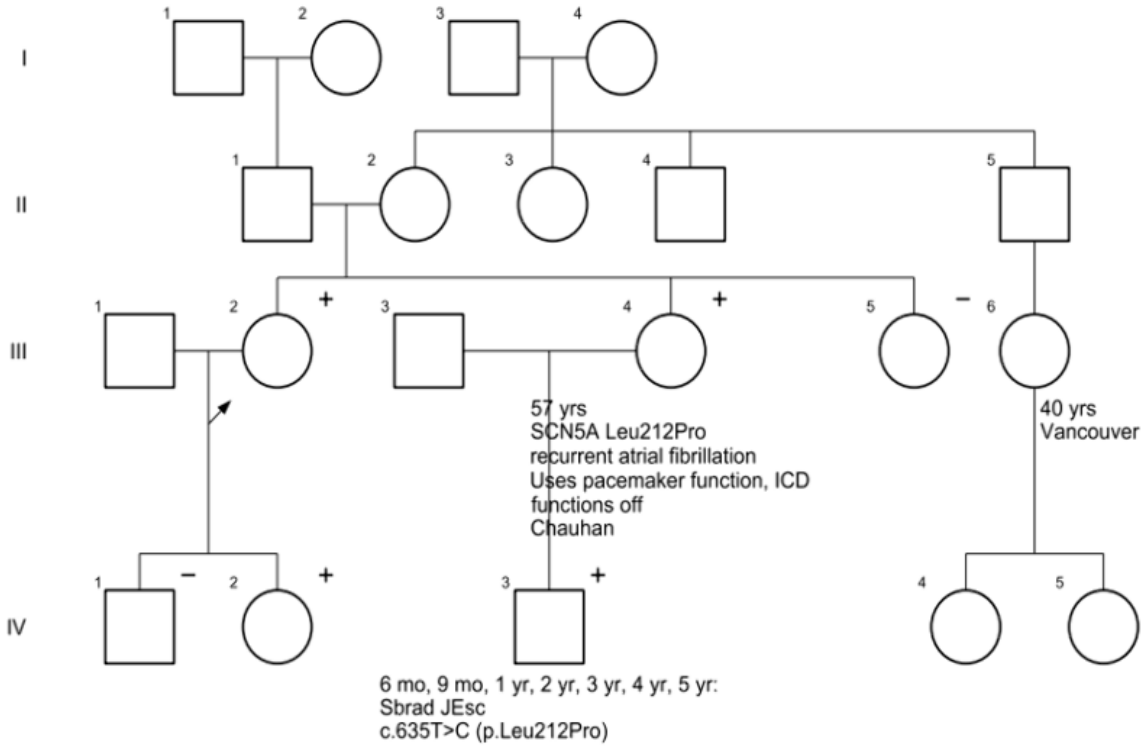


Figure 2: Sinus capture with 1st degree AV block, junctional and ventricular escape beats.

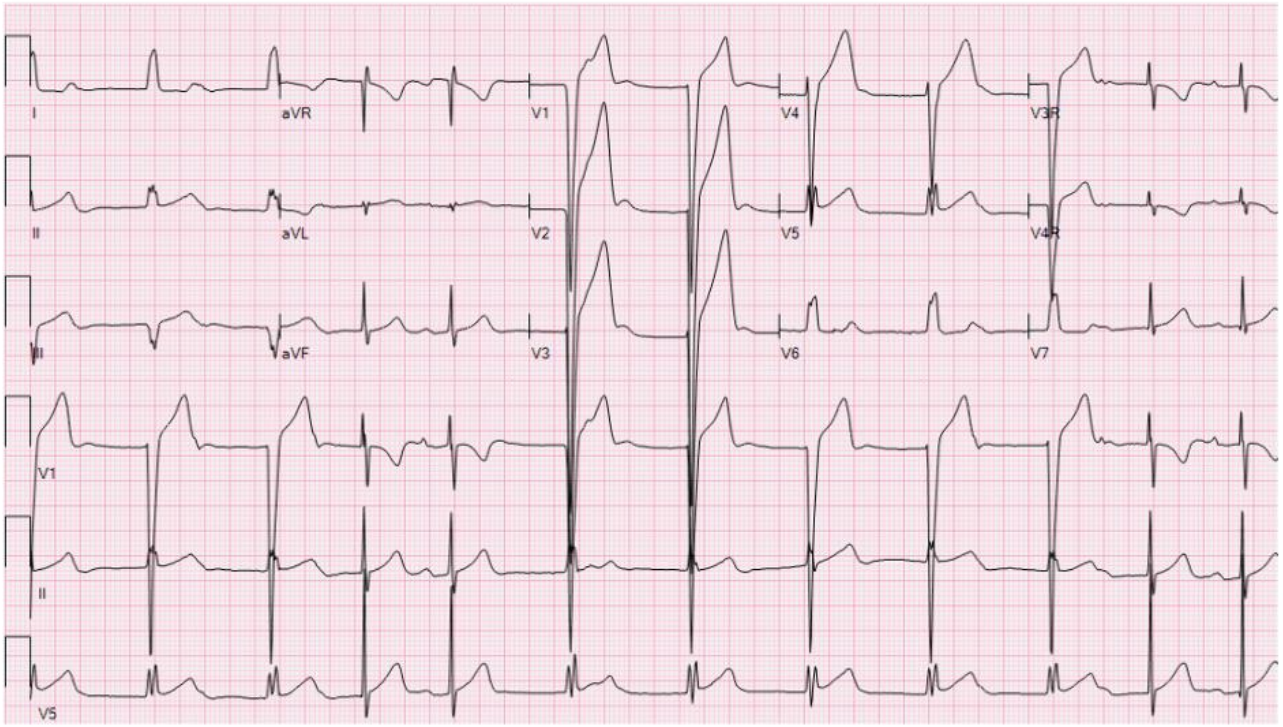


Figure 3: Holter Monitor showing sinus rhythm with 1st degree AV block, Wenckebach and ventricular escape rhythm.

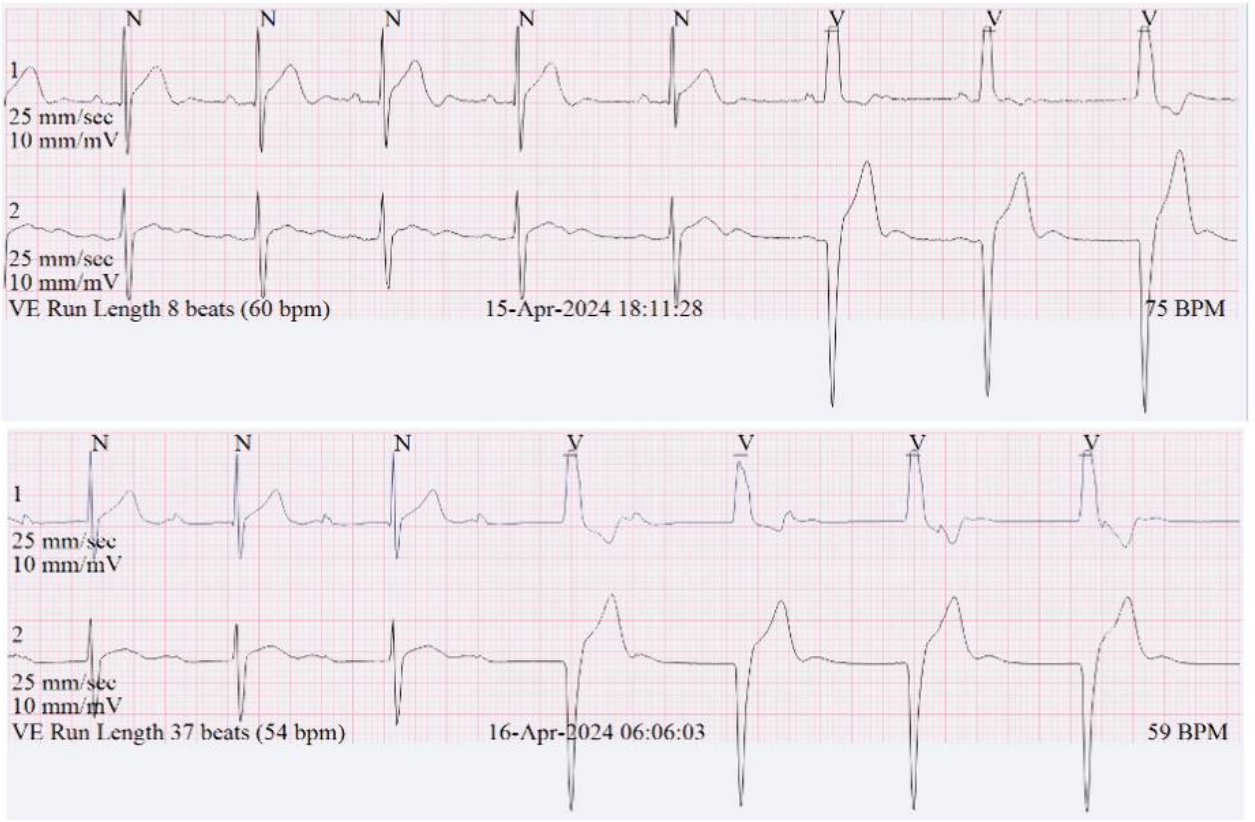


Figure 4. Pedigree of the family carrying the *SCN5A* c.665G>A (p.Arg222Gln) variant. The multigenerational pedigree demonstrates autosomal dominant inheritance with variable expressivity. Individuals carrying the familial *SCN5A* p.Arg222Gln variant (+) show a spectrum of conduction and arrhythmic phenotypes, including sinus bradycardia, accelerated junctional rhythm, first-degree atrioventricular block, QRS prolongation, and ventricular arrhythmias. The proband is indicated by the arrow.

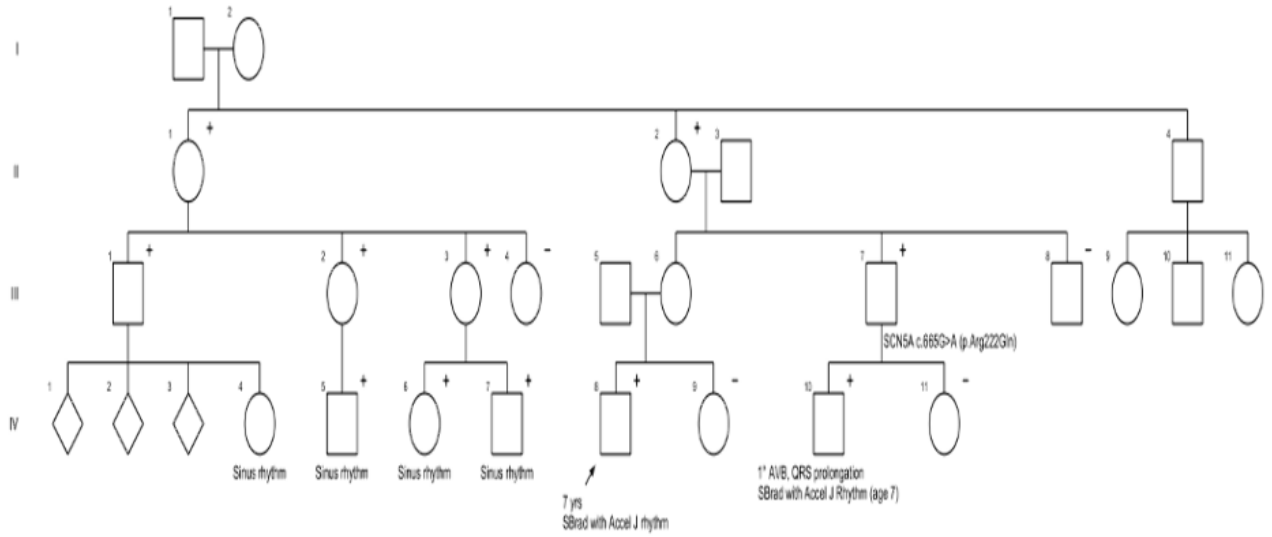
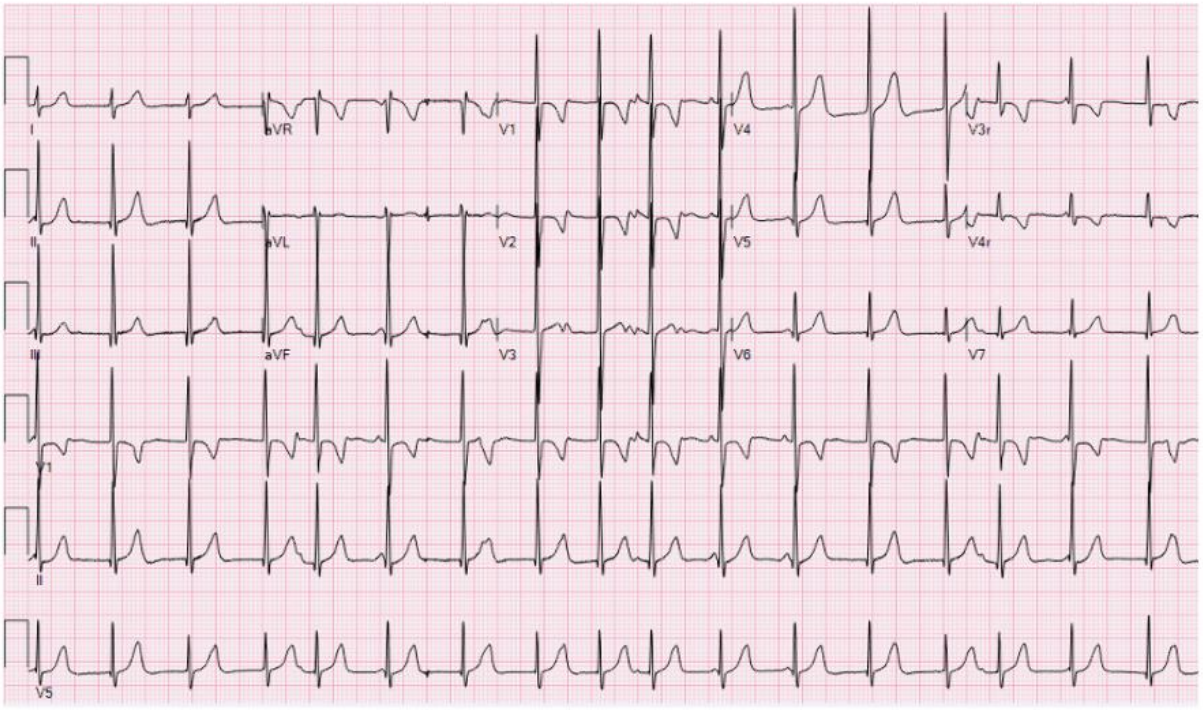


Figure 5: ECG displaying junctional rhythm with isolated premature atrial contractions and intermittent sinus capture beats.



Conclusions: Although clinically distinct, both variants cluster within a narrow region of the proximal N-terminal domain, suggesting that this portion of Nav1.5 may represent a mutation-sensitive hotspot capable of disrupting channel stability, trafficking, or gating regulation. The close spatial proximity of Leu212 and Arg222 strengthens the biological plausibility that this specific N-terminal segment plays an under-recognized role in sinoatrial and atrial conduction. Early conduction abnormalities such as junctional rhythm in genotype-positive children may represent subclinical manifestations and warrant careful longitudinal surveillance. This two-family case series expands the phenotypic spectrum associated with N-terminal *SCN5A* variants with the novel finding of an accelerated junction rhythm and underscores the need for integrated clinical, electrophysiologic, and genetic assessment in inherited conduction disorders.



O-005 / #405

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

FIBROTIC SIGNATURE IN THE SERUM PROTEOME OF FONTAN PATIENTS – RESULTS OF A MASS SPECTROMETRY ANALYSIS OF EXTRACELLULAR MATRIX PROTEINS

Isabel Mihajlovic[1], Miriam Michel[2], Fatima Ageed[2], David Renaud[2], Alexander Blaha[2], Nele Ströbel[2]
[1]Medical University of Innsbruck, Innsbruck, Austria, [2]Innsbruck, Paediatrie Iii, Innsbruck, Austria

Background and Aim: The Fontan procedure for single-ventricle congenital heart defects leads to chronically elevated central venous pressure and commonly results in Fontan-associated liver disease (FALD), characterized by progressive hepatic fibrosis that may advance to cirrhosis or hepatocellular carcinoma. Myocardial fibrosis is likewise common in these patients, and emerging evidence suggests that elements of pulmonary vascular and interstitial remodeling may also resemble early forms of pulmonary fibrosis. Together, these manifestations highlight the systemic nature of fibrotic remodeling in the Fontan circulation. Consequently, there is considerable interest in reliable noninvasive indicators or molecular patterns for assessing organ fibrosis. To address this need, we applied an unbiased serum proteomic approach to identify fibrosis-related protein signatures in adult Fontan patients.
Methods: In a prospective cross-sectional study, the serum proteomes of 48 adult Fontan patients (enrolled at two tertiary centers) were compared to age- and sex-matched healthy controls using Tandem Mass Tag (TMT) 16-plex mass spectrometry. After depleting high-abundance proteins, tryptic digestion and TMT labeling were performed. Pooled samples were analyzed by high-resolution nanoLC–Orbitrap mass spectrometry. Differential protein abundance between Fontan and control groups was determined with appropriate normalization and statistics (false discovery rate $q < 0.05$ for significance). Functional enrichment analysis (Gene Set Enrichment Analysis, GSEA) was conducted to identify overrepresented Gene Ontology categories and curated pathway gene sets (MSigDB Hallmark and KEGG).
Results: A total of 808 proteins were significantly altered in Fontan patient serum compared to controls (372 upregulated, 436 downregulated; $q < 0.05$). Strikingly, many of the most elevated proteins in Fontan patients were extracellular matrix (ECM) components or fibrosis-related factors. For example, Thrombospondin-2 (THBS2), ADAMTS-like 2 (ADAMTSL2), Adipocyte Enhancer-Binding Protein 1 (AEBP1), and Integrin Beta-Like 1(ITGBL1) showed roughly 1.5- to 3-fold higher levels in Fontan serum. GSEA confirmed a



strong pro-fibrotic signature, with gene sets related to ECM organization and fibroblast activation markedly overrepresented in Fontan patients.

Conclusions: Adult Fontan patients exhibit a distinctive fibrotic signature in their serum proteome. Multiple matrix-associated proteins—most notably THBS2 and ADAMTSL2—are significantly elevated and show promise as noninvasive biomarkers of profibrotic processes in this population. Together, these findings support the possibility of developing a peripheral blood–based biomarker panel for the assessment and grading of FALD, myocardial fibrosis, and potentially pulmonary fibrotic involvement.



O-006 / #439

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

CONGENITAL LONG QT SYNDROME – FROM SCREENING OF FAMILY MEMBERS TO SUDDEN CARDIAC DEATH – A CASE SERIES

Lilia Bardarska, Anna Kaneva
National Heart Hospital, Sofia, Bulgaria

Background and Aim: Long QT syndrome (LQTS) is a rare congenital disorder that even in asymptomatic children is a worrisome finding. We present a case series of patients with genetically confirmed diagnosis.
Methods: This is an observational study of patients with congenital LQTS evaluated in our center. We've studied their clinical presentation, initial QTc-values, response to therapy and outcomes.
Results: A total of seven cases were diagnosed with congenital LQTS from 2015 to 2022. Details are presented in the table below. All but two were asymptomatic. In one case prolonged QT was an accidental finding, another 4 underwent family screening. Family history of LQTS, syncope or aborted sudden cardiac death (SCD) was positive in 4 cases. Initial QTc values were 442-540 ms (mean= 487 ms), whether maximum QTc on Holter was 470-560 (mean 532 ms). In all, but two patients beta-blocker therapy was started and doses up to 3 mg/kg/day were tolerated well. QTc values didn't show significant change. There was one SCD of a boy with LQTS2 and a high-risk pore loop mutation. No other events occurred. Two asymptomatic girls with relatively normal QTc values, no high-risk T-wave features or mutations are left without treatment.

	Age	Sex	Symptoms	Family history	Schwartz score	Genetic variant	QTc initial	QTc max	QTc present	Therapy
Patient 1	3	F	No	Yes	3	KCNH	465	480	445	No
Patient 2	3	M	No	No	2.5	KCNQ	476	590	480	propranolol
Patient 3	9	M	No	Yes	4	KCNQ	547	576	519	propranolol



Patient 4	1	F	No	Yes	1	KCNQ	450	470	445	no
Patient 5	11	M	Syncope	No	4	SCN5A	480	490	480	propranolol
Patient 6	4	F	No	Yes	4	SCN5A	526	560	500	propranolol
Patient 7	8	M	Syncope	No	4	KCNH	540	560	NA	propranolol

Conclusions: Our case series is small because of Bulgaria's small population and probably the lack of ECG screening, and the relative unavailability of genetic testing in the earlier years. Nevertheless, we consider it informative as it highlights the disease heterogeneity and the need for better management strategies now that more data on genetic background is available.



O-007 / #622

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

THE ROLE OF EPICARDIUM-DERIVED CELLS IN THE DEVELOPMENT OF THE SINUS VENOSUS AND THE SINOATRIAL NODE

Thomas Bos[1], Tamara Borsboom[1], Conny Munsteren[1], Lambertus Wisse[1], Marco Deruiter[1], Monique Jongbloed[2]
[1]Leiden University Medical Centre, Leiden, Netherlands, [2]Leiden University Medical Center, Cardiology, Leiden, Netherlands

Background and Aim: Aberrant development of the sinoatrial node is associated with several cardiac rhythm and conduction disorders. The development of several components of the cardiac conduction system is influenced by epicardial-derived cells (EPDCs), a multipotent migratory population contributing to cardiac fibroblasts and smooth muscle cells, among others. Data on epicardial contributions to the sinoatrial node are currently still scarce. Mechanical proepicardium inhibition reduces interstitial collagen deposition and leads to abnormal cardiomyocyte alignment in the avian sinoatrial node (Bressan et al., 2018). However, the mechanisms by which sinoatrial node development is impacted by EPDCs has yet to be investigated in a mammalian model. Therefore, here we aimed to study the effect of (partial) disruption of epicardial epithelial-to-mesenchymal transition in mouse embryos by preventing canonical Wnt signaling in venous proepicardial organ-derived cells. We hypothesized that a deficient epicardial contribution to the sinoatrial node during development, results in structural and functional abnormalities, reminiscent of sinus node dysfunction in humans.
Methods: To study this, $Wt1^{CreERT2/+}$; $Rosa26^{mTmG}$ embryos and $Wt1^{CreERT2/+}$; $Rosa26^{mTmG}$; $Ctnnb1^{fl/fl}$ embryos were exposed to tamoxifen during embryonic day (E)8.5 and E9.5 via maternal intraperitoneal injections. At E15.5, the sinus venosus myocardium, including the sinoatrial node, was examined and quantified using QuPath.
Results: All embryos showed numerous GFP^+ (i.e. epicardial-derived) cells surrounding and within the myocardium of both cardinal veins and the sinoatrial node. $Ctnnb1^{fl/fl}$ embryos showed thin hypertrabeculated ventricular walls and ventricular septal defects. In several $Ctnnb1^{fl/fl}$ embryos, the sinoatrial node myocardium had an abnormal, incohesive appearance, with many prominent blood vessels. Moreover, the sinoatrial node myocardial area per section was notably smaller in $Ctnnb1^{fl/fl}$ embryos than $Ctnnb1^{+/+}$ embryos. To investigate proliferation in the sinus venosus myocardium as a potential explanation, an immunohistochemical staining of Ki67 was performed. Preliminary results show that $Ctnnb1^{fl/fl}$ embryos may have a higher proportion of Ki67+



cells in the sinoatrial node than Ctnnb1$^{+/+}$ embryos, possibly due to a compensatory increase in cell division.

Conclusions: Together, these findings support a structural contribution of EPDCs to the mammalian sinoatrial node, dependent on canonical Wnt signaling. Future investigations will include the study of sinoatrial node function and its autonomic innervation.



O-008 / #628

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

MEK INHIBITORS FOR THE TREATMENT OF HYPERTROPHIC CARDIOMYOPATHY IN PATIENTS WITH RASOPATHIES (MEKINRAS) – PRELIMINARY RESULTS.

Maciej Kołodziej[1], Katarzyna Łuczak-Woźniak[2], Krzysztof Szczałuba[3], Halszka Kamińska[2], Bożena Werner[2]
[1]Medical University of Warsaw, Department Of Pediatrics, Warsaw, Poland, [2]Medical University of Warsaw, Department Of Paediatric Cardiology And General Pediatrics, Warsaw, Poland, [3]Medical University of Warsaw, Center Of Excellence For Rare And Undiagnosed Diseases, Warszawa, Poland

Background and Aim: RASopathies arise from dysregulated RAS–MAPK signaling and frequently cause severe hypertrophic cardiomyopathy (HCM), particularly in Noonan syndrome. Although trametinib has shown benefit, prior work excluded PTPN11 variants and did not stratify outcomes by genotype.
Our aim is to present preliminary, genotype-aware effectiveness of trametinib in pediatric RASopathy-associated HCM, including patients with PTPN11 mutations.
Methods: MEKinRAS is an ongoing randomized, open-label trial enrolling patients aged 0–18 years with genetically confirmed RASopathies of any type and echocardiographic HCM. Phase 1 (3 months) compares trametinib added to standard care (beta-blocker and/or disopyramide) versus standard care alone, assessing NT-proBNP, troponin, and echocardiography. If superiority is observed, Phase 2 treats all participants with trametinib for 12 months. Phase 3 withdraws trametinib for 3 months to evaluate durability of effect.
Results: Eight children have been enrolled (RAF1 n=4, RIT1 n=2, PTPN11 n=2). After Phase 1, NT-proBNP reduction was greater in trametinib group (mean difference: −7,679.8 pg/mL; SD 9,979.6; −65.8%) than in control group (−360.5 pg/mL; SD 286.3; −11.2%). Maximal wall thickness (MWT) decreased by −1.6 mm (SD 0.7)in trametinib versus −0.4 mm (SD 0.4) control group. After 12 months of trametinib treatment in all participants, NT-proBNP decreased by 89.19% (SD 7.01%) (−6,946 pg/mL (SD:9,873), MWT by 3.21 mm (SD: 2.33), and MWT z-score by 4.36 (SD: 3.68) from baseline.
Conclusions: Trametinib was more effective than standard therapy during one year of treatment. NT-proBNP improved earliest, whereas echocardiographic remodeling required longer exposure. Genotype and younger age at initiation appear to modify benefit. Importantly, PTPN11 carriers improved substantially, supporting inclusive recommendations for trametinib in RASopathy-associated HCM, however, these findings



come from a small, single-center cohort and should be validated in larger, multicenter studies.



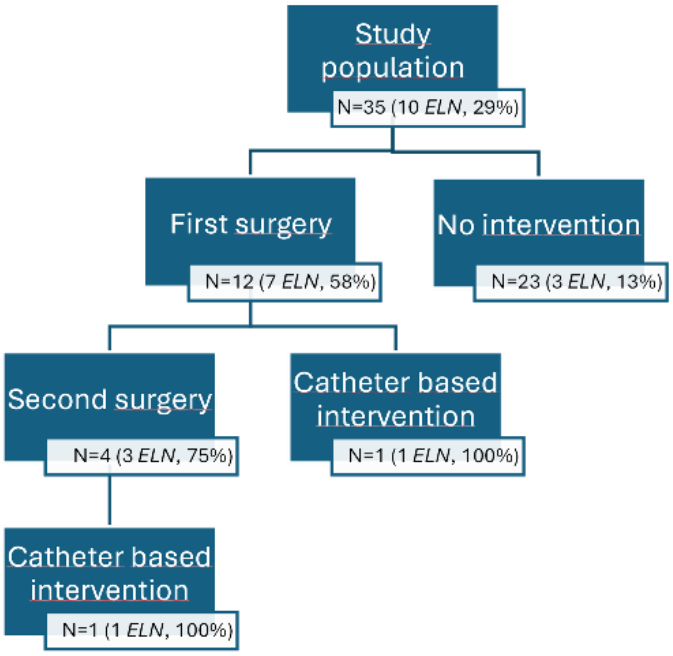
O-009 / #771

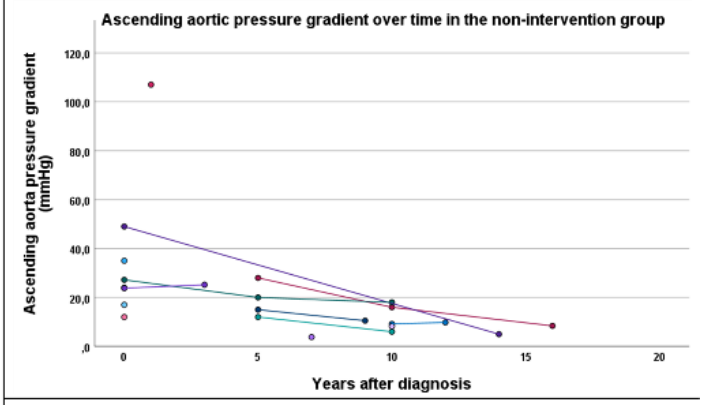
GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

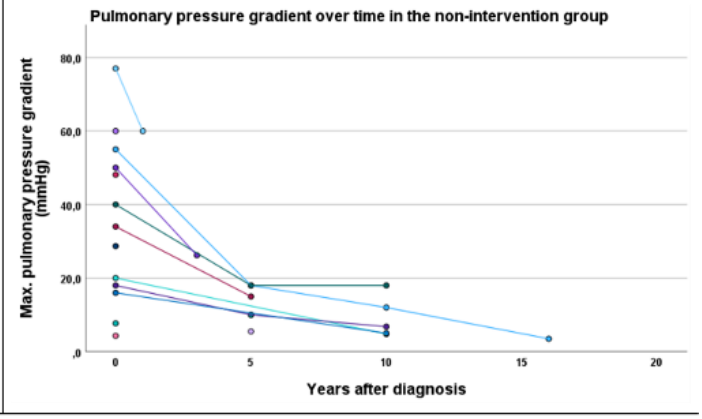
ELN-RELATED VASCULAR DISEASE: ARE WE TREATING TOO EARLY?

Kwinten Aelbrecht[1], Simon D'Hulst[2], Katya De Groote[2], Gilles Mets[2], Joseph Panzer[2], Kristof Vandekerckhove[2], Bert Callewaert[3], Laura Muiño Mosquera[2,3]
[1]Ghent University, Faculty Of Medicine, Ghent, Belgium, [2]Ghent University Hospital, Division Of Pediatric Cardiology, Department Of Pediatrics, Ghent, Belgium, [3]Ghent University Hospital, Center For Medical Genetics, Ghent, Belgium

Background and Aim: Williams-Beuren syndrome (WBS) is a microdeletion syndrome occurring in ~1/10.000 births, affecting multiple organ systems, most notably neurodevelopment and the cardiovascular system. The 1.5-1.8Mb deletion includes 22 single-copy genes, with *ELN* responsible for most cardiovascular abnormalities. Isolated (likely) pathogenic variants (PV) in *ELN*, responsible for elastin production, cause similar cardiovascular problems but with minimal involvement of other systems. The most frequent cardiovascular problems in *ELN*-related arteriopathy (EA) are supravalvular aortic stenosis (SVAS), supravalvular and peripheral pulmonary stenosis (PPS), aortic coarctation, and coronary ostial stenosis.
Methods: This retrospective monocentric study included patients with EA, encompassing WBS and isolated *ELN* PVs. Of 42 genetically confirmed cases, 35 had sufficient follow-up data for inclusion. Patients were grouped by whether they underwent intervention. Demographics, echocardiography, and intervention data were collected longitudinally to assess the natural history of EA and to compare cardiovascular outcomes between WBS and isolated *ELN*-variant patients.
Results: Of the 35 patients, 71% had WBS; 57% were male, with a median age at diagnosis of 0.7yrs (IQR 0.2-1.9) and a median follow-up of 7.9yrs (IQR 1.0-10.4). Thirty-four percent had both SVAS and PPS, 14% had SVAS with coarctation, 14% had isolated SVAS, and 23% had isolated PPS. Surgery rates were 67%, 40%, 60%, and 0% respectively, with 60% performed before the age of 1 year. One-third required reintervention. Patients with an *ELN* PV had 9.3-fold higher odds of surgery than those with WBS. A smaller sinotubular (ST) junction was an additional predictor of intervention. In the non-intervention group (N=23), 16 patients had isolated or combined aortic/pulmonary stenosis, with gradients decreasing over time in all, particularly for pulmonary lesions.







Conclusions: Patients with EA have a high burden of cardiovascular complications, with 23% requiring cardiac surgery before the age of 1 year and one-third needing reintervention. Individuals with a pathogenic *ELN*-variant or a low ST-junction z-score appear to be at increased risk for early intervention. Nevertheless, spontaneous improvement of aortic and pulmonary stenosis occurs in most patients managed without surgery, supporting expectant management with close follow-up, especially when ventricular hypertrophy is absent and cardiac function is preserved or hyperdynamic.



O-010 / #1202

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

A NOVEL NONSENSE CAPNS1 VARIANT IN PAEDIATRIC-ONSET PULMONARY ARTERIAL HYPERTENSION ASSOCIATED WITH NEUROLOGICAL MANIFESTATIONS

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Background and Aim: Calpain mediates collagen synthesis and pulmonary vascular cell proliferation. Its stability depends on calpain small subunit 1 (CAPNS1). Recently, bi-allelic loss-of-function variants in CAPNS1 have been reported in two families with pulmonary arterial hypertension (PAH), with neurological symptoms described in one patient. Loss of calpain is also associated with disorders related to spasticity and muscle weakness. Here, we report a novel homozygous CAPNS1 variant in two siblings with paediatric-onset PAH. One of them also exhibited progressive neurological symptoms.
Methods: Clinical and genetic data were collected from medical records. The patients were identified through the Dutch National Network for Paediatric Pulmonary Hypertension.
Results: We identified two siblings with a homozygous nonsense CAPNS1 variant (c.388C>T; p.Arg130*). Segregation analysis in the consanguineous parents confirmed both being heterozygous carriers. Two other siblings of the patients, in whom cardiac screening was negative for PAH, were non-carriers. No genetic data were available for other relatives. Proband 1, the third child of the family, was evaluated at age three due to failure to thrive and a heart murmur. Right heart catheterization confirmed PAH, and he was treated with dual therapy. At age eight he was referred for a neurological evaluation due to progressive muscle weakness of the lower limbs and face, dysphagia, and dysarthria. Physical examination revealed bilateral facial palsy, ptosis, loss of cervical lordosis, weakness of the shoulder muscles, and reduced deep tendon reflexes. Panel-based exome sequencing for neuromuscular disorders was negative. Proband 2, the fourth child of the family, was referred at age two after she presented with echocardiographic findings consistent with right ventricular overload following a lower respiratory tract infection. During follow-up, her symptoms progressed, and she was started on dual therapy. She is currently three years of age, and no neurological symptoms have become overt in this proband.



Conclusions: These findings support the association between homozygous variants in CAPNS1 and PAH. Additionally, it highlights the rare presence of neurological manifestations in PAH patients with bi-allelic nonsense CAPNS1 variants.



O-012 / #1224

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

GUT MICROBIOME IN CHILDREN WITH CONGENITAL HEART DISEASE FOLLOWING CARDIOPULMONARY BYPASS SURGERY (GUMIBEAR STUDY) – SHOTGUN METAGENOMIC ANALYSIS

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Background and Aim: The evolution of the gut microbiome in infancy is associated with life-long health benefits. Its development in infants with congenital heart disease (CHD) requiring surgery involving cardiopulmonary bypass (CPB) is impacted by environmental factors. CPB, itself, may result in higher pro-inflammatory bacteria and lower healthy species. These infants face challenges in which gut microorganisms play a role, including sepsis and necrotising enterocolitis. This study aimed to characterise microbiota composition perioperatively and to compare it to healthy controls.
Methods: In this prospective cohort study, infants with CHD requiring CPB surgery were recruited. Stool samples were collected one week pre-operatively, and post-operatively at 1, 4, 24 and 52 weeks. Bio-banked, healthy, breastfed, controls from the INFANTMET study were selected were matched to subjects by age at sample acquisition. Advanced Shotgun metagenomic sequencing analysis was used.
Results: 53 patients were recruited, of which 27 met the minimum sampling requirements (sample pre-operatively and at least 1-week post-operatively). 14 patients required neonatal surgery, most commonly for biventricular cyanotic lesions (n=9, 64%), while 13 patients were operated beyond the neonatal period, most commonly for left-to-right shunts (n=8, 62%). We identified a significant decrease in alpha-diversity between pre-operative and post-operative samples using Shannon index (-0.45, p=0.002), more pronounced in neonatal patients. When examining taxonomy, there was a fall in the Actinobacter phylum (p=0.023) marked by significantly reduced *Bifidobacteria*. Control microbial composition differed significantly (Beta diversity assessed by Jaccard distances, and Permanova analysis of Bray-Curtis dissimilarities) compared with pre-operative (p=0.0105) and post-operative (p=0.003) samples. Actinobacter phylum was reduced in subjects with lower abundance of several *Bifidobacterium* species. Proteobacteria were significantly higher in subjects, as well as several species in the Enterococcus and Klebsiella genera (fig. 1&2). Longitudinal assessment demonstrated a gradual increase in

Actinobacteria over time post-operatively, with gradually falling Proteobacteria (fig. 3)

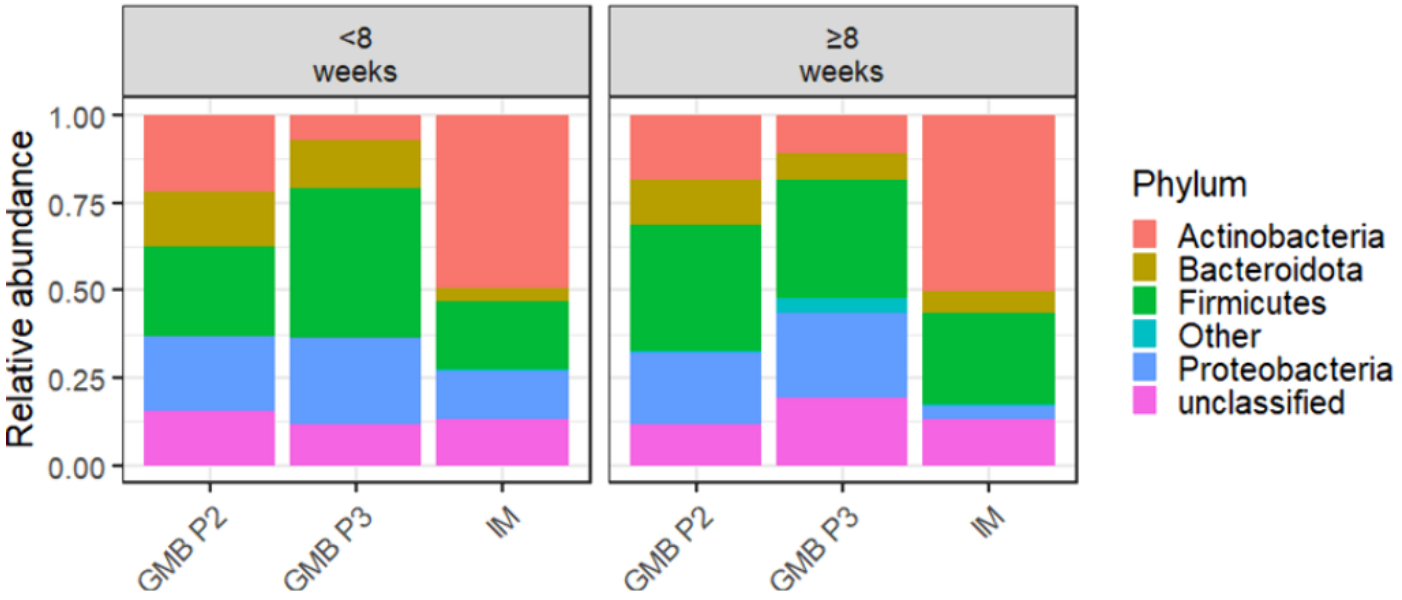


Fig1

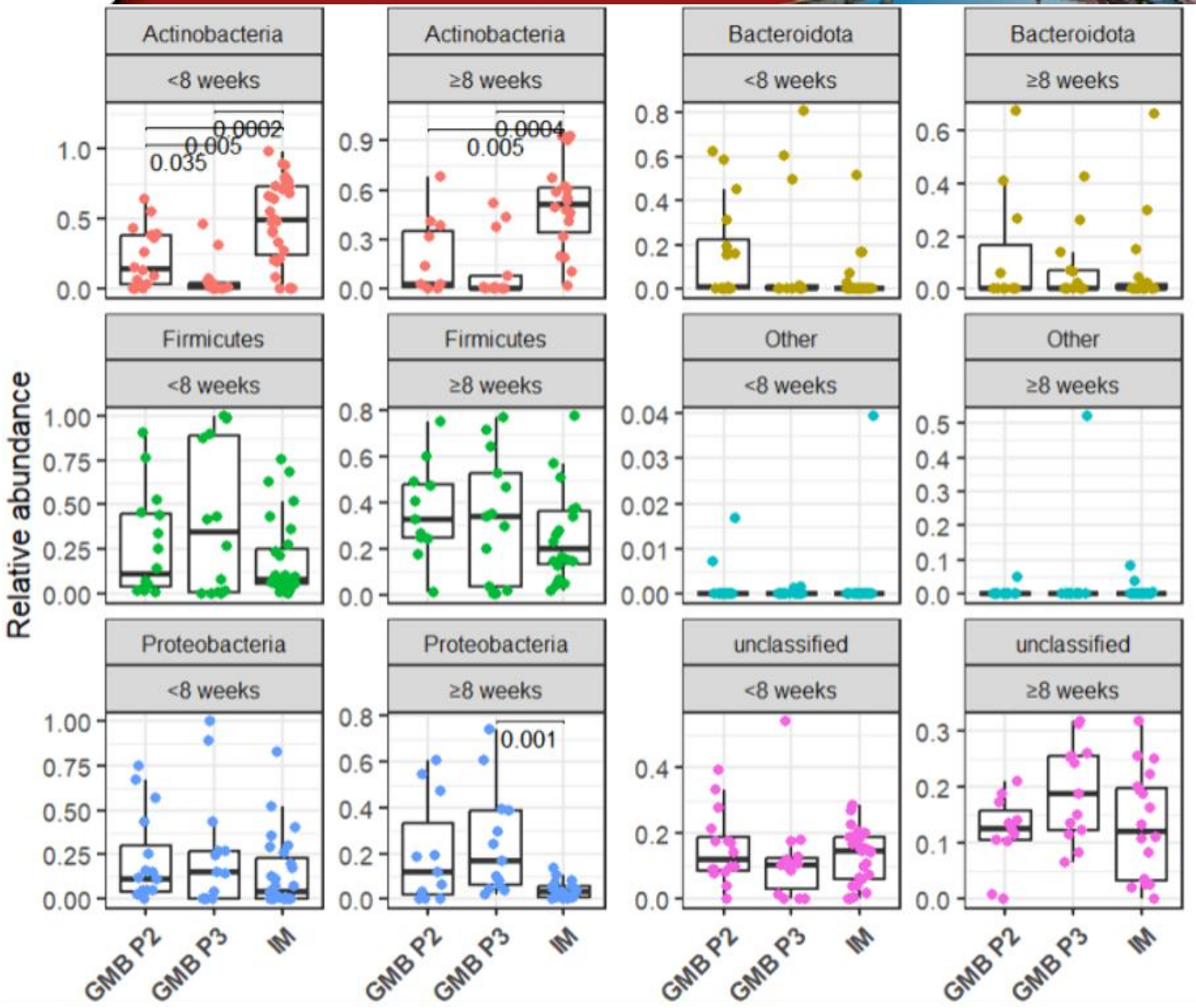

Actinobacteria
<8 weeks
Actinobacteria
≥8 weeks
Bacteroidota
<8 weeks
Bacteroidota
≥8 weeks
Firmicutes
<8 weeks
Firmicutes
≥8 weeks
Other
<8 weeks
Other
≥8 weeks
Proteobacteria
<8 weeks
Proteobacteria
≥8 weeks
unclassified
<8 weeks
unclassified
≥8 weeks
Relative abundance
0.0002
0.005
0.035
0.0004
0.005
0.001
GMB P2
GMB P3
IM

Fig2

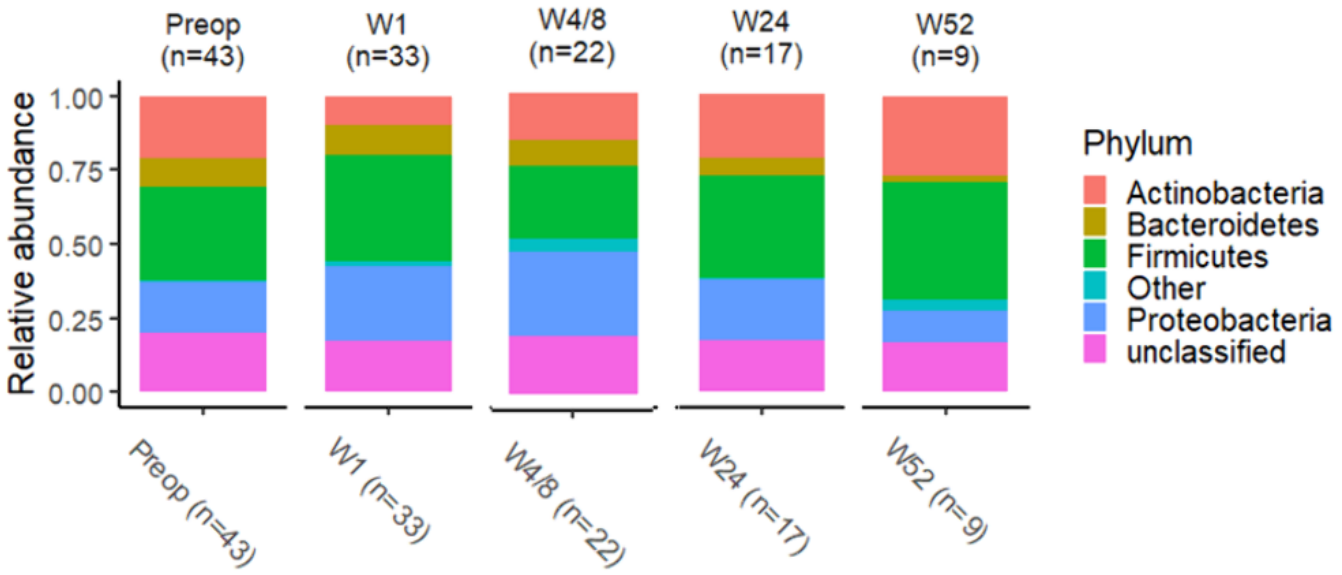


Fig3

Conclusions: CPB surgery appears to result in decreased alpha diversity indicating a fall in microbial richness and evenness. Subjects, both pre- and post-operatively, had significantly decreased bifidobacteria and higher potentially pathogenic species than controls. The study suggests that gut microbiota composition could be used as a biomarker of postoperative health and recovery in such patients.



O-013 / #299

GENETICS, BASIC SCIENCE AND MYOCARDIAL DISEASE ABSTRACT SESSION
14-05-2026 11:30 - 13:00

PREVALENCE AND ROLE OF PATHOGENIC CARDIOMYOPATHY GENE VARIANTS IN PEDIATRIC BIOPSY-PROVEN ACUTE MYOCARDITIS.

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Background and Aim: Acute myocarditis (AM) is an important cause of heart failure in children and adults. The pathogenesis is not completely understood and pathogenetic (P) variants in cardiomyopathy genes may play a role in determining the clinical course and outcomes of patients with AM. We aim to determinate the prevalence of pathogenic/likely pathogenic (P/LP) cardiomyopathy gene variants in a cohort of pediatric patients with biopsy-proven (BP) AM and the correlation with outcome.
Methods: We collected data from a cohort of 124 paediatric patients with BP-AM, we selected only patients that performed genetic tests. We compared gene positive and gene negative groups. T-student test and Kaplan Meier analysis were used. Outcome included death and heart transplantation
Results: 30 contemporary consecutive patients performed genetic test and were included in the study. Prevalence of P/LP gene variants was 27%, with a prevalence in sarcomeric genes (figure 1). No pathological mutations in desmosomial genes were found. No statistically significant differences were detected between gene positive and gene negative groups. In particular, analysis showed no difference in terms of fibrosis, viral infection or coinfenction, ejection fractions and outcome (figure 2 and 3). Moreover, no differences were found in recovery or in requiring mechanical circulatory support (MCS) (table 1)
Conclusions: The link between genetics and myocarditisremained. Probably myocarditis has a multifactorial pathogenesis in which a genetic predisposition interacts with environmental or other triggers. Our pediatric experience didn't show any difference in outcomes between gene positive and gene negative patients. However, this result required a validation in a larger population.



O-014 / #323

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

PARENTS OF CHILDREN WITH HEART DISEASE; EXPERIENCES AND CHALLENGES AFTER LONG TERM HOSPITALIZATION

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Background and Aim: Background: As surgical and medical care makes great progress, an increasing number of children with complex heart disease (CHD) are surviving. This positive outcome often comes with recurrent and prolonged hospital stays, that affects the whole family. **The aim** of this study was to explore how parents of children with CHD experience and navigate the circumstances after long term hospitalization, as well as their experience of daily life following discharge.
Methods: Method: Twenty semi-structured interviews were conducted in spring 2025 with 12 mothers and 8 fathers whose children had been hospitalised for more than 30 days at the two national paediatric heart centres in Sweden. The data were analysed using qualitative content analysis**.**
Results: Result: The analysis revealed one main category, “Life rewritten” that describes the experience and navigation after discharge from long-term hospitalization. Five subcategories were identified; *“Time passes and memories remain”* explains that the parents experienced a life-changing time and that they will never be the same again; *“Everyday life”* the parents express that they worship the small things in life, like being with their family and friends; *“Relation to the child”,* expresses that the parents have a feeling that they need to learn to know their child, and to become parents again; *“ Reliability of home hospital services”* explains that they have great trust in their home hospital who helped them to see the healthy in their child; *“Managing the environment”* explains that parents experience a need to explain what they´ve been through to relatives, colleagues, school, and other health care instances. No one fully understands their experience which makes them feel lonely.
Conclusions: Conclusion: Long-term hospitalization of a child with CHD profoundly



impacts parents, leading to lasting emotional, social, and relational changes. Support after discharge is essential to help families navigate this new reality.



O-015 / #212

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

A NATIONAL REVIEW OF PHARMACIST PROVISION IN PAEDIATRIC EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) IN THE UNITED KINGDOM (U.K.) AND IRELAND

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Background and Aim: Twelve paediatric intensive care units (PICU) conduct paediatric ECMO across the U.K. and Ireland; 2 centres conducting Veno-arterial (VA) and the remaining 10 doing both VA and Veno-venous (VV) modalities. Data from 2024: ECMO run numbers, per annum vary per centre; 50% (16-20 runs) and 42% (>20 runs), 92% of centres stated maximum patient ECMO capacity, at any one time was between 3-5 patients. PICU pharmacists are an essential part of the multidisciplinary team, making significant reduction in medication errors, reducing mortality, lowering critical care length of stay, reducing healthcare acquired infections, preventing adverse drug events, identifying interactions, reducing costs and carbon footprints. There is no data relating to the paediatric pharmacy workforce, in ECMO provision, in U.K. and Ireland.
Methods: A multi-centred, electronic survey on pharmacist workforce in paediatric ECMO was created and shared with the 12 paediatric ECMO centre lead PICU Pharmacists, across U.K. and Ireland. Data was collated on; pharmacy funded time, pharmacist's job plan, (highly expert level) consultant pharmacist involvement, 7 day/week pharmacy service and if there was a structured in-house training or competency framework for pharmacists: to aid looking after ECMO patients.
Results: 100% response rate to the survey from the 12 ECMO paediatric centres. 8% (n=1/12) of pharmacists had funded time, 33% (n=4/12) had ECMO written into their pharmacist job plan, 8% (n=1/12) had consultant pharmacist, 25% (n=3/12) had 7 day/week pharmacy service to ECMO patients. None of the 12 centres had a structured ECMO pharmacy inhouse training programme or competency framework.
Conclusions: The survey highlighted deficiency of pharmacy provision for paediatric ECMO; lack of funding, recognition within job plans, service variation over 7 days: particularly at weekends with no formalised training and competency frameworks. PICU pharmacist in-depth understanding and interpretation of altered and rapidly shifting physiological, pharmacokinetic and pharmacodynamic processes in critical care patients, is essential to the safe and effective use of medicines, in the critical care child who



requires ECMO. Further work is needed to review pharmacy funding and educational gap analysis of the PICU Pharmacists in ECMO in the U.K. and Ireland, to support the needs of the PICU multidisciplinary team.



O-016 / #723

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

FONTAN FAMILY CAMP HAS A POSITIVE IMPACT ON PSYCHOSOCIAL WELL-BEING AND HUMAN CONNECTIONS

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Background and Aim: We aimed to evaluate the effect of Fontan camp on well-being and human connections using pre and post camp surveys. The Fontan operation is a palliative surgical pathway for single-ventricle congenital heart disease, typically completed over multiple surgeries. Significant long-term complications include Fontan failure, reduced life expectancy, and non-cardiac issues that may require heart transplantation. Psychological stress for both patients and families is impacted by ongoing medical needs, physical limitations, and an uncertain prognosis. Multidisciplinary family camps may offer opportunities for connection, peer support and improved well-being.
Methods: The Fontan Family Camp was held over a weekend during the Summer (Friday to Sunday) and included families identified through a local database, clinic flyers, and social media postings. Programming consisted of outdoor activities for the entire family. Parental education sessions included 1. Transition care 2. Adult Fontan testimonies 3. Psychology consults and 4. Cardiologist-led Question-and-answer session. A licensed psychologist was available throughout the camp for additional individual (parent and child) sessions. Evaluation surveys were administered on the first and last day of camp assessing well-being and connectedness using a 5-point Likert scale (5= strongly agree).
Results: Camp was attended by 14 children with Fontan physiology (8-16years), 19 siblings (7-13 years), and 23 caregivers. Surveys were completed by 23 children and 18 caregivers. Twenty-six percent of children and 50% of parents reported learning new information about the heart. Parents' rating of connectedness with others increased significantly, 2.6 pre to 3.4 post camp (p=0.01), whereas children's connectedness was unchanged (pre 4.0 vs post 3.9). Notably, 17 of the 23 children reported making a friend during camp. Overall, camp was described as a positive experience for all who attended. Written feedback included *"As a parent, this support group allows for honest questioning and the chance to hear from others who have walked the same road. This helps ease that feeling of isolation."*
Conclusions: The Fontan Family Camp was associated with improved connectedness and positive psychosocial experiences for families affected by Fontan physiology. Camps that



combine structured education with informal interaction may enhance social support, resilience, and a sense of belonging in this population.



O-017 / #852

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

ADOLESCENTS' OPINIONS AND INFORMATIONAL NEEDS ABOUT SEXUAL AND REPRODUCTIVE HEALTH

Åsa Burström[1], Annika Bay[2,3], Harpa Vidarsdottir[4], Malin Berghammer[5]
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Background and Aim: The number of adolescents surviving into adulthood and reproductive age is increasing. During adolescence, these individuals must acquire knowledge to assume responsibility for their own health, including sexual and reproductive health (SRH). However, evidence suggests that the information is insufficient to meet the needs of adolescents with heart disease. The study aims to explore opinions and informational needs regarding sexual and reproductive health in adolescents with heart disease, and to determine preferred modalities for receiving such information.
Methods: Data were collected through semi-structured interviews. Inclusion criteria: adolescents (female and male), aged 15-18 years, living with heart disease. Six university hospitals participated in the recruitment process. Data were analyzed with qualitative content analysis.
Results: A total of 11 female adolescents (mean age 16.4) participated. The data analysis yielded three categories, comprising eight subcategories. (1) *Perspectives on the topic* reflecting adolescents' opinions on the content of the information, timing, and that the information is adapted to the individuals' needs and developmental stage. Information on contraception, SRH, and recurrence risk is considered essential; however, it should be communicated with sensitivity, delivered in a timely and gradual manner. (2) *Balancing concerns,* expressing adolescents' health-related worries, and strategies for effective communication. Concerns about body appearance (e.g., chest scars), future pregnancy, and recurrence risk contributed to distress for some adolescents, were often difficult to discuss, yet remained important aspects of information provided. Although face-to-face communication was frequently preferred, adolescents also considered group sessions with peers, brochures, and submitting written questions as suitable approaches.
(3) *Confidential setting* highlights the necessity for privacy and the importance of feeling safe within a trustworthy relationship with health care professionals.



Conclusions: The findings indicate that adolescents regard SRH in relation to their heart condition as an important topic. It highlights that trustworthy communication and relational trust are central when adolescents receive information. The Information should be individualized and provided gradually, with careful attention to the developmental stage and need. Additionally, adolescents seek both competence and sensitivity from health care professionals, which fosters confidence and reduces concerns.



O-018 / #31

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

PERCEIVED BARRIERS AND FACILITATORS FOR IMPLEMENTING FAMILY-CENTERED CLINICAL ROUNDS IN PEDIATRIC CARDIOLOGY, A HEALTH CARE PROFESSIONALS SURVEY

Josien Klein, Isabel Olivieira, Saskia Juffermans, Lieke Rozendaal, Hilda Mekelenkamp
Willem-Alexander Children's Hospital, department of pediatrics, Leiden University Medical Center, leiden, Netherlands

Background and Aim: Family-centered care is an important core principle in pediatric cardiology. Family-centered clinical rounds are an important instrument to engage patients and their family caregivers in decision-making of daily care and treatment. Our aim is to gain insight into barriers and facilitators perceived by healthcare professionals regarding the implementation of family-centered clinical rounds in pediatric cardiology.
Methods: A survey based on a literature search, consisting of thirteen questions, including eight closed-ended multiple-choice and five open-ended questions. Closed questions were analyzed using descriptive statistics, and open responses were categorized. The online survey was distributed among the medical team in October 2025.
Results: A total of 55 healthcare professionals completed the survey, including 31 pediatric nurses, 10 trainees, 5 pediatric cardiologists, 7 medical residents, and 2 physician assistants. When asked about their satisfaction with the current clinical rounds, the professionals gave an average score of 7 (range 4-9) , where 1 = not at all satisfied and 10 = very satisfied . The most frequently indicated facilitating factors were 'child and parent participation leads to care that better meets the needs of the child and parent, which results in higher satisfaction with care for both parties' (45/55) and 'by participating in the clinical rounds, caregivers are better informed about the prescribed medication and matters relating to discharge' (39/55), see Table 1. The fact that healthcare professionals are less able to speak freely was the highest scoring barrier (46/55), followed by 'language barriers and cultural differences may be hindering (37/55)**.** Of the healthcare professionals 27 out of 55 prefer family-centered clinical rounds three times a week. In the presence of the pediatric nurse, physician assistant, and pediatric cardiologist, see Table 1. Almost all professionals indicated that it is the nurse could prepare children and caregivers for clinical family-centered rounds
(44/55).



Table 1 Survey results			
	N=42 nurses	N=13 physicians	total
What do you see as facilitating factors for family-centered clinical rounds?			
Child and parent participation leads to care that better meets the needs of the child and parent, which results in higher satisfaction with care for both parties	34	11	45
By participating in the clinical rounds, caregivers are better informed about the prescribed medication and matters relating to discharge	31	8	39
Time savings for nurses and doctors through immediate assessment and treatment	26	8	34
It is clearer for caregivers when to ask their questions and to whom	22	5	27
Children will have a better understand their treatment. As a result, children and parents adhere better to treatment recommendations, positively effecting recovery.	16	2	18
Leads to less pain and distress	4	0	4
Other	5	4	9
What do you see as barriers for family-centered clinical rounds?			
Nurses and doctors are less free to speak openly	35	11	46
Language barriers and cultural differences may be hindering	29	8	37
Less opportunity for education	15	8	23
Other	16	10	26
Which disciplines should be present during the family-centered clinical rounds?			
Pediatric nurse	40	11	51
Physician assistant	35	7	42
Pediatric cardiologist	35	9	44
Resident	23	11	34
Other	7	5	12
How could you prepare the child and parents for family-centered clinical rounds?			
Instruction by the nurse about the role of the parent and child, and what they can expect	34	10	44
During the admission interview, parents receive an information leaflet about family-centered clinical rounds and are asked whether they would like to participate	29	8	37
Other	9	3	12
How many times a week would you like to have family-centered clinical rounds?			
Daily	5	2	7
3x week	23	4	27
1x week	12	3	15

Conclusions: The findings of our survey show that healthcare professionals consider family-centered clinical rounds as an important tool to include the needs of children and family caregivers, confirming what is known from the literature. In addition, there are also



perceived barriers. We started a multidisciplinary collaboration to implement family-centered rounds in the pediatric cardiology department.



O-019 / #480

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

DEVELOPMENT OF MEDICAL DIGITAL TECHNOLOGY TO SUPPORT SELF-RELIANCE–PROMOTING ACTIVITIES FOR PATIENTS INCLUDING CONGENITAL HEART DISEASE

Atsuhito Takeda[1,2], Eriko Kawase[2], Shihoko Sakuma[2], Saki Tsuruoka[2], Hisako Yamazaki[2]
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Background and Aim: Background: Our hospital established the Pediatric Self-Reliance Support Center (Harmonie) in October 2024 and initiated consultation services aimed at supporting self-reliance–promoting activities for patients including congenital heart disease. This study describes the development of a medical digital system and presents a preliminary evaluation of its operational utility. Aims: Harmonie developed and implemented a proprietary cloud-based database (DB) incorporating artificial intelligence (AI) to support consultation activities. This study aimed to assess the operational feasibility and perceived benefits of the system in a real-world setting.
Methods: The database was developed using Claris FileMaker Cloud in collaboration with an external partner through a guided development approach. Core functions included (1) Web-based user registration, (2) PDF conversion of consultation-related records by support staff, and (3) automatic generation of monthly summary reports. Additional AI-assisted functions were subsequently introduced: (4) recognition and digitization of business card information, (5) automated summarization of consultation histories, and (6) generation of draft self-reliance support plans. System usage data and qualitative feedback from support staff were reviewed descriptively.
Results: During the first year of operation, 73 individuals were registered, and 172 consultations were conducted. After implementation of the database and AI-assisted functions, support staff reported improvements in several operational aspects, including smoother registration workflows, enhanced real-time information sharing, reduced administrative burden associated with monthly data aggregation, and more efficient multidisciplinary coordination. The system's customizable structure also allowed iterative modification based on staff needs, facilitating timely documentation such as meeting minutes.
Conclusions: Self-reliance support initiatives require coordination across medical, educational, and administrative sectors, making efficient information management essential. The present findings suggest that cloud-based databases can support data accumulation, sharing, and aggregation in this context. Furthermore, AI-assisted



summarization of consultation records may offer additional support for routine operations. **All data were managed in compliance with institutional data governance policies, and AI-assisted processing was designed to support administrative tasks without replacing professional judgment or clinical decision-making.** However, further studies are needed to evaluate the system's impact on consultation quality and patient-related outcomes.



O-020 / #533

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

LISTENING TO THEIR VOICES: STRENGTHS AND SUPPORT NEEDS OF INDIVIDUALS WITH CONGENITAL HEART DISEASE, DOWN SYNDROME, AND BOTH CONDITIONS

Marcia Van Riper
University of North Carolina at Chapel Hill, Nursing, Chapel Hilll, United States of America

Background and Aim: As individuals with congenital heart disease (CHD), Down syndrome (DS), and both conditions are living longer and more productive lives, it is increasingly important to understand their strengths and support needs from their own perspectives, rather than relying solely on parent or caregiver reports. The purpose of this study was to deepen our understanding of these self-identified strengths and support needs to better inform care, advocacy, and quality-of-life initiatives.
Methods: Semi-structured interviews were conducted with 35 individuals aged 10–46 years who were living with CHD, DS, or both conditions. Prior to the interviews, participants selected 15–20 photographs depicting themselves with their favorite people or engaged in their favorite activities. These images served as prompts to encourage discussion, reflection, and storytelling. Participants chose whether their interview was conducted in person or via Zoom and whether they wished to have a parent or support person present; most elected to participate via Zoom with a parent or support person. Interviews were transcribed verbatim and analyzed using a coding framework informed by the Resiliency Model of Family Stress, Adjustment, and Adaptation.
Results: This presentation will highlight participants' responses to two central questions: (1) *What are your strengths or the things you do well?* and (2) *What are the things you need help with?* Pictures and quotes will be used to illuminate the diverse capabilities, adaptive strategies, and areas of needed support identified by participants, offering essential insights for clinicians, families, and researchers committed to promoting optimal quality of life across the lifespan
Conclusions: A key finding was that, for some participants, this was the first time anyone had asked them directly about their strengths and support needs—underscoring the importance of listening to their voices. When nurses and other clinicians truly listen to the voices of individuals with CHD, DS, and both conditions, they can strengthen partnerships in care, improve quality of care, and foster greater satisfaction for patients, families, and providers.



O-021 / #632

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

EFFECTS OF PREOPERATIVE NUTRITION-BASED INTERVENTIONS ON PRE-, INTRA-, AND POSTOPERATIVE OUTCOMES IN CHILDREN UNDERGOING CARDIAC SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

Maciej Kołodziej[1], Piotr Halicki[2], Agata Stróżyk[1], Radosław Pietrzak[2], Michał Buczyński[3], Andrea Horvath[1]
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Background and Aim: The importance of appropriately managing malnutrition in surgical patients is widely recognized. This systematic review aimed to summarize the evidence on the efficacy and safety of preoperative nutrition-based interventions on pre-, intra-, and postoperative outcomes in children undergoing cardiac surgery.
Methods: We systematically searched CENTRAL, MEDLINE, and EMBASE for interventional and observational studies comparing any nutrition-based preoperative intervention with any comparator in children undergoing cardiac surgery. The main outcome was the length of intensive care unit stay in the postoperative period. For all meta-analyses, the certainty of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluation approach.
Results: Nineteen studies were included (8 RCTs, 1 non-RCT, 10 observational studies). The interventions/exposures varied across studies. In two RCTs, shorter ICU and hospital stay were observed with 2-week (vs 1-week; n = 40) and 1-month preoperative nutrition support (vs no support; n = 80). Evidence from observational studies suggests an association between any preoperative nutrition support and shorter hospital length of stay (meta-analysis of 4 studies: MD = –7.23 days; 95% CI, –14.07 to –0.40; I^2 = 58%; n = 278) and fewer days to achieve full feeds postoperatively (meta-analysis of 3 studies: MD = –3.29; 95% CI, –4.23 to –2.34; n = 138; I^2 = 21%). However, no difference in postoperative ICU stay was found between groups (MD = –3.56 days; 95% CI, –7.22 to 0.11; n = 175). Overall, no significant adverse events were associated with these interventions. The very low certainty of evidence limits these findings.
Conclusions: This systematic review provides very low–certainty evidence suggesting that preoperative nutrition-based interventions may be safe and potentially beneficial in



children undergoing cardiac surgery. The variability across studies highlights a key evidence gap and the need for standardized preoperative nutritional protocols.



O-022 / #750

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

CARE CLOSER TO HOME: A REGIONAL PROJECT REPORT FROM THE UNITED KINGDOM

Susana De Sousa[1], Natali Chung[1], Joe Eurell[1], Nathalie Picaut[1], Lynda Shaughnessy[1], Ilin Hayter[1], Emmanuel Quist-Therson[2], Sankara Narayanan[2], David Taylor[1]
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Background and Aim: We aimed to identify the number of patients from the West Hertfordshire region (United Kingdom) seen at a specialised tertiary centre outpatients department in London that could be offered cardiology review closer to home. The project was initiated following a network visit to West Hertfordshire Teaching Hospitals, where clinicians discussed care provision closer to patients/families' homes as an objective to pursue.
Methods: We have conducted a retrospective study focusing on outpatients department attendance at Royal Brompton and Harefield Hospitals, part of Guy's and St Thomas' NHS Foundation Trust. We have included all patients 16 years of age and under, with complex and/or simple structural congenital heart disease, with a Hertfordshire post code address, and a minimum of one outpatient episode recorded. Patients above 16 years old and those being followed up by inherited cardiac conditions, electrophysiology or aortopathy specialities were excluded from the study.
Results: Between November 2022 and October 2024, a total of 462 patients meeting inclusion criteria were identified via electronic medical record database search. All 462 patients were reviewed in terms of diagnosis using the International Classification of Diseases, Tenth Revision (ICD-10) and categorised as simple or complex. 289 patients were excluded due to complex diagnosis or prior surgical intervention in simple diagnosis. The remaining 173 patients were categorised as structural or non-structural congenital heart disease, leading to a further 95 exclusions due to non-structural congenital heart disease and 35 exclusions due to patients having been discharged. The remaining 43 patients were categorised with simple/structured disease, making them eligible to be offered cardiac review at West Hertfordshire. There is ongoing clinician review of these patients to confirm eligibility.
Conclusions: Data is key in guiding healthcare teams to improve care provision and patient experience. The value created by providing care closer to home can certainly be measured by income brought to hospitals, but it needs to start including the value created



to patients and families. We are awaiting eligibility confirmation to proceed with the project and measure further institutional and patient outcomes.



O-023 / #1204

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

WHEN SECONDS MATTER: PAEDIATRIC BASIC LIFE SUPPORT TRAINING FOR FAMILIES OF CHILDREN WITH HEART DISEASE

Helena Roos[1,2], Sepideh Olausson[2,3], Anders Nygren[4], Ewa-Lena Bratt[2,4,5]
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Background and Aim: Heart disease is among the most common comorbidities in children who suffer out-of-hospital cardiac arrest. Paediatric basic life support (PBLS) training is strongly recommended for families of children at elevated risk, as the initial links in the chain of survival rely heavily on bystanders. Timely and effective PBLS significantly increases the chance of survival. This study aimed to explore the perspectives of physicians and nurses on PBLS training and to identify perceived barriers and facilitators to implementing such training for families. The overarching goal was to describe PBLS training practices at paediatric cardiology clinics across Sweden.
Methods: An explorative descriptive design was used, based on semi-structured interviews with paediatricians and registered nurses working in paediatric cardiology clinics in Sweden. Inclusion criteria were a minimum of five years of experience in the field. The interviews focused on the participants' experiences and practices regarding PBLS training for families of children with heart disease.
Results: Healthcare professionals expressed concern that introducing PBLS training might heighten parental anxiety, leading to reluctance in raising the topic. Consequently, PBLS training was infrequently discussed or offered. Despite this, participants were generally positive towards the idea of implementing PBLS training routinely. However, there was uncertainty regarding which families within the paediatric cardiology population should be prioritised. The absence of structured routines and national guidelines was experienced as both frustrating and ethically burdensome. Lack of formal policy emerged as the primary barrier to implementation. Participants emphasised that the PBLS content itself was straightforward and that families should be given sufficient time and opportunities to



practise until they felt confident. In some cases, families returned for additional sessions, either to reinforce their skills or after taking time to process emotionally challenging aspects of the training.

Conclusions: This study reveals inconsistencies in PBLS training practices for families of children with heart disease across Sweden. There is a clear need for consensus to which families must be prioritized for PBLS training and for national guidelines to support healthcare professionals in identifying which families should be offered PBLS training to ensure equitable and systematic implementation.



O-025 / #301

NURSING AND ALLIED HEALTH PROFESSIONALS ABSTRACT SESSION
14-05-2026 14:30 - 16:00

CHILDREN AND YOUTH WITH HEART DISEASE IN FOCUS – AN INTERVENTION TO INCREASE PERSON-CENTEREDNESS IN HIGHLY SPECIALIZED CARE

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Background and Aim: A person-centered approach is essential in health care, including highly specialized care such as pediatric cardiac care. Convention on the rights of the child emphasizes the right for children to participate in their own care and in decisions related to care. Previous research indicates that communication between children, parents, and caregivers can improve particularly prior to heart surgery. One way to address this is through person-centered care (PCC), which integrates both the child's own perspective and a child-focused approach. **Aim** is to enhance PCC for children undergoing evaluation for heart surgery or catheter intervention, and their parents, by developing and evaluating an intervention involving a structured preoperative care pathway that includes surgical center and referring hospitals.
Methods: The process is guided by the Consolidated Framework for Implementation Research (CFIR), to optimize the sucess of the implementation of interventions in clinical settings. Inclusion criteria are children aged 0-18 years, their parents and healthcare staff both at the surgical center and the referring hospitals. The pathway covers the period from the presentation of the preoperative examination at a cardiac conference until the date for surgery or catheter intervention is decided. During this pathway, decisions and surgery dates will be communicated to the child, parents, and local hospitals. We want to develop and evaluate a new model for care. The development is based on co-creation design including workshops with stakeholders (children, parents, and healthcare staff). The model will be evaluated through participants experience of participation before and after implementation of the intervention. The pre-intervention data collection is ongoing until March 2026 and the workshops are planned for spring 2026. Participation is measured by the Visual Care Measure (VCM) instrument, tailored to capture PCC in both a child and an adult version. Additional study specific questions cover various aspects of care satisfaction.
Results: The primary outcome measure is improved person-centeredness among the



parents and children using the VCM. A 20% improvement is hypothesized.

Conclusions: The result will form a structured care pathway, grounded in a person-centered approach, which will promote participation, sense of security and satisfaction regarding information and communication for children and parents**.**



O-026 / #303

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

TRICUSPID SEPTAL OFFSETTING IN HEALTHY CHILDREN: AGE-SPECIFIC REFERENCE VALUES TO REFINE EBSTEIN ANOMALY DIAGNOSIS

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Background and Aim: Ebstein's anomaly (EA) is a rare congenital malformation of the tricuspid valve. Transthoracic echocardiography (TTE) is the diagnostic standard, and diagnosis traditionally relies on apical displacement of the septal tricuspid leaflet >8mm/m^2 body surface area (BSA). This threshold derives from a predominantly adult cohort and may not be valid in newborns and young children due to considerable BSA difference. The study aims to evaluate the current diagnostic threshold and to establish age-specific offsetting reference values and cut-offs in healthy children to improve diagnostic accuracy for EA.
Methods: The Copenhagen Baby Heart Study (CBHS) is a prospective, population-based cohort study of >25,000 newborns, investigating cardiac structure and function. We included a random sample of 1000 healthy participants with TTE performed neonatally and at 4-6 years of age. Offsetting was defined as the distance from a line connecting the two mitral valve hinge points to the septal tricuspid leaflet hinge point. For each participant, septal tricuspid leaflet offsetting was measured, indexed to BSA, and z-scores were generated. Right atrial and ventricular dimensions were also obtained. BSA-indexed z-scores (=+2, +3, +4 and +5) for offsetting are presented.
Results: Among the 1000 participants, 50.9 % were female; median age was 12 days neonatally and 5.2 years at follow-up. Mean BSA-indexed offsetting was 11.1 mm/m^2 (range 0.7-25.1) neonatally and 5.0 mm/m^2 (0.8-11.0) at follow-up. Age-specific thresholds for z-scores +2, +3, +4, and +5 were 17.8, 21.2, 24.5, 27.9 mm/m^2 neonatally and 8.1, 9.7, 11.3,



12.9 mm/m^2 at 4-6 years of age. Neither sex distribution nor any of the right-sided echocardiographic measurements differed significantly between children with BSA-indexed offsetting Z> +2 and those with Z≤ +2 in either age group. In the neonatal group, 82.4% of healthy infants exceeded the diagnostic criterion of 8mm/m^2, whereas in pre-school children it was 3.8%.

Conclusions: The historical 8 mm/m^2 criterion is not appropriate for neonates and pre-school children, as this would label >80% of healthy neonates and 3.8% of healthy young children as abnormal. In diagnosing Ebstein's anomaly, age-specific Z-score cut-offs provide a more appropriate reference to supplement assessments of tricuspid valve morphology, RV morphology, and ECG findings.



O-027 / #1367

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

BEYOND VOLUMES: THE ROLE OF 4D FLOW MRI IN OPTIMIZING PULMONARY VALVE REPLACEMENT TIMING IN REPAIRED TETRALOGY OF FALLOT

Enrico Piccinelli[1], Karol Calò[2], Valentina Mazzi[2], Alessandra Marasi[1], Mara Pilati[1], Micol Rebonato[1], Lisa Bianco[1], Diego Gallo[2], Marco Deriu[2], Umberto Morbiducci[2], Gianfranco Butera[1], Aurelio Secinaro[1]
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Background and Aim: Advances in diagnosis and surgical techniques have allowed most patients with Tetralogy of Fallot (ToF) to reach adulthood; however, long-term follow-up is required. Cardiovascular magnetic resonance (MRI) is the gold standard for assessing cardiac volumes and function and 4D flow MRI offers a comprehensive characterization of complex blood flow patterns. This study aims to evaluate 4D flow MRI–derived hemodynamic quantities in patients with repaired ToF undergoing routine assessment for pulmonary valve replacement (PVR).
Methods: This single-center retrospective study included patients with ToF repaired with a transannular patch who underwent routine cardiovascular MRI to evaluate indication for PVR. 4D flow MRI acquisitions were performed for all patients. The 3D anatomy of the right ventricle was reconstructed for each phase of the cardiac cycle. In addition to standard MRI measures of ventricular size and function, advanced hemodynamic quantities, including blood velocity, vorticity, kinetic energy, and helical flow-derived parameters, were computed from 4D flow MRI data and evaluated in patients with and without an indication for PVR.
Results: Thirty-three patients were included (age 22.67±8.80 years, weight 68.21±19.65 Kg). Eight patients (24%) met current MRI criteria for PVR. Both patients with and without indication for PVR exhibited predominantly right-handed helical flow patterns, with the former characterized by a significantly lower rotational imbalance of helical flow patterns in the right ventricle outflow tract (RVOT) over the diastolic phase (median values 0.035 vs 0.170;$p<0.01$). A moderate correlation emerged between pulmonary regurgitant fraction and both mean velocity ($R=0.46;p<0.01$) and kinetic energy ($R=0.48;p<0.01$) over the diastolic phase. Helical flow intensity was positively correlated with RV ejection fraction ($R=0.44;p<0.05$). In univariate logistic regression, balance of counter-rotating helical flow patterns in the RVOT over the entire cardiac cycle was a mild predictor of PVR indication



(adjusted R^2=0.23,p<0.01). In bivariate analyses, combining mean kinetic energy with helical flow patterns rotational balance improved PVR prediction (adjusted R^2=0.35, p<0.001).

Conclusions: 4D flow MRI provides additional insights into complex hemodynamics in patients with repaired ToF. Imbalance in helical flow patterns direction of rotation and kinetic energy emerged as relevant hemodynamic markers associated with clinical indication for PVR, supporting the potential of 4D flow parameters to guide intervention timing.



O-028 / #49

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

LEFT ATRAIL FUNCTION IN PAEDIATRIC CARDIOMYOPATHIES

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Background and Aim: The association between left ventricular (LV) systolic dysfunction and adverse outcomes in paediatric cardiomyopathies (CM) has been well-established, but little is known about the prognostic value of the diastolic function in this population. This study aims to evaluate the association between left atrial (LA) function, assessed through 2D-speckle tracking echocardiography (2D-STE), and adverse outcomes in paediatric CM patients.
Methods: A retrospective study of 138 paediatric CM patients (dilated, hypertrophic, and restrictive CMs) and 45 controls from three Institutions was conducted. Echocardiographic parameters, including LA reservoir strain (LAS), were measured from each patient's oldest complete echocardiogram at each Institution. The primary composite endpoint was cardiovascular death or aborted death, the need for a ventricular assist device (VAD), or cardiac transplantation. Cox regression models, receiver operating characteristic (ROC) curves, and Kaplan-Meier survival analysis were used to assess the association of LAS and other echocardiographic markers with clinical events.
Results: During a median follow-up of 78.8 months, 25 patients experienced the composite endpoint. Lower LAS ($p<0.001$), impaired global longitudinal strain (GLS) ($p=0.003$), reduced LV ejection fraction (LVEF) ($p=0.003$), increased LA volume index (LAVi) ($p=0.027$) and E/eE' ($p=0.024$) were significantly associated with adverse outcomes. Multivariable Cox analysis demonstrated that LAS (HR 0.90, [0.84 – 0.96], $p=0.001$) is independently associated with the combined endpoint in model A adjusted for E/A and E/e', in model B (HR 0.94, [0.89 – 0.99], $p=0.018$) adjusted for LAVi and LVEF, in model C (HR 0.91, [0.87 – 0.95], $p<0.001$) adjusted for GLS and LVEF. LAS performed better than LAVi in determining the association with outcomes, with an Area Under the Curve (AUC) of 0.739 ($p < 0.001$) and a cutoff of 15.3% (sensitivity 0.58; specificity 0.86).



Conclusions: LAS is strongly and independently associated with adverse outcomes in paediatric CM patients, providing additional information beyond traditional echocardiographic parameters. Incorporating LAS into routine evaluations may improve risk stratification and guide early interventions in paediatric CM.



O-029 / #540

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

FROM METABOLISM TO ANATOMY: INTEGRATING 18F-FDG PET/CT AND CT–DERIVED VIRTUAL REALITY TO DIAGNOSE INFECTIVE ENDOCARDITIS AND GUIDE MANAGEMENT IN CHILDREN WITH COMPLEX CONGENITAL HEART DISEASE

Judyta Szeliga[1], Ewa Mroczek[1], Izabela Szymońska[2], Jacek Kołcz[3], Tomasz Mroczek[3], Aleksandra Morka[1]
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Background and Aim: Diagnosing infective endocarditis (IE) in children with congenital heart disease(CHD) remains highly challenging. Altered anatomy, previous surgical repairs, prosthetic materials (homografts, Contegra conduits, stents), and inconclusive echocardiographic findings often limit diagnostic confidence. While 18F-fluorodeoxyglucose positron emission tomography/computed tomography(18F-FDG PET/CT) is well established in adults with CHD and prosthetic devices, paediatric guidelines regarding indications, preparation, and interpretation are lacking. Physiological variability in glucose uptake and a paucity of literature—mostly case reports and small series—necessitate careful adaptation of adult protocols. Integrating PET/CT with high-resolution CT reconstructions in virtual reality (VR) may improve anatomical correlation, spatial assessment, and decision-making.
Methods: Two paediatric CHD patients with suspected IE underwent 18F-FDG PET/CT. Preparation included a high-fat, low-carbohydrate diet, glycaemic control, physical rest, and heparin. Imaging was performed ≥8 weeks postoperatively, analysing attenuation-corrected(AC) and non-corrected(NAC) images, SUVmax,SUVratio, and focal versus diffuse uptake patterns. CT datasets were rendered in VR to assess graft anatomy, aneurysmal changes, postoperative remodelling, and to correlate metabolic hotspots with structural abnormalities.
Results: Patient 1: A 13-year-old girl with Williams syndrome, status post two surgeries (Gore-Tex patch, aortic homograft). During episodes of IE (Staphylococcus aureus, Acinetobacter baumannii), large brachiocephalic aneurysms and recurrent aortic coarctation developed. PET/CT showed intense focal uptake (SUVmax 18.8;SUVratio >4). VR–CT fusion confirmed that the metabolic focus corresponded precisely to aneurysmal instability. Follow-up PET/CT post-antibiotic therapy demonstrated reduced uptake



(SUVmax 4.2; SUVratio ≈1), enabling safe timing and extent of complex surgical repair. Patient 2: An 8-year-old girl with pulmonary atresia, absent pulmonary trunk, d-malposition of great arteries, and multiple VSDs, post Rastelli repair and transcatheter VSD closure. One month after her second RV–PA conduit replacement IE was suspected(Streptococcus mitis). PET/CT >3 months post-op revealed diffuse, low-grade uptake (SUVmax 3.8;SUVratio <1). VR demonstrated normal postoperative remodelling with graft thickening but no deformation or focal inflammation. With clinical improvement, negative cultures, and resolution of a dental source, reoperation was safely deferred.

Conclusions: 18F-FDG PET/CT may significantly support IE diagnosis and management in paediatric CHD, especially when anatomy is complex or echocardiography is inconclusive. Multimodal integration of PET/CT with CT-based VR enhances anatomical interpretation, clarifies metabolic findings, and informs therapeutic decision-making. Paediatric-specific guidelines are urgently needed.



O-030 / #1351

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

CMR T1 MAPPING REVEALS DISTINCT CORONARY TERRITORY SIGNATURES

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Background and Aim: Cardiac magnetic resonance (CMR) parametric mapping has emerged as a key tool in diagnosing heart transplant (HTx) rejection. Despite the common assumption of uniform T1 thresholds across myocardial segments, prior studies suggest regional variability. The influence of coronary territories, however, remains insufficiently characterized. We aimed to assess T1 variation across coronary territories in pediatric and adult healthy controls, as well as in rejection-free HTx patients.
Methods: This retrospective study included 105 healthy controls (51 children, 54 adults) and 45 rejection-free HTx patients (13 children, 32 adults). Rejection-free status was confirmed using endomyocardial biopsy, clinical assessment, and donor-derived cell-free DNA (dd-cfDNA). Myocardial segmentation followed the standard 16-segment AHA model with coronary territory classification applied accordingly. Segments with artifacts were excluded.
Results: The RCA territory consistently demonstrated the highest T1 values across all groups. In pediatric subjects, LAD exhibited the second-highest values and LCX the lowest, with statistically significant differences only among healthy controls. In adults, no significant LAD–LCX differences were observed in either healthy or HTx groups. (Figure 1.)

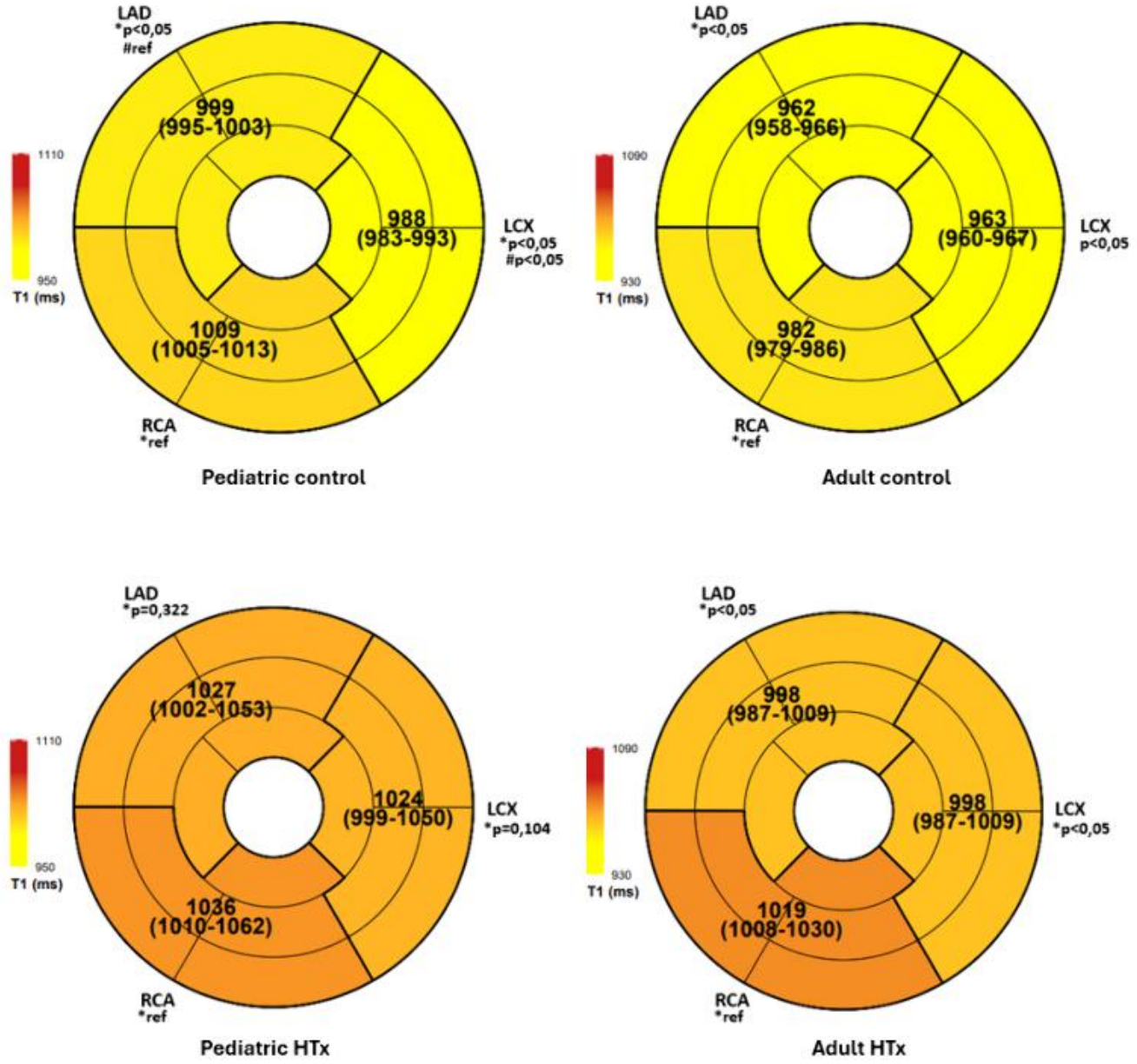


*Figure 1. Mean T1 systole mapping values (95% CI) of coronary territories. RCA T1-mapping values were the highest across all study groups (*p < 0.05) except pediatric HTx group (*p>0,05). The difference between LAD and LCX territories was observed only in healthy children (#p < 0.05).*

Conclusions: CMR T1 mapping demonstrates clear, reproducible coronary-territory patterns, with robust RCA dominance across pediatric and adult hearts—healthy and transplanted. A mild LAD–LCX difference is seen only in healthy children. These physiological variations do not compromise diagnostic accuracy; rather, they reveal



intriguing microstructural features that may offer new insights for refining myocardial tissue characterization.



O-031 / #214

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

"SYSTEMIC ARTERIAL STIFFENING AND ITS ASSOCIATION WITH LEFT VENTRICULAR ADVERSE REMODELING IN CHILDREN WITH REPAIRED AORTIC COARCTATION"?

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Background and Aim: Coarctation of the aorta (CoA) is associated with long-term cardiovascular complications, including vascular dysfunction, arterial stiffness, and adverse remodeling of the left ventricle (LV) and left atrium (LA). While well studied in adults, pediatric data are limited. We hypothesized that children after successful CoA repair would have increased arterial afterload compared with controls, and that Doppler-derived indices of arterial load would correlate with LV remodeling.
Methods: This is a cross-sectional study of children after COA repair and age- and sex-matched heatlhy controls. Clinical and echocardiographic parameters were collected retrospectively. Doppler-derived indices of arterial load were used for this study were effective arterial elastance index (Eal) and total arterial compliance index (TACI).
Results: We identified a convenience sample of 100 children with history of COA repair along with 100 age- and sex-matched healthy volunteers who met the inclusion criteria. Although only 7% had a diagnosis of systemic hypertension, children in the COA group had higher pulse pressure (55.5 ± 6.5 vs 46 ± 4.5 mmHg, p<0.0001), Eal (3.73 ± 0.15 vs 2.67 ± 0.62 mmHg m2 ml-1, p<0.0001), and lower TACI (0.52 ± 0.15 vs 0.82 ± 0.22 ml mmHg-1 m-2, p<0.0001). Patients also showed early signs of LV and LA remodeling with higher LV mass z-score (1.76 ± 1.72 vs 0.55 ± 0.36, p < 0.0001) and LA volume index (26.04 ± 8.72 vs 20.01 ± 6.29 ml m-2, p <0.0001) compared to healthy controls. In the multivariate linear regressions, TACI and stent implantation correlated with LV mass z-scores (b ± SE -0.408 ± 0.188, p = 0.033 and b ± SE 2.064 ± 0.794, p = 0.011). LV mass z-score and LA volume index were both associated with peak tricuspid regurgitation velocity (b ± SE 0.061 ± 0.275, p = 0.030, and b ± SE 0.011 ± 0.004, p = 0.012).
Conclusions: Children after successful COA repair exhibit increased arterial stiffness alongside associated with adverse LV remodeling and diastolic dysfunction. Doppler-derived indices of arterial load, easily obtained during routine echocardiography, may improve risk stratificationcould help to identify patients at increased risk for adverse remodeling



O-032 / #280

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

IMPACT OF DEVICE TYPE ON ATRIAL DYNAMICS AFTER TRANSCATHETER ASD CLOSURE IN CHILDREN: A 3D SPECKLE-TRACKING STUDY

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Background and Aim: Although transcatheter closure is the standard treatment for secundum atrial septal defect (ASD), data regarding three-dimensional (3D) atrial mechanics—particularly of the right and left atrium (RA/LA)—remain scarce in the pediatric population. We aimed to evaluate the changes in bi-atrial function following device closure and to investigate the impact of device type on atrial mechanics.
Methods: We retrospectively analyzed 49 patients (<16 years) who underwent transcatheter ASD closure. 3D speckle-tracking echocardiography (STE) was performed at baseline, 1 month, and 3 months post-procedure to quantify longitudinal and circumferential strain for reservoir (Sr/Sr_c), conduit (Scd/Scd_c), and contraction (Sct/Sct_c) phases. Functional changes were compared between patients receiving wire-framed (WF) devices and those receiving wire-meshed (WM) devices.
Results: At 1 month post-procedure, significant reductions were observed in LA circumferential reservoir (Sr_c) and contraction (Sct_c) strains compared with baseline (35.6 ± 12.9 vs. 26.2 ± 11.8, p=0.0005, −16.2 ± 10.4 vs. −11.7 ± 7.4, p=0.002, respectively). RA mechanics also declined, notably in longitudinal reservoir (Sr) and circumferential reservoir (Sr_c) and contraction (Sct_c) strains (35.3 ± 12.8 vs. 31.3 ± 11.6, p=0.03, 24.8 ± 7.4 vs. 17.3 ± 15.1, p=0.01, −12.7 ± 7.5 vs. −7.1 ± 8.0, p=0.009, respectively). These parameters did not show significant recovery at 3 months. In the device-type analysis, while no differences were noted at 1 month, the WF group exhibited significantly better preservation of LA function at 3 months compared with the WM group, specifically in LA Sr (38.4 ± 11.8 vs. 25.6 ± 13.6, p=0.013), LA Sct (−13.7 ± 6.2 vs. −7.3 ± 7.5, p=0.019), and LA Sct_c (−15.2 ± 5.5 vs. −9.3 ± 7.4, p=0.023).
Conclusions: Transcatheter ASD closure is associated with a transient reduction in bi-atrial strain parameters in the early postoperative period, with circumferential mechanics being notably affected. Importantly, wire-meshed devices may offer better preservation and recovery of left atrial contraction function compared with wire-framed devices. 3D STE



serves as a valuable modality for monitoring these mechanical changes and optimizing device selection strategies.



O-033 / #469

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

UNMASKING THE SILENT BURDEN: SUBCLINICAL MYOCARDIAL AND VASCULAR IMPAIRMENT IN CHILDHOOD-ONSET TAKAYASU ARTERITIS VIA MULTIMODAL IMAGING

Berkcan Hasan Dilaver[1], Hayrettin Hakan Aykan[2], Umut Berk Mercan[2], Hülya Ercan Emreol[3], Yelda Bilginer[3], Tevfik Karagöz[2], Seza Özen[3]
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Background and Aim: Childhood-onset Takayasu arteritis (c-TA) is associated with significant cardiovascular morbidity. We aimed to evaluate subclinical myocardial dysfunction using speckle-tracking echocardiography and to investigate the utility of oscillometric arterial stiffness analysis as a non-invasive diagnostic screening tool by comparing patients with age-matched healthy controls.
Methods: This single-center, retrospective case-control study included 25 patients diagnosed with c-TA before age 18 according to the EULAR/PRINTO/PReS Ankara 2008 criteria. Vascular involvement was classified based on the Numano classification. In addition to standard echocardiography, Left Ventricular Global Longitudinal Strain (LV-GLS) was assessed to detect silent myocardial impairment. Arterial stiffness was measured using an oscillometric pulse wave analysis device to calculate Pulse Wave Velocity (PWV) and Augmentation Index (AIx). To account for somatic growth, all parameters were standardized using age-and sex-specific Z-scores.
Results: Mean age at symptom onset was 11.8 ± 3.9 years. While conventional Left Ventricular Ejection Fraction (LVEF) was preserved (mean 69.9%), LV-GLS was significantly impaired (mean -16.0%; Z-score: +2.1), revealing subclinical dysfunction. Vascular screening demonstrated distinct arterial stiffening in patients (mean PWV Z-score: +1.21) compared to healthy controls (-0.13), confirming the method's utility in differentiating pathological remodeling. Hypertension, aortic insufficiency, and heart failure were identified as key prognostic factors. A mortality rate of 18.2% was observed; notably, this included a 5-year-old patient with severe heart failure, while half of the deaths occurred within 5 years of transitioning to adult care, emphasizing the critical risk of silent cardiac involvement.
Conclusions: c-TA imposes a severe hemodynamic burden, leading to concentric hypertrophy and subclinical dysfunction even when LVEF is normal. While strain imaging tracks silent myocardial progression, oscillometric analysis serves as an effective non-invasive screening tool for vascular remodeling. The high mortality rate, particularly during



the transition to adult care, necessitates a multidisciplinary approach focused on aggressive cardiovascular preservation beyond inflammation control.



O-034 / #873

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

VOLUMETRIC AND FUNCTIONAL RIGHT VENTRICULAR ASSESSMENT BY PRINCIPAL STRAIN ANALYSIS IN CHILDREN WITH REPAIRED TETRALOGY OF FALLOT

Ryusuke Numata[1,2], Matsubara Daisuke[2,3], Renzo Carderon-Anyosa[2], Hunter Kaufmann[2], David Biko[2], Gianni Pedrizzetti[4], Anirbenn Banerjee[2]
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Background and Aim: Background: Principal strain (PS)-analysis using three-dimensional speckle-tracking echocardiography enables us to simultaneously measure 3D-ventricular volumes and strains. PS quantifies 3D-deformation by defining not only amplitude but also direction of principal myocardial contraction (PS-angle). **Objectives:** 1) To validate volumetric and functional parameters using PS-analysis in volume-overloaded RV of repaired-tetralogy of Fallot (rTOF) versus cardiac magnetic resonance (CMR), and 2) to describe PS-analysis indices in patients undergoing pulmonary valve replacement (PVR).
Methods: Methods: Sixty-four pediatric patients with rTOF (12.4 ± 5.2 years) and 58 age-matched healthy children (12.8 ± 3.7 years) were prospectively included. We calculated PS-magnitude (global PS: GPS) and -angle, indexed RV end-diastolic and end-systolic volumes (EDVi and ESVi), RV ejection fraction (EF), and conventional strains. Among rTOF patients, 32 CMR were available. First, we validated volumetric-parameters obtained by PS-analysis against CMR. Second, we compared these indices between rTOF patients and controls. Lastly, we evaluated the discriminative value of PS-analysis in PVR.
Results: Results: PS-analysis and CMR measurements showed good correlations (EDVi, $r=0.80$; ESVi, $r=0.74$; and EF, $r=0.70$, $p<0.001$). GPS showed the highest correlation with 3D-EF ($r=-0.84$, $p<0.001$). rTOF patients exhibited nearly doubled RV-volume and significantly decreased 3D-EF and conventional strains. PS-magnitude also decreased in rTOF patients, with altered PS-angles in RV-free wall. Volume measurements of RV showed the highest predictive value for discriminating PVR(+) by ROC analysis, followed by PS-functional parameters.
Conclusions: Conclusions: PS-analysis is a reliable and reproducible method for both volumetric and functional analysis of volume-overloaded RV in rTOF, which can be of incremental value for defining the indications for PVR.



O-035 / #1356

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

4D FLOW MRI-DERIVED HEMODYNAMICS IN PATIENTS WITH REPAIRED TETRALOGY OF FALLOT

Joost Van Schuppen[1], Jane Splinter[2], Eric Schrauben[1], Irene Kuipers[2], Jaap Oosterlaan[3], R.N. Planken[4], Pim Van Ooij[1], Nico Blom[2], Annelies Van Der Hulst[2]
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Background and Aim: Long term clinical management of repaired Tetralogy of Fallot (rToF) patients is challenging since optimal timing and indication for pulmonary valve replacement (PVR) remains subject of ongoing debate. Whole heart 4D Flow MRI (4Dflow) enables analyses of advanced hemodynamic parameters reflecting blood flow (in)efficiency, turbulence, and intracardiac energy dissipation, which may provide new insights into long-term right ventricular (RV) dilatation and RV performance. Studies employing 4Dflow showed that rToF patients exhibit abnormal intracardiac and vascular flow patterns, including kinetic energy (KE), increased viscous energy loss (VEL) and pathological vortex formation. This study evaluates the nature and extent of altered hemodynamics in rToF patients.
Methods: rToF patients receiving standardized follow-up care were eligible for inclusion. Patients receiving cardiac MRI, including a 4Dflow acquisition as part of standardized care for indications not related to RV and pulmonary disease, e.g. repaired VSD patients, were included as controls. Using 3DSlicer, segmentations of the RV outflow tract (RVOT) and main pulmonary artery (MPA)(RVOT-MPA), as well as segmentations comprising the RVOT, MPA and proximal left and right pulmonary branches (RVOT-MPA-LPA-RPA**)** were created and postprocessed using in-house developed software. Measures included KE (Total KE / cardiac cycle, µJ); VEL (total VEL / cardiac cycle, mW); vorticity (total / cardiac cycle, rad) and peak velocity (PV, cm/s). Absolute values of 4Dflow parameters, as well as the values normalized to RV stroke volume (RVSV), were compared between rToF and controls using Mann-Whitney-U-tests.
Results: Data from eleven rToF patients (median age [IQR] 14.3 [11.4; 14.2] years) and eight controls (median age [IQR] 12.7 [10.9-15.0]) years) were compared (Table 1). Figure 1

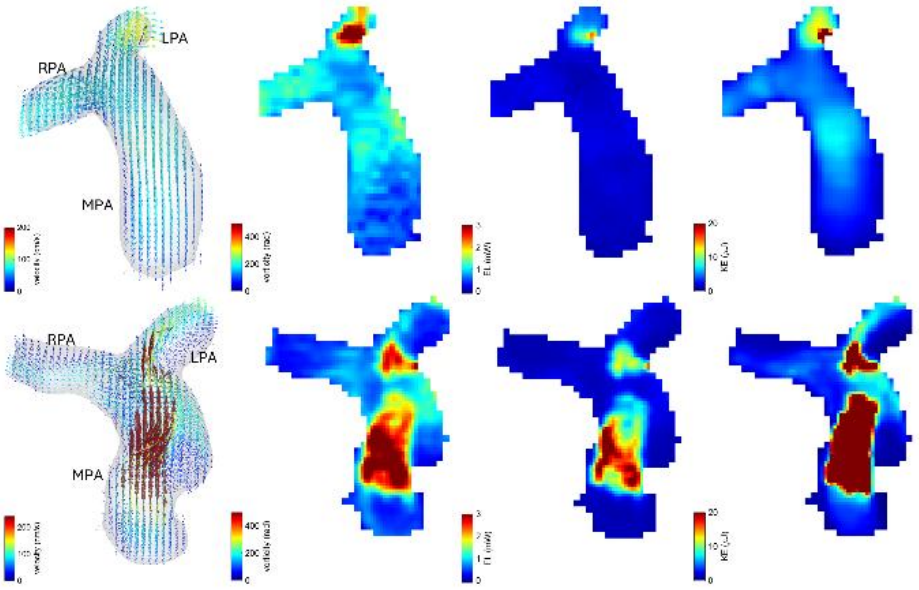


shows an example of velocity, vorticity, VEL and KE in one patient and one control subject. rToF patients showed significantly higher PV, KE, VEL, and vorticity in both the RVOT–MPA and full trajectory. These differences were evident in absolute values as well as when normalized to RVSV.

Table 1.	rToF patients	Controls	p-value (2-tailed)
Number of patients	11	8	
%male	81.8	62.5	
Age at MRI (years old)	14.3 [11.4; 14.2]	12.7 [10.9; 15.0]	.778
RVSV (ml)	80.0 [63.4; 88.9]	58.5 [55.7; 71.3]	.177
LVEF (%)	56.0 [53.3; 59.9]	60.5 [55.5; 65.7]	.152
RVEF (%)	51.0 [47.5; 53.1]	53.0 [48.6; 58.7]	.310
Aortic regurgitation (ml)	1.5 [-0,3; 5.8]	1 [-3.5; 11.0]	.505
Pulmonary regurgitation (ml)	11.0 [8.1; 23.7]	0 [-0.14; 0.64]	<.001
Primary cardiac diagnoses	9 surgically corrected ToF, DORV (TAP n=8, infra-annular patch n=1,), 2 surgically corrected PA-VSD (infundibulectomy n=1, Contegra Conduit 16 mm n=1)	1 structurally normal heart, surgically corrected cor triatriatum (n=1), aortic stenosis (n=1), aortic coarctation (n=1), ASD and VSD (n=1), ASD (n=1), VSD (n=2).	
RVOT-MPA			
PV	84.9 [70.2; 98.7]	53.5 [47.4; 61.6]	<.001
KE (µJ)	3659.8 [2306.3; 5251.0]	1088.9 [929.9; 1447.6]	<.001
VEL (mW)	62.6 [29.1; 149.5]	10.1 [7.3; 16.1]	<.001
vorticity (rad)	81697.8 [51592.0; 106923.5]	37077.6 [25139.8; 54397.9]	.026
RVOT-MPA-LPA-RPA			
PV (cm/s)	82.5 [70.7; 98.9]	55.9 [50.2; 64.3]	.002
KE (µJ)	5270.6 [3283.0; 6964.5]	1462.5 [1224.7; 1967.2]	<.001
VEL (mW)	87.2 [55.3; 184.6]	12.9 [9.0; 21.2]	<.001
Vorticity (rad)	108067.3 [71644.8; 138580.2]	46890.2 [30492.3; 65722.1]	.009
RVOT-MPA normalized to RVSV			
PV/SV	1.1 [0.9; 1.5]	0.9 [0.7; 1.1]	.109
KE/SV	40.1 [32.3; 64.7]	17.9 [15.5; 21.9]	<.001
VEL/SV	0.7 [0.4; 1.8]	0.1 [0.1; 0.3]	<.001
VRT/SV	870.9 [717.9; 1292.9]	591.4 [412.4; 827.0]	.020
RVOT-MPA-LPA-RPA normalized to RVSV			
PV/SV	1.1 [0.9; 1.5]	0.9 [0.7; 1.1]	.238
KE/SV	64.0 [46.6; 81.7]	22.8 [20.5; 29.5]	<.001
VEL/SV	1.1 [0.8; 2.2]	0.2 [0.1; 0.3]	<.001
VRT/SV	1308.8 [972.4; 1730.5]	701.6 [498.3; 1001.3]	.012

Conclusions: Our study demonstrates significantly higher PV, KE, VEL, and vorticity in rToF patients compared with those without prior MPA surgery. These results indicate energetically unfavorable hemodynamics in the RVOT-MPA of rToF patients, potentially

impacting RV performance and clinical outcome.





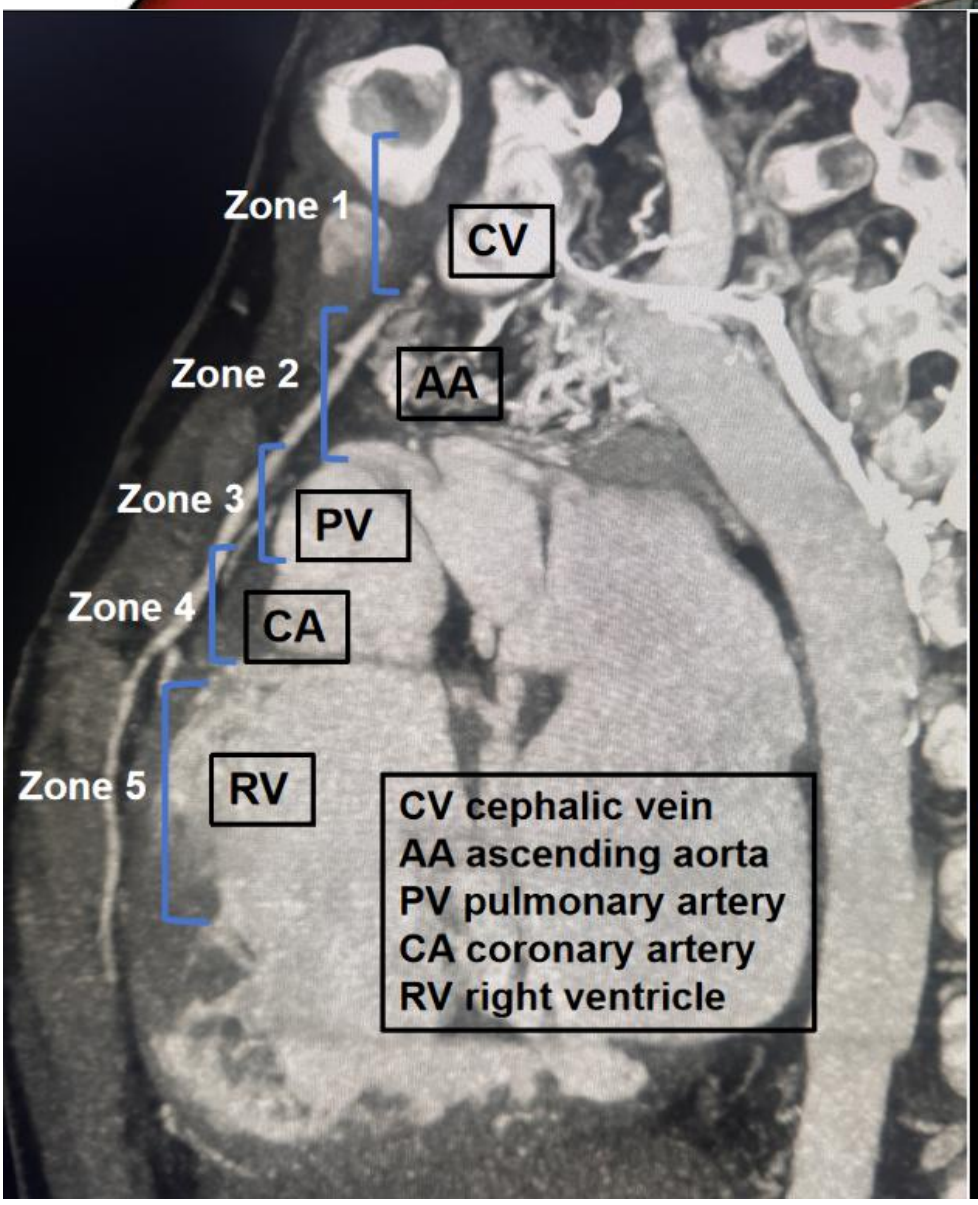
O-036 / #1385

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

PREDICTING PERIOPERATIVE ADVERSE OUTCOMES IN CONGENITAL HEART DISEASE PATIENTS UNDERGOING RE-THORACOTOMY BASED ON CT-DETECTED ADHESION EXTENT AND RISK SCORING

Xiangnan Li[1], Yang Liu[2], Zhihui Hou[1], Bin Lu[1], Shuo Dong[2]
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Background and Aim: Cardiac re-thoracotomy surgery increases the risk of adverse events during the procedure and perioperative period due to adhesions forming between the heart and the pericardium and pleura. However, there is currently a lack of precise non-invasive methods for preoperative adhesion assessment. The aim of this study is to investigate whether a scoring system and model for assessing adhesions based on routine preoperative CT scans of congenital heart disease can predict perioperative adverse events.
Methods: We retrospectively collected data from patients undergoing cardiac re-thoracotomy at Fuwai Hospital from January 2015 to December 2024. CT-based assessment includes adhesions extent (measured in cm), and severity scoring of cardiac adhesions. adverse cardiac events were defined as major intraoperative hemorrhage (red blood cell transfusion exceeding 10 mL/kg) and all-cause mortality within 30 days postoperatively. Secondary adverse events included postoperative low cardiac output syndrome, cardiopulmonary bypass duration, ventilator usage time, intensive care unit length of stay, and hospitalization costs. Using multiple linear regression and logistic regression to analyze the association between CT adhesion extent and scores with adverse events.



CT-Based Adhesion Scoring:
cephalic and brachial veins (zone 1), ascending aorta and bypass grafts (zone 2), pulmonary artery and external duct (zone 3),coronary arteries (zone 4), and right ventricular region (zone 5).
Anatomical structures separated from the chest wall by >3 mm are defined as low risk (0 points), ≤3 mm as high risk (1 point), and the presence of adhesions counts as 2 points, with a maximum total score of 10 points.

Results: Among overall 730 patients, 430 (58.9%) were male with a mean age of 31.5 ± 12.8 years. Forty-five patients experienced perioperative adverse events, including 42 cases of intraoperative hemorrhage and 3 cases of perioperative all-cause mortality. CT assessment of adhesion extent was independently associated with major adverse events (β=12.837, *P*<0.001), ventilator usage time (β=0.034, *P*=0.002), and total costs (β=3.251, *P*<0.001). Meanwhile, CT adhesion scores were independently associated with major adverse events (β=2.378, *P*<0.001), extracorporeal circulation time (β=0.583, *P*=0.004), ICU length of stay (β=5.583, *P*<0.001), and total costs (β=1.251, *P*<0.001). In the multivariable logistic regression model, the extent of CT adhesions (aOR: 4.21, *P*=0.036) and CT adhesion score (aOR=1.79, *P*<0.001) were independently associated with perioperative adverse events.



Conclusions: The extent of adhesions and adhesion scores assessed by preoperative CT in re-thoracotomy independently predict perioperative adverse events. Severe surgical adhesions significantly increase the risk of major hemorrhage. Additionally, sternal deformity resulting from a single procedure may compromise multiple anatomical structures during thoracotomy. Factors such as pulmonary hemorrhage, infection, and malnutrition collectively prolong mechanical ventilation duration, ICU stay, and overall hospitalization time.



O-037 / #411

CARDIAC IMAGING ABSTRACT SESSION
14-05-2026 16:30 - 18:00

DEVELOPING AN OPEN-SOURCE PIPELINE FOR ROBUST ENERGY-LOSS QUANTIFICATION IN TCPC PATIENTS USING 4D FLOW MAGNETIC RESONANCE AND COMPUTATIONAL SIMULATION

Maren Treiber, Florian Gartner, Heiko Stern, Christian Meierhofer
German Heart Center, TUM University Hospital, Technical University of Munich, Department Of Congenital Heart Disease And Pediatric Cardiology, Munich, Germany

Background and Aim: Background: Energy losses represent a fundamental hemodynamic quantity, reflecting the inefficiency of blood flow and the additional workload imposed on the cardiovascular system. In complex congenital anatomies—particularly in Fontan/TCPC circulations—elevated energy losses have been linked to exercise intolerance, impaired long-term outcomes, and the need for interventional or surgical optimization. Therefore, precise quantification of energy losses is crucial for clinical assessment and for guiding patient-specific therapeutic planning.
Methods: Methods: In this project, we systematically investigate multiple approaches for calculating energy losses from 4D-Flow MRI and benchmark them against values derived from patient-specific CFD simulations in TCPC patients (Figure 2).
Results: Results: We show that obtaining reliable energy-loss estimates directly from 4D-Flow MRI is challenging due to noise, insufficient resolution and mass-imbalance effects. Accurate results therefore require dedicated denoising, turbulence modelling, and energy-flux balancing steps (Figure 1). In contrast, simulations allow stable estimation of energy losses provided that the vascular segmentation and inlet/outlet flow profiles are accurate. By integrating both perspectives, we demonstrate that the highest fidelity is achieved when MRI-based measurements and simulations are used in a complementary manner. To support this, we developed an open-source processing pipeline that performs all necessary correction steps on 4D-Flow MRI data, computes energy losses, and automatically compares them with patient-specific CFD results.
Conclusions: Conclusion: We demonstrate ways to standardize energy-loss quantification in TCPC, enabling more robust clinical interpretation. Given accurate anatomical masks, computational simulations could potentially replace in-vivo 4D flow measurements for energy-loss
estimation.

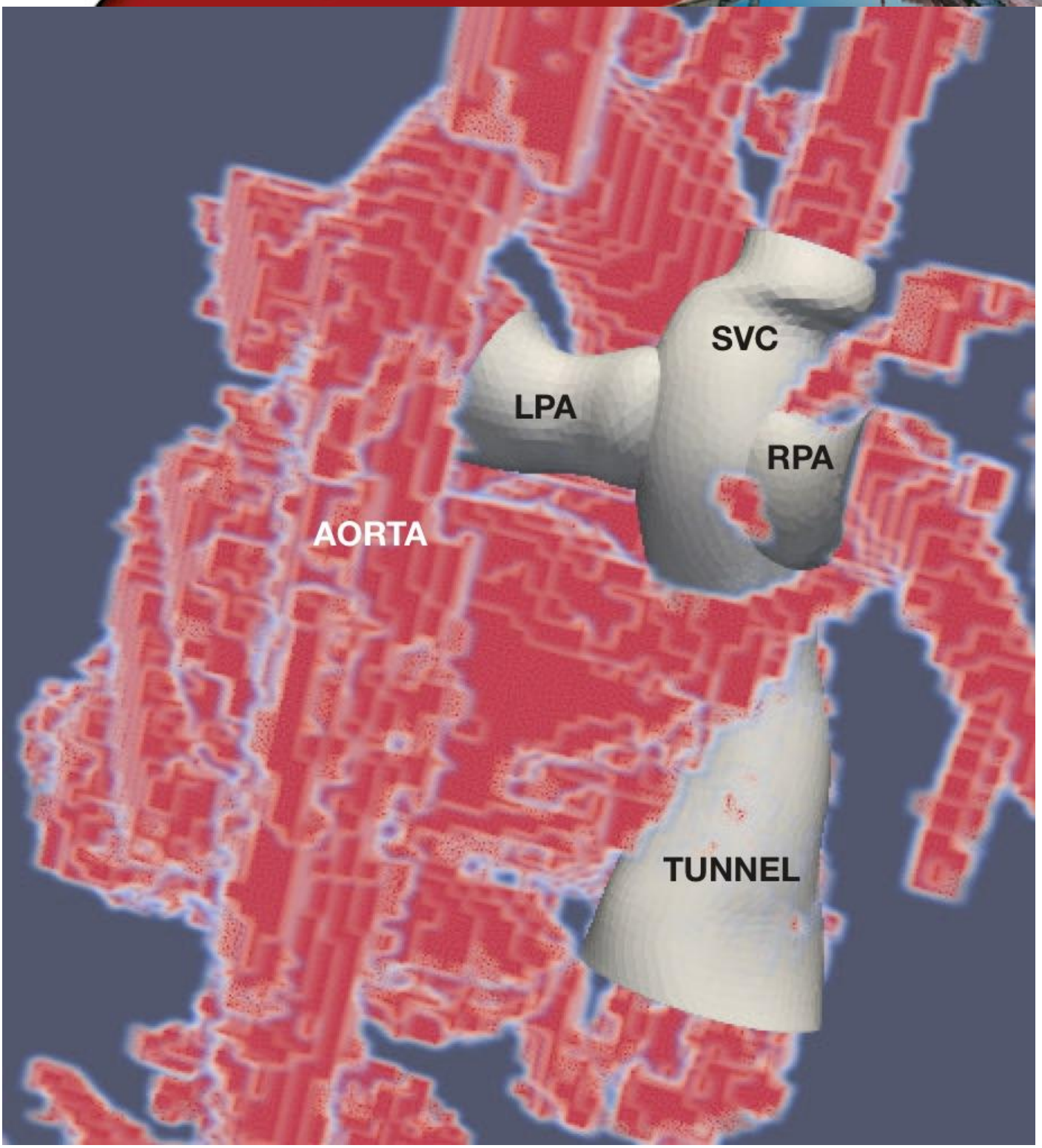


Figure 1: Anatomical mask of the Fontan anastomosis used for energy-loss calculations. The mask was generated by combining an automatically thresholded reconstruction from magnitude and phase images (red) with manually refined contours created in an open-source modelling tool

(grey).

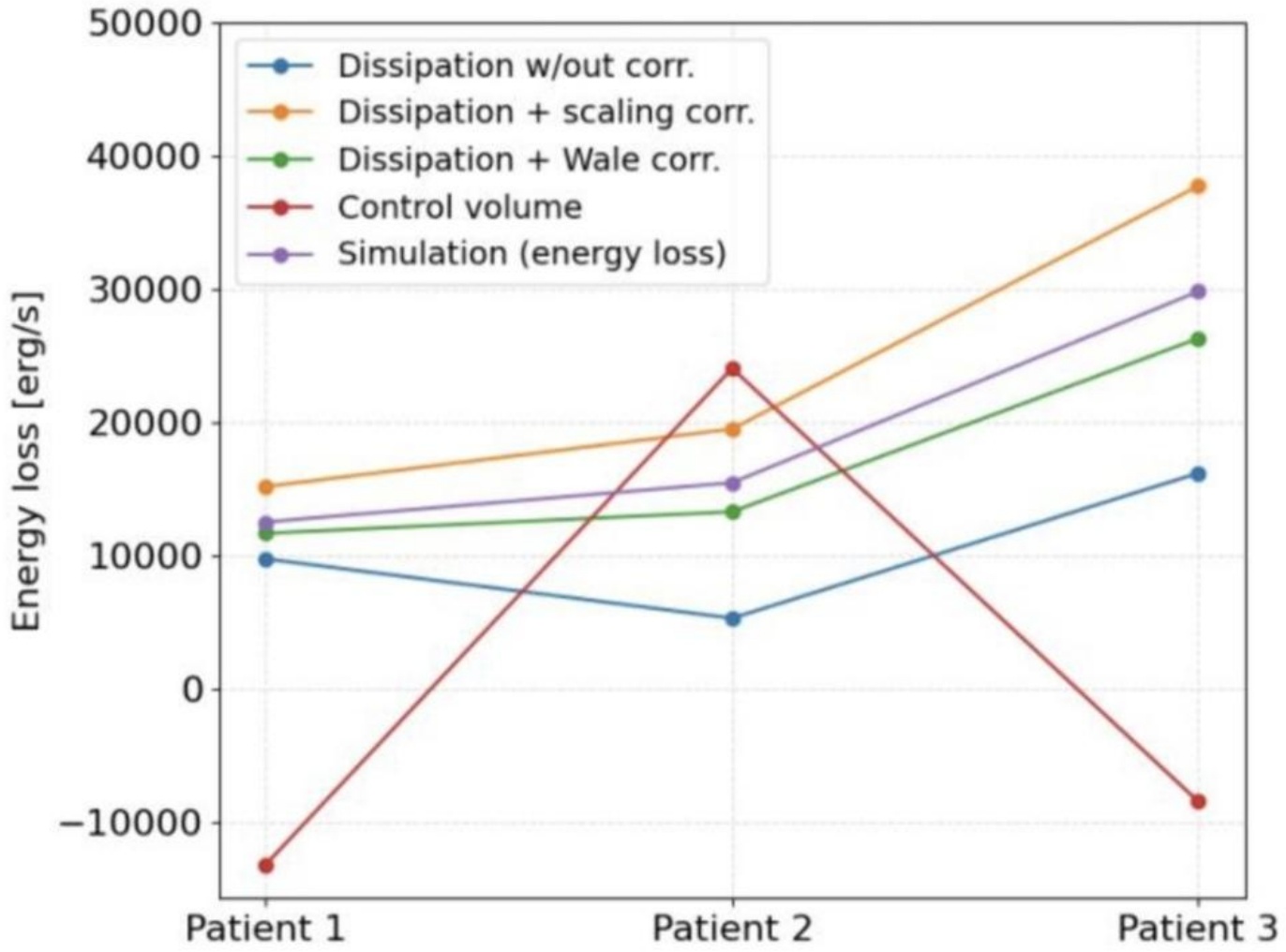


Figure 2: Energy loss (erg/s) across the Fontan anastomosis in three patients, quantified using five different methods: dissipation-based estimates with and without correction (scaling and WALE correction), the control-volume method, and simulations derived from the reconstructed anatomy. The simulation results and the WALE-corrected dissipation method show the closest agreement, indicating the best correspondence to the expected ground truth.



O-038 / #338

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

INTEGRATING POLYGENIC AND CLINICAL RISK: PREDICTING ADHD AND AUTISM IN INDIVIDUALS WITH CONGENITAL HEART DEFECTS

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Background and Aim: Children born with congenital heart defects (CHD) have an elevated risk of later psychiatric disorders, particularly autism and ADHD. Genetic susceptibility may further modify this risk, but the contribution remains unclear. This study investigates the effect of common genetic variants and CHD on the development of ADHD and autism.
Methods: We used data from the Danish iPSYCH2015 case cohort, comprising 132,986 individuals born between 1981–2008, with linked national registry and genetic information. containing information on CHD diagnoses, psychiatric outcomes, and demographic variables were obtained from national registers. Common genetic variants were used to compute polygenetic risk scores (PRS) for ADHD and autism, categorized into low, medium, and high strata. Associations between CHD, PRS, and psychiatric outcomes were estimated using Cox regression, including tests for interaction.
Results: Individuals with CHD (n=1860) had higher rates of psychiatric disorders, particularly ADHD and autism. We observed additive effects between CHD and PRS for ADHD and autism, but no statistical interaction. For both ADHD and autism, the relative impact of CHD was greatest among individuals in the lowest PRS stratum. Absolute risk curves demonstrate the same additive effect of ADHD and autism with increasing genetic risk and in the presence of CHD.
Conclusions: Individuals with CHD have an increased risk of ADHD and autism, and higher polygenic risk scores further elevate this risk. The effects of CHD and genetic predisposition appear additive. Individuals with CHD and low PRS may represent a subgroup in which CHD has a comparatively stronger influence on ADHD and autism risk. These findings highlight the potential value of integrating genetic information with clinical risk factors to identify vulnerable subpopulations for targeted monitoring.



O-039 / #1399

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

NEURODEVELOPMENTAL SCREENING IN CHILDREN WITH CONGENITAL HEART DISEASE: THE NECKER CHILDREN'S HOSPITAL CARDIAC NEURODEVELOPMENTAL CENTER FOLLOW-UP

Neil Derridj[1], Helena Huguet[2], Alain Camacho[1], Leila Kettani[1], Josephine Merriot[1], Anne-Cyrielle Plassard[1], Sylvie Martins[3], Fanny Bajolle[1], Damien Bonnet[4], Johanna Calderon[3]
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Background and Aim: Children with congenital heart disease (CHD) are at increased risk of neurodevelopmental impairments. A systematic neurodevelopmental screening program was implemented at Necker Children's Hospital. We aimed to describe outcomes according to a previously published theoretical neurodevelopmental risk classification and to identify associated risk factors.
Methods: Neurodevelopmental screening was conducted during pediatric cardiology visits at Necker Children's Hospital (January 2024–September 2025) using parent-completed ASQ-3, M-CHAT, and SDQ questionnaires with standard cut-offs. Children were classified into four theoretical neurodevelopmental risk groups, and outcomes were compared across groups using multivariable logistic regression within risk strata.
Results: A total of 255 children with isolated CHD were included (mean age 23 ± 19 months; 55% male) and 21% were born preterm. Overall, 69% underwent open-heart surgery and 40% required neonatal surgery. According to theoretical neurodevelopmental risk, 29% were classified as very high risk, 27% high risk, 31% moderate risk, and 13% low risk. Overall, 68% screened positive on the ASQ-3 and 25% on the M-CHAT; among children completing the SDQ (n = 31), 65% showed elevated behavioral risk. Screening outcomes did not differ across risk categories in the overall cohort; however, after exclusion of preterm-born children, severe ASQ impairment (≥1 severe domain) was observed in 49%, 35%, 36%, and 33% across the predefined neurodevelopmental risk groups, showing a non-significant trend toward higher rates in the very high-risk group (p = 0.10). In the high/very high-risk no perinatal or surgical determinants were associated with increased



neurodevelopmental impairment. In the moderate/low-risk groups, longer cardiopulmonary bypass duration was associated with positive ASQ-3 screening (OR 5.84, 95% CI [1.12–30.47], p = 0.04).

Conclusions: Nearly 70% of children with isolated CHD screened positive for neurodevelopmental impairments in a systematic screening program. Although the theoretical risk stratification provides a relevant framework, families experiencing developmental concerns may have been over-represented in our sample, potentially reducing differences between neurological risk groups. Integrating standardized questionnaires into routine cardiology follow-up may be effective in identifying vulnerable children in need of comprehensive neurodevelopmental evaluation. Cardiac Neurodevelopmental Programs are needed to optimize long-term outcomes in CHD.



O-040 / #81

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

EXAMINING NEUROPSYCHOLOGICAL OUTCOMES AND NEURAL CORRELATES OF CHILDREN DIAGNOSED WITH CONGENITAL HEART DISEASE AND CHILDREN BORN VERY PRETERM

Samantha Roberts[1], Renee Sananes[1], Magdalena Wojtowicz[2], Michael Seed[3], Steven Miller[4], Vann Chau[5], Stephanie Au-Young[5], Ting Guo[5], Linh Ly[5], Vanna Kazazian[6], Ruth Grunau[7], Tricia Williams[1]
[1]The Hospital for Sick Children, Psychology, Toronto, ON, Canada, [2]York University, Toronto, Canada, [3]The Hospital for Sick Children, Cardiology, Elizabeth St, Toronto, ON, Canada, [4]BC Children's Hospital Research Institute, Vancouver, Canada, [5]The Hospital for Sick Children, Neurology, Toronto, ON, Canada, [6]The Hospital for Sick Children, Toronto, ON, Canada, [7]BC Children's Hospital Research Institute, Vancouver, Canada

Background and Aim: Children with Congenital Heart Disease (CHD) and children born Very Preterm (VP) have similar patterns of brain injury and dysmaturation, both groups are at risk for poorer neurodevelopment. Limited research has compared the neurodevelopment of these groups and its associations with brain metabolites. This study (1) compared neurodevelopment at 18-months, (2) examined longitudinal trajectories from 18-36 months, and (3) explored metabolic profiles and their association with neurodevelopment at 36-months in these two groups.
Methods: Neurodevelopment was assessed using the Bayley Scales of Infant and Toddler Development-III (Bayley-III) and parent ratings of child behaviour using the Child Behavior Checklist (CBCL 1.5-5 year). *Objective 1*included 181 children with CHD (n=81) or born VP (n=100) assessed at 18-months. *Objective 2* included 116 children (CHD n=44; VP n=72) with outcome data at 18 and 36-months of age. Repeated measures ANOVA, hierarchical linear models, and reliable change indices were used to examine group differences over time and predictors of outcomes. *Objective 3* included 89 children (VP n=55; CHD n=34) with MRS data collected post-surgery for the CHD group and at term-age-equivalent for the VP group. Descriptive statistics, correlational analyses, and linear regression explored associations between metabolite ratios and neurodevelopment at 36-months.
Results: At 18 months, children achieved similar Bayley-III Composite scores, although children with CHD had lower Gross Motor scaled scores and a higher proportion of low Gross Motor and Language scores. Longitudinal analyses showed declining Cognitive scores from 18 to 36 months in both groups. Language improved among CHD children but



remained stable in VP children, whereas Motor scores declined among VP children but were stable in the CHD group (score change of ≥1 SD). Internalizing concerns increased at 36 months for both groups. MRS metabolic profiles were described; NAA was associated with motor outcome in CHD, and higher lactate/choline ratio was associated with higher total behaviour concerns in VP children.

Conclusions: This work is one of few to examine shared and unique longitudinal neurodevelopmental and psychosocial outcomes among CHD and VP children, and offers preliminary insights into metabolic associations. Findings help inform transdiagnostic clinical surveillance and intervention initiatives to promote neurocognitive outcomes.



O-041 / #728

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

LONG-TERM NEURODEVELOPMENT AFTER PEDIATRIC CARDIAC ARREST: TRAJECTORIES, INDIVIDUAL OUTCOMES, AND THE ROLE OF INTERDISCIPLINARY FOLLOW-UP

Lucy Liem[1,2,3], Katharina Schmitt[1,2,3,4], Franziska Markel[1,2,3], Peter Kramer[3], Laura Glasmeyer[3], Hannah Ferentzi[1,2,3]
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Background and Aim: Research on pediatric cardiac arrest has predominantly focused on short-term outcomes, especially survival and neurologic status at discharge. Long-term neurodevelopmental trajectories, however, remain markedly underresearched, despite the increasing number of children surviving cardiac arrest. Early neurologic screening tools such as the PCPC (pediatric cerebral performance category scale) provide only coarse information of limited predictive value for cognitive, motor, or language development. This study aimed to characterize long-term developmental outcomes in children after cardiac arrest, analyze individual developmental trajectories, and identify clinical factors associated with outcome across multiple follow-up timepoints.
Methods: Clinical data was collected to describe the cohort and the circumstances of resuscitation. Initial neurologic functioning was screened using PCPC scores at admission and discharge.
A total of 22 children survived cardiac arrest and underwent at least one standardized neurodevelopmental assessment using the Bayley Scales of Infant and Toddler Development, Third Edition (BSID-III). Developmental testing was performed at approximately 0.5, 1, 2, and 3 years after resuscitation. Eight children underwent assessments at all four timepoints, enabling analysis of individual trajectories.
Results: Of the 22 children, 95% had in-hospital cardiac arrest and 86% had surgically treated congenital heart disease. Median age at arrest was 85.5 days. PCPC scores indicated a decline from admission (PCPC 1 in 82%) to discharge (PCPC 1: 41%, PCPC 2:



45%, PCPC 3–4: 14%).

BSID-III results demonstrated substantial heterogeneity across cognitive, motor, and language domains. Some children showed clinically relevant developmental recovery over time, whereas others exhibited emerging deficits not detectable at discharge. Longitudinal data from children with complete follow-up revealed highly individualized developmental pathways rather than uniform patterns of recovery or impairment.

Conclusions: This study is among the first to report both long-term outcomes and detailed developmental trajectories after pediatric cardiac arrest. Its strong interdisciplinary approach—uniting pediatric cardiology and developmental psychology—constitutes a unique and valuable feature. The variability of individual courses underscores the urgent need for structured, multidisciplinary follow-up programs to identify emerging deficits early and provide targeted support, emphasizing that clinical responsibility must extend well beyond hospital discharge.



O-042 / #44

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

VINELAND-II ADAPTIVE BEHAVIOR SCALES AND NEURODEVELOPMENTAL CATCH-UP IN FONTAN PATIENTS: WHO CAN CATCH UP?

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Background and Aim: Neurodevelopmental delay is one of the major long-term issues in patients with Fontan circulation. We previously reported that neurodevelopmental outcomes in these patients tend to improve over time, suggesting the possibility of catch-up development. However, factors associated with this improvement remain unclear. This study focused on Fontan patients who showed borderline developmental status at 3 years of age and aimed to identify clinical and social factors related to developmental catch-up, with special emphasis on adaptive behavior assessed by the Vineland Adaptive Behavior Scales, Second Edition (Vineland-II).
Methods: We analyzed 36 and 30 Fontan patients who showed borderline development at 3 years of age and were reassessed at 6 and 9 years of age, respectively (the 3–6-year and 3–9-year cohorts). Each cohort was divided into two groups: group C (catch-up) and group N (non-catch-up). Background variables—including the total number of operations, age at first on-pump operation, total number of on-pump operations, ages at Glenn and Fontan operations, postoperative central venous pressure (CVP), B-type natriuretic peptide (BNP), and Vineland-II scores—were compared between groups.
Results: In the 3–6-year cohort, Vineland-II scores were significantly higher in group C than in group N (93 vs. 85, $p < 0.05$). In the 3–9-year cohort, both the total number of operations and the total number of on-pump operations were significantly lower in group C (2.9 vs. 3.8, $p < 0.05$; 1.9 vs. 2.6, $p < 0.01$, respectively).
Conclusions: In Fontan patients with borderline developmental status, catch-up neurodevelopment was associated with fewer surgical interventions and higher Vineland-II adaptive behavior scores. Vineland-II assessment may serve as a practical tool for developmental risk stratification and identification of patients with potential for recovery. Early recognition of adaptive behavior profiles and timely social support could further enhance long-term neurodevelopmental outcomes in this vulnerable population.



O-043 / #80

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

CARDIOPULMONARY FITNESS AND EMOTIONAL CONCERNS IN FONTAN YOUTH

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Background and Aim: Youth with Fontan circulation frequently exhibit reduced exercise capacity and concerns with psychosocial function. However, the extent to which cardiopulmonary function relates to emotional outcomes remains unclear. This study examined associations between key cardiopulmonary markers and emotional concerns using data from the Pediatric Heart Network (PHN) Fontan dataset.
Methods: Cross-sectional data from the Pediatric Heart Network Fontan public database were analyzed (N = 402, 153 females, aged 12.40±3.21 years). Cardiopulmonary variables included peak oxygen consumption (VO_2peak, mL/kg/min), body surface area (BSA)-indexed oxygen pulse (BSA-indexed O_2 pulse, mL/beat/m2), chronotropic index (CI), and ventilatory efficiency at anaerobic threshold (AT VE/VCO_2). Emotional concerns were derived from the Congenital Heart Adolescent and Teenager (CHAT) questionnaire. Associations between cardiopulmonary fitness and emotional concerns were examined using Pearson correlations. Predictors were evaluated using multiple linear regression models adjusted for age, sex, pubertal status, and fenestration status. Independent-samples t-tests were used for subgroup analyses comparing cardiopulmonary and emotional concerns between prepubertal (N = 129) and post-pubertal youth (N = 273).
Results: Higher AT VE/VCO_2 was associated with greater emotional concerns (r=.21, p=.001). Adjusted regression models found that AT VE/VCO_2 significantly predicted emotional concerns (β=.28, p=.016). VO_2peak, BSA-indexed O_2 pulse, and CI did not predict emotional concerns. Pre-pubertal youth demonstrated higher AT VE/VCO_2, t(297.5)=5.41, p<.001 (Pre-pubertal: 45.15±10.52; Post-pubertal: 39.74±7.23), lower



BSA-indexed O_2 pulse, t(220.6)=-2.89,p<.001 (Pre-pubertal: 5.34±1.37; Post-pubertal: 5.81±1.57) and more emotional concerns, t(223.8)=2.09, p=.038 (Pre-pubertal: 23.28±18.33; Post-pubertal: 19.10±15.48), compared to post-pubertal youth. Conclusions: AT VE/VCO_2 significantly predicted emotional concerns in youth with Fontan circulation, whereas VO_2peak and other traditional fitness measures did not. AT VE/VCO_2 may serve as a sensitive physiological indicator of emotional vulnerability in this population. Pre-pubertal youth with Fontan circulation showed higher AT VE/VCO_2 and lower BSA-indexed O_2 pulse, indicating developmental limitations in cardiovascular efficiency. This group also reported more emotional concerns than post-pubertal youth. Future research should investigate whether improving ventilatory efficiency, through targeted exercise training, respiratory muscle interventions, or medical procedures, could reduce emotional distress in Fontan youth. The NIH/NHLBI Pediatric Heart Network Fontan Cross-Sectional Study dataset was used in preparation of this work. Data were downloaded from https://www.pediatricheartnetwork.org//pud_login.asp?study_id=FCSD on 09/23/2025.



O-044 / #698

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

BIOMARKER-BASED NEUROLOGIC PROGNOSTICATION AFTER PEDIATRIC CARDIAC ARREST: CLINICAL PREDICTORS, FEASIBILITY AND OUTCOMES IN A PEDIATRIC CARDIOLOGY COHORT

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Background and Aim: Neurologic prognostication after pediatric cardiac arrest remains difficult, particularly in children with congenital or acquired heart disease. The new Pediatric Life Support guidelines recommend a repeated multimodal approach including biomarkers of neurological damage. While biomarkers such as NSE and S100ß are increasingly used in adult resuscitation medicine, evidence for their clinical or scientific relevance in resuscitated children remains limited.
This study aimed to provide a comprehensive characterization of children hospitalized in a pediatric cardiology department who underwent resuscitation and to investigate associations between clinical parameters, established biomarkers (NSE, S100ß) and experimental neuroinjury biomarkers (GFAP, NEFL, UCHL1) with survival.
Methods: We conducted a retrospective single-center analysis of 44 children who underwent cardiopulmonary resuscitation after cardiac arrest. Sociodemographic data, underlying cardiac diagnoses, resuscitation parameters, intensive care variables and biomarker (NSE, S100, GFAP, NEFL and UCHL1) measurements at baseline, 24h, 48h and 72h were collected. Survival to hospital discharge (survivors vs. nonsurvivors) was used for group comparison.
Results: Of the 44 children, 68% survived. Hypoplastic left heart syndrome was the most frequent diagnosis (34%). Median age at arrest was 96.5 days. Mean CPR duration was 27 minutes and was significantly longer in non-survivors than in survivors (37.0 vs. 22.0 minutes; p = 0.015). NSE levels at 24 hours were significantly higher in non-survivors based



on a Mann–Whitney U test (80.1 vs. 46.3 µg/L; p = 0.030). S100ß was elevated in non-survivors at baseline (p = 0.034) and at 24 hours (p = 0.036). GFAP, NEFL and UCHL1 showed no significant differences between survivors and non-survivors at any timepoint. Non-survivors tended to have longer ventilation durations and ICU stays.

Conclusions: This study provides a detailed characterization of a pediatric cardiac arrest cohort and demonstrates that early elevations in NSE and S100ß are associated with mortality, while experimental biomarkers (GFAP, NEFL, UCHL1) lacked discriminatory value. Limited feasibility of these experimental markers was observed due to heterogeneous sampling and processing, contributing to variability and reduced interpretability. Taken together, our results establish an important basis for subsequent research—ranging from longitudinal follow-up to larger, more statistically powerful biomarker cohorts that may enhance the reliability of neurologic prognostication after pediatric cardiac arrest.



O-045 / #1272

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

INHALED NITRIC OXIDE VIA HIGH-FLOW NASAL CANNULA IN POST-REPAIR CONGENITAL HEART DISEASE PATIENTS WITH PULMONARY HYPERTENSION AFTER EXTUBATION: A COHORT STUDY WITH PROPENSITY SCORE MATCHING

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Background and Aim: For patients with congenital heart disease and pulmonary hypertension, corrective surgical repair carries a substantial risk of inducing pulmonary hypertensive crisis. The conventional clinical strategy involves three key components: postoperative administration of inhaled nitric oxide, oral sildenafil prior to extubation, and gradual tapering of inhaled nitric oxide to mitigate rebound pulmonary hypertension. While this conventional regimen demonstrates effectiveness, it is often associated with prolonged postoperative recovery. To address this limitation, we propose a fast weaning strategy, namely the continuation of inhaled nitric oxide delivery via high-flow nasal cannula following extubation.

Methods: Since 2019, our center has administered prophylactic inhaled nitric oxide therapy using the classic weaning strategy to patients with a pulmonary arteriolar resistance index exceeding 6 WU×m^2. In 2023, the novel weaning protocol proposed in this study was formally implemented. We retrospectively screened pediatric patients whose cardiac lesion limited to ventricular septal defect, atrial septal defect, patent ductus arteriosus between 2019 and 2024. Eligible patients admitted from 2023 to 2024 were assigned to Group 1, while those admitted from 2019 to 2022 constituted Group 2. For 1:1 propensity score matching, the predictive variables included age, pulmonary vascular resistance index, and the duration of cardiopulmonary bypass.

Results: Group 1 comprised 22 patients, whereas Group 2 comprised 53 patients. After propensity-score matching, 22 matched pairs were generated. The two groups showed no differences in baseline characteristics ($p>0.05$, SMD<0.2). Postoperative pulmonary hypertensive crisis occurred in 2 patients (9.1%) in Group 1 and 3 patients (13.6%) in Group



2; the difference was not statistically significant ($p > 0.999$). The duration of mechanical ventilation was shorter in Group 1 [18 (8.5, 22.3) vs 21.5 (19.8, 27.3) hours, $p = 0.014$, RR 2.26, 95% CI 1.28-3.97, E-value 3.94, CI lower 1.89]. No major complications, such as re-intubation, extracorporeal membrane oxygenation support, renal replacement therapy or death were observed in either group.

Conclusions: The strategy of continuing inhaled nitric oxide delivery via high-flow nasal cannula after extubation exhibits comparable safety to the conventional weaning strategy. Moreover, it significantly shortens the duration of postoperative mechanical ventilation, which is conducive to promoting early postoperative recovery.



O-046 / #1489

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

NEURODEVELOPMENT IN CHILDREN WITH SEVERE CONGENITAL HEART DEFECTS; RELATION WITH PRENATAL PARAMETERS

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Background and Aim: Neurodevelopmental impairment occurs more frequently in children with severe congenital heart disease (CHD) compared to their peers. Multiple factors contribute to the development of these impairments and the exact pathophysiological background is not fully understood, yet altered brain development is already noted in fetal life. The aim of this study is to investigate the impact of fetal brain development on postnatal neurodevelopmental outcomes in children with severe CHD.
Methods: Children with severe CHD are routinely assessed in a neurodevelopmental follow-up monitoring program. We extracted consecutive cases that were prenatally assessed in a monitoring program that assesses fetal brain development and growth from 2014 until 2020. This program encompasses ultrasound 3D volumes of the fetal brain 3-4 times in pregnancy. The neurocognitive follow-up program includes neurodevelopmental testing to generate a full-scale intelligence quotient (FSIQ). Psychosocial difficulties were assessed using standardized questionnaires (BRIEF and SDQ) completed by parents and children. The children were divided into three groups: age-appropriate scores, mild neurodevelopmental delay (FSIQ < 85), and severe neurodevelopmental delay (FSIQ < 70). Fetal parameters and brain development will be compared between these three groups. Severe CHD was defined as all CHD that needed operation or therapeutic interventions in the first year of life.
Results: We included 54 children who had completed the fetal monitoring program and the postnatal neurodevelopmental follow-up monitoring program. A wide distribution of IQ scores was observed ranging from above average to well below average. Compared to the Dutch normative population, the processing speed index and visual-spatial index were significantly lower by 4 IQ points (p=0.019 and p=0.023 respectively). Additionally, a disharmonious IQ profile was frequently observed. Comparison with the fetal data is



ongoing.

Conclusions: Children with severe CHD demonstrate impaired neurocognitive development, particularly in processing speed and visual–spatial functioning. Although mean IQ scores are only slightly lower than population norms, there is substantial interindividual variability. The relationship with the fetal parameters is yet to be explored.



O-047 / #1541

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

PREVALENCE AND RISK FACTORS OF POST-TRAUMATIC STRESS SYMPTOMS AND ANXIETY IN PARENTS OF CHILDREN WITH CONGENITAL AND ACQUIRED HEART DISEASES

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Background and Aim: Parents of children with congenital and acquired heart diseases (CAHD) are exposed to repeated hospitalizations and potentially traumatic medical events. Data on post-traumatic stress symptoms (PTSS), post-traumatic stress disorder (PTSD), and anxiety in this population remain limited.
Methods: This prospective, monocentric observational study was conducted at Necker–Enfants Malades Hospital (Paris, France). Parents were invited to complete psychosocial questionnaires as part of a systematic neurocardiac follow-up program. Parents who completed questionnaires between February 2024 and June 2025 were included. Anxiety was assessed using the STAI-Y2 scale. PTSD was defined by a PCL-5 score ≥31, and PTSS by the presence of significant symptoms across the four DSM-5 clusters (intrusion [B], avoidance [C], negative alterations in cognition and mood [D], and hyperarousal [E]). Univariate and multivariable logistic regression analyses were performed.
Results: A total of 422 parents were included; 79% were mothers. Median child age was 4 months at hospital discharge and 2 years at psychosocial assessment. Overall, 322 parents completed the PCL-5 and 367 completed the STAI-Y2. Based on the PCL-5, 15% of parents met criteria for PTSD. Among parents completing the PCL-5, 50.6% reported intrusion symptoms (criterion B), 37.6% avoidance (criterion C), 28.0% negative alterations in cognition and mood (criterion D), and 31.7% hyperarousal symptoms (criterion E). A clinically significant anxious state was identified in 17% of parents overall. The composite outcome of PTSD or anxiety was present in 26% of parents. In multivariable analyses, no clinical or care-related variable was independently associated with PTSD. A family history of CAHD was independently associated with anxiety (adjusted OR 2.50, 95% CI 1.03–6.06) and showed a borderline association with the composite outcome of PTSD or anxiety (adjusted OR 2.40, 95% CI 0.98–5.91).
Conclusions: PTSS, PTSD, and anxiety were frequent among parents of children with



CAHD, with high prevalences of intrusion and avoidance symptoms. Psychological outcomes were not associated with objective markers of disease severity or care intensity. A family history of CAHD emerged as the main factor associated with parental anxiety, supporting the need for systematic psychosocial screening irrespective of cardiac disease severity.



O-048 / #227

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

IATROGENEC WITHDRAWAL SYNDROME (IWS) HAS A SPECIFIC RISK PROFILE IN CHILDREN AFTER CARDIAC SURGERY

Ida Hüners[1], Daniel Biermann[1], Sophia Schumann[2], Gerhard Schön[3], Urda Gottschalk[2], Palle Jürgensen[2], Lena Siebel[2], Friederike Jess[2], Carolin Gleitze-Nolting[2], Jonas Denecke[4], Irwin Reiss[5], Rainer Kozlik-Feldmann[2], Michael Huebler[1], Sebastian Harms[2]
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Background and Aim: Iatrogenic withdrawal syndrome (IWS) in children undergoing cardiac surgery is an underrecognized complication in critically ill children exposed to prolonged sedation and analgesia. Despite growing awareness, data on IWS prevalence and its associated risk factors in pediatric cardiac intensive care units (pCICUs) remain limited. This study aims to determine the prevalence of IWS in patients following cardiac surgery and to identify perioperative and pharmacologic predictors to improve sedation management and patient outcomes
Methods: This retrospective, single-center cohort study included all pediatric patients admitted to the pCICU following cardiac surgery within a 15-month period. IWS screening was performed using the Withdrawal Assessment Tool-1 (WAT-1) at least three times daily after extubation. A WAT-1 score ≥3 was defined as IWS, with severity categorized as mild (WAT-1: 3–7) or severe (WAT-1 >7). Multivariate logistic regression was performed using demographic and perioperative parameters. Subgroup analysis focused on sedation regimes in ventilated children.
Results: 311 patients were included, WAT-1 screening compliance was >95%. The overall prevalence of IWS was 46,4%. Regression analysis identified significant predictors for IWS: univentricular physiology (OR 3.4, p=0.017), postoperative infection (OR 5.34, p=0.023), and prolonged ventilation (10-100h (OR 2.88, p=0.017), >100h (OR 6.13, p=0.002). Postoperative lactatemia (> 2 mmol/h for >6 h) was a negative predictor of IWS (OR 0.38, p=0.023). In the subgroup analysis of all postoperative ventilated children, use of benzodiazepine (midazolam; OR 3.9, p=0.019) and ultra-short acting opioids (remifentanil;



OR 3.6, p=0.034), and remifentanil infusion-time >48h (OR 5.1, p=<0.001) predicted IWS.
Conclusions: To our knowledge, this is the first comprehensive single-center assessment of IWS risk in pediatric cardiac surgery patients. IWS is common and should be routinely screened. Prolonged ventilation under midazolam or remifentanil, especially beyond 48 hours, increases risk; careful weaning protocols are essential, and extended remifentanil infusion should be avoided. More research is needed on PK/PD as high lactate levels indicate both low cardiac output and likely impaired sedative metabolism in this group.



O-050 / #427

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

INTRACARDIAC ECHOCARDIOGRAPHY–GUIDED TRANSSEPTAL PUNCTURE IN THE PEDIATRIC POPULATION: A SINGLE-CENTER EXPERIENCE

Mirko Topalovic[1], Nina Bobić[2], Gorazd Mlakar[1], Tatiana Miriam Marušič[1], Saša Ilovar Strehar[1], Matej Pal[1], Pokorn Žiga[1], Pia Homan[1], Rina Rus[1], Tine Prolič Kalinšek[2], Jernej Štublar[2], Jernej Irišič[2], Matevž Jan[2]
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Background and Aim: Fluoroscopy-guided transseptal puncture (TSP) is the gold standard for transseptal access in both adults and children. The introduction of intracardiac echocardiography (ICE) has enabled operators to perform both imaging and TSP while reducing or eliminating fluoroscopy use. The aim of this single-center retrospective study was to evaluate the feasibility, effectiveness, and safety of ICE-guided TSP in children.
Methods: Consecutive patients who underwent zero-fluoroscopy left-sided ablation procedures in our institution between 21 January 2015 and 6 February 2025 were included in this retrospective analysis. ICE and three-dimensional electroanatomic mapping systems were used in all procedures. In patients with a body weight (BW) below 30 kg, bilateral femoral venous access was established. Adverse events during the procedure and within 30 days post-procedure were collected and analyzed.
Results: A total of 98 TSPs were performed in 98 ablation procedures in 94 pediatric patients (atrio-ventricular reentry tachycardia (AVRT): 80/98 [81.6%]; atrial ectopic tachycardia: 6/98 [6.12%]; ventricular tachycardia (VT): 3/98 [3.06%]; ventricular ectopy: 3/98 [3.06%]; atrioventricular nodal reentry tachycardia (AVNRT): 1/98 [1.02%]; combined AVNRT/AVRT: 4/98 [4.08%]; combined VT/atrial flutter: 1/98 [1.02%]). Median BW was 52.0 kg (range 17–97 kg). Fourteen patients (14%) had BW below 30 kg, and 19 (20.2%) had BW between 30 and 40 kg. Most TSPs (97/98 [98.98%]) were performed via the transfemoral approach; one was performed via the transjugular approach. All TSPs were successful (98/98 [100%]). No intraprocedural complications related to TSP occurred (0/98 [0%]). The overall major complication rate was 2/98 (2.04%). One patient had occlusion of terminal left circumflex coronary artery branch due to radiofrequency delivery. One patient had cardiac tamponade that was caused with right ventricle perforation with a diagnostic catheter and was not related to TSP. In this



patient ICE facilitated early intraprocedural detection of pericardial effusion. No TSP-related complications were observed during follow-up, and there was no long-term morbidity or mortality in the cohort.

Conclusions: ICE-guided TSP is a feasible, effective, and safe method for transseptal access in the pediatric population. Furthermore, ICE is valuable for the early recognition of procedural complications.



O-051 / #277

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

CARDIAC AND MUSCLE HEALTH IN PEDIATRIC SUPER FONTANS

Mavis Lui[1], Daniel Bernstein[1], Jin Long[1], Mary Leonard[1], Inger Olson[1], Jonathan Myers[2], Joseph Dehoney[3], Troy Jefferies[4], John Cooke[5], Rajesh Punn[1], Latha Palaniappan[1], Seda Tierney[1]
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Background and Aim: Children and adolescents with Fontan circulation often have diminished exercise tolerance, a predictor of morbidity and mortality. Nonetheless, a subset attains normal capacity (≥80% predicted peak VO_2, termed “Super-Fontan”). The determinants of endothelial function, body composition, muscle mass and strength, mobility, and lipid profiles in this subgroup remain inadequately characterized. We aimed to characterize these determinants in Super-Fontan (SFon) and <80% predicted peak VO_2 (Fon) patients.
Methods: Our cohort consisted of patients aged 8-19 years with Fontan circulation cleared for exercise with no implanted pacemakers, who are enrolled in an exercise intervention trial. Participants underwent cardiopulmonary exercise testing, endothelial function testing, strain echocardiogram, dual-energy X-ray absorptiometry (DXA), muscle dynamometry, lipid testing, and functional movement screening. Baseline characteristics were compared between SFon and Fon groups.
Results: Among 137 participants, the median percent-predicted peak VO_2 was 74.6% [62.1, 88.1]. Sixty participants (44%) met criteria for Super-Fontan physiology. Compared to Fon group, the SFon group was younger (11.3 [9.4, 13.1] vs. 14.5 [10.8, 16.5] years, p<0.001), had better arterial tone (pulse wave amplitude: 284.1 [136.2, 281.0] vs. 354.3 [176.6, 579.8], p=0.002), better cardiac systolic function (longitudinal strain: -16.4 [-18.9, -13.1] vs. -14.4 [-16.8, -12.3]%, p=0.012), lower injury risk (Functional Movement Screening score: 13 [11, 15] vs. 11 [9, 13], p=0.006), more favorable lipid profiles (HDL: 47 [42, 51] vs. 41 [36, 50] mg/dL, p=0.030), and leaner body composition (BMI z-score, lean BMI, and fat mass index, p<0.001). Despite their superior aerobic performance, the SFon group demonstrated lower absolute muscle strength across leg extension, leg flexion, and



handgrip (all $p<0.05$), consistent with younger age and lower body mass.

Conclusions: Nearly half of this cohort achieved Super-Fontan status, a higher proportion than reported in the general Fontan population, likely reflecting referral and enrollment biases to the trial. Super-Fontan youth demonstrated healthier vascular, body composition, and mobility profiles, but lower absolute muscle strength. These findings suggest that preserved aerobic capacity in the pediatric Fontan population may be more closely associated with vascular health, leanness, and mobility than with muscular strength, highlighting resistance training as a potential complementary intervention target.



O-052 / #875

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

VENTRICULAR ARRHYTHMIAS IN TETRALOGY OF FALLOT PATIENTS UNDERGOING PULMONARY VALVE REPLACEMENT: COMPARISON BETWEEN PROACTIVE SLOW-CONDUCTING ANATOMICAL ISTHMUS EVALUATION AND ABLATION AND CONVENTIONAL APPROACH

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Background and Aim: Proactive mapping of slowly conducting anatomical isthmuses (SCAI) in patients with tetralogy of Fallot (ToF) without history of VT undergoing pulmonary valve replacement late in adulthood has been recently suggested to reduce arrhythmic burden. Comparison between traditional (without EPS) and contemporary (with EPS) approaches are lacking
Methods: A retrospective evaluation of consecutive ToF patients undergoing PVR without clinical history of VT or EPS evaluation was conducted, and data regarding adverse arrhythmic outcomes were collected. A prospective evaluation of consecutive ToF patients undergoing PVR with proactive mapping was conducted. Electroanatomical mapping was performed with systematic evaluation of all possible anatomical isthmuses. Conduction velocity (CV) across all documented AI was calculated. Ventricular programmed stimulation was performed at 2 sites with three extrastimuli until refractoriness or induction, during baseline and isoproterenol infusion. Radiofrequency catheter ablation (RFCA) was performed in all patients with inducible VT and/or SCAI. All patients receiving RFCA underwent loop-recording implantation.
Results: The retrospective cohort consisted of 139 (70.5% males) patients (median age at correction 32, iqr 14-60 months) enrolled until 2023. The contemporary cohort (January 2023-december 2024) consisted of 18 patients, median age at correction 35 months (iqr 23-47), 73% males, age at enrollment 46±10 years; 54% with a previous shunt, 46% with a previous transannular patch, 27% pulmonary valvotomy and infundibular boring. There were no SCAI1 (tricuspid-to-scar); there were 3 SCAI 2 (pulmonary valve (PV)-to-scar, mean CV 0.43 m/s), 9 SCAI 3 (PV-to-ventricular septal defect patch, mean CV 0.3 m/s), 2 SCAI 4



(tricuspid-to-VSD, CV 0.4 m/s). RFCA was performed on all SCAI; acute success was achieved in all but 1 patient. On follow-up, no adverse events where recorded in the EPS cohort (median follow-up 17 months, iqr 8-21 months), 11 ventricular arrhythmic events in the retrospective cohort (median 66 months, iqr 1.2-145 months).

Conclusions: A proactive strategy in ToF patients undergoing PVR shows a reduced incidence of ventricular events favoring patients undergoing SCAI evaluation and treatment. EPS and SCAI evaluation and treatment is safe and effective over a relatively long systematic follow-up. A longer follow-up is however needed to further enforce systematic EPS in rToF candidate to PVR.

O-053 / #120

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

EXERCISE INTENSITY PRESCRIPTION IN PEDIATRIC CARDIOLOGY: COMPARING HEART RATE RESERVE AND VENTILATORY THRESHOLD METHODS

João Rato[1], Tomás Sim-Sim[1], Mafalda Sequeira[1], Susana Cordeiro[1], Raquel Alves[2], Vanessa Santos[2], Rui Anjos[1], Helena Santa-Clara[2]
[1]Department of Pediatric Cardiology - ULSLO, Carnaxide, Portugal, [2]Faculdade de Motricidade Humana, Cruz Quebrada, Portugal

Background and Aim: Exercise intensity prescription is central to exercise programs in pediatric cardiology, but evidence on the best methodology remains limited. FORCE guidelines (Gauthier 2023) apply the percentage of heart rate reserve (%HRR), whereas other authors propose ventilatory thresholds (VTs) from cardiopulmonary exercise testing (CPET), which lead to greater improvements in peakVO_2 (Hansen 2025). This study compares these two approaches, something not previously done in pediatric cardiology.
Methods: Data from 219 CPETs (January 2022-June 2025) on a tertiary reference hospital was assessed. Risk stratification was performed according to FORCE. Patients were divided into three categories according to disease severity. For each level the upper target of training HR was defined as: A (less severe) – 90%HRR or HR at peakVO_2; B (moderate) – 75%HRR or VT2; C (most severe) – 60%HRR or VT1. Normal and non-normal continuous variables are presented as mean±SD or median [IQR] and compared between groups using one-way ANOVA or Kruskal–Wallis. Categorical variables are compared using chi-square. Paired comparisons of target HR were analysed using paired t-tests. For predictive modelling of VT2 achievement, logistic regression was employed. Significance was defined as $p<0.05$.
Results: Median patient's age was 17yo [IQR 16], 35% female patients. Cardiomyopathies represented 7% and the rest had variable congenital heart diseases. Mean peakVO_2 was 27.3±7.3ml/kg/min (69.4±16.9% of the predicted value). Distribution across FORCE categories was: A–13% (n=28), B–57% (n=125), C–30% (n=66). Only 67% (n=144) patients reached VT2, and those had higher BMI (OR 1.12, $p=0.006$), higher peak HR (OR 1.02, $p=0.009$), and lower VE/VCO_2 slope (OR 0.92, $p<0.001$). Target HRs were significantly different across the whole sample: 147±22bpm by %HRR and 137±31bpm by VTs ($p<0.001$); and by categories: A – 168±18 vs. 177±19, B – 149±19 vs. 143±22, C – 133±21 vs. 110±23 (all $p<0.001$) (graph 1).
Conclusions: Exercise intensity targets differ substantially when using %HRR versus VTs



across risk categories. The %HRR method may underestimate appropriate exercise HR in lower-risk patients and overestimate it in moderate or high-risk. However, not every patient will achieve both VTs. How different exercise HRs may truly impact exercise effects in the pediatric cardiac population may now be subject of further study.



O-054 / #585

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

SURGICAL ICDS IN SMALL CHILDREN: LEAD LONGEVITY, COMPLICATION BURDEN, AND LONG-TERM EFFICACY

Aycan Çelebi[1], Ilker Ertugrul[1], Tevfik Karagöz[1], Şafak Alpat[2], Mustafa Yılmaz[2]
[1]Hacettepe University Faculty of Medicine, Department Of Pediatric Cardiology, ANKARA, Turkey, [2]Hacettepe University Faculty of Medicine, Department Of Cardiovascular Surgery, ANKARA, Turkey

Background and Aim: Surgically implanted implantable cardioverter-defibrillators (ICDs) are an essential option for pediatric patients with low body weight or limited vascular access who are unsuitable for transvenous systems. However, somatic growth–related technical challenges and the need for long-term follow-up complicate ICD management in children, while available data remain limited, particularly in infants and young children. This study aimed to describe the demographic and clinical characteristics of pediatric patients undergoing surgical ICD implantation and to evaluate the safety, efficacy, and long-term outcomes of these systems.
Methods: A retrospective review included pediatric patients receiving a surgically implanted ICD between 2010 and 2024 (n = 37). Data included demographic features, indications for implantation, underlying structural or electrical heart disease, device and lead configurations, and surgical techniques. Outcomes included ICD therapies, arrhythmia burden, perioperative complications, device- or lead-related events, and long-term follow-up findings.
Results: The mean age at implantation was 4.8 years and the mean body weight was 18.6 kg; 21 patients (53.8%) weighed ≤15 kg. Genetic arrhythmia syndromes constituted the largest subgroup, and long QT syndrome was the most common diagnosis. ICD implantation was performed for primary prophylaxis in 21 patients (53.8%) and for secondary prophylaxis in 18 (46.2%). Surgical approaches included epicardial systems in 23 patients (58.9%), subcutaneous coils in 14 (35.8%), and extrapleural intrathoracic placement in 2 (5.3%). System revisions were required during follow-up, either within the same configuration or using alternative approaches. Median complication-free survival differed by lead type (epicardial: 101 months; subcutaneous: 73 months; extrapleural: 58 months). Appropriate ICD therapies were delivered in 12 patients (30.7%), whereas three patients (7.7%) received four inappropriate shocks. During a mean follow-up of 64.7 ± 42.3 months (range: 1–15 years), complications requiring surgical intervention occurred in 18



patients (46.1%), most of which were lead-related.

Conclusions: This study provides an assessment of surgical ICD implantation in infants and young children and compares outcomes across techniques. Although complications and revision rates were high, no mortality occurred, supporting surgical ICD implantation as an effective option. Nevertheless, age- and weight-related limitations, growth-associated lead issues, and procedural complexity underscore the need for individualized risk–benefit evaluation in this population.



O-055 / #626

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

TRANSVENOUS PACEMAKER AND ICD IMPLANTATION IN CHILDREN UNDER 20 KG: A SINGLE-CENTER EXPERIENCE WITH DEVICE RELATED COMPLICATIONS OVER 25 YEARS

Nilay Korgal, Ilker Ertugrul, Tevfik Karagöz
Hacettepe University, Pediatric Cardiology, Ankara, Turkey

Background and Aim: Transvenous pacemaker and implantable cardioverter-defibrillator (ICD) implantation is occasionally required in children weighing less than 20 kg. However, small vessel size, ongoing growth, and long-term lead-related issues raise concerns regarding safety and durability. While epicardial systems are often preferred, transvenous devices continue to be used in selected patients. Data describing long-term complications and management strategies in this specific population are limited.
Methods: We retrospectively reviewed pediatric patients weighing less than 20 kg who underwent transvenous pacemaker or ICD implantation at our center between 2000 and 2025. Demographic data, underlying rhythm diagnoses, device type, lead longevity, device- and venous-related complications, management strategies, and follow-up outcomes were analyzed.
Results: Fifteen patients were included. Patient weight at the time of implantation ranged between 9 and 19 kg. Indications for device implantation were congenital complete atrioventricular (AV) block in 7 patients, postoperative complete AV block in 5 patients, and inherited arrhythmia syndromes in 3 patients (2 long QT syndrome, 1 Brugada syndrome). Three patients received an ICD, while the remaining patients underwent transvenous pacemaker implantation. The median lead longevity was 171 months (range: 23–288 months). Lead dysfunction occurred in four patients. One ICD patient developed lead fracture resulting in inappropriate shocks, and the entire system was subsequently extracted; the patient has since been followed without device therapy. In another patient, lead dysfunction was associated with severe tricuspid valve injury requiring surgical tricuspid valve replacement, and complete lead extraction was not feasible. In the remaining two patients with lead dysfunction, the leads could not be extracted due to venous complications: one patient had superior vena cava (SVC) occlusion, while in the other, the lead was firmly adherent to the innominate vein. Both patients underwent individualized management, including system revision when feasible. No device-related mortality occurred during follow-up.



Conclusions: In children weighing less than 20 kg, transvenous pacemaker and ICD implantation may result in clinically important lead-related complications, including inappropriate ICD shocks, major tricuspid valve injury requiring surgery, and complex extraction scenarios related to venous occlusion or lead adhesion. Careful patient selection and long-term follow-up are essential when transvenous systems are used in this population.



O-056 / #1220

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

BIOELECTRICAL IMPEDANCE ANALYSIS PARAMETERS AS PREDICTORS OF CARDIOPULMONARY EXERCISE CAPACITY IN FONTAN PATIENTS

Paola Koepcke, Sarah Zobel, Lena Walzer, Anastasia Schleiger, Victor Lengyel, Annalena Bettecken, Katja Weiss, Friederike Danne, Marcus Kelm, Peter Kramer, Felix Berger, Stanislav Ovrutskiy
Deutsches Herzzentrum der Charité, Department For Congenital Heart Disease - Pediatric Cardiology, Berlin, Germany

Background and Aim: Patients with Fontan circulation face high risks of declining physical capacity and may exhibit altered body composition, both of which are indicators of long-term morbidity. While cardiopulmonary exercise testing (CPET) is the gold standard for evaluating functional status, assessment of body composition is generally not routinely performed. We aimed to investigate the association between Bioelectrical Impedance Analysis (BIA) derived parameters and CPET results.
Methods: We performed a retrospective cross-sectional analysis of Fontan patients who underwent BIA during regular follow-up examinations in our institution between 02/2018 and 11/2020. Fifty-seven patients (median age 19.8 years, median follow-up after Fontan 13.3 years) were included. Data retrieved included BIA parameters (phase angle (PhA), lean mass percentage (LM%), body fat percentage (BF%), extracellular/body cell mass (ECM/BCM) index) and CPET results. Associations were evaluated using correlation coefficients and multivariable linear regression adjusted for age. Patients were stratified by median VO_2peak (ml/min/kg) into "preserved" (> 22.5 ml/min/kg) and "reduced" (≤ 22.5 ml/min/kg) exercise capacity groups to compare body composition profiles.
Results: Overall physical capacity was reduced in the cohort [median VO_2peak 22.5 (IQR 18.3-27.2) ml/min/kg; 59.6 (IQR 45.4-70.1) % predicted]. Median body mass index was normal [20.6 (IQR 17.7-24.0) kg/m^2]. BIA revealed a median PhA of 5.7 (IQR 4.9-6.6)° and ECM/BCM index of 0.94 (IQR 0.8-1.1). VO_2peak was positively correlated with LM% (r_s= 0.58, $p < 0.001$) and PhA (r_s= 0.48, $p < 0.001$). Strong negative correlations were observed between VO_2peak and both ECM/BCM index (r_s= -0.60, $p < 0.001$) and BF% (r_s= -0.55, $p < 0.001$). In multivariable linear regression analysis, PhA, LM%, BF% and ECM/BCM index remained significant predictors of VO_2peak independent of age. Patients in the "preserved" exercise capacity group demonstrated significantly lower ECM/BCM index, BF% and higher PhA and LM% compared to the "reduced" group.



Conclusions: BIA-derived parameters, particularly ECM/BCM index and LM%, are strongly correlated with exercise capacity in Fontan patients. BIA offers a simple, non-invasive tool to identify patients at risk of deconditioning and may improve risk stratification. Future studies should investigate correlations with hemodynamics and clarify whether BIA parameters represent modifiable targets for nutritional and exercise interventions to improve long-term prognosis.



O-057 / #1310

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

CLINICAL OUTCOMES OF BILATERAL CARDIAC SYMPATHETIC DENERVATION IN CHILDREN WITH INHERITED VENTRICULAR ARRHYTHMIAS

Murat Akkuş[1], Melike Ülker[2], Merve Maze Aydemir[3], Şerif Şerifoğlu[3], Murat Hanözü[4], Hasan Candaş Kafali[3], Yakup Ergul[3], Alper Güzeltaş[3]
[1]Memorial Bahçelievler Hospital, Department Of Thoracic Surgery, istanbul, Turkey, [2]Avrasya Hospital, Department Of Thoracic Surgery, Istanbul, Turkey, istanbul, Turkey, [3]University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Department Of Pediatric Cardiology, Istanbul, Turkey, [4]University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Department Of Thoracic Surgery, Istanbul, Turkey

Background and Aim: İntroduction
Inherited cardiac channelopathies, such as long QT syndrome (LQTS) and catecholaminergic polymorphic ventricular tachycardia (CPVT), are major causes of life-threatening ventricular arrhythmias in children. These arrhythmias are often triggered by increased sympathetic activity and may be refractory to medical therapy; therefore, cardiac sympathetic denervation has emerged as an adjunctive treatment. This study reports the clinical outcomes of bilateral cardiac sympathetic denervation in pediatric patients with LQTS and CPVT.
Methods: Methods
Clinical and follow-up data of pediatric patients who underwent BCSD were retrospectively analyzed. Pre- and postoperative symptoms, ventricular arrhythmia burden, and implantable cardioverter-defibrillator (ICD) shock frequency were evaluated.
Results: Results
A total of 52 patients who underwent BCSD were initially assessed; after exclusion of patients with incomplete or unavailable data, 49 patients were included in the final analysis. The median age at surgery was 12.18 years (IQR: 7.96–15.61). Twenty-seven patients were diagnosed with CPVT and 20 with LQTS. The median follow-up duration was 36.33 months (IQR: 18.93–53.37). Among 18 patients without an ICD, all experienced preoperative arrhythmic symptoms, including syncope or exercise-induced ventricular arrhythmias. Following BCSD, complete symptom resolution was observed in 11 patients (61.1%), while 4 patients (22.2%) showed a marked reduction in exercise-related



arrhythmias. One patient (5.5%) remained symptomatic and was scheduled for repeat denervation. Two patients (11.1%) died during follow-up; both deaths occurred several years after surgery and were unrelated to the procedure. Overall, 83% of patients demonstrated meaningful clinical improvement after BCSD. An ICD was present in 31 patients, 25 of whom had the device implanted prior to sympathetic denervation. BCSD was associated with a marked reduction in annual ICD shock burden, decreasing from a median of approximately 3 shocks per year before the procedure to 0 shocks per year during follow-up. Complete suppression of ICD shocks was achieved in nearly three-quarters of patients. No major complications or procedure-related mortality were observed.

Conclusions: Conclusion

BCSD showed favorable efficacy in pediatric patients with adrenergically mediated malignant ventricular arrhythmias, leading to reduced symptoms, arrhythmia burden, and ICD shocks with low procedural risk, supporting its role as an adjunctive therapy in refractory inherited ventricular arrhythmia syndromes..



O-059 / #267

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

OFF-LABEL MULTI-LEAD WEARABLE ECG MONITORING FOR PAEDIATRIC SYNCOPE IN COMPLEX CONGENITAL HEART DISEASE

Mindaugas Smetaninas[1], Sofija Šestak[1], Guostė Stankevičiūtė[1], Ričardas Kundelis[2], Artiomas Širvys[1], Dominyka Širvienė[1], Gintarė Pudinskaitė[1], Skaiste Sendzikaite[1,3], Justinas Bacevičius[1,2]
[1]Vilnius University Faculty of Medicine, Vilnius, Lithuania, [2]Vilnius University Hospital Santariškių Klinikos, Vilnius, Lithuania, [3]Vilnius University Faculty of Medicine, Institute Of Clinical Medicine, Department Of Cardiovascular Diseases, Cardiothoracic Surgery Center, Vilnius, Lithuania

Background and Aim: Diagnostic evaluation of ambiguous symptoms in children with complex congenital heart disease (CHD) is often challenging. Dizziness in this population may result from diverse cardiac or extracardiac mechanisms, making rhythm–symptom correlation essential yet difficult to obtain. Conventional short-duration ambulatory ECG monitoring frequently fails to capture sporadic events within limited recording windows. We report the first off-label paediatric application of a novel six-lead wrist-worn photoplethysmography (PPG)- and ECG- based monitoring device-originally designed for adults, to determine the etiology of recurrent dizziness in a 6-year-old boy with uncorrected CHD and Eisenmenger syndrome.
Methods: The patient is a 6-year-old boy with tricuspid atresia, hypoplastic right ventricle, complete transposition of the great arteries, and obligatory atrial and ventricular septal defects. His family declined surgical palliation after birth, and he subsequently developed Eisenmenger syndrome. Recently he presented with intermittent non-exertional (pre-)syncope occurring at rest. Initial evaluation, including transthoracic echocardiography, laboratory testing, and neurological evaluation, did not identify a specific cause. 24-hour Holter monitoring was performed with no episodes of (pre-)syncope during the recording window. Thus, it failed to confirm or exclude an arrhythmogenic cause. Due to clinical suspicion of intermittent bradyarrhythmia, empiric pacemaker implantation was considered. However, as a final diagnostic step, long-term outpatient monitoring with a wrist-worn, six-lead ECG system was initiated off-label following multidisciplinary consensus. Continuous PPG-based rhythm surveillance combined with on-demand multi-lead ECG acquisition enabled real-time evaluation during spontaneous symptomatic events at home.



Results: During prolonged 30-day monitoring, the wearable device successfully captured multi-lead ECG during both dizziness and syncope episodes. No significant bradyarrhythmias or tachyarrhythmias were present at the time of symptoms. This effectively excluded a rhythm-related mechanism, preventing unnecessary invasive electrophysiological study or pacemaker implantation, and redirected clinical evaluation toward more probable hypotensive or neurological causes.
Conclusions: This case illustrates the limitations of short-term ECG monitoring for intermittent paediatric syncope in complex congenital heart disease. The diagnostic challenge was solved by the first off-label use of a wrist-worn device combining PPG and six-lead wire-free ECG monitoring in a child, enabling precise rhythm–symptom correlation and avoiding unnecessary intervention. Such technologies may support individualized evaluation of syncope in similarly high-risk paediatric populations.



O-060 / #545

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

ELECTROMECHANICAL INTERACTION IN POST-REPAIR TETRALOGY OF FALLOT AND SIMILAR LESIONS

Michal Vrbík[1], Jennifer Fumanelli[2], Terezia Tavačova[1], Peter Kubuš[1], Roman Gebauer[1], Jan Kovanda[1], Jan Janoušek[1]
[1]Children´s Heart Centre, 2nd Faculty Medicine, Charles University and University Motol Hospital, Prague, Czech Republic, [2]Children´s Heart Centre, Motol Hospital, Prague, Prague, Czech Republic

Background and Aim: Patients after repair of tetralogy of Fallot (ToF) and similar lesions frequently exhibit right bundle branch block and decreased right ventricular (RV) function. We sought to study ventricular electromechanical interaction as a potential substrate for RV cardiac resynchronization therapy (RV CRT).
Methods: Cross-sectional single center study in 47 pts after biventricular repair (ToF=37, pulmonary atresia=7, absent pulmonary valve syndrome=2, patent truncus arteriosus=1) aged median (IQR) 0.8 (0.2-1.1) yrs at primary repair and 15.1 (12.6-17.3) yrs at evaluation. Ultra-high frequency ECG (UHF ECG) and speckle tracking echocardiography were used to detect local ventricular electrical activation and peak segmental contraction timing and to quantify electromechanical dyssynchrony.
Results: At baseline all pts. showed right bundle branch block with a mean (SD) QRS duration of 149 (24) ms. UHF ECG (Figure 1) visualized local electrical activation timing across both ventricles. In the majority of pts (37/47) RV outflow tract was activated later than RV inflow with a median (IQR) delay of 10 (6-20) ms (Figure 2). A linear correlation was found between QRS duration and maximum electrical delay between the septum/left ventricle (LV) and the RV free wall (RVFW) ($R=0.827$, $p<0.001$) as well as between the time to segmental electrical activation and peak contraction ($R=0.518$, $p<0.001$) (Figure 3). Maximum mechanical delay between the septum/LV and RVFW was, however, significantly longer than the electrical delay (mean (SD) 113 (50) vs 80 (22) ms, $p<0.001$). RV electromechanical dyssynchrony was accompanied by pre-stretch (PS, median 4.4, IQR 1.2-12.8 %), post-systolic strain (PSS, median 2.3, IQR 1.0-6.5 %) and PS+PSS/effective shortening ratio (median 0.20, IQR 0.08-0.54) in late activated RVFW segments. PS and PSS did not, however, correlate with the maximum electrical
delay.

Figure 1: UHF ECG lead positions (C1-8 and CX1-5 = V1-8 and VX1-5)

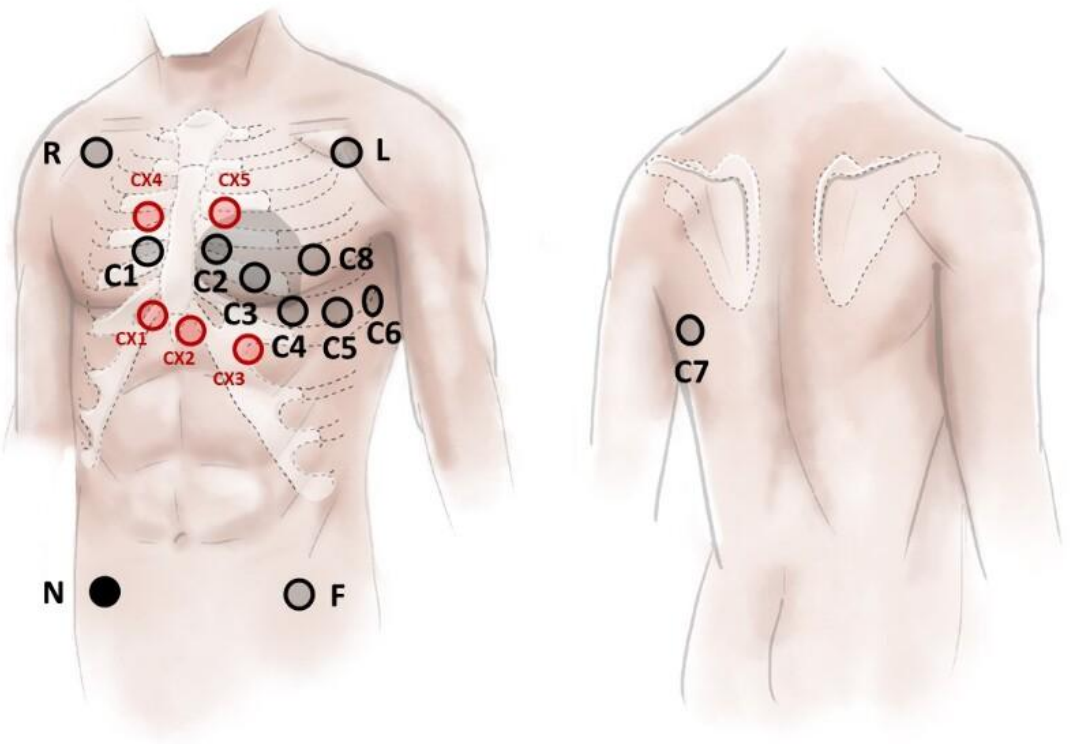


Figure 2: UHF ECG activation map

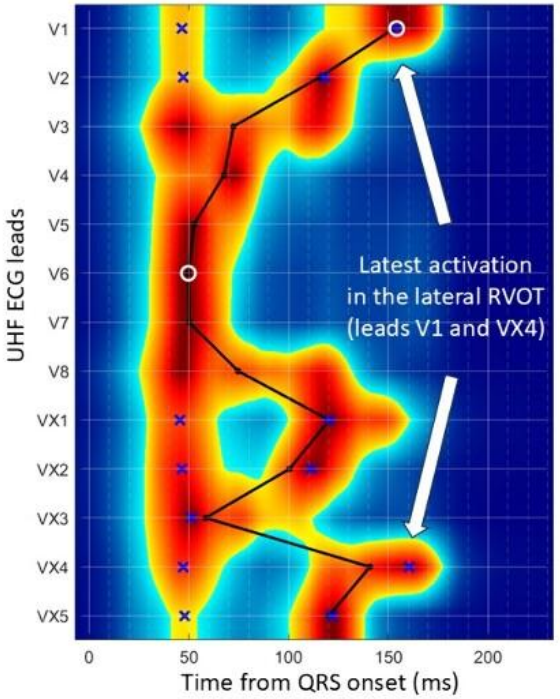
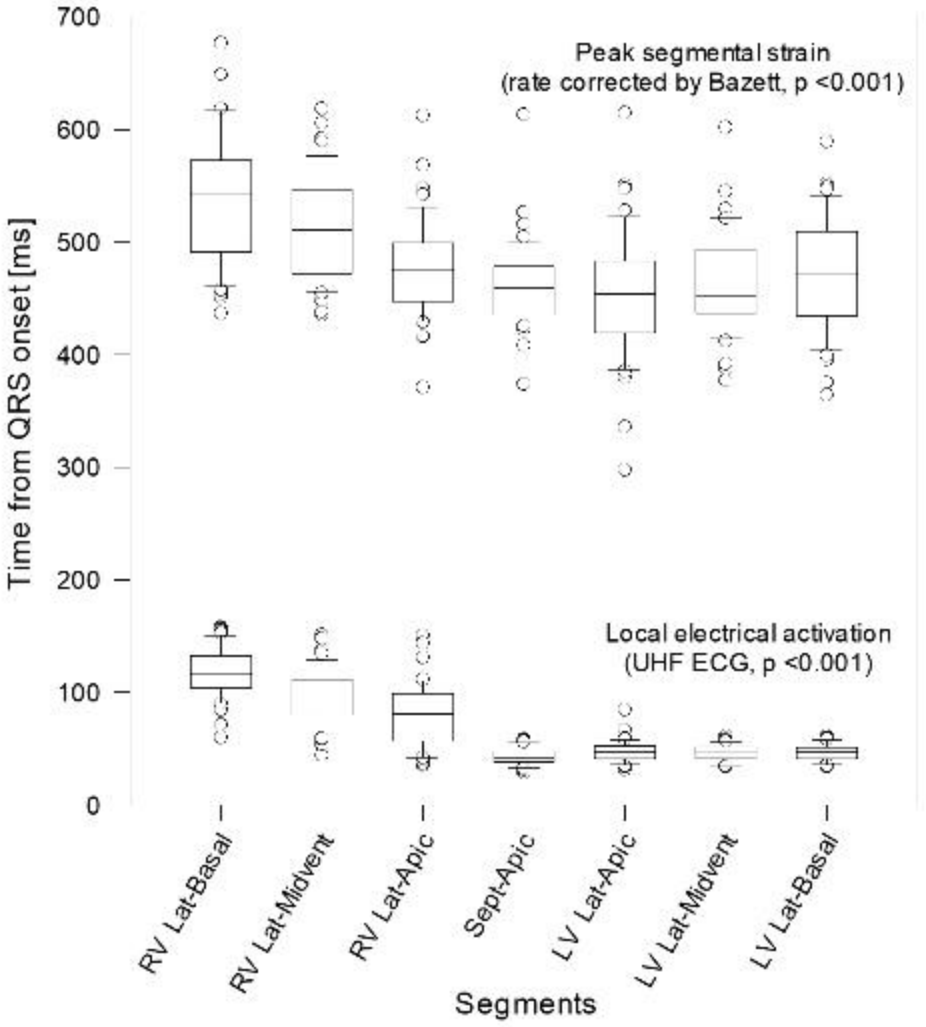




Figure 3: Electromechanical interaction



Conclusions: Patients with repaired ToF and similar lesions exhibit significant RV electromechanical dyssynchrony detectable by UHF ECG and speckle tracking echocardiography with correlated segmental electrical activation and contraction timing. Mechanical dyssynchrony exceeds, however, the electrical. The amount of PS and PSS



does not correlate with electrical activation delay. Indication for RV CRT should be based on the presence of both electrical dyssynchrony and its mechanical counterpart. UHF ECG may allow for accurate lead placement.



O-061 / #1434

CARDIAC DYSRHYTHMIAS AND ELECTROPHYSIOLOGY & SPORTS CARDIOLOGY, PHYSICAL ACTIVITY AND PREVENTION ABSTRACT SESSION
15-05-2026 09:00 - 10:30

TRANSITION FROM FLUOROSCOPIC TO FLUOROLESS ATRIAL TRANSSEPTAL PUNCTURE FOR PEDIATRIC CATHETER ABLATION

Zsofia Nagy, Andrea Fleisz, Orsolya Csenteri, Laszlo Kornyei
Gottsegen National Cardiovascular Center, Budapest, Hungary

Background and Aim: Transseptal puncture (TSP) is traditionally performed under fluoroscopic guidance, which allows visualization of the needle and sheath but exposes patients and operators to ionizing radiation. Advances in intracardiac echocardiography (ICE) have enabled fluoroless procedures, but comparative pediatric data remain limited. Our aim was to assess the safety, efficacy, and procedural outcomes of ICE-guided, zero-fluoroscopy TSP in pediatric catheter ablation, including cases requiring conversion to fluoroscopy, and to compare results with conventional fluoroscopy-guided procedures.
Methods: Between September 2022 and October 2025, 99 consecutive pediatric patients underwent primary ICE-guided zero-fluoroscopy TSP (ICE group) and were compared with a historical cohort 50 fluoroscopy-guided cases (Fluoro-group, October 2019-August 2022). Demographic data, procedural success, complications, and radiation exposure were evaluated, with special attention to cases requiring fluoroscopic conversion.
Results: A total of 149 TSPs (99 ICE, 50 Fluoro) were analyzed. The median age was 14 [IQR 11–16; range 4–18] in the ICE group and 15 [IQR 11–16; range 6–18] in the Fluoro group; median weight 59 [IQR 48.5–67] vs. 63 [IQR 42.5–71.75] kg, respectively. TSP success was 100% in both groups, with no significant differences in complication rates (6.1% vs. 2.0%; p = 0.424). Conversion to fluoroscopy occurred more often in the ICE group (35.4% vs. 20.0%; p = 0.054) but did not increase complications. Rates of pericardial effusion (1.0% vs. 2.0%; p = 0.999) and transient AV block (5.1% vs. 0%; p = 0.169) were comparable. Even with conversion, radiation exposure remained markedly lower in the ICE group: fluoroscopy time (1.64 ± 1.62 vs. 2.87 ± 2.53 min; p = 0.0047), cumulative dose (1.49 ± 5.22 vs. 2.16 ± 3.15 mGy; p = 0.0001), and DAP (15.94 ± 48.20 vs. 20.8 ± 33.4 cGy·cm^2; p = 0.0141). Among converted cases, complication, pericardial effusion, and AV block rates (2.22% vs. 5.77%; 0% vs. 1.92%; 2.22% vs. 3.85%; all p > 0.6) were not significantly different.
Conclusions: ICE-guided zero-fluoroscopy TSP is a safe and effective approach for pediatric ablation. Even when conversion to fluoroscopy is required, radiation exposure remains markedly lower than with standard fluoroscopy-guided procedures, confirming its role in minimizing radiation without compromising safety or efficacy.



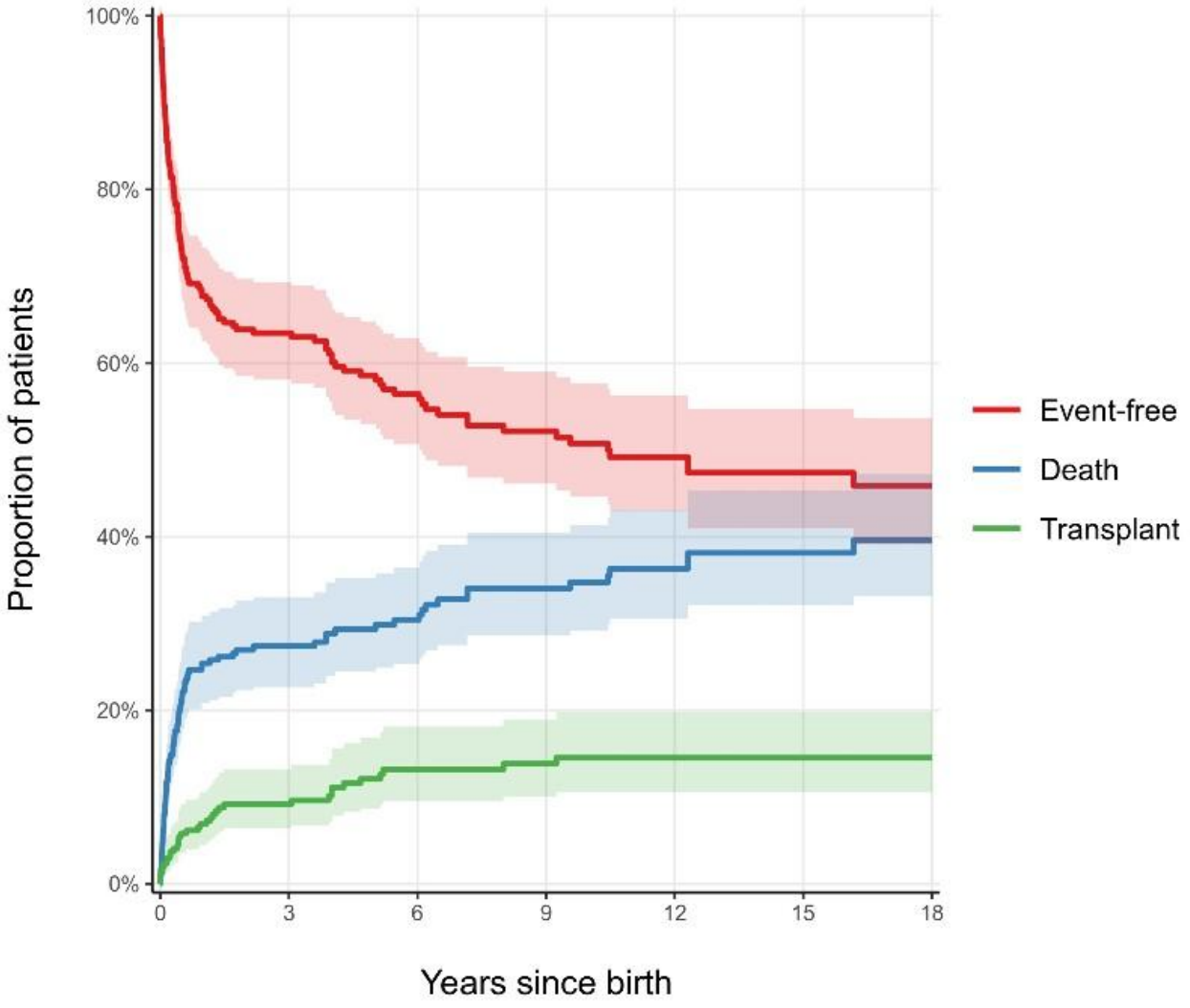
O-062 / #245

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

OUTCOME OF PRENATALLY DIAGNOSED SINGLE VENTRICLE HEART DISEASE THROUGH 18 YEARS OF AGE: A SINGLE-CENTRE RETROSPECTIVE STUDY

Swapna Sivadas Thilakam, Lindsay Freud, Michael Seed, Vitor Guerra, Mrinal Lad, Koyelle Papneja, Osami Honjo, Gloria Ho, Alejandro Floh
The Hospital for Sick Children, Cardiology, TORONTO, Canada

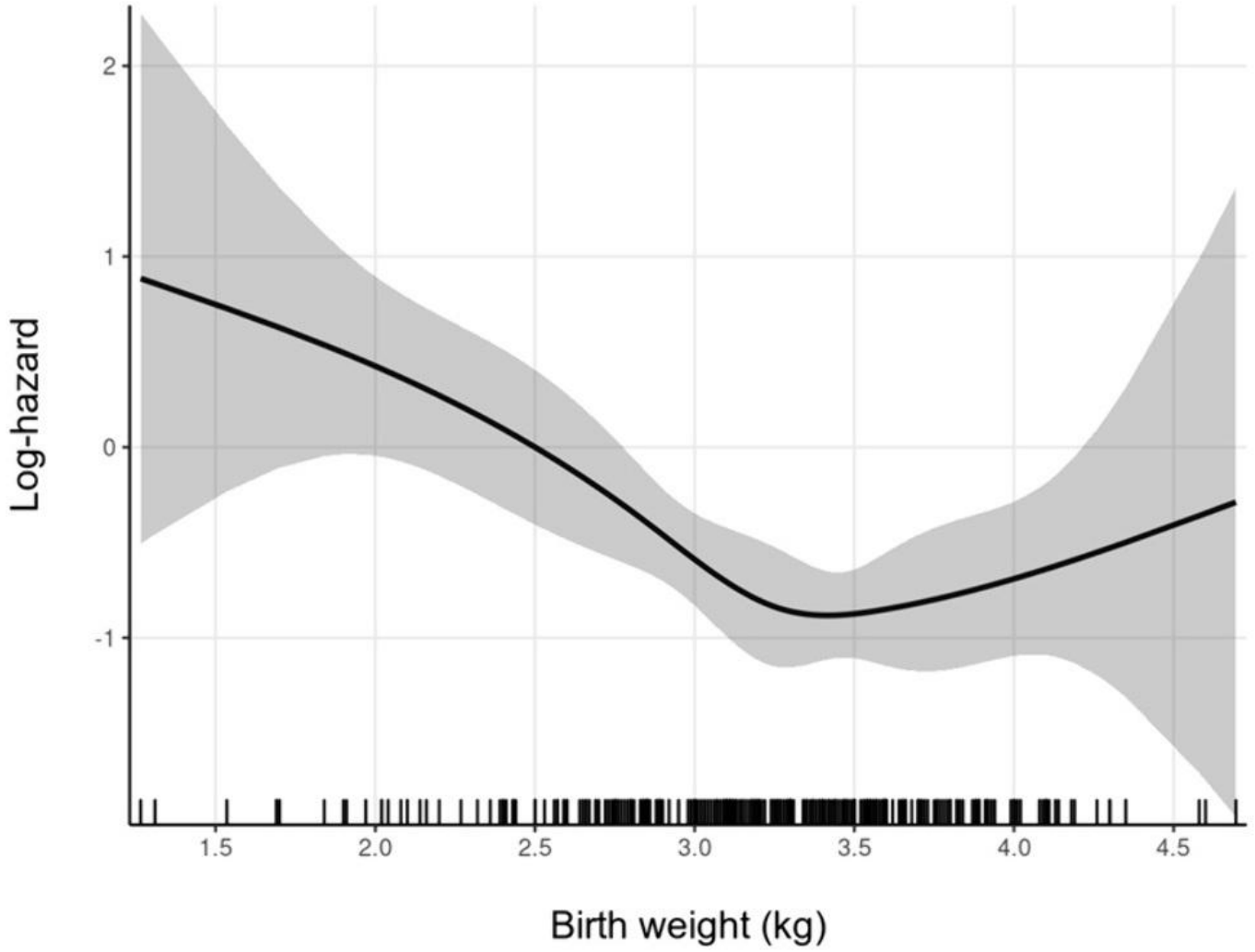
Background and Aim: Single ventricle heart disease (SVHD) is a collection of severe forms of congenital heart disease that rely on one ventricle to support the circulation. Despite increasing prenatal detection, long-term outcome data from the time of fetal diagnosis are lacking to counsel expectant families. We sought to report outcomes among prenatally diagnosed SVHD patients who were live-born with intention-to-treat (ITT) at our centre and to investigate factors affecting transplant-free survival.
Methods: We performed a retrospective study of prenatally diagnosed SVHD patients from 1999 to 2022. Mortality of live-born ITT patients was estimated using the Gray sub-distribution method. Multivariable cause-specific hazard regression was used to assess the effects of right ventricular (RV) dominant morphology, heterotaxy, genetic abnormality or extracardiac malformation (G-ECM), adverse maternal-fetal environment (defined as maternal age>35 years, fetal growth restriction, or pregnancy-related disorder, i.e., preeclampsia), and birth weight (BW) on the hazard of death, with transplant as a competing risk. A secondary analysis was performed, adding era of birth by 5 year-intervals.
Results: Of 719 fetuses diagnosed with SVHD, 360 (50.0%) were live-born (313 [43.5%] terminations, 42 [5.8%] demises, and 4 [<1%] unknown pregnancy outcome). 60 families (16.7%) opted for compassionate care, yielding 300 live-born ITT SVHD patients. Median BW was 3.26 kg (IQR: 2.85-3.60 kg), 74.3% had RV morphology, 6.0% heterotaxy, 22.3% G-ECM, and 28.7% adverse maternal-fetal environment. 109 patients died, and 36 were transplanted at median of 4.8 months (1.4-20.4) and 9.0 months (2.6-39.3), respectively. 18-year transplant-free survival was 45.9% (95%CI: 39.2-53.7%), with 39.6% (33.2-47.3%) mortality and 14.5% (10.6-19.8%) transplant (Figure 1). Regression analysis (Figure 2) demonstrated increased risk of death with RV morphology (HR 1.82, 95%CI: 1.05-3.14) and a non-linear relationship with BW (p=0.001, Figure 3). In the secondary analysis, era of birth was not associated with transplant-free survival.



At-risk N:	300	143	98	74	57	36	23



Variable	HR [95% CI]	*P*-value
Heterotaxy	1.640 [0.747, 3.601]	0.22
Right ventricular dominant morphology	1.816 [1.052, 3.137]	0.032
Adverse maternal-fetal environment	0.810 [0.508, 1.291]	0.38
Known genetic abnormality or extracardiac malformation	1.063 [0.653, 1.730]	0.81
Birth weight (kg)	Figure 3 (non-linear relationship)	0.001



Conclusions: By 18 years of age, less than half of prenatally diagnosed SVHD patients were alive without transplant. The hazard of death was increased for RV morphology and both small and large for gestational age BW, which may be a modifiable risk factor.



O-063 / #300

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

RIGID MOTION COMPENSATION OF FETAL GROSS MOTION AND MATERNAL RESPIRATION FOR 3D FETAL CARDIAC CINE

Mattias Karlsson[1,2], Marjolein Piek[1,2,3], Erik Hedström[1,2,4], Anthony Aletras[1,2,5]
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Background and Aim: Fetal cardiovascular magnetic resonance CINE images serve as an important complementary tool to ultrasound for evaluating fetal cardiac anatomy, function, and pathology. A 3D radial pulse sequence has previously been developed for use during maternal free-breathing (Piek et al., MRM 2022). However, fetal gross motion and maternal respiratory motion reduce image quality, negatively affecting the method's clinical value. Therefore, the aim was to evaluate whether correcting for fetal gross motion and maternal respiration in k-space using rigid motion compensation increases diagnostic quality.
Methods: Fetal 3D CINE data were acquired over four minutes of maternal free-breathing using a 3D slab-selective radial balanced SSFP research sequence (Piek et al., MRM 2022) with synchronized Doppler ultrasound cardiac gating (smart-sync, Northh Medical) on a 1.5T MAGNETOM Aera (Siemens Healthineers). Gross fetal motion was corrected for by reconstructing 10-second intervals using compressed sensing. A region of interest (ROI) was manually selected around the heart, and intervals with high entropy in the ROI were excluded. A particle swarm algorithm aligned remaining volumes to a reference by optimizing mutual information via rotation and translation. To correct for maternal respiration, a unitless signal was extracted from the k-space origin using a second-order Chebyshev type 2 bandpass filter. This signal was multiplied by a translation vector to estimate spatial displacement, and the translation vector was optimized to minimize ROI entropy on non-uniform Fourier transform reconstructions using a second particle swarm algorithm. 3D CINEs with 12 cardiac phases acquired in 12 fetuses were reconstructed via compressed sensing with and without correction. A blinded experienced observer scored cardiac diagnostic quality on a visual analogue scale using multiplanar reformatted transversal and short-axis views from the 3D CINE volumes.
Results: Figure 1 shows cardiac diagnostic quality scores, where motion-corrected CINEs

showed higher diagnostic quality scores ($p = 0.009$ using Wilcoxon signed-rank test). Figures 2 and 3 illustrate the varying quality of the CINEs.

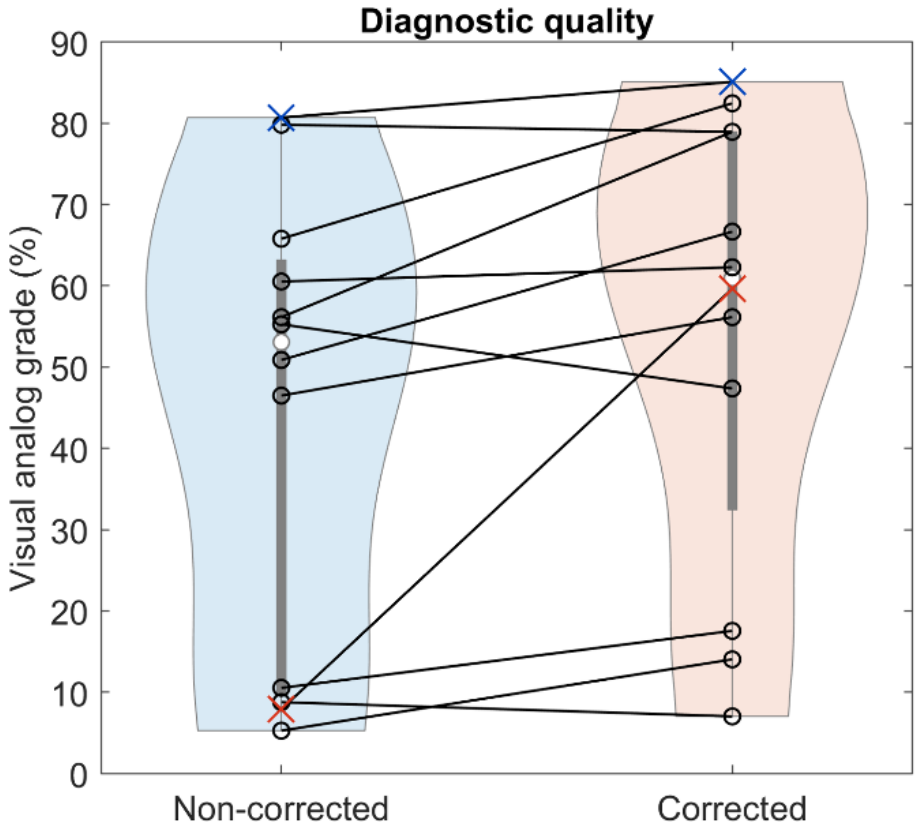


Figure 1. Diagnostic quality scores for non-corrected and corrected CINEs. Transversal views for fetus marked with orange and blue crosses can be seen in Figure 2 and Figure 3, respectively.

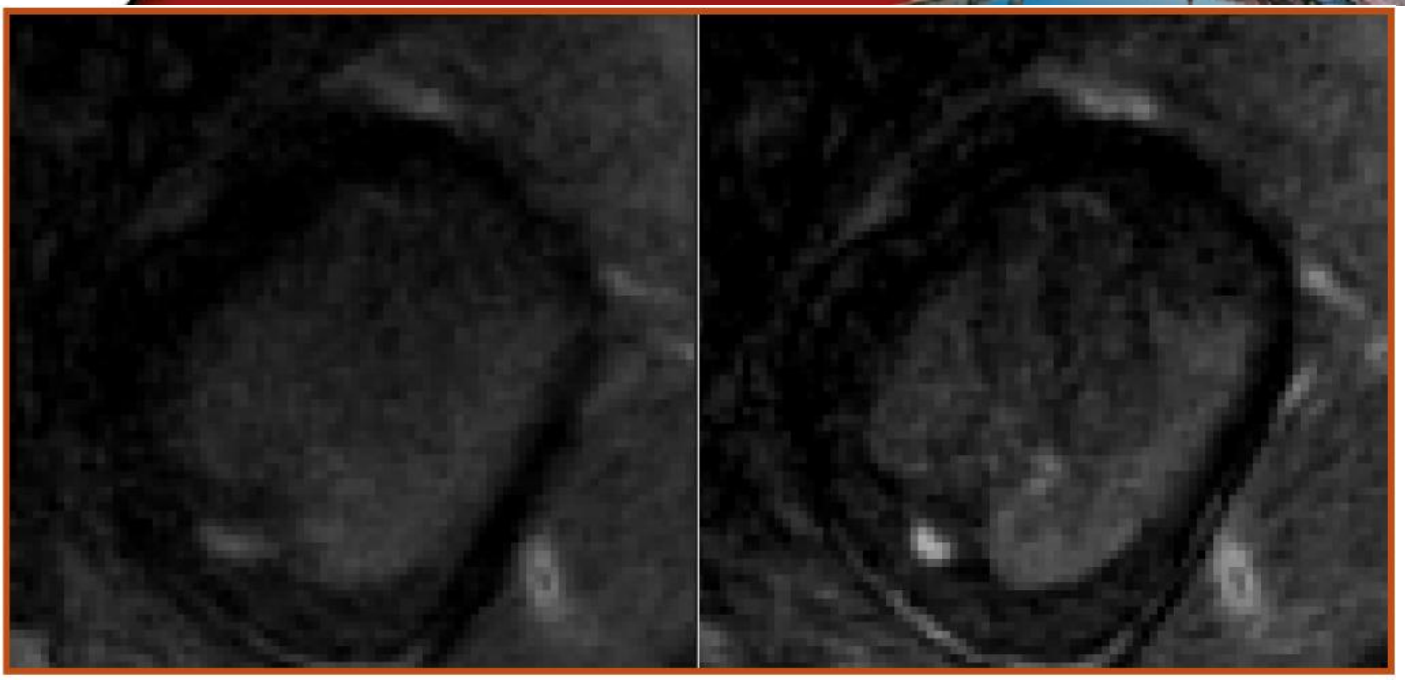


Figure 2. Original (left) and corrected (right) transversal view for the fetus marked by the orange cross in Figure 1. Increased edge sharpness in the motion-corrected image markedly increased diagnostic quality from inconclusive to being able to assess ventricular volumes and function.

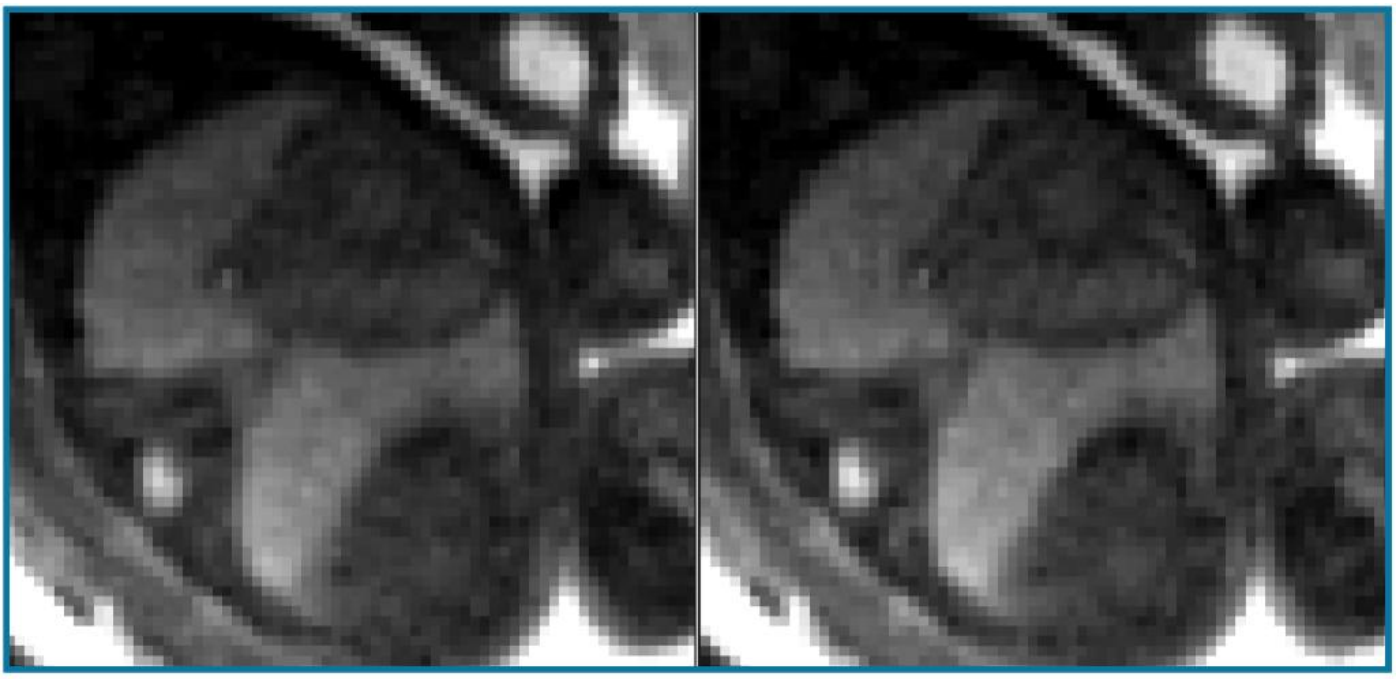


Figure 3. Original (left) and corrected (right) transversal view for the fetus marked by the blue circle in Figure 1. Overall cardiac diagnostic quality did increase marginally.



Conclusions: Rigid motion correction of fetal gross motion and maternal respiratory motion increased the diagnostic quality of 3D fetal CINE volumes, improving the robustness of free-breathing fetal cardiac CINE. The authors gratefully acknowledge Siemens Healthineers for providing access to pulse sequence development tools.



O-064 / #66

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

INTEGRATING MULTIMODAL IMAGING IN FETAL CONGENITAL HEART DISEASE: THE COMBINED ROLE OF ECHOCARDIOGRAPHY AND CARDIOVASCULAR MRI IN A PRECISION MEDICINE APPROACH.

Marco Masci[1], Brahmdeep S Saini[1], Josh Van Amerom[2], Christopher Macgowan[2], Koyelle Papneja[1], Alessandra Toscano[3], Lindsay Freud[1], Michael Seed[1]
[1]The Hospital for Sick Children, Cardiology, Elizabeth St, Toronto, ON, Canada, [2]The Hospital for Sick Children, Translational Medicine, Toronto, Canada, [3]Bambino Gesù Children's Hospital, Rome, Italy

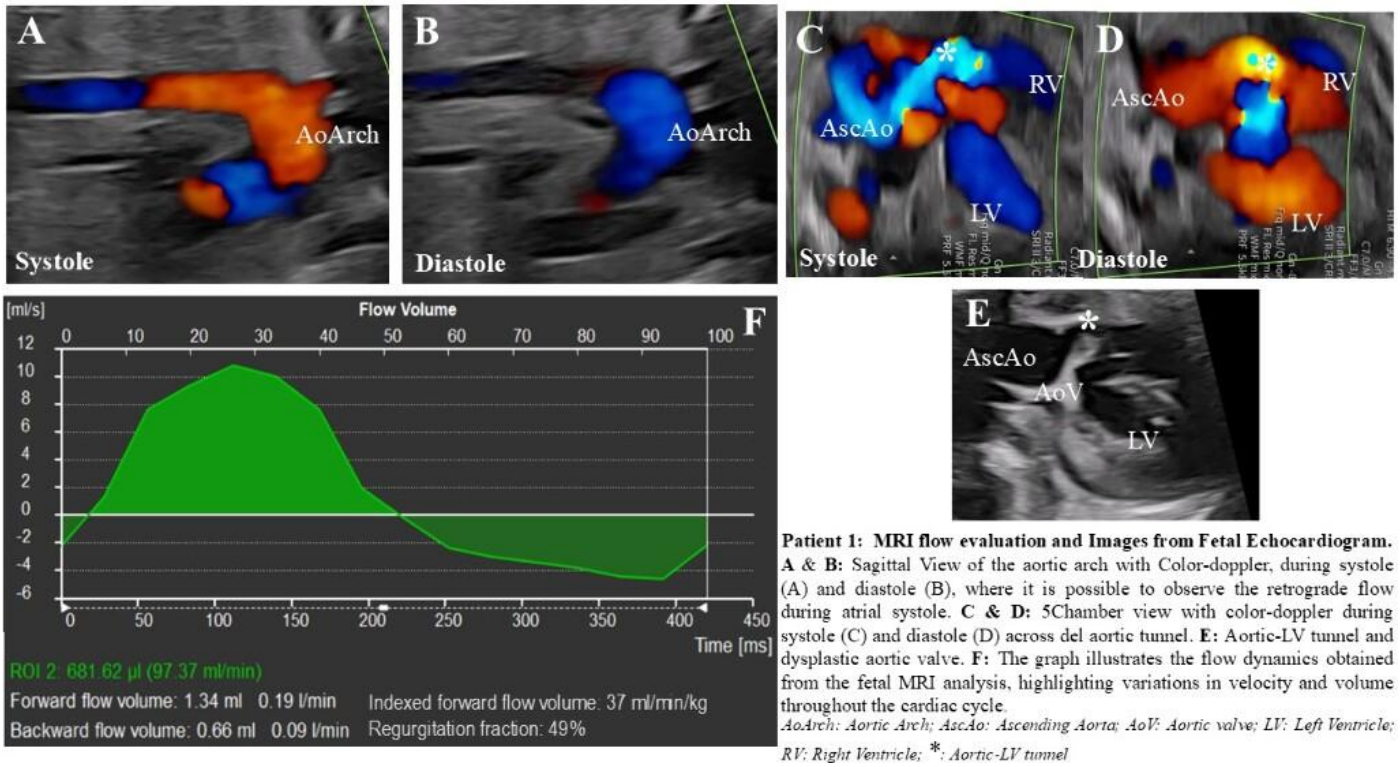
Background and Aim: Fetal echocardiography remains the primary diagnostic tool for the assessment of congenital heart disease (CHD) in utero. Despite its high diagnostic accuracy, fetal echocardiography can benefit, in selected cases, from complementary fetal cardiovascular magnetic resonance imaging (MRI). The aim of our study is to describe what fetal MRI can truly add to the already reliable and accurate Fetal echo evaluation.
Methods: From September 2025 to October 2025, we evaluated three consecutive cases of fetuses affected by three different types of CHDs, for which fetal MRI was performed based on three distinct clinical indications. Both echocardiographic and magnetic resonance imaging findings were analyzed.
Results: The three cases, summarized in Figure 1, presented distinct clinical scenarios: one fetus with severe aortic stenosis–regurgitation (likely due to a congenital aortic tunnel), associated with marked dilation of the ascending aorta, retrograde flow throughout the aortic arch, and severe left ventricular hypertrophy and systolic dysfunction (Fig.2); one fetus with a borderline left ventricle, complex aortic coarctation, and mitral valve dysplasia with moderate regurgitation (Fig.3); and one fetus with HLHS, mitral atresia-aortic stenosis variant, complicated by severe obstruction to pulmonary venous return (Fig.4).
Despite their heterogeneity, all cases shared a profound impact on fetal hemodynamics and, unfortunately, features contributing to an uncertain prognosis, thereby influencing prenatal
counseling.



Table1. Summary Table of Imaging Features, Referral Reasons, and Fetal Outcomes

	Fetal Echo	MRI Indication	Gestational Age MRI	Fetal Cardiac MRI	Additional MRI Benefit	Postnatal/Outcome
pt.1	• **LV-Ao tunnel** (severe stenosis and regurgitation), • Severely dysplastic aortic valve, • Hypertrophied and dysfunctional LV/EFE.	Is the anterograde flow through the aortic valve adequate to support systemic circulation? How severe is the aortic regurgitation? Is cerebral blood flow preserved?	35w+6d	• Severe retrograde diastolic flow in AA, Aortic RF: 50% • Diminutive net aortic forward flow. • Compensatory increase in flow across the MPA and DA with retrograde flow into the arch. • Preservation of cerebral blood flow	Program of PGE at birth **confirmed**	LV-Ao tunnel closure (aortic end); Aortic valvotomy; Right coronary cusp patch augmentation; S/P Ross-Konno procedure; closure of the residual LV-Ao tunnel with the autograft muscle cuff; S/P Right coronary osteoplasty with a treated pericardial patch.
pt.2	• **Borderline left ventricle**, • Mildly hypoplastic, dysplastic MV with moderate regurgitation and closely spaced papillary muscles, • LVOT and aortic valve hypoplasia, • Hypoplastic aortic arch. • CVO: 450 mL/min/kg (CO LV: 93mL/min/kg)	What is distribution of blood flow and ventricular volumes?	35w+2d	• LV hypoplasia with reduced antegrade flow in the AA • LVEDVI: 21 ml/m2 • CVO: 445 ml/min/kg (CO LV: 90 ml/min/kg)	Hypothesis of borderline left ventricle with reduced anterograde flow through aortic valve **confirmed**	Comfort/compassionate care
pt.3	• **HLHS MS/AS** with small VSD. Hypoplastic aortic arch. • **Severe obstruction of pulmonary vein egress** (PV Doppler with to-and-fro flow, VTI ratio 1) due to **Membranous structure or infolding**. • Small decompressing chamber, with anomalous and tortuous drainage in SVC, which seems also obstructed	Lungs anatomy? Decompressing chamber with abnormal pulmonary veins drainage?	27w+6d	• Pulmonary lymphangiectasia (right worse than left) • Tortuous connection between the pulmonary veins and the SVC	Abnormal and severely obstructed pulmonary venous drainage **confirmed** Information about lungs anatomy **added**	Ongoing pregnancy Multidisciplinary team discussion: aim of concordant care and compassionate care

AA: Ascending aorta; Ao: Aorta; LV-Ao: Left ventricle-aorta; CO; Cardiac output; CVO: Combined ventricular output; DA: Descending aorta; EFE: Endocardial fibroelastosis; HLHS; Hypoplastic lef heart syndrome; LV: Left ventricle; LVOT: Left ventricular outflow tract; MPA; Main pulmonary artery; PGE: Prostaglandin; RF: Regurgitation fraction; SVC: Superior vena cava



Patient 1: MRI flow evaluation and Images from Fetal Echocardiogram. **A & B:** Sagittal View of the aortic arch with Color-doppler, during systole (A) and diastole (B), where it is possible to observe the retrograde flow during atrial systole. **C & D:** 5Chamber view with color-doppler during systole (C) and diastole (D) across del aortic tunnel. **E:** Aortic-LV tunnel and dysplastic aortic valve. **F:** The graph illustrates the flow dynamics obtained from the fetal MRI analysis, highlighting variations in velocity and volume throughout the cardiac cycle.
*AoArch: Aortic Arch; AscAo: Ascending Aorta; AoV: Aortic valve; LV: Left Ventricle; RV: Right Ventricle; *: Aortic-LV tunnel*



Patient 2: Images from Fetal Echocardiogram, MRI and 3D reconstruction.

A & B: Cross-sectional View at the level in short axis, in end-diastole and end-systole, where it is possible to observe closer papillary muscles.

C & D: 2D Short axis Cine in fetal MRI, with contouring for volumes evaluation (yellow for RV, red for LV).

E & F: Fetal echo 4Chamber view in end-diastole (E) and end-systole (F)

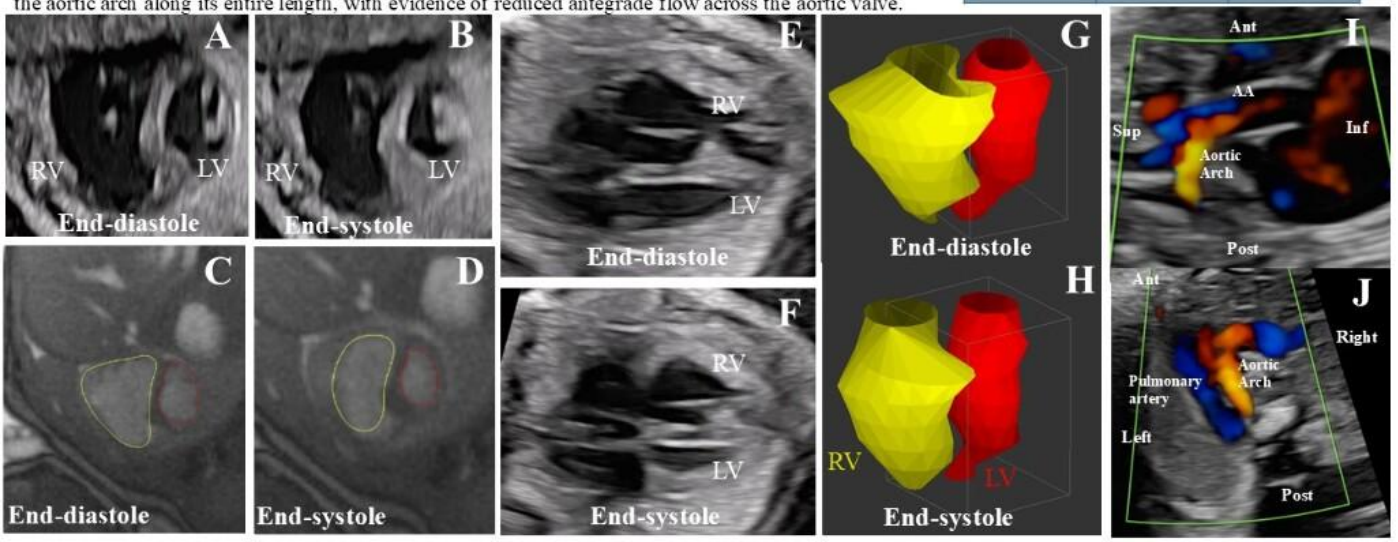
G & H: MRI 3D reconstruction of LV (red) and RV (yellow), both in end-diastole(G) and end-systole (H)

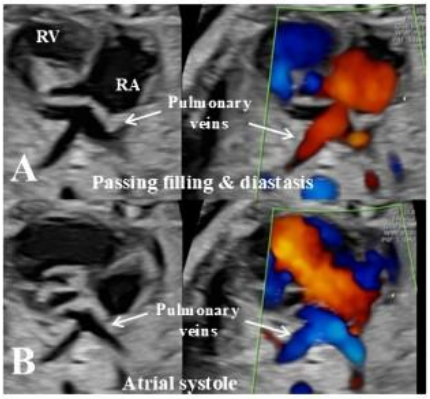
I &J: Sagittal view (I) and 3-vessel view projection (J) on echocardiography show retrograde flow in the aortic arch along its entire length, with evidence of reduced antegrade flow across the aortic valve.

AA: Ascending aorta; Ant: Anterior; Inf: inferior; LV: Left ventricle, Post: Posterior; RV: Right ventricle; Sup: superior.

Tab.2 MRI flows and volume evaluation

LV Cardiac Index (ml/min/kg)	CVO indexed (ml/min/kg)	LV EDVi (ml/m2)
90	445	20



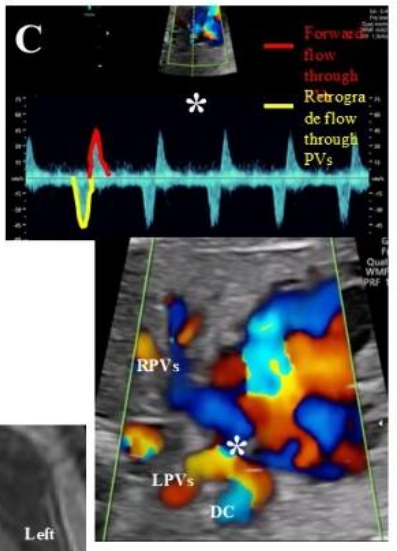


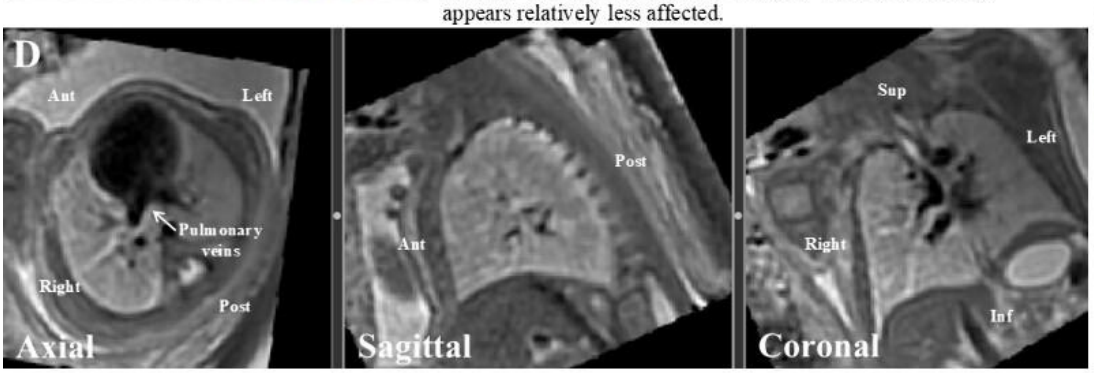
Patient 3: Images from Fetal Echocardiogram and MRI.

A & **B:** Cross-sectional View at the level of pulmonary veins, with and without Color-doppler, during passive filling and diastasis (A) and atrial systole (B), where it is possible to observe the retrograde flow during atrial systole.

C: Cross-sectional view at the level of the pulmonary veins showing flow acceleration in the pulmonary venous drainage (*) with an associated pulmonary vein Doppler pattern demonstrating a prominent A-wave reversal in the upper panel. A decompressive chamber (DC) of the right pulmonary veins is also present.

D: lungs anatomy in fetal MRI, that shows linear hyperintensities in the lung interstitium in keeping with pulmonary lymphangectasia. The right lung is more severely affected with marked changes, while the left lung appears relatively less affected.





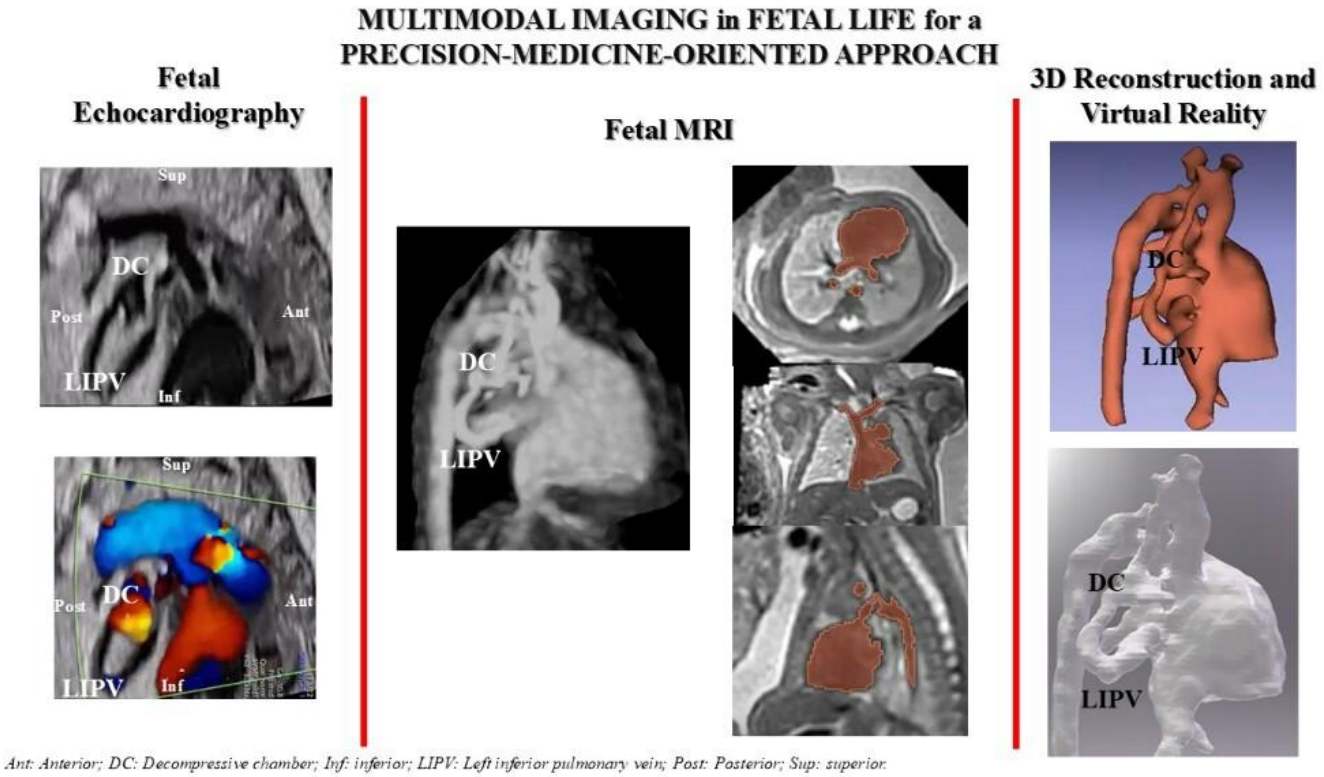
Ant: Anterior; DC: Decompressing chamber; Inf: inferior; LPVs: Left pulmonary veins; Post: Posterior; PVs: pulmonary veins; RA: Right Atrium; RPVs: Right pulmonary veins; RV: Right Ventricle; Sup: superior.

Conclusions: Through a multimodal imaging approach, we were able to clarify the pathophysiological mechanisms and their impact on the expected outcomes of three

fetuses with complex and heterogeneous CHDs. In particular, we used advanced tools to generate segmentation analysis, 3D reconstruction and virtual reality model (Fig.5). The use of multimodal imaging, and specifically a second-level technique such as fetal MRI, should not primarily aim at refining intracardiac anatomical details, but rather at providing additional information on pathophysiology, including flow and volume alterations, as well as extracardiac findings.

With this personalized, precision-medicine–oriented approach, it is possible to obtain a more comprehensive understanding of the clinical scenario and, consequently, of the expected outcomes for each patient. This case-by-case differentiation may substantially improve prenatal counseling and parental awareness, supporting a pathway of concordant and informed

care.



Ant: Anterior; DC: Decompressive chamber; Inf: inferior; LIPV: Left inferior pulmonary vein; Post: Posterior; Sup: superior.



O-065 / #70

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

ANATOMICAL STUDY OF TRICUSPID ATRESIA: INSIGHTS INTO RIGHT VENTRICLE DEVELOPMENT

Julie Karila Cohen
NECKER HOSPITAL, PARIS, France

Background and Aim: Congenital heart defects are among the most frequent malformations, affecting 7 in 1,000 pregnancies in Europe. Tricuspid atresia (TA) represents 2.7% of cyanotic heart defects. The right ventricle (RV), whose morphology depends on its muscular bands, remains less well understood. This study aimed to analyze human fetal and neonatal hearts with TA to determine whether the presence of RV muscular bands correlates with the degree of tricuspid valve development.
Methods: We conducted a retrospective, descriptive study on 44 fetal and neonatal cardiac specimens from the Necker-Enfants Malades anatomical collection. Each specimen was examined macroscopically to assess tricuspid valve morphology, ventricular anatomy, and presence of RV muscular structures (septal band, moderator band, anterior papillary muscle). Statistical analyses were performed using Fisher's exact test ($\alpha = 0.05$) to compare muscular versus membranous TA.
Results: Among 44 specimens, 39 presented muscular and 5 membranous TA. The moderator band was absent in 38/39 muscular cases but constant in all membranous cases ($p < 0.001$). The septal band, Y-shaped septal branch, and anterior papillary muscle were also significantly more frequent in membranous TA. The pulmonary valve was agenetic in 60% of membranous TA versus 2.5% of muscular TA ($p < 0.01$). These findings demonstrate morphological heterogeneity linked to the timing of embryonic developmental arrest.
Conclusions: Our results support the hypothesis that the septal and moderator bands of the RV originate from the tricuspid myocardial primordium (tricuspid gully), while the parietal band and subpulmonary conus derive from the heart's inner curvature. This dual embryologic origin explains the absence of these structures in early developmental failure (muscular TA) and their preservation in later anomalies (membranous TA). This study strengthens the developmental model of the RV and highlights the importance of the tricuspid inlet in its morphogenesis



O-066 / #72

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

EVALUATING THE ROLE OF FETAL SPECKLE TRACKING ECHOCARDIOGRAPHY IN VENTRICULAR DISPROPORTION?

Carla Blunt, Suhair Shebani, Katie Linter
University Hospitals of Leicester, East Midlands Congenital Heart Centre, leicester, United Kingdom

Background and Aim: Ventricular disproportion in the fetal heart can indicate an obstruction lesion, often presenting as a smaller left ventricle (LV) relative to the right ventricle (RV). This finding could indicate a left heart obstruction particulalry coarctation of the aorta (CoA). Which is a condition that is difficult to diagnosis prenatally. Speckle tracking echocardiography (STE) is an advanced imaging technique used to assess myocardial deformation and function. It may provide an additional diagnostic marker for fetal CoA, aiding both diagnosis and management of the condition. This study aims to determine whether STE parameters-specifically Global Sphericity Index (GSI) and Global Longitudinal Strain (GLS) – can assist in detecting obstructive lesions such as CoA in fetuses presenting with ventricular disproportion.
Methods: This prospective study utilised speckle tracking echocardiography to analyse 22 fetal cases from 16 fetuses who presented with ventricular disproportion. These were compared to a control group of healthy fetuses. Z scores and statistical analysis were performed. With further sub-group analysis on cases later confirmed to have obstructive lesions such as CoA.
Results: Fetuses with ventricular disproportion and a confirmed obstructive lesion exhibited significantly lower LV GLS and lower GSI compared to gestational age-matched controls ($p < 0.05$). Comparison of true and false positive cases of ventricular disproportion revealed that the true positive group demonstrated significantly lower GSI and a reduced LV GLS compared to the false positive group ($p < 0.05$), with large effect sizes for both parameters ($r=0.56$ and 0.63 respectively). Statistical analysis revealed no significant difference between the RV GLS of the obstructive group compared with gestational age-matched controls (p value = 0.365). There was also no statistical significance seen in RV GLS between the true and false positive cases ($p = 0.323$).
Conclusions: STE analysis may represent a valuable tool for assessing fetuses with ventricular disproportion and could aid in the prediction of CoA and assisst in the managemnt of this cohort of patients.



O-067 / #467

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

IMPACT OF FETAL PULMONARY VALVULOPLASTY ON RIGHT AND LEFT VENTRICULAR FUNCTION IN FETUSES WITH CRITICAL PULMONARY STENOSIS OR PULMONARY ATRESIA WITH INTACT VENTRICULAR SEPTUM

Martin Schoeber, Andreas Tulzer, Gerald Tulzer, Janis Plößner
Children's Heart Center Linz, Pediatric Cardiology, Linz, Austria

Background and Aim: Critical pulmonary stenosis (crit PS) and pulmonary atresia with intact ventricular septum (PA/IVS) are severe forms of right ventricular outflow tract obstructions that impair antegrade flow and subsequently hinder right ventricular (RV) growth and function. Fetal pulmonary valvuloplasty has emerged as a potential intervention to restore forward flow and promote ventricular remodeling in utero. This study evaluates whether fetal dilation of the pulmonary valve leads to measurable improvement in ventricular performance.
Methods: A total of 15 fetuses were included in a retrospective analysis (5 crit PS, 10 PA/IVS). Fetal pulmonary valvuloplasty was performed at a mean gestational age of 28 + 1 weeks. Echocardiographic data were collected few days before and after valvuloplasty, and the results were analyzed using the Wilcoxon test.
Results: Tricuspid regurgitation gradient decreased in 67% of cases. TAPSE increased in 54% of fetuses, while tricuspid inflow velocities increased in 56% (E-wave) and 67% (A-wave). Tissue Doppler (TDI) measurements showed increases in isovolumetric velocity (IVV, 60%), S' (54%), E' acceleration (69%), and A' acceleration (69%). Although mean E' velocity showed a mild deterioration in 54%, the median values revealed a balanced distribution (46% improving, 46% worsening). A' velocity improved in 77% of fetuses. RV isovolumetric acceleration time (IVA time) shortened in 70% of cases. MAPSE showed increases in 58% of fetuses and MV E-wave velocities improved in 78%. MV A-wave velocities decreased in 56%. In TDI measurements LV IVV increased in 55%, and E' velocity improved in 64%. IVA and A' velocity decreased in 55% and 67% of cases. E' acceleration worsened in 55%, and IVA time increased in 55%.
Conclusions: Fetal dilation of the pulmonary valve in crit PS and PA/IVS was associated with improvements in RV systolic and diastolic function, reflected by increased TAPSE, enhanced tricuspid inflow, improved tissue Doppler indices, and reduced tricuspid regurgitation gradients. LV responses showed mainly improvements in early diastolic filling (MV E-wave, LV E') as well as in IVV. These preliminary findings suggest that fetal pulmonary



valvuloplasty can positively influence RV and LV performance and may promote more favorable biventricular physiology.



O-068 / #487

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

TRENDS IN PERINATAL OUTCOMES OF PRENATALLY DIAGNOSED HYPOPLASTIC LEFT HEART SYNDROME OVER 20 YEARS

Sofie Dannesbo[1], Mrinal Lad[2], Gloria Ho[2], Niels Vejlstrup[1], Henning Bundgaard[1], Nathalie Dutil[2], Michael Seed[3], Sarah Lord[2], Lindsay Freud[3]
[1]Copenhagen University Hospital Rigshospitalet, Department Of Cardiology, Copenhagen, Denmark, [2]The Hospital for Sick Children, Cardiology, TORONTO, Canada, [3]The Hospital for Sick Children, Cardiology, Elizabeth St, Toronto, ON, Canada

Background and Aim: Hypoplastic left heart syndrome (HLHS) and its variants comprise a severe form of single ventricle heart disease that relies on the right ventricle (RV) to support the circulation. Strategies have changed for the management of fetuses and neonates with HLHS over time, yet the effects on perinatal outcomes are ill-defined. In this study, we aimed to investigate trends in perinatal outcomes of prenatally diagnosed HLHS and variants over the past 20 years.
Methods: This retrospective single-center cohort study included all fetuses diagnosed with HLHS and HLHS variants (i.e., double outlet RV with mitral atresia etc.) at The Hospital for Sick Children, Toronto, Canada between 2004 and 2023. Restrictive atrial septum (RAS) was defined as a pulmonary venous forward-to-reverse VTI ratio <5:1. Time trends in termination of pregnancy (TOP), compassionate care (CC) management, and 6-month mortality among live-born intention-to-treat (ITT) infants were analyzed.
Results: 450 fetuses were diagnosed with standard HLHS (81.3%) or HLHS variant (18.7%). RAS was identified in 12.0% with no difference between HLHS phenotypes. Genetic abnormalities were present in 22.4%, which were more common in HLHS variants (43.2%) as compared to standard HLHS (16.9%, p<0.001). TOP occurred in 43.8% of pregnancies with significant variation over the study period (Figure 1), with decreasing frequency since 2020. CC was chosen in 25.2% of neonates with an increasing trend since 2020 (Figure 2). Neither RAS nor HLHS phenotype explained the variations over time in choice of care pathway. Of 166 live-born infants in the ITT cohort, 50 (30.1%) died by 6 months of age. Despite a trend towards decreased mortality in recent years (Figure 3), there was no statistically significant difference in mortality over time, nor by RAS or HLHS phenotype.
Conclusions: Pregnancy decision-making has changed over time for prenatally diagnosed HLHS and variants with less TOP and more CC in recent years, whilst 6-month mortality rates have remained similar. These findings may reflect the recent incorporation of routine multi-disciplinary counseling regarding perinatal palliative care at our center; however,



further research is required to understand determinants of parental decision-making.

Figure 1: Predicted probability of pregnancy termination for all fetuses with HLHS and HLHS variants, excluding fetal demise.

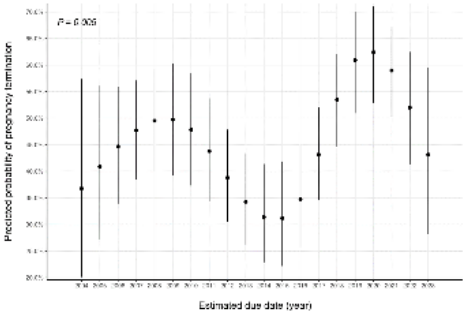


Figure 2: Predicted probability of compassionate care pathway for all live-born infants with HLHS and HLHS variants

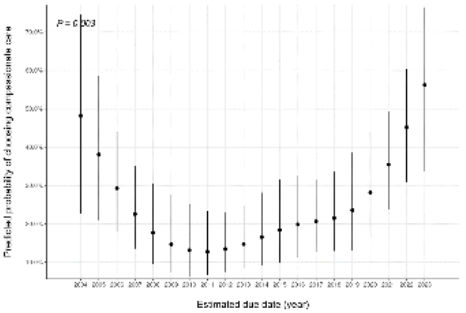
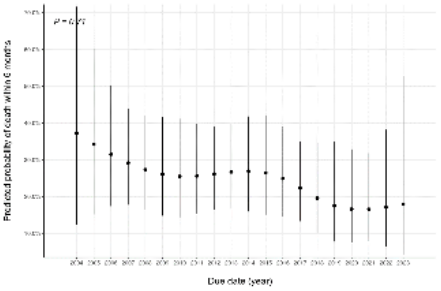


Figure 3: Predicted probability of 6-month mortality for all live-born ITT infants with HLHS and HLHS variants





O-069 / #406

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

INCREASED ATRIOVENTRICULAR LENGTH RATIO AS A MARKER OF ISOMERISM ON FETAL ECHOCARDIOGRAPHY

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Background and Aim: Atrioventricular septal defect (AVSD) consists of a primum atrial septal defect, an inlet ventricular septal defect, and a common atrioventricular valve. AVSD may occur in isolation or in association with genetic abnormalities and complex congenital malformations, including isomerism. Prior studies have suggested that the atrioventricular length ratio (AVL), defined as the atrial-to-ventricular length ratio in diastole, is increased in fetuses with AVSD compared to those with structurally normal hearts. This study aimed to compare the AVL ratio among fetuses with isolated AVSD and those with AVSD associated with isomerism.
Methods: AVL measurements were obtained in 169 fetuses at 13.5–37.5 weeks' gestation. Subjects were categorized into three groups: **Group 1:** structurally normal hearts (n = 110) **Group 2:** isolated AVSD (n = 48) **Group 3:** AVSD with left isomerism (n = 11)
Results: Mean AVL ratios were: Group 1: **0.53** (range 0.34–0.71) Group 2: **0.70** (range 0.47–0.98) Group 3: **1.02** (range 0.73–1.53) Significant differences were found between Group 1 and Group 2, and between Group 1 and Group 3 (both $p = 0.000$). The AVL ratio also differed significantly between Group 2 and Group 3 ($p = 0.001$). Bradycardia was observed in 17% of fetuses with AVSD and left isomerism.
Conclusions: Our findings indicate that the AVL ratio is markedly increased in fetuses with AVSD associated with left isomerism, relative to both fetuses with structurally normal hearts and those with isolated AVSD. These data support the utility of the AVL ratio as an adjunctive echocardiographic marker for the prenatal identification of heterotaxy.



O-070 / #763

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

AUTOANTIBODIES TO THE SODIUM/POTASSIUM PUMP ALPHA-1 SUBUNIT AT1A1 IDENTIFY AT-RISK PREGNANCIES THAT WILL DEVELOP FETAL/CONGENITAL HEART BLOCK: EVIDENCE AND TRANSLATIONAL PLAN

Robert Hamilton[1], Kelly Chen[1], Stephanie Benjamin[1], Diptendu Chatterjee[1], Linda Hiraki[2], Carl Laskin[3], Jill Buyon[4]
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Background and Aim: Autoimmune congenital heart block (CHB) is associated with maternal autoimmune disease (lupus, Sjögren's). Although 80+% of affected pregnancies are anti-Ro positive, CHB develops in only 1 in 50, indicating that anti-Ro alone is insufficient. We aimed to identify more predictive maternal autoantibody targets among fetal cardiac protein.
Methods: We compared sera from pregnancies with CHB outcome to at-risk pregnancies without CHB using solubilized proteins from fetal heart and/or developmentally immature stem cell-derived cardiomyocytes to characterize the antibody targets on 2D gels. A 4-peptide ELISA was developed based on the identified cardiac protein target epitopes. Additional cohorts from Canada, Germany, Italy, Spain and U.S. are being assessed to refine and validate our assays. (Table 1) In collaboration with EuroImmun AG, we are developing a standardized research assay for translation to clinical care.
Results: Pregnancies with prior CHB were assessed separately. (Table 1, Columns 11 to 13) For no prior CHB, sera from 7 affected and 5 unaffected pregnancies identified expanding autoantibody target cardiac proteins (beyond Ro and La) throughout CHB pregnancies, which were absent in unaffected pregnancies. (7/7 versus 0/5; p=0.0013, Fisher Exact Test [FET]) The earliest target was AT1A1 (sodium/potassium pump alpha 1 subunit), and western blots identified these autoantibodies. (7/7 versus 0/5; p=0.0013, FET) A Padua cohort identified the same autoantibody fingerprint, and same AT1A1 reactivity by both western and ELISA. (20/20 versus 0/25; p<0.00001, FET). A Toronto (validation) cohort had equivalent results for 2/3 methods. (16/16 versus 0/24; p<0.00001, FET). In pregnancies with a prior CHB child, the antibody pattern and anti-AT1A1 ELISA were occasionally positive despite no CHB resulting in a reduced positive predictive value (0.429). Negative predictive value remained 1.0. Ro-negative autoimmune CHB provided equivalent results.



Six additional cohorts are under evaluation.

TABLE 1									
Evaluated Cohorts	**No Prior CHB**								
	Discovery Cohort			Padua Cohort			SickKids (6/18 to 8/23)		
	CHB	no CHB	**PPV: NPV:**	CHB	no CHB	**PPV: NPV:**	CHB	no CHB	**PPV: NPV:**
2D CHB Pattern +	7	0	**1**	20	0	**1**	16	0	**1**
2D CHB Pattern -	0	5	**1**	0	25	**1**	0	24	**1**
Sensitivity Specificity	**1**	**1**	p=0.0013	**1**	**1**	p<0.00001	**1**	**1**	p<0.00001
Western anti-AT1A1 +	5	0	**1**	20	0	**1**	16	0	**1**
Western anti-AT1A1 -	0	5	**1**	0	25	**1**	0	24	**1**
Sensitivity Specificity	**1**	**1**	p=0.0013	**1**	**1**	p<0.00001	**1**	**1**	p<0.00001
ELISA anti-AT1A1 + (O.D.> 0.7)	ELISA not performed			20	0	**1**	ELISA failed		
ELISA anti-AT1A1 - (O.D.< 0.7)				0	25	**1**			
Sensitivity Specificity				**1**	**1**	p<0.00001			
	Prior CHB				**Ro negative**				
	Combined Cohorts								
	CHB	no CHB	**PPV: NPV:**		CHB	no CHB	**PPV: NPV:**		
2D CHB Pattern +	3	4	**0.429**		5	0	**1**		
2D CHB Pattern -	0	7	**1**		0	1	**1**		
Sensitivity Specificity	**1**	**0.636**	p=0.19		**1**	**1.000**	p=0.17		
Western anti-AT1A1 +	3	4	**0.429**		5	0	**1**		
Western anti-AT1A1 -	0	7	**1**		0	1	**1**		
Sensitivity Specificity	**1**	**0.636**	p=0.19		**1**	**1.000**	p=0.17		
ELISA anti-AT1A1 + (O.D.> 0.7)	ELISA not performed				5	0	**1**		
ELISA anti-AT1A1 - (O.D.< 0.7)					0	1	**1**		
Sensitivity Specificity					**1**	**1.000**	p=0.17		
Prospective Cohorts	Geissen Germany			SickKids (9/23 to present)			NYU Pilot Cohort		
	CHB (n=6)	no CHB (n=50)		CHB (n=4)	no CHB (n=30)		CHB (n=10)	no CHB (n=10)	
	Brescia, Italy			Torino, Italy			University Hosp. Barcelona		
	enrolling			enrolling			enrolling		

CHB = congenital heart block; PPV = positive predictive value; NPV = negative predictive value; O.D. = optical density; ELISA = enzyme-linked immuno-sorbent assay

Conclusions: We have identified AT1A1 as a robust autoantibody target associated with autoimmune CHB outcome. This marker demonstrates strong discriminatory performance across multiple cohorts. Ongoing multicentre validation and assay development with commercial partner EuroImmun AG will support translation of these findings into a clinical diagnostic test aimed at improving CHB risk prediction. We seek further collaboration with fetal cardiology clinics and their referring rheumatologists.



O-071 / #1432

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

LONG-TERM EFFECTS OF FETAL GROWTH RESTRICTION ON CARDIOVASCULAR STRUCTURE AND FUNCTION: A COHORT STUDY IN GROWTH-DISCORDANT IDENTICAL TWINS

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Background and Aim: We investigated the effect of fetal growth restriction (FGR) on cardiovascular structure and function in childhood in a growth-discordant identical twin model, thereby naturally controlling for genetic, obstetric, and environmental confounding factors.
Methods: This study is part of the LEMON cohort study of growth-discordant identical twins born at the Leiden University Medical Center, The Netherlands. Echocardiography was prospectively performed in 42 twin pairs aged between 5 and 17 years. Growth discordance was defined as a birth weight discordance ≥20%. Outcome measures were compared between the smaller and larger twin and included structural parameters (left ventricular (LV) dimensions and carotid intima-media thickness (cIMT)), and functional parameters (LV systolic and diastolic function using Doppler and LV strain imaging, and aortic pulsed wave velocity (aPWV)).
Results: Median gestational age at birth was 34.1 weeks (IQR 31.6-36.0) with median birth weights of 1471 grams (IQR 1114-1876) and 2025 grams (IQR 1623-2705) for the smaller and larger twin, respectively. Median age at echocardiography was 11 years (IQR 9-14). Smaller twins presented with significantly lower LV global longitudinal strain (-19.6% versus -20.7%), and higher mitral peak E and A velocities, and higher mitral E/e' ratio compared to larger co-twins. No within-pair differences were found regarding structural cardiac parameters, cIMT and aPWV.
Conclusions: In a growth-discordant identical twin model, FGR is associated with subclinical changes in LV systolic and diastolic function in the smaller growth-restricted twin compared to the larger appropriately-grown co-twin. This indicates that adverse



cardiovascular remodeling after FGR persists into childhood, potentially influencing long-term risk of cardiovascular disease.



O-072 / #1451

FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

PRENATAL 3D MULTIPLANAR NEUROSONOGRAPHY AND ARTIFICIAL INTELLIGENCE-BASED ASSISTANCE SCANNING IN FETUSES WITH CONGENITAL HEART DEFECTS

Tamara Yarygina[1], Rena Gasanova[2], Fariza Eltaeva[2], Alina Goitemirova[2], Roman Shmakov[1]
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Background and Aim: Currently, fetal and neonatal cardiac surgery can save the lives of most infants born with heart defects. However, a significant number of patients with congenital heart defects subsequently experience psychomotor developmental disorders of varying severity, largely due to the pathological formation of brain structures during the prenatal period. Given the significant public importance of this problem, the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) has designated the detection of congenital heart defects in the fetus as an indication for prenatal multiplanar neurosonography studying at least 12 sections obtained in three planes, in contrast to the basic study of three sections of only the horizontal plane. However, in real practice, obtaining multiple sections and recognizing fetal brain structures may be limited by both examination time and specialist training. The aim of this study was to evaluate the effectiveness of 3D multiplanar neurosonography and artificial intelligence (AI)-based assistance scanning in identifying and assessing brain structures in fetuses with congenital heart disease compared to a standard examination.
Methods: This was a prospective cohort observational study of 50 fetuses with CHD in cephalic presentation at 18-24 weeks of gestation in 2024-2025. US scan was performed using 3D endocavity probe (Samsung Hera W10 and Samsung Hera Z20; Samsung Medison) with AI technology of 5D CNS+ multiplanar neurosonography. In each case, multiplanar neurosonography was performed with and without automated reconstruction. The feasibility n (%) and time (sec, Me (Q1-Q3) of obtaining all sections were assessed. The Fisher exact test and Mann-Whitney U test was used. The result was significant at $p < .05$.
Results: In scanning without automatic reconstruction, all necessary sections were obtained in 81% (41/50) of cases, compared to 98% (49/50) with automatic reconstruction software ($p = .03$). The time to obtain the necessary sections without automatic reconstruction was significantly longer than that using AI-enabled software: 420 (120-540) seconds versus 120 (60-210) seconds, respectively ($p = .001$).
Conclusions: The use of AI technology for 3D automatic reconstruction in examining



fetuses with congenital heart defects significantly increases the possibilities of performing multiplanar neurosonography, obtaining all necessary sections with shortening the time of ultrasound examination.



O-073 / #416

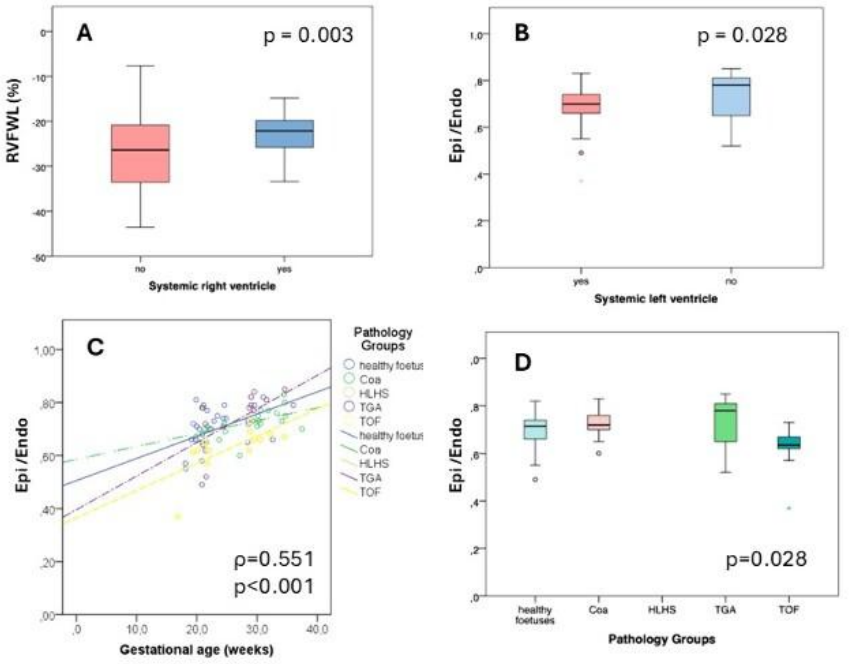
FETAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 11:30 - 13:00

FOETAL MYOCARDIAL DEFORMATION: INSIGHTS INTO NORMAL AND PATHOLOGICAL CARDIAC MECHANICS

Irene Cattapan[1], Aurora Bertolin[2], Alessia Cerutti[1], Martina Avesani[1], Roberta Biffanti[1], Elena Reffo[1], Biagio Castaldi[1], Giovanni Di Salvo[1]
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Background and Aim: The arrangement of myocardial fibers plays a crucial role in determining cardiac contraction patterns. Speckle tracking echocardiography enables the assessment of myocardial deformation along different spatial directions. In particular, layer-specific longitudinal strain analysis provides insight into the organization of longitudinal myocardial fibers. The aim of the present study is to compare functional myocardial data between foetuses with and without congenital heart disease (CHD) in order to hypothesize how myocardial remodelling may occur in the presence of congenital defects during pregnancy.
Methods: We retrospectively evaluated 99 foetal echocardiograms acquired between 15 and 37 weeks of gestation. Thirty foetuses were healthy controls; 69 had a congenital heart disease (CHD): coarctation of the aorta (CoA, n=21), transposition of the great arteries (TGA, n=14), hypoplastic left heart syndrome (HLHS, n=20) and tetralogy of Fallot (TOF, n=15). Offline two-dimensional speckle-tracking analysis was performed with TOMTEC (TOMTEC Imaging, Germany). For each foetus we derived left-ventricular endocardial longitudinal strain (Endo-LS) and epicardial longitudinal strain (Epi-LS), together with right-ventricular global longitudinal strain (RV-GLS) and free-wall strain (RVFWS).
Results: Strain analysis was feasible in all foetuses except for the left ventricle in HLHS. Compared with controls, CHD foetuses showed lower strain values for every parameter ($p<0.001$). Foetuses with a subaortic right ventricle (TGA and HLHS) already displayed reduced RVFWS versus those with a non-systemic right ventricle ($p=0.003$), Fig. A. Across gestation the Epi/Endo ratio increased, indicating a progressive rise in epicardial contribution ($\rho=0.551$, $p<0.001$), Fig. C. In CHD foetuses this ratio followed lesion-specific patterns: subpulmonic left ventricles in TGA exhibited a higher Epi/Endo ratio (0.78% IQR 0.16 vs 0.70% IQR 0.08, $p = 0.028$), suggesting development of a right-ventricle–like fiber architecture, whereas TOF foetuses preserved a normal Epi/Endo ratio despite markedly

depressed Endo-LS and Epi-LS, consistent with impaired left-ventricular growth secondary to ventricular interdependence, Fig. B and
D.



Conclusions: This study confirms the high technical feasibility of foetal strain analysis and highlights its ability to detect early functional abnormalities in foetuses with CHD. Layer-specific evaluation of the ventricular wall underscores the potential of STE to capture myocardial maturation processes. These findings support the integration of strain parameters into comprehensive prenatal diagnostic protocols, which should be further validated in larger-scale studies.



O-074 / #78

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

SUCCESSFUL LONG TERM OUTCOME OF CABG IN PAEDIATRIC PATIENTS: A RETROSPECTIVE ANALYSIS AT A TERTIARY CENTRE

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Background and Aim: Background: The first experience of CABG in children is in a case of ALCAPA in 1966. Subsequently, further surgical experiences with various pathologies were published. Paediatric coronary arterial graft could be indicated in Kawasaki disease and various coronary anomalies as a planned procedure. It may also be performed as an emergency or salvage intervention in technically challenging cases involving coronaries or due to iatrogenic coronary injury. It requires advanced surgical expertise in paediatric patients because the graft arteries are small. Aim: To assess both early and long-term outcomes following surgical myocardial neovascularisation in the paediatric population who underwent cardiac surgery at a tertiary cardiac centre in the UK.
Methods: This is a retrospective analysis of patients at a UK tertiary cardiac care centre who underwent CABG from 1997 to 2025. Patients were selected from our database using key search words: 'CABG/LIMA/RIMA/ALCAPA/coronary graft'. The inclusion criterion was patients younger than 18 years undergoing coronary artery bypass graft (CABG). Patients who received other forms of coronary artery surgery, like coronary reconstruction or ostioplasty without concomitant CABG were not included. A total of 13 studies were identified through the database search. 2 patients were excluded as they received coronary grafts in adulthood. A total of 11 patients met these criteria and were included in the final analysis. All available case records, operative notes, investigation results, and follow-up data were systematically reviewed as part of the retrospective evaluation.
Results: A total of 11 patients were included in the study, with an age range of 9 days to 15 years at the time of surgery. Early postoperative outcomes demonstrated good cardiac function and successful discharge home in all cases. 1 patient died secondary to an infectious illness 13 years after surgery. Overall, long-term follow-up was for a mean duration of 21 years, showing sustained improvement in myocardial perfusion and functional status, with 91% transplant-free survival and no reinterventions.
Conclusions: Surgical myocardial neovascularization in children is associated with favourable early and long-term outcomes. The procedure appears to be a viable and durable option in critical cases, contributing to improved myocardial perfusion, clinical stability and survival.



O-075 / #112

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

LONG TERM VENTRICULAR ASSIST DEVICES IN CHILDREN AND CONGENITAL ADULTS: 20 YEARS OF EXPERIENCE.

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Background and Aim: Technical implant of long-term ventricular assist devices (VAD) in children and adults with congenital heart disease is challenging because they have worst results compared with patients with adquired heart disease. We describe our experience along 20 years.
Methods: Retrospective analysis of 52 long-term VAD implanted from 2006 to 2025 in a specialized congenital heart disease Unit. We generally implant Berlin-Heart® definitive cannulas by median sternotomy, connected to Berlin-Heart® or Levitronics® pumps. Informed consent was signed in all cases. This study has been approved in the ethical committee of our Hospital.
Results: We implanted 52 VAD in 50 children and 2 adults. A 12-years girl received Heartmate3®, 42 children received a whole Berlin-Heart®, and remain 9 patients (2 adults and 7 children) receiving Levitronics® with Berlin-Heart® cannulas. Median age was 29 months [IQR 5-84], median weight 10 kg [IQR 6-24], 48% females, 54% had previous surgeries, 46% previous ECMO, 42% renal failure needing dyalisis or continuous hemofiltration, 27% hepatic failure, 54% pulmonary hypertension. Clinically they had end stage cardiomyopathy-67% or congenital heart disease-33%. INTERMACS level was I in 85% and II in 15%. VAD indication was mainly bridge to transplant (79%), and 21% bridge to decision. VAD was univentricular in 77% and biventricular in 23% The median average time with VAD was 52 days [IQR 21-130]. Main complications were Bleeding (49%) and cerebral stroke (44%). The majority of patients reached transplant (73%), 23% dead while on assistance, 2% had explanted VAD because of improving of cardiac function, and 2% is nowadays at home with her Heartmate3®. In-hospital mortality was 31% (12 deaths on VAD, and 4 deaths in the inmediate postoperative course after transplantation) We observed that biventricular VAD (p:0,018), bridge to decision as indication (p:0,023), renal failure



(p:002), and INTERMACS-I (p:0,047) were significantly associated with greater in-hospital mortality.

Conclusions: VAD implanted in children and congenital adult patients with end stage heart disease is feasible and gives them more time. Transplant becomes a reality in 73%. Our patient with intracardiac device is at home with good quality of life. VAD explantation is possible if the cardiac function recovers.



O-076 / #1287

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

LONG-TERM OUTCOMES AFTER PEDIATRIC EPICARDIAL PACING: CRITICAL IMPACT OF SURGICAL ACCESS AND VENTRICULAR LEAD POSITION OVER TIME

Uladzislau Kolbik[1], Vitali Kadachkin[2], Stepan Nenoglyadov[3], Yury Linnik[1], Konstantin Drozdovski[1]
[1]Belarusian National Center for Pediatric Surgery, Department Of Pediatric Cardiac Surgery, Minsk, Belarus, [2]Belarusian National Center for Pediatric Surgery, Cathlab, Minsk, Belarus, [3]Belarusian State Medical University, Minsk, Belarus

Background and Aim: Pacemaker (PM) implantation remains the gold standard treatment for children with postoperative complete atrioventricular block. For patients under 20 kg, the epicardial approach is often preferred due to size constraints and growth considerations. Particular attention must be given to optimal ventricular lead positioning, as improper placement—especially during chronic right ventricular (RV) pacing—carries a significant risk of inducing electromechanical dyssynchrony. Over time, this can lead to pacemaker-induced cardiomyopathy and left ventricular (LV) systolic dysfunction.
Methods: We analyzed 80 patients (2014–2025) comparing median resternotomy (n=39) and left lateral thoracotomy (n=41), the latter including primary implants (n=28) and reoperations after prior RV pacing via sternotomy (n=13). Left ventricular ejection fraction (LVEF), paradoxical septal motion (PSM), and their correlation with lead placement were evaluated.
Results: Median resternotomy group: mean age 1.2±0.2 years; weight 7.1±0.5 kg. Ventricular leads were primarily implanted on the right ventricular diaphragmatic surface and free wall. Only six patients in this group achieved successful left ventricular apical lead positioning due to technical constraints. Postoperative median LVEF significantly deteriorated from 72% [66-76%] to 64% [58-69%] in RV-paced patients ($p<0.001$) but was preserved with LV apical pacing. PSM occurred in 28/39 patients (72%). The cohort of left lateral thoracotomy (mean age 3.8±0.5 years; weight 15.3±1.5 kg) underwent LV lead implantation (lateral wall/apex). Primary implants (n=28) showed stable LVEF (67% [64-71%] preoperatively vs. 67% [65-71%] postoperatively). The reimplantation subgroup (n=13) following prior RV pacing showed significant LVEF improvement from 43% (37-55%) to 68% (65-70%; $p<0.05$). Notably, preoperative PSM was present in 10/13 reimplantation cases (76.9%), resolving postoperatively in 7 (70% resolution rate). Persistent PSM occurred in only 3 patients (23.1%).
Conclusions: Our study demonstrates that ventricular lead implantation via lateral



thoracotomy effectively preserves long-term LV function, whereas RV pacing is associated with significant LVEF reduction and paradoxical septal motion. Thus, for cases requiring a median sternotomy approach, we recommend specific technical adjuncts—including a "deep stitch," pericardial gauze tamponade, and the use of a cardiac positioner device—to secure optimal apical positioning of the ventricular lead and thereby prevent future pacemaker-induced ventricular dyssynchrony.



O-077 / #1282

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

CLINICAL OUTCOMES OF TRICUSPIDIZATION REPAIR FOR CONGENITAL BICUSPID AORTIC VALVE MALFORMATION IN CHILDREN

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Background and Aim: Bicuspid aortic valve (BAV) is the most common congenital aortic valve malformation. Treatment of BAV in children still poses unique challenges, including growth requirements and the various presentations of the bicuspid valve. Tricuspidization with autologous pericardium has been widely used in aortic valve repair, ranging from single to triple leaflet , which has demonstrated acceptable outcomes. This study aims to investigate the immediate and postoperative outcomes after the tricuspidization repair in our center.
Methods: We retrospectively reviewed the medical records of 33 consecutive patients with BAV who underwent tricuspidization repair between 2017 and 2024. Immediate postoperative outcomes and follow-up data were analyzed.
Results: Thirty-three patients underwent tricuspidization repair were included with the median follow-up period of 14.9 months (IQR: 3.9-32.1 months). Preoperative aortic valve annular diameter was 19.0 mm (interquartile range [IQR], 16.0 to 21.0 mm), and the median age at surgery was 8.5 years (IQR: 4.1 to 10.9 years). The number of patients with 1, 2, and 3 leaflets undergoing tricuspidization repair is 23 (69.7%), 4 (12.1%), and 6 (18.2%) respectively. Among the cohort, 7 patients (21.2%) presented with isolated aortic stenosis (AS), 12 (36.4%) with isolated aortic regurgitation (AR), and 14 (42.4%) with combined AS and AR. The peak transaortic velocity decreased from 3.2 ± 1.4 m/s preoperatively to 1.7 ± 0.5 m/s postoperatively (P < .001). This improvement remained stable (1.9 ± 0.8 m/s) during the follow-up. The number of patients with severe AR decreased from 11 (33.3%) preoperatively to 0 postoperatively. Freedom from severe AR at 1 and 3 year was 87.1% ± 7.0% and 74.7% ± 13.0%, respectively. Freedom from reoperation at 1 and 2 year was 84.5% ± 7.3% and 77.4% ± 9.5%, respectively.
Conclusions: For pediatric patients with BAV, tricuspidization repair offers acceptable valvular function after repair. Notably, this technique delivers an innovative "structure-and-function preservation" approach tailored to BAV cases-one that expands the application



scope of valvuloplasty and provides a new therapeutic option for managing complex aortic valve pathologies.



O-078 / #30

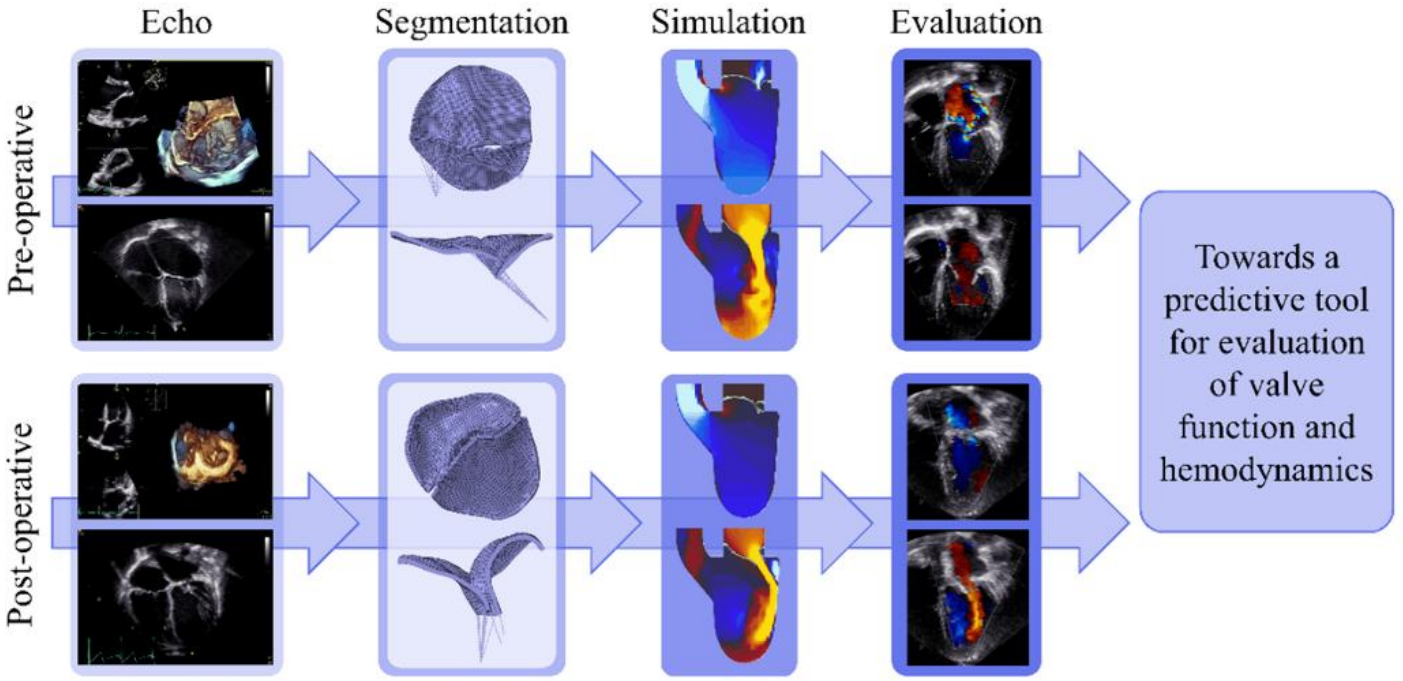
CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

TOWARD PREDICTION OF MITRAL VALVE REPAIR USING PATIENT-SPECIFIC FLUID-STRUCTURE INTERACTION MODELING

Lea Christierson[1], Johan Revstedt[2], Alice Pozza[3], Andreea Dragulescu[3], Conal Morgan[4], Osami Honjo[3], Luc Mertens[3], Hanna Isaksson[5], Nina Hakacova[1,3]
[1]Children's Heart Centre, Lund, Sweden, [2]Department of Energy Science, Lund University, Lund, Sweden, [3]The Hospital for Sick Children, Toronto, Canada, [4]The Hospital for Sick Children, Lund, Sweden, [5]Department of Biomedical Engineering, Lund, Sweden

Background and Aim: Moderate to severe pediatric mitral valve disease remains difficult to manage and a major cause of heart failure. Surgical repair often yields residual stenosis or regurgitation, requiring reintervention. Intraoperative echocardiographic assessment is limited by altered loading conditions, leading to discrepancies with postoperative findings. We have developed FSI dsimulation framework with the aim to predict valve function before surgery which could improve outcomes. Aim of this study was to validate the simulations against pre- and post-operative data (Fig. 1).
Methods: Seven pediatric patients with severe mitral regurgitation who underwent surgical repair were retrospectively analyzed (age range: 2–17 years; median: 6 years; 57% female). Patient-specific mitral valve geometries, including the subvalvular apparatus, were segmented from pre- and post-operative 3D echocardiograms. Flow boundary conditions were derived from left ventricular volume measurements. Valve dynamics and blood flow interactions were simulated using the FSI framework. Model performance was evaluated against echocardiographic data in both conditions.
Results: The FSI model accurately reproduced systolic and diastolic valve dynamics and ventricular flow. Pre-operatively, the regurgitation grade matched echocardiographic assessment in 6 of 7 patients, and post-operatively in 4 of 7. The site of regurgitation was correctly identified in 6 of 7 patients, both pre- and post-operatively. The simulation model also captured the angle of the regurgitant jet in the atrium compared to color Doppler images. Simulated transvalvular pressure gradients agreed with Doppler measurements (mean difference: 0.38 ± 1.57 mmHg pre-operatively, and –0.42 ± 3.26 mmHg post-operatively).
Conclusions: The proposed FSI framework successfully captured mitral valve function and hemodynamics in pediatric patients before and after surgical repair. To our knowledge, this is the first FSI framework applied to a pediatric cohort with mitral valve regurgitation and compared against both pre- and post-operative *in vivo* data. Our work fills a critical gap in

pediatric mitral valve modeling and establishes a foundation for patient-specific prediction of surgical outcomes. Ultimately, our framework could enable virtual surgical planning, optimize repair strategies, and improve the durability and success of pediatric mitral valve interventions. ***Figure 1:*** *The FSI framework for mitral regurgitation uses echocardiography to create patient-specific mitral valve simulations pre- and post-operatively, to predict surgical mitral valve repair outcome.*





O-079 / #84

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

SURGICAL MANAGEMENT OF ASCENDING AORTIC ANEURYSM IN PATIENTS WITH GENETIC CONNECTIVE TISSUE DISORDERS

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Background and Aim: Ascending aortic aneurysms associated with genetic connective tissue disorders are commonly observed in children and young adults. Aortic root stabilization can be achieved through several surgical techniques. This study aims to determine the surgical outcomes of aortic root replacement in this cohort.
Methods: We performed a retrospective analysis of patients with genetic connective tissue disorders who underwent an aortic root replacement at our institution between January 2000 and April 2025. Medical records were reviewed for baseline characteristics, echocardiographic data, operative details, and follow-up outcomes. Overall survival and freedom from reoperation were estimated using the Kaplan-Meier method. Risk factor analysis was performed using the Cox regression model to calculate hazard ratios (HR). Categorical variables were reported as counts and percentages, and continuous variables as medians with interquartile ranges (IQR).
Results: We identified 67 patients, including 46 with Marfan syndrome (MFS) and 21 with Loeys-Dietz syndrome (LDS). The median age at procedure was 21.1 (14.1-31.0) years. Associated anomalies included 15 funnel chests, 9 peripheral vascular anomalies, 6 keeled chests, and 3 bicuspid aortic valves. Z-scores of the aortic valve, sinus of Valsalva, and sino-tubular junction were 3.0 (1.4-5.0), 5.5 (4.6-6.8), and 3.8 (2.2-4.6). Svensson's index was 1.6 (1.5-5.0). Significant aortic insufficiency (≥moderate) was observed in 6 patients. Surgical procedures included 50 David procedures, 11 Bentall procedures, 5 Yacoub procedures, and one aortic root replacement with HAART-Ring. There was no hospital mortality. During the follow-up of 9.2 (4.7-15.9) years, 7 deaths occurred. Survival at 1, 5, and 10 years was 98.2, 96.1, and 86.3%, and was lower in LDS compared with MFS (57 vs. 100% at 10 years, $p<0.001$). Reoperation was needed in 23 patients. Freedom from reoperation at 1, 5, and 10 years was 89.7, 70.8, and 54.3%. Younger age at operation (HR: 0.919, $p=0.025$), lower weight at operation (HR: 0.972, $p=0.014$), and LDS (HR: 6.627, $p=0.008$) were risk factors for mortality.



Conclusions: Surgery for ascending aortic aneurysm in patients with genetic connective tissue disorders could be performed safely. However, long-term survival was suboptimal and there was a relevant reoperation ratio. Younger age and weight at operation, and LDS were significant risk factors for mortality.



O-080 / #187

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

RESULTS AND LONG-TERM OUTCOMES FOLLOWING SURGICAL DECOMPRESSION OF VASCULAR RINGS WITH OR WITHOUT CONCOMITANT TRACHEAL SURGERY

Andrea Linnenbank[1], Matthias Gorenflo[1], Patrick Saur[1], Matthias Karck[1], Tsvetomir Loukanov[1], Philippe Grieshaber[2]
[1]Heidelberg University Hospital, Heidelberg, Germany, [2]Münster University Hospital, Department Of Pediatric Cardiac Surgery, Münster, Germany

Background and Aim: Vascular rings are rare congenital anomalies causing tracheoesophageal compression with consecutive symptoms. Although surgical decompression usually provides relief, the influence of tracheal pathologies, surgical techniques, symptom duration and patient age on long-term outcomes remain poorly characterized.
Methods: A retrospective analysis was performed on 133 patients who underwent vascular ring surgery in a single center between 2000 and 2024. Clinical data were extracted from hospital records. Subgroup analyses were performed according to vascular ring type, symptom duration, age at surgery, risk of short- and long-term complications (respiratory issues, infections, nerve paresis, bleeding) and concomitant tracheal pathologies or procedures.
Results: Of the 133 patients, 39.1% had a right aortic arch (RAA), 33.1% a double aortic arch (DAA), 15.0% a pulmonary sling (PS), 12.0% an isolated A. lusoria, and 0.8% an isolated encircling aorta. Tracheomalacia and anatomic tracheal malformations were most prevalent in PS (65.0%, 13/20) and DAA (56.8%, 25/44) and were a significant risk factor for delayed or incomplete symptom relief (p=0.008). Concomitant tracheal surgery was associated with a significantly higher mortality (15.8% vs. 0.9%; p<0.001), more complications (57.9% vs. 34.2%; p=0,048) and worse absence of symptoms (HR= 0.419, p=0.063). Symptom duration had a strong influence on outcomes: Symptom onset <1 year was associated with a higher incidence of reinterventions, tracheal surgery, complications (69.8% vs. 30.2%) and mortality (5.3% vs. 0%). A duration >1 year was linked to faster postoperative symptom resolution (median 21.5 month vs. 35.5 month). Patients younger than six months at the time of treatment were at an increased risk of postoperative complications (44.4% vs 34.1%) and mortality (8.9% vs. 0%). Multivariate analysis identified younger age at surgery, concomitant tracheal procedures, reduced tracheal lumen, and additional tracheal pathologies as main predictors of complications.
Conclusions: Tracheal pathologies and comorbidities necessitating concomitant tracheal



surgery during vascular ring surgery are associated with higher rates of complications and mortality. Younger age at surgery and shorter symptom duration are linked to less favourable outcomes, often reflecting more severe clinical conditions requiring early intervention. These findings highlight the importance of personalized and carefully considered treatment strategies.



O-081 / #691

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

MODELING FIRST-STAGE HYPOPLASTIC LEFT HEART SYNDROME STRATEGIES USING A ZERO-DIMENSIONAL CLOSED-LOOP FRAMEWORK

Aseem Milind Pradhan[1], Sophie Malekzadeh-Milani[2], Chiara Sacchi[2], Damien Bonnet[2], Irene Vignon-Clementel[1]
[1]INRIA Saclay, Palaiseau, France, [2]M3C-Necker, Hôpital Necker-Enfants malades AP-HP, Paris, France

Background and Aim: Hypoplastic Left Heart Syndrome (HLHS) is a complex congenital cardiac condition which needs a series of surgeries to ensure the survival of the patient. The first-stage palliation (Norwood procedure) is especially critical, as it establishes the physiological conditions necessary for both immediate survival and eligibility for subsequent surgeries. Clinicians employ a variety of surgical and interventional strategies informed by individual patient data, institutional preference, and surgeon experience. Currently morbidity and mortality remain substantial. Early reintervention rates vary with 20–40% of patients requiring additional procedures before the stage-2 intervention. There is, thus, an opportunity for improving outcomes with the aid of virtual human twins.
Methods:

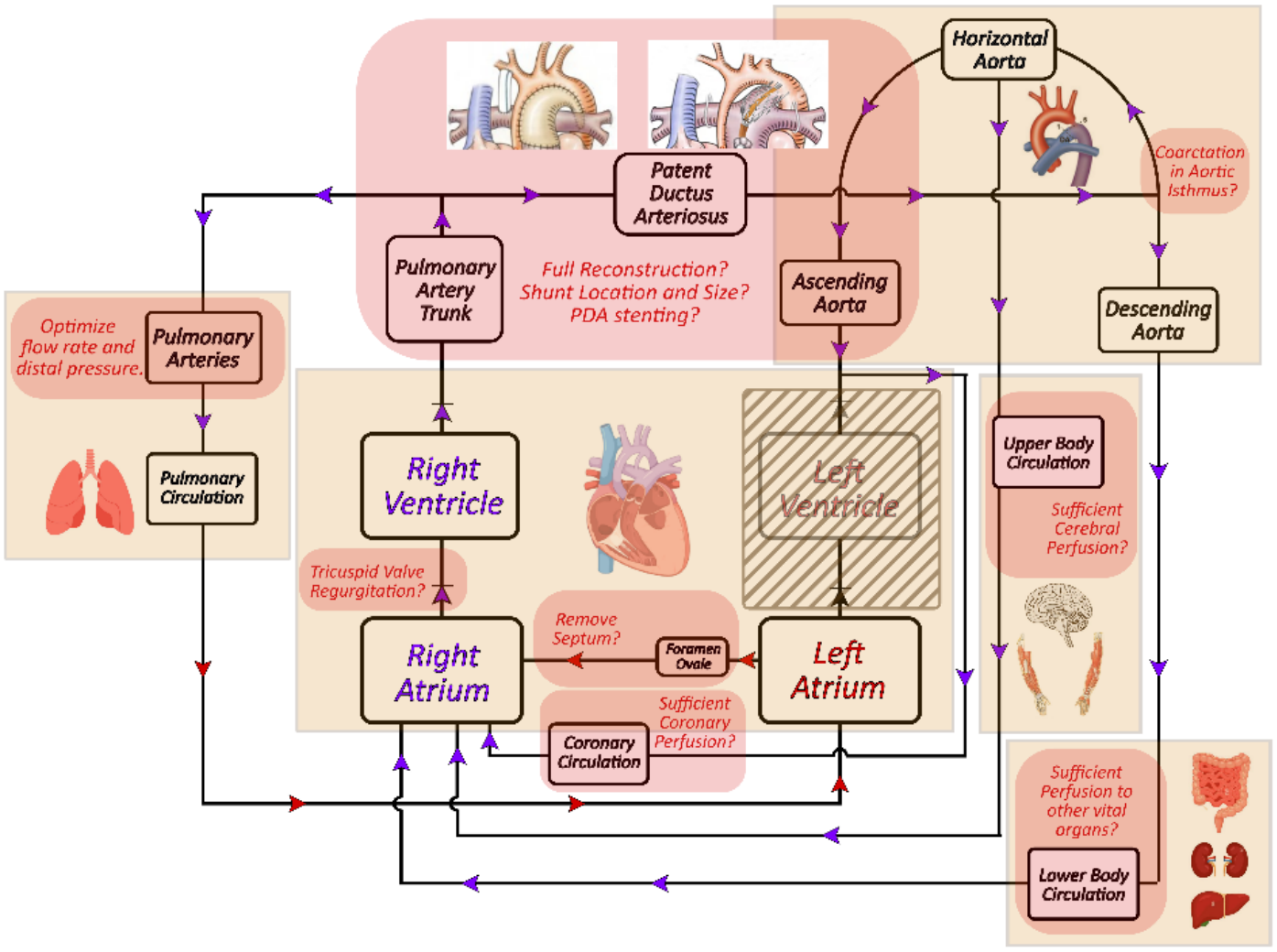


Figure 1: *Closed-loop network model of the Hypoplastic Left Heart Syndrome circulation, highlighting key physiological compartments and the primary clinical questions. (PDA – Patent Ductus Arteriosus)*

We constructed zero-dimensional (lumped parameter) computational models representing the entire HLHS circulation before and after the first-stage intervention. We evaluated four potential strategies for this stage, including the traditional Norwood procedure with either a Blalock-Thomas-Taussig or Sano shunt, Hybrid Norwood approach, and fully catheter-based interventions as practiced at Hôpital Necker-Enfants Malades, Paris. The model incorporates key cardiovascular compartments, allowing assessment of how different procedural strategies affect relevant biomarkers (shown in **Figure 1**).

Results: These virtual models enable systematic exploration of these interventions by introducing targeted modifications to each strategy, for example, the length and diameter of the cardiopulmonary shunts, the degree of banding of the pulmonary arteries, etc. By quantifying clinically meaningful biomarkers such as systemic and pulmonary flows, load on the single ventricle, coronary and cerebral perfusion, and flow to other vital organs, the model provides insights into which approaches are most likely to produce favorable



outcomes and reduce the need for reinterventions.

Conclusions: This modeling framework could help optimize surgical and catheter-based strategies and support personalized intervention planning.



O-082 / #1294

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

EARLY REPAIR OF TRUNCUS ARTERIOSUS IS ASSOCIATED WITH FEWER PREOPERATIVE COMPLICATIONS AND COMPARABLE POSTOPERATIVE OUTCOMES

Patrizio Moras[1], Ambra De Carolis[1], Cosimo Marco Campanale[1], Marco Masci[1], Serena Ventrella[2], Federica Giglietta[2], Marzia Moras[2], Alessandra Toscano[2]
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Background and Aim: Truncus arteriosus (TA) is a rare and complex congenital heart defect associated with high neonatal morbidity and mortality. Prenatal diagnosis enables optimized perinatal management, early initiation of prostaglandin therapy, and timely referral to specialized centers, potentially improving outcomes. This may be particularly relevant in anatomically complex forms such as Van Praagh type A4 TA, which is associated with interruption of the aortic arch and a high risk of preoperative instability. The aim of this study was to assess whether early surgical repair of TA is associated with fewer preoperative complications and improved postoperative outcomes.
Methods: All patients with TA treated at our center between 1995 and 2024 were retrospectively reviewed. Patients were divided into two groups according to the Van Praagh classification: Group 1 included TA type A4, while Group 2 included TA types A1–A3. Clinical characteristics, timing of surgery, preoperative complications, early postoperative outcomes, and long-term follow-up were compared between groups.
Results: Seventy-six patients were included; 24 (31.5%) had a prenatal diagnosis, including all 10 patients with TA type A4. Mean follow-up was 13.5 ± 6.2 years, during which 5 deaths occurred (6.5%). Group 1 underwent surgical repair at a significantly younger age compared with Group 2 (8 ± 6 days vs 174 ± 60 days, $p<0.001$). There were no significant differences between groups in weight at surgery (3.4 ± 1.1 kg vs 4.2 ± 2.0 kg, $p=0.393$), postoperative length of stay (41 ± 20 days vs 50 ± 14 days, $p=0.647$), or age at right ventricle–to–pulmonary artery (RV–PA) conduit replacement (51 ± 24 months vs 60 ± 38 months, $p=0.428$). Patients undergoing earlier repair (group 1) experienced fewer preoperative complications, including necrotizing enterocolitis and sepsis (0 vs 6 events), and lower mortality (0 vs 5 deaths).
Conclusions: In this cohort, early repair of TA was associated with fewer preoperative complications and lower mortality. This was particularly evident in patients with prenatally diagnosed type A4 anatomy. Postoperative outcomes were comparable to those observed



after later repair. These findings support the importance of fetal diagnosis and early surgical timing in the management of TA in specialized centers.

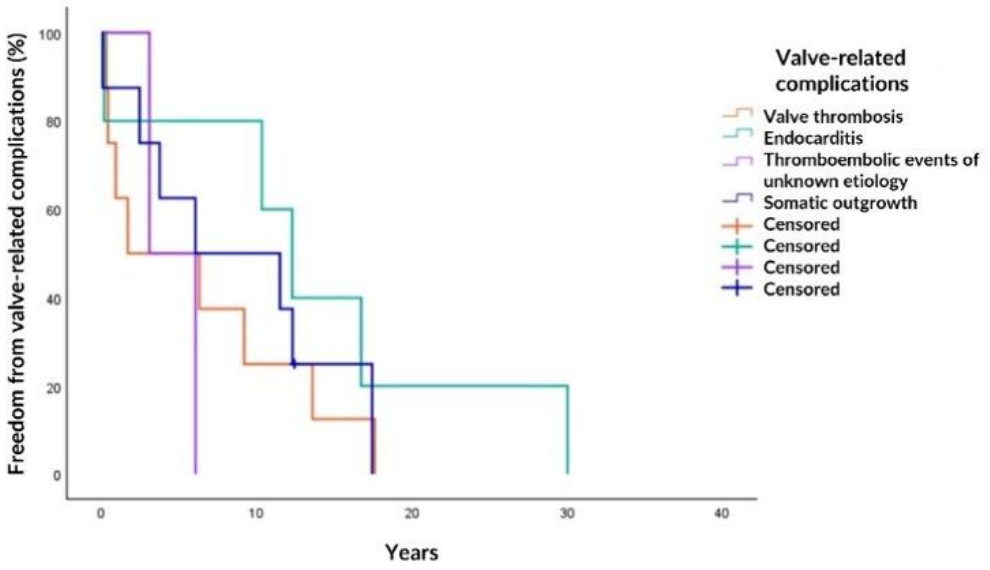
O-083 / #148

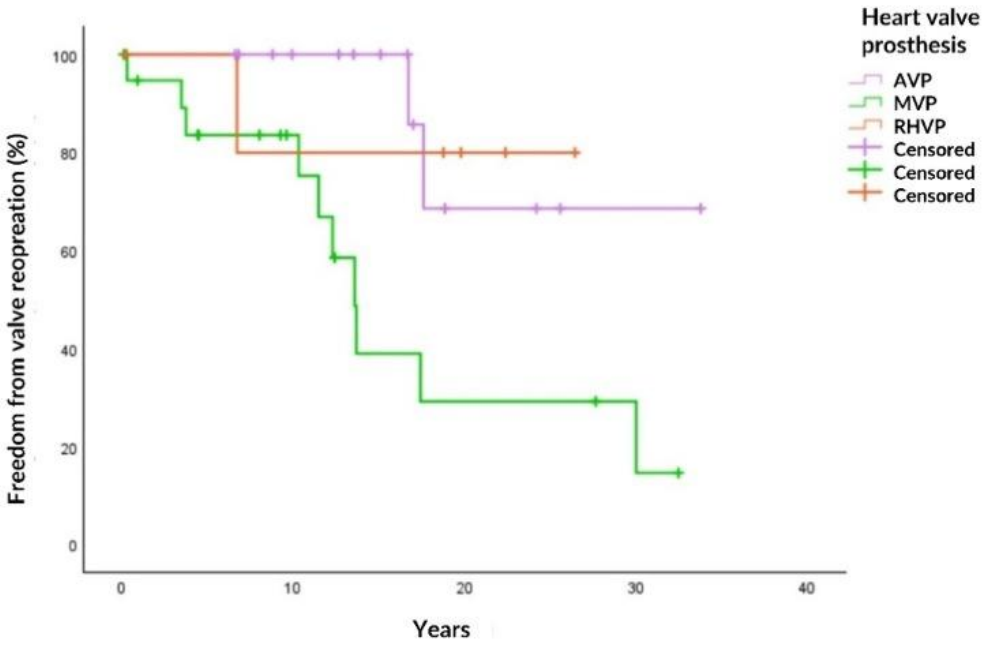
CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

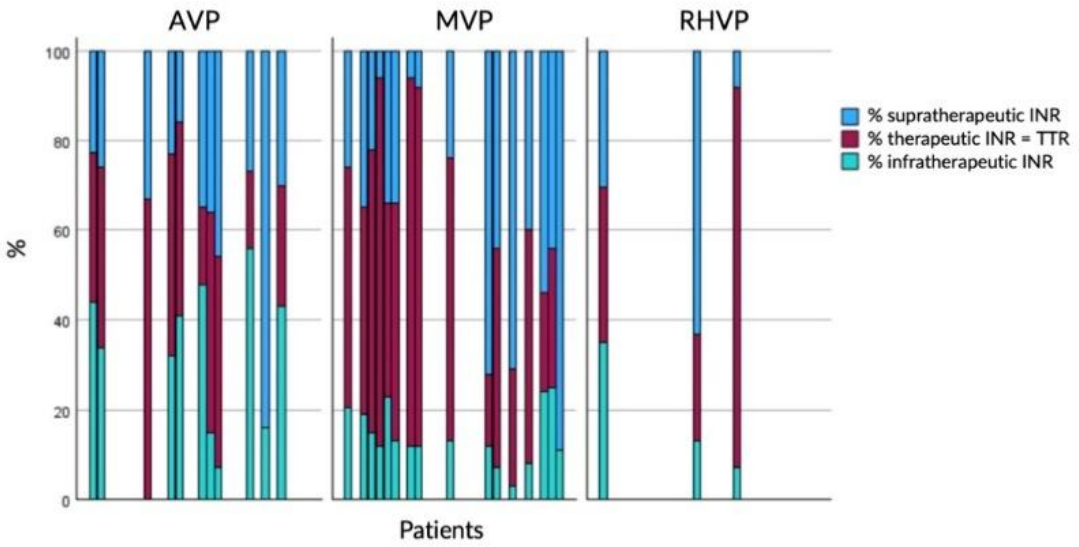
MECHANICAL PROSTHESES FOR VALVE REPLACEMENT IN CHILDREN: A LIFELONG CHALLENGE

Eline-Alice Brys[1], Julie Deboodt[1], Thomas Martens[2], Katrien François[1,2], Katya De Groote[1], Thierry Bové[1,2]
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Background and Aim: Mechanical valve prostheses are intended to offer a durable long-term solution in young patients with heart valve disease. However, their use in pediatrics is hindered by need for lifelong anticoagulation and thrombotic complications. This study assessed long-term survival, valve-related morbidity, reoperation rates, and anticoagulation quality following mechanical valve implantation in children.
Methods: This retrospective study included all patients ≤ 20 years who underwent valve replacement with mechanical prosthesis at Ghent University Hospital between 1991 and 2025. Primary endpoints were survival, valve-related complications, and freedom from valve reoperation. Anticoagulation management and time in therapeutic INR range (TTR) were evaluated as secondary outcomes. Maximum follow-up was 34 years.
Results: 46 patients were included: 15 aortic valves (AVP), 26 mitral valves (MVP), and 5 right-sided heart valves (RHVP). Median age at implantation was 11.5 years (IQR 2.7–15.9). 30- and 90-day mortality was 0% and 4.5%, respectively. Estimated survival at 1-10-20 years was 100%-100%-100% for AVP; 82%-77.4%-68.8% for MVP; and 100%-100%-80% for RHVP (p=0.098). Long-term valve-related complications occurred in 54.8%: valve thrombosis (19.0%), prosthetic outgrowth (19.0%), endocarditis (11.9%) and thromboembolic events (4.8%) (**Figure 1**). Freedom from valve reoperation at 1-10-20 years was 100%-100%-68.6% for AVP; 94.7%-83.6%-29.3% for MVP; and 100%-80%-80% for RHVP (p=0.014) (**Figure 2**). Patients younger than six years had significantly lower survival (p=0.012) and higher reoperation risk (p<0.001). Anticoagulation therapy showed high variability, only 9.1 % achieved a TTR ≥70 %; median TTR was 29.0 % (IQR 16.8-44.0) (**Figure 3**).


Freedom from valve-related complications (%)
100
80
60
40
20
0
0
10
20
30
40
Years
Valve-related complications
Valve thrombosis
Endocarditis
Thromboembolic events of unknown etiology
Somatic outgrowth
Censored
Censored
Censored
Censored


Freedom from valve reopreation (%)
100
80
60
40
20
0
0
10
20
30
40
Years
Heart valve prosthesis
AVP
MVP
RHVP
Censored
Censored
Censored



Conclusions: Mechanical valve replacement in children results in considerable morbidity related to both the prosthesis and anticoagulation therapy. Whereas mechanical aortic valves show excellent long-term outcome, mitral valve replacement with a mechanical prosthesis remains challenging due to high reoperation rate in commonly younger children. Evidence for right-sided mechanical valves is scarce but is associated with increased thrombosis risk. Suboptimal INR control highlights the need for safer and equally effective anticoagulation strategies in pediatric patients.



O-084 / #511

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

CIRCLE OF WILLIS VARIANTS AND THEIR ASSOCIATION WITH CONGENITAL HEART DISEASE AND POSTOPERATIVE BRAIN INJURY

Judit Alsina Rossell[1], Laura Pellicer Casanova[1], Marta Camprubí Camprubí[1], Marta Gómez Chari[2], Monica Rebollo Polo[2]
[1]Hospital Sant Joan de Déu, Neonatology, Esplugues de Llobregat, Spain, [2]Hospital Sant Joan de Déu, Radiology, Esplugues de Llobregat, Spain

Background and Aim: The Circle of Willis (CW) is a key arterial structure ensuring cerebral blood flow. Its classic configuration is present in only 18–25% of individuals, with frequent variants such as hypoplasia or agenesis. Congenital heart disease (CHD) may alter fetal circulation, potentially influencing this morphology and cerebral perfusion. This study aimed to examine the association between CHD and CW alterations, considering their possible link to cerebral hypoxia or hypoperfusion. Specific objectives included describing CW morphology in these patients, identifying anatomical variants, and analyzing their relationship with hemodynamic compromise and postoperative brain injury.
Methods: This is a retrospective study. Ninety-six neonates with CHD were included. All of them had postoperative brain magnetic resonance imaging (MRI). Brain MRIs were analyzed by two blinded investigators. CW was assessed using Non-contrast "Time-of-Flight" angiography and three-dimensional reconstructions. The main arteries were classified as normal, hypoplastic, or absent. Patients were classified regarding cyanosis and/or obstruction of aortic flow. Variants were correlated with disease type and neurological findings.
Results: Anatomical variants were found in 81% of cases, more frequent in the posterior sector (right posterior communicating artery 39.5%, left 31.2%, right posterior cerebral artery 26%, left 20.8%) than anterior (left anterior cerebral artery (LACA) 15.6%, anterior communicating artery 11.4%, right anterior cerebral artery 8.4%). Middle cerebral artery variants were rare (≤1%). Cyanotic patients showed fewer variants for right anterior cerebral artery, ($p=0.012$) and for left posterior communicating artery ($p=0.045$). Variants were associated with higher rates of stroke and white matter injury, particularly LACA ($p=0.003$ and $p=0.050$), without differences in hemorrhagic or hypoxic-ischemic lesions. LACA variants were linked to more left-sided lesions (57% vs 28.6% right and 34.6% bilateral, $p=0.037$).
Conclusions: CW variants were highly prevalent in neonates with CHD, particularly in the posterior circulation. Cyanotic patients showed fewer anatomical variants, suggesting



distinct cerebrovascular adaptations. Several variants, especially those involving LACA, were associated with higher rates of stroke and white matter injury. These findings highlight the potential contribution of CW morphology to cerebral vulnerability in CHD.



O-085 / #576

CONGENITAL HEART SURGERY ABSTRACT SESSION
15-05-2026 14:30 - 16:00

OUTCOME OF PATIENTS WITH FONTAN ASSOCIATED PROTEIN LOSING DISEASES AFTER NORWOOD PALLIATION

Eva Sames-Dolzer[1], Gregor Gierlinger[1], Michaela Kreuzer[1], Roland Mair[2], Fabian Seeber[2], Andreas Tulzer[3], Christoph Bauer[3], Gerald Tulzer[3], Rudolf Mair[2]
[1]Johannes Kepler University Linz, Medical Faculty, Division For Pediatric And Congenital Cardiac Surgery, Linz, Austria, [2]Kepler University Hospital, Division For Pediatric And Congenital Cardiac Surgery, Linz, Austria, [3]Children's Heart Center Linz, Pediatric Cardiology, Linz, Austria

Background and Aim: Children with hypoplastic left heart syndrome and related malformations are usually treated by staged Norwood palliation leading to Fontan physiology. The occurrence of protein losing diseases can be associated with severe Fontan failure and may be life limiting. Surgical procedures and lymphatic interventions can positively influence longterm outcome of this critical patient subgroup.
Methods: Between 1997 and October 2025 493 Norwood procedures have been performed at a single center using an RVPA conduit in 86% of our patients. 298 Norwood patients received a fenestrated extracardiac Fontan palliation with an on average 20 mm PTFE prosthesis at a median age of 3,6 years (range 0,9-7,7 years). This single center retrospective study investigates the outcome after onset of protein losing diseases as well as intervention strategies in this patient group.
Results: 5% of the initial Norwood group developed a protein losing enteropathy (25 pts.) and 2% at least one event of plastic bronchitis (11 pts.) at a median age of 5,9 years (range 3-17 years). Residual anatomic problems (mainly at the LPA) have been addressed using catheter interventions or surgery in 23 pts. Furthermore,13 patients received surgical procedures in order to improve Fontan physiology including 10 refenestration procedures and 3 Hraska operations. 8 patients underwent lymphatic interventions. 30% (10/34) died or underwent heart transplantation after median 3,3 years (range 0,4-11,3 years) after diagnosis. The median follow up period of surviving patients without HTX is 6,9 years (range 0,5-18,8 years). The 10 years survival expectancy after diagnosis of PLE is 60% and after plastic bronchitis 74%. 18/ 34 patients do not show clinical symptoms at last follow up and are in good general condition.
Conclusions: Protein losing diseases are still major complications of life threatening dimension leading to death or need for heart transplantation in a relevant portion of this subgroup. Nevertheless, life expectancy can be improved by successful surgical or



lymphatic interventions as is shown by the encouraging median follow up period of 7 years (with a maximum of 19 years in one patient). Besides prevention of anatomic obstacles, enhanced treatment options may alter quality of life of sufferers.



O-086 / #167

YOUNG INVESTIGATOR AWARD
15-05-2026 14:30 - 16:00

RISK FACTORS FOR THE DEVELOPMENT OF PROSTHETIC VALVE THROMBOSIS AFTER SYSTEMIC ATRIOVENTRICULAR VALVE REPLACEMENT IN PEDIATRIC PATIENTS WITH A FUNCTIONAL SINGLE VENTRICLE

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Fukuoka Children's Hospital, Fukuoka, Japan

Background and Aim: The risk factors for the development of prosthetic valve thrombosis (PVT) after systemic atrioventricular valve replacement in patients with functional single ventricles remain poorly understood.
Methods: The medical records of 39 operations in 28 patients with functional single ventricles who underwent systemic atrioventricular valve replacement between 1998 and 2021 were retrospectively reviewed. Clinical variables were compared between patients with and without PVT.
Results: The median age at operation was 20 (range: 0-240) months, and the body weight was 7.8 (2.5-57.0) kg. The valve size was 21 (16-33) mm, and the ratio of valve size (mm) to weight (kg) was 2.4 (0.5-6.4). Valve replacement was performed before the bidirectional Glenn procedure (BDG) in 8 cases, with BDG in 7 cases, between BDG and total cavopulmonary connection (TCPC) in 13 cases, with TCPC in 4 cases, and after TCPC in 7 cases. PVT occurred after 12 of the 39 operations (31%). There were significant differences in the age at operation (12 vs. 26 months, p=0.003), weight at operation (4.9 vs. 10.2 kg, p=0.001), and valve size/weight ratio (3.6 vs. 2.1, p=0.002) between operations with and without PVT. There were no significant differences regarding heterotaxy syndrome, preoperative vasoactive agents, or ventricular function. The incidence of PVT was higher before the completion of TCPC than at other points: before BDG (4/8 operations, 50%), BDG (3/7, 43%), between BDG and TCPC (5/13, 38%), compared to TCPC (0/4, 0%), and after TCPC (0/7, 0%) (P<0.001). In the multivariate Cox proportional hazards analysis, body weight at surgery was identified as an independent predictor of PVT (Hazard Ratio 0.70, 95% Confidence Interval 0.50–0.89; p<0.001). Freedom from the development of PVT was 78% at 1 year and 62% at 5 and 10 years in all patients. In patients weighing <10 kg, freedom from PVT was 38% at 10 years, whereas it was 100% at 10 years in patients weighing ≥10 kg.
Conclusions: Patients who developed PVT were younger, were underweight, and had a



greater ratio of prosthetic valve size to body weight than those who did not. Close monitoring for PVT is warranted, especially before the completion of TCPC.



O-087 / #188

YOUNG INVESTIGATOR AWARD
15-05-2026 14:30 - 16:00

A BIOPSYCHOSOCIAL MODEL FOR UNDERSTANDING EARLY NEURODEVELOPMENTAL VULNERABILITY IN CHILDREN WITH CONGENITAL HEART DEFECTS

L.Eliza Chiperi[1,2], Cristina Tecar[3,4], Adina Hutanu[5,6]
[1]Monza Ares Hospital, Pediatric Cardiology, Cluj-Napoca, Romania, [2]Emergency Institute for Cardiovascular Diseases and Heart Transplant, Pediatric Cardiology, Targu Mures, Romania, [3]RoNeuro Institute for Neurological Research and Diagnostic, Cluj-Napoca, Romania, [4]Iuliu Hatieganu University of Medicine and Pharmacy, Department Of Neurosciences, Cluj Napoca, Romania, [5]Center for Advanced Medical and Pharmaceutical Research, Laboratory of Humoral Immunology, Targu Mures, Romania, [6]George Emil Palade University of Medicine, Pharmacy, Sciences and Technology, Department Of Laboratory Medicine, Targu Mures, Romania

Background and Aim: Children with congenital heart defects(CHD) are at increased risk for neurodevelopmental impairment, beginning early before surgical or intensive care exposure. To characterize risk mechanisms, we integrated findings addressing neurodevelopmental, biological, and psychosocial contributors to early developmental outcomes.
Methods: A complex prospective cross-sectional study, designed as a biopsychosocial model, included 158 participants, composed of:
(1)A preoperative study that included children under 6-years of age with unrepaired non-cyanotic and cyanotic CHD. Psychomotor development was assessed using Denver Developmental Screening Test-II (DDST-II), generating domain-specific and global-developmental scores. (2)A parallel biomarker study that analysed serum neurotrophic and glial proteins like Brain_Derived_Neurotrophic_Factor(BDNF), Neuron_Specific_Enolase, protein-S100, Glial_Fibrillary_Acidic_Protein(GFAP), Tau_protein, Myelin_Basic_Protein, Adrenomedullin, Monocyte_chemoattractant_protein to evaluate their discriminative value for developmental delay. (3)A psychosocial study that assessed maternal psychological adaptation and child-related stress using the ICCAP (Impact of Congenital Anomalies on Parents) questionnaire, covering six functional domains, examined associations with children's developmental outcomes.
Results: In the developmental study, 97% of children with cyanotic CHD and 54% of those with non-cyanotic CHD demonstrated developmental delay. Global DDST-II scores were significantly lower than established norms (p=0.03), with gross-motor and personal–social domains being the most affected. Prenatal diagnosis (p=0.012) and exclusive breastfeeding



(p=0.008) were associated with better developmental performance. In the biomarker analysis, BDNF and GFAP emerged as the strongest candidate neuromarkers, demonstrating moderate discriminative accuracy for developmental delay (AUC=0.72 vs AUC=0.75). A threshold >5895pg/mL for BDNF and >0.68ng/ml for GFAP were associated with increased developmental risk.

In the psychosocial study, higher maternal stress—specifically in the "social experience" (r=–0.24, p=0.03) and "contact with medical staff" (r=–0.28, p=0.01) domains—correlated with lower child psychomotor scores.

Conclusions: Findings across these three studies converge to demonstrate that children with unrepaired CHD experience substantial early neurodevelopmental vulnerability stemming from biological, developmental, and psychosocial pathways, independent of peri-operative factors. BDNF and GFAP may represent promising early neuromarkers for identifying children at risk. Psychosocial burden was demonstrated to add a contribution to early developmental vulnerability. Early neurodevelopmental screening, prenatal counselling, promotion of breastfeeding, and integrated biopsychosocial care pathways could improve early outcomes and allow individualized follow-up for children with CHD and their families.



O-088 / #481

YOUNG INVESTIGATOR AWARD
15-05-2026 14:30 - 16:00

NATIONWIDE OBSERVED PREVALENCE, TRENDS, AND FUTURE PROJECTIONS OF CONGENITAL HEART DISEASE IN JAPAN: AN 8-YEAR REGISTRY-BASED POPULATION ANALYSIS IN A DECLINING-BIRTH SOCIETY

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[1]Keio University, Tokyo, Japan, [2]Jichi Medical University, Tochigi, Japan, [3]Database Subcommittee of the Japanese Society of Pediatric Cardiology and Cardiac Surgery, Tokyo, Japan, [4]Gunma Children's Medical Center, Gunma, Japan, [5]Fukuoka Children's Hospital, Fukuoka, Japan, [6]Mie University Graduate School of Medicine, Mie, Japan, [7]Tokyo Metropolitan Children's Medical Center, Tokyo, Japan

Background and Aim: Congenital heart disease (CHD) occurs in approximately 7–10 per 1,000 live births worldwide, but contemporary nationwide data from Japan—where rapid population decline is underway—have been limited. This study aimed to describe national CHD birth prevalence and temporal trends from 2017–2024, and to project case numbers through 2050.
Methods: Nationwide registry data from certified institutions of the Japanese Society of Pediatric Cardiology and Cardiac Surgery were analyzed, encompassing 6,566,350 live births. Birth prevalence was calculated using the Wilson method, and temporal trends were evaluated with negative binomial regression. Future cases were projected by applying multiple prevalence scenarios derived from 2017–2024 data to national birth forecasts from the 2023 population projections.
Results: A total of 92,551 CHD cases were identified (14.1 per 1,000 live births), including 2.80 per 1,000 for critical CHD (CCHD). Although national births and CHD counts declined during the study period, birth prevalence increased significantly (+2.4% per year for all CHD; +1.0% per year for CCHD; both $p < 0.01$). Significant increases in birth prevalence were observed in 12 non-critical subtypes and one critical subtype (coarctation of the aorta). Decomposition analysis showed that five mild lesions—ventricular septal defect, atrial septal defect, patent ductus arteriosus, pulmonary stenosis, and peripheral pulmonary stenosis—accounted for more than 70% of the overall increase, indicating improved detection of mild defects as the primary driver. Based on projected national births, estimated CHD cases in 2050 ranged from 7,649 to 12,432, corresponding to a +14% to −30% change relative to 2024. CCHD cases were projected to range from 1,361 to 1,702, a 20–35% decrease relative to 2024.



Conclusions: In Japan, CHD birth prevalence has continued to rise modestly despite substantial declines in national births, suggesting stable future demand for pediatric cardiology services. In contrast, CCHD incidence is expected to decline gradually. This nationwide dataset provides the first comprehensive assessment of contemporary CHD prevalence in Japan and quantitatively characterizes future trends that had not been previously evaluated. These findings provide a reference model for countries with similar demographic trajectories, including those in Europe, as they plan long-term healthcare systems for congenital heart disease.



O-089 / #359

YOUNG INVESTIGATOR AWARD
15-05-2026 14:30 - 16:00

YIELD OF CLINICAL SCREENING IN PAEDIATRIC FIRST-DEGREE RELATIVES OF PATIENTS WITH DESMOSOMAL CARDIOMYOPATHY

Sara Moscatelli[1,2], Leonie Luedke[2], Ella Field[2], Annabelle Barnes[1,2], Annabelle Crompton[2], Gabrielle Norrish[1,2], Juan Kaski[1,2]
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Background and Aim: Background and Aim: Variants in desmosomal genes (*PKP2, DSP, DSG2, DSC2* and *JUP*), usually inherited as autosomal dominant traits, cause a range of arrhythmogenic cardiomyopathy (ACM) phenotypes, including arrhythmogenic right ventricular cardiomyopathy (ARVC), dilated cardiomyopathy (DCM), and non-dilated left ventricular cardiomyopathy (NDLVC). Historically, familial desmosomal cardiomyopathies have been considered adult-onset diseases, but the yield of clinical screening in paediatric first-degree relatives has not been systematically evaluated.
Methods: Methods: Clinical data from all children (£18 years) referred to a single referral centre for family screening following a diagnosis of desmosomal cardiomyopathy in a first-degree relative were analysed.
Results: Results: Of 173 children from 77 families referred for screening, 79 (47%) from 55 (71%) families harboured the familial desmosomal gene variant (26 *DSP*, 26 *PKP2*, 2 *DSG2*, 1 *JUP*). 11 children [14%; 6 females (55%)] from 8 families (10%) reached diagnostic criteria for one of the ACM phenotypes at a mean age of 12.5± 4.2 years, with 4 (5%) [JK2] younger than 10 years. 1 *DSP* and 1 *PKP2* carrier each fulfilled diagnostic criteria for NDLVC (non-ischemic left vemtricular scar), 3 *DSP* carriers had DCM (of whom 2 were biallelic), and 6 *PKP2* carriers had ARVC [Figure 1]. In addition, 2 patients had non-diagnostic features: 1 *DSP* carrier right ventricular (RV) hypokinesia on cardiac magnetic resonance (CMR,); 1 *DSG2* carrier had borderline RV systolic impartment on CMR. Of the 6 *PKP2*-ARVC, 2 had non-sustained ventricular tachycardia (NSVT); 2 had RV dilation, 1 with aneurysms and RWMAs; 1 had ventricular ectopy (VE) >500/day. All *DSP*-DCM patients had extensive late gadolinium enhancement (LGE) and NSVT; both biallelic *DSP*-DCM patients underwent cardiac transplantation.
Conclusions: Conclusion: Clinical screening identifies diagnostic criteria for an ACM phenotype (ARVC, DCM, NDLVC) in 14% of paediatric first-degree relatives of individuals



with desmosomal-related cardiomyopathy. These findings highlight the importance of commencing clinical screening at a young age.



O-090 / #1219

YOUNG INVESTIGATOR AWARD
15-05-2026 14:30 - 16:00

ASSOCIATION BETWEEN BLOOD BIOMARKERS AND HEMODYNAMIC PARAMETERS IN ADOLESCENTS AND ADULTS AFTER THE FONTAN PROCEDURE: A RETROSPECTIVE COHORT STUDY

Kentaro Kogawa
The Jikei University School of Medicine, Department Of Pediatrics, Tokyo, Japan

Background and Aim: Background: As the population of adolescent and adult patients with Fontan circulation continues to grow, long-term outcomes remain constrained by Fontan circulatory dysfunction, characterized by elevated central venous pressure (CVP) and reduced cardiac output. Red blood cell distribution width (RDW) is an inexpensive and widely available hematological parameter and a known prognostic marker in heart failure; however, its relationship with invasive hemodynamics in Fontan patients has not been fully elucidated. **Objectives:** To investigate the association between RDW and invasive hemodynamic parameters in adolescent and adult Fontan patients and to evaluate the utility of RDW as a noninvasive circulatory marker.
Methods: Methods: This single-center retrospective study included consecutive Fontan patients aged ≥16 years who underwent routine cardiac catheterization ≥5 years after surgery between June 2014 and July 2025. Laboratory data and catheter-derived hemodynamic parameters were analyzed. The primary endpoint was the correlation between RDW and CVP, and the secondary endpoint was the correlation between RDW and central venous oxygen saturation ($ScvO_2$).
Results: Results: Forty patients (median age, 22 years) were analyzed. The median RDW was 13.3%, and the median CVP was 11.0 mmHg. RDW showed a significant positive correlation with CVP ($\rho = 0.57$, $P < 0.001$) and significant negative correlations with $ScvO_2$ ($\rho = -0.66$, $P < 0.001$) and cardiac index ($\rho = -0.34$, $P = 0.03$). Patients with elevated RDW (>14.5%) had significantly higher CVP (14.5 vs. 10.5 mmHg, $P < 0.001$) and lower $ScvO_2$ (63.8% vs. 76.1%, $P < 0.001$) than those with normal RDW. Multivariable analysis identified RDW as an independent predictor of $ScvO_2$ ($P < 0.001$).
Conclusions: Conclusions: In adolescent and adult patients after the Fontan procedure, RDW was significantly associated with elevated CVP and reduced $ScvO_2$ and independently predicted impaired systemic oxygen delivery. RDW is inexpensive, widely accessible, and may serve as a practical noninvasive biomarker for identifying patients at risk of Fontan circulatory dysfunction and optimizing the timing of invasive assessment during long-term follow-up.



O-091 / #912

YOUNG INVESTIGATOR AWARD
15-05-2026 14:30 - 16:00

LONGITUDINAL ASSESSMENT OF CARDIAC FUNCTION AFTER CRANIOSPINAL IRRADIATION IN PEDIATRIC CENTRAL NERVOUS SYSTEM TUMOR SURVIVORS

Ana Carolina Izurieta-Pacheco[1,2], Alice Pozza[3], Emil Stefors[3,4], Marisa Signorile[5], Danielle Weidman[1,6], Kyle Runeckles[5], Farheen Ismail[6], Julie Bennett[1,6], Luc Mertens[3], Derek Tsang[6], Paul Nathan[1]
[1]The Hospital for Sick Children, Division Of Pediatric Oncology, Toronto, Canada, [2]Hospital Sant Joan de Déu, Oncology Department, Pediatric Cancer Center Barcelona, Barcelona, Spain, [3]The Hospital for Sick Children, Department Of Pediatric Cardiology, Labatt Family Heart Centre, Toronto, Canada, [4]Oslo University Hospital, Department Of Pediatric Cardiology, Norway, Norway, [5]Ted Togers Computational Program, Ted Rogers Center For Heart Research, TORONTO, Canada, [6]Princess Margaret Cancer Centre, University Health Network, Department Of Radiation Oncology, Toronto, Canada

Background and Aim: Survival among children with central nervous system (CNS) tumors has improved markedly. However, cardiovascular disease has emerged as an important cause of late morbidity in long-term survivors. Although anthracycline (AC) chemotherapy is not used to treat brain tumors, craniospinal irradiation (CSI) can expose the heart to radiation. The impact of CSI on heart function is poorly studied, and surveillance guidelines offer no CSI-specific recommendations. We aimed to evaluate longitudinal echocardiographic parameters of systolic and diastolic function following CSI and identify predictors of subsequent cardiac dysfunction.
Methods: Retrospective multi-institutional cohort study (January 2000-September 2024) of pediatric CNS tumor patients treated with CSI without prior AC exposure. Serial echocardiographic assessment included left ventricular ejection fraction (EF), shortening fraction (SF), global longitudinal strain (GLS), and Doppler-based diastolic indices. Longitudinal changes were modelled using mixed-effects models adjusted for demographic, treatment, cardiovascular and endocrine variables.
Results: Among 129 survivors (median age at diagnosis: 8 [IQR 5-11] years; median age at study: 23 [IQR 18-27] years), medulloblastoma was the most common diagnosis (80%) and most patients received photon-based CSI (median CSI dose: 2,360 [IQR 2,340-3,600] cGy; mean heart dose: 1.217 [IQR 2.340-3.600] cGy). Left ventricular EF and SF declined over time ($p=0.006$ and $p<0.00$, respectively), remaining stable through early adolescence, but decreasing at older ages (Figure 1A-B). GLS demonstrated a biphasic trajectory, with early post-CSI improvement followed by progressive decline ($p<0.001$), with sex-specific

differences at younger ages (p=0.015) (Figure 1C). Diastolic parameters remained stable. Cardiovascular risk factors were present in 28%, dyslipidemia (39%; n=14) and overweight (22%, n=8) being the most frequent. Two-thirds of patients developed endocrine late effects, the most common being growth hormone deficiency (n=58, 67%). Endocrine comorbidities were associated with lower EF over time (p=0.037).

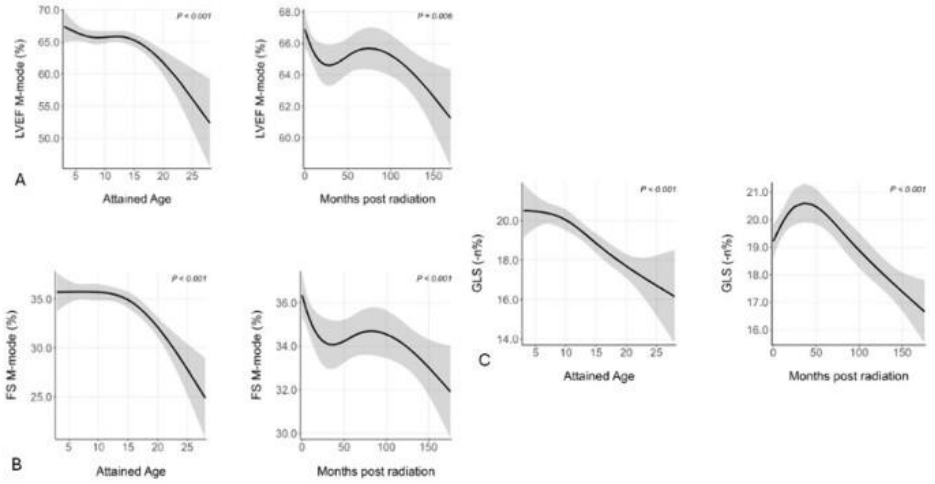


Figure 1. Longitudinal trajectory of systolic echocardiographic parameters: A) EF; B) SF; C) GLS.

Conclusions: We provide novel insights into cardiac vulnerability after CSI. Progressive long-term decline in systolic function was identified in CSI-treated CNS tumor patients, despite modest cardiac radiation doses and no prior AC exposure. Age at diagnosis, sex, and endocrine comorbidities modulate severity and evolution of systolic parameters, while diastolic indices remain stable.



O-092 / #1368

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

CLINICAL OUTCOMES AND RIGHT VENTRICULAR REMODELING AFTER PULMONARY VALVE REPLACEMENT IN REPAIRED TETRALOGY OF FALLOT: A META-ANALYSIS OF CONTEMPORARY COHORT STUDIES

Ludovica Bossio[1], Giuseppe Mazza[1], Silvia Pezzaniti[1], Francesca Conte[1], Rosalba De Sarro[1], Giovanni Di Salvo[2], Salvatore De Rosa[1], Daniele Torella[1], Jolanda Sabatino[1]
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Background and Aim: Pulmonary valve replacement (PVR) is widely performed in patients with chronic pulmonary regurgitation after tetralogy of Fallot (TOF) repair; however, its long-term impact on survival, arrhythmic risk, heart-failure progression, and right-ventricular remodeling remains debated. We performed a meta-analysis of contemporary cohort studies comparing clinical and functional outcomes of PVR versus non-PVR management.
Methods: Five observational cohorts (total N≈3,479) were included. Outcomes assessed included all-cause mortality, cardiovascular mortality, arrhythmias (overall and sustained VT), advanced heart failure, RV end-diastolic volume index (RVEDVi), predicted peak VO_2, and RV systolic pressure. Random-effects or Peto fixed-effect models were applied where appropriate.
Results: Across studies, PVR did not reduce all-cause mortality (OR 0.66, 95% CI 0.41–1.08; p=0.10), while results showed a significant reduction in cardiovascular mortality with PVR (OR 0.54, 95% CI 0.29–0.98; p=0.043). PVR did not significantly affect overall heart-failure events (OR 0.96, p=0.92;), nor sustained VT (OR 1.01, p=0.99). A trend toward higher arrhythmia incidence after PVR was observed (OR 2.01, 95% CI 0.85–4.75; p=0.11; I^2=69%) driven by heterogeneity between studies, driven by one study with markedly elevated event rates. Regarding structural and functional parameters, PVR was associated with a significant reduction in RVEDVi compared with non-PVR patients (mean difference, MD –48.7 mL/m^2, p<0.001), confirming robust reverse remodeling. RV systolic pressure increased modestly after PVR (MD +7.45 mmHg, p<0.001), while % predicted peak VO_2 did not improve (MD –4.96%, p=0.32).
Conclusions: In repaired TOF, PVR is consistently associated with substantial RV volumetric reverse remodeling but neutral effects on overall mortality and major arrhythmias, although a possible reduction in cardiovascular mortality emerges. These results highlight the clinical value of PVR for RV remodeling yet underscore the need for prospective, event-powered studies to clarify its effect on long-term clinical outcomes.



O-093 / #1286

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

DIGITAL HEALTH PASSPORT FOR CONGENITAL HEART DISEASE PATIENTS: ENABLING LIFELONG CARE AND EMPOWERMENT

Serena Flocco[1], Giovanna Campioni[2], Raluca-Bianca Nedesca[3], Arianna Magon[4], Davide Coti Zelati[3], Massimo Chessa[5], Giulia Guglielmi[5]
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Background and Aim: Congenital heart disease (CHD) is the most common congenital condition and requires lifelong follow-up. Advances in surgical and medical care enable over 90% of children with CHD to reach adulthood, highlighting the need for structured follow-up and effective transition programs. Patients often have complex clinical histories, and lack of immediate access to critical information during emergencies or travel can compromise adequate care. To address this, a patient-centred Digital Health Passport is being implemented for both pediatric and adult patients to enhance safety, autonomy, and continuity of care across the lifespan.
Methods: An NFC-enabled wearable device will be provided to CHD patients, serving as a Digital Health Passport. Device activation and data entry are guided by healthcare teams at referral centers, and data can be managed by families and patients via password protection according to EU GDPR. The device stores encrypted clinical and demographic data, including diagnoses, surgical history, therapies, allergies, and emergency contacts. This information can be easily read through any NFC-equipped phone, and is available for 120 seconds. This tool is compatible with Android and iOS devices, allows offline access, and can even translate information into ten different languages. To support patients and families in initially using the device, structured educational activities will be provided by the referral centre.
Results: This project aims to reach ≥95% of patients receving the device to complete data and ≥90% of them to regularly use it. Outcomes will also include patient and family satisfaction, patient self-management, patient engagement, and adherence to therapy, as



measured through self-reported questionnaires. Future perspectives include facilitation of clinical decisions across different settings, including non-tertiary centres.

Conclusions: Implementation of the NFC-based Digital Health Passport is expected to establish a lifelong framework for safe and continuous care for CHD patients. It will support seamless transition from pediatric to adult services, promote patient autonomy, and strengthen communication among healthcare providers, especially during emergency situations. The model is scalable, sustainable, and can be integrated into multidisciplinary follow-up programs, advancing patient-centered care and adoption of digital health solutions.



O-094 / #343

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

AORTIC COARCTATION: LONG-TERM OUTCOMES AFTER REPAIR WITH VS. WITHOUT FOREIGN MATERIAL

Simon Schiessler[1], Pinar Bambul-Heck[1], Julie Cleuziou[2], Andreas Eicken[1], Alfred Hager[1], Peter Ewert[1], Katarzyna Gendera[1]
[1]German Heart Center, TUM University Hospital, Technical University of Munich, Department Of Congenital Heart Disease And Pediatric Cardiology, Munich, Germany, [2]German Heart Center Munich, Technical University of Munich, Department Of Congenital And Paediatric Heart Surgery, Munich, Germany

Background and Aim: Aortic coarctation (CoA) can be treated surgically, using end-to-end anastomosis, patch aortoplasty, subclavian flap repair, or conduit implantation, or via catheter-based intervention such as balloon angioplasty and stent placement. A key unresolved issue is whether foreign material introduced into the aortic wall affects long-term vascular physiology and hemodynamics. This study evaluates the long-term influence of foreign material used in CoA repair, with a focus on resting and exercise-induced hypertension, and performance and ECG changes during cardiopulmonary exercise testing (CPET).
Methods: We conducted a retrospective analysis of patients with repaired CoA who underwent follow-up CPET at a tertiary university hospital. Exclusion criteria included univentricular circulation, a systemic right ventricle, extra-anatomical aortic conduits, and reintervention for recurrent CoA within 12 months after CPET. Patients were grouped according to the presence or absence of foreign material (stent, patch, or conduit) in the aortic isthmus. Endpoints were resting blood pressure, exercise blood pressure response, peak oxygen uptake (VO_2max), exercise-induced ST-segment abnormalities, and the need for antihypertensive medication.
Results: A total of 111 patients (36% female) were included, with a median follow-up of 35 years (IQR 24–42). Forty-two patients (38%) had foreign material in the aortic isthmus. Baseline characteristics—including age, gender, anthropometrics, and follow-up duration—were similar across groups. Antihypertensive medication was required significantly more often in patients with foreign material (74% vs. 39%; $p < 0.001$). VO_2peak showed a non-significant trend toward higher values in patients without foreign material (30.1 vs. 27.6 mL/kg/min; $p = 0.07$). Resting blood pressure, exercise blood pressure response and ST-segment changes did not differ significantly. Multivariable analysis identified age at follow-up and the presence of foreign material as the strongest predictors



of arterial hypertension, while age at initial CoA repair showed no association with later hypertension.

Conclusions: Foreign material used in CoA repair appears to increase the likelihood of requiring antihypertensive therapy, although exercise capacity and blood pressure profiles remained similar between groups. While these findings do not support changes to current treatment strategies—particularly given the benefits of less invasive catheter-based approaches—they highlight the need for careful long-term blood pressure monitoring in patients with foreign material in the aortic isthmus.



O-095 / #1486

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

LONG-TERM OUTCOMES OF HEART TRANSPLANTATION IN ADULTS WITH CONGENITAL HEART DISEASE: A SINGLE CENTER EXPERIENCE

Domenico Crea[1], Nicola Pradegan[1], Chiara Tessari[1], Daniela Bacich[1], Giuseppe Toscano[1], Daniela Mancuso[1], Biagio Castaldi[2], Giovanni Di Salvo[2], Annalisa Angelini[3], Vladimiro Vida[4], Gino Gerosa[1], Vincenzo Tarzia[1]
[1]University of Padova, Padova, Italy, [2]University of Padova, Department For Women's And Children's Health, Pediatric And Congenital Cardiology Unit, padova, Italy, [3]Cardiovascular Pathology Unit Hospital University of Padua, Cardiac Thoracic Vascular Sciences And Public Health, Padova, Italy, [4]University of Padova, Department Of Cardiac, Thoracic And Vascular Sciences, Padova, Italy

Background and Aim: Heart transplantation (HT) represents the definitive treatment for selected patients with end-stage heart failure secondary to congenital heart disease (CHD). Given the increasing number of CHD patients surviving into adulthood and the complexity of this population, long-term post-transplant outcomes remain a matter of concern. This study aimed to evaluate long-term survival and clinical outcomes after HT in CHD patients in a single-center experience.
Methods: CHD patients undergoing HT at our institution were retrospectively analyzed. Demographic, clinical, surgical, and follow-up data were collected. The primary endpoint was overall survival. Secondary endpoints included long-term transplant-related complications. Survival analysis was performed using Kaplan–Meier analysis. Continuous variables are reported as median and interquartile range (IQR).
Results: A total of 47 patients (33 males, 14 females) with congenital heart disease underwent heart transplantation. Median age was 39 years (IQR 29-50). Among them,15 patients (31.9%) had CHD with univentricular physiology. Median follow-up was 52 months (IQR 1–131).
During long-term follow-up, there was no cardiac allograft vasculopathy (CAV) grade ≥2, post-transplant neoplasms occurred in 1 patient and chronic kidney disease (CKD) in 11 patients.
At last follow-up, median left ventricular ejection fraction was 61% (IQR 58–68.75), indicating preserved graft function in the majority of long-term survivors. Median TAPSE was 16.5 mm (IQR 14- 19.74). Moderate tricuspid regurgitation was detected in only 1 patient and no other moderate or severe atrioventricular valve regurgitation was observed. Kaplan-Meier survival analysis showed an overall survival of 64.2±8.1% at 10 years, and



46.2±12.8% at 20 years.

Conclusions: Heart transplantation in patients with congenital heart disease provides acceptable long-term survival despite the anatomical complexity and comorbidities of this population. Although long-term complications such as CAV, neoplasms, and CKD remain common, acceptable graft function and survival can be achieved. These findings support heart transplantation as a durable treatment option for selected CHD patients managed in experienced centers with dedicated long-term follow-up



O-096 / #233

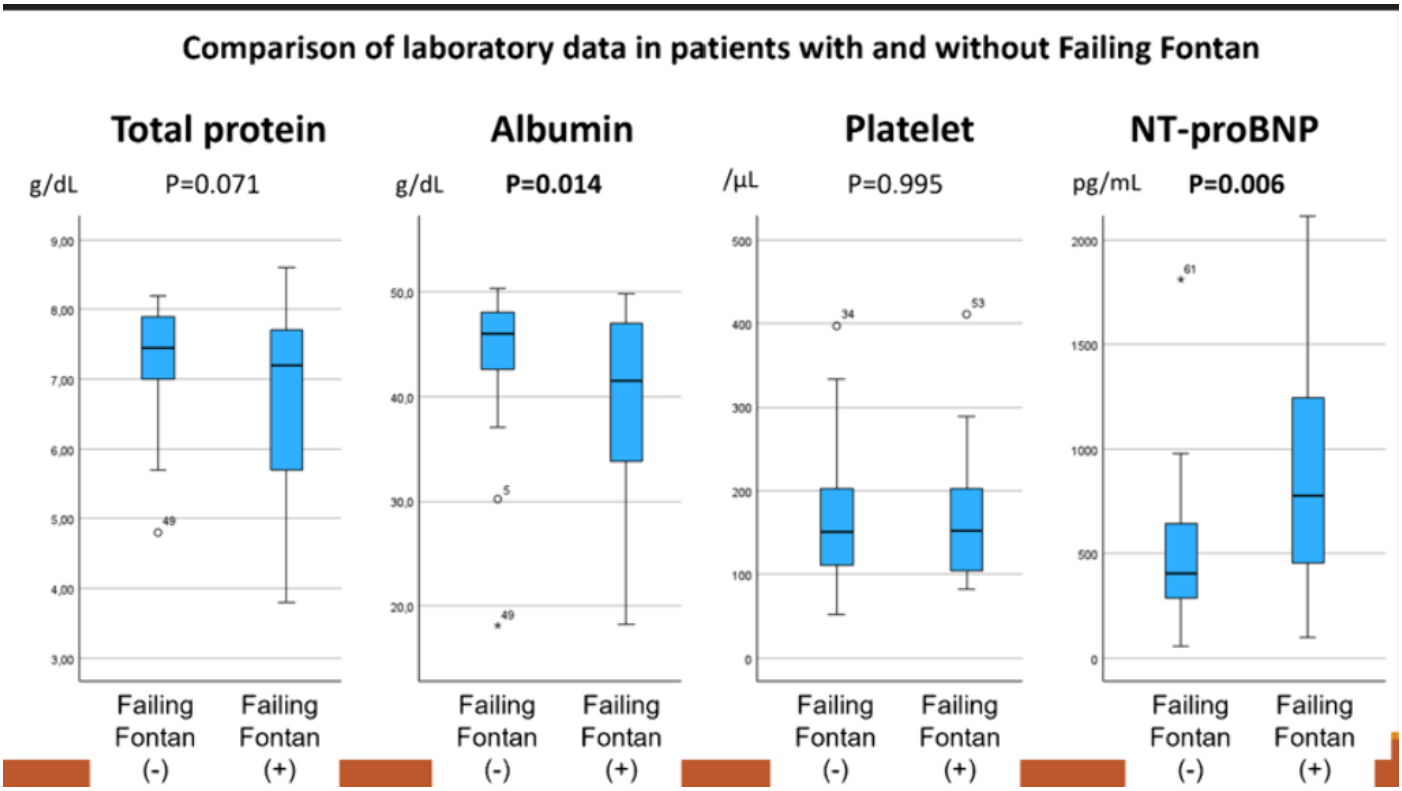
ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

CLINICAL OUTCOME OF LATE SURVIVORS FOLLOWING THE CLASSIC FONTAN PROCEDURE

Jasmin Reyhaniye[1], Muneaki Matsubara[1], Thibault Schaeffer[1], Jonas Palm[2], Christoph Röhlig[2], Paul Philipp Heinisch[1], Alfred Hager[2], Jürgen Hörer[1], Masamichi Ono[1]
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Background and Aim: The insidious development of heart failure and multi-organ dysfunction in adults with a classic Fontan was reported. This study aimed to evaluate the late outcome of adult patients after the classic Fontan procedure and to investigate the prevalence of failing Fontan.
Methods: Among 170 patients who underwent the classic Fontan procedure between 1978 and 1995, those who survived for more than 20 years with follow-up data were included. Outcomes were evaluated, including mortality, arrhythmia, failing Fontan, and laboratory variables.
Results: A total of 60 patients were included. The diagnoses included 37 tricuspid atresia (Ib in 20, Ic in 6, IIb in 3, and IIc in 8), 14 double inlet left ventricle (DILV), and 9 others. The median age at the Fontan was 6.3 (IQR: 3.9-10.1) years. The type of the Fontan included 35 atriopulmonary connections (13 Kreutzer and 22 Lins) and 25 atrioventricular connections (Björk). During the median follow-up of 35.3 (32.4-37.7) years, there were 13 deaths with a median period of 32 (IQR: 29-35) years, and 31 onset of failing Fontan with median period of 31 (IQR: 21-36) years. Tachyarrhythmia was observed in 19 patients. Patients with failing Fontan showed lower survival than those who did not (p=0.013). DILV (HR: 2.26, p=0.03) and ascites (HR: 2.70, p<0.01) were risk factors for failing Fontan. Absolute lymphocyte counts (890 (670-1420) vs.1200 (870-1690) μL, p<0.01) were lower at the onset of failing Fontan, compared to 1 years before the onset of failing Fontan. At follow-up, albumin levels (4.1 (3.4-4.7) vs. 4.6 (4.1-4.8) g/dl, p=0.01) were lower and NT-proBNP (774 (449-1247) vs. 404 (238-669), p=0.006) was higher in patients with failing Fontan than those without. However, GOT (p=0.35), GPT (p=0.37), gamma GTP (p=0.70), Fib-4 (p=0.48), protein level (p=0.07), and platelet counts (p=0.99) were similar between the groups.

Conclusions: In adult patients with the classic Fontan physiology, late mortality and late onset of failing Fontan were relevant more than 20 years postoperatively. Lymphopenia, low albumin level, and higher NT-proBNP were observed in patients with failing Fontan. Serial evaluation of biomarkers seems to be important for the management of adult Fontan patients.





O-097 / #578

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

FONTAN-ASSOCIATED LIVER DISEASE: CLINICAL AND EPIDEMIOLOGICAL IMPACT ON A LARGE COHORT IN THE UK, A RETROSPECTIVE MULTICENTER STUDY.

Eleonora Munaretto[1], Hannah Bellsham-Revell[2], Natalie Dedieu[3], Aaron Bell[2], Niromila Nadarajan[3], Mara Cananzi[1], Alastair Baker[4], Michael Quail[3]
[1]University Hospital of Padua, Paediatric Hepatology And Gastroenterology, Padua, Italy, [2]Evelina Children's Hospital, Guy's and St Thomas' NHS Foundation Trust, Paediatric Cardiology, London, United Kingdom, [3]Great Ormond Street Hospital for Children NHS Foundation Trust, Department Of Paediatric Cardiology, London, United Kingdom, [4]King's College Hospital, NHS Trust, London, UK, Paediatric Liver Center, London, United Kingdom

Background and Aim: As survival after the Fontan procedure improves, FALD prevalence is increasing; however, paediatric data remain limited. This study investigates FALD prevalence, its impact on survival, and risk factors for disease severity.
Methods: A retrospective multicenter cohort study was conducted across three UK tertiary care centres, including patients with univentricular heart who underwent the Fontan procedure between 1987 and 2024. Liver disease severity was assessed using MELD-XI and VAST scores.
Results: Among 729 patients, 53.5% (390) underwent liver assessment, with a median age of 13.1 years and median follow-up of 12.8 years. FALD prevalence was 10.9% at 0-5 years, 23.3% at 5-10 years, 63.7% at 10-15 years, 82.6% at 15-20 years, 91% at 20-25 years, and 100% at 25-40 years. Radiological cirrhosis was detected in 18.2% of imaging within 5 years, 29.9% at 5-10 years, 37.7% at 10-15 years, and 83.3% beyond 25 years. Hepatocellular carcinoma was present in 0.14%. Liver stiffness did not change over time nor correlated with disease severity, whereas VAST and MELD-XI scores positively correlated with time post-Fontan ($p<0.0005$, $p<0.0001$). Older age at Fontan, cardiac isomerism, and male sex correlated with MELD-XI ($p=0.003$, 0.004, 0.036). Univariate Cox regression identified liver injury pre-Fontan (HR 3.74, $p=0.041$), VAST (HR 2.93, $p<0.0005$) and MELD-XI (HR 1.17, $p=0.015$) as significant mortality predictors. Multivariable analysis confirmed VAST (HR 3.15, $p<0.0005$) and MELD-XI (HR 1.21, $p=0.013$) independent role. ROC analysis identified VAST ≥ 2 and MELDXI ≥ 14 as mortality predictors.
Conclusions: FALD progresses to advanced liver disease in nearly all patients over time, with up to 64% of patients developingFALD during childhood, including radiological cirrhosis in 38%. Pre-Fontan liver injury, MELD-XI and VAST scores are associated with mortality, while liver stiffness does not predict progression. We therefore advocate for



initiating liver assessments within the first decade post-Fontan to enable timely management of hepatic complications.



O-098 / #1423

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

RELATIONSHIPS BETWEEN CARDIOPULMONARY EXERCISE TESTING, CARDIAC BIOMARKERS, AND CMR PARAMETERS IN YOUNG ADULTS WITH REPAIRED TETRALOGY OF FALLOT

Benedetta Leonardi, Federica Gentili, Eliana Tranchita, Claudia Montanaro, Matteo D'Agostini, Ottavia Porzio, Marcello Chinali, Rosalinda Palmieri, Giulia Di Già, Rossana Palumbo, Aurelio Secinaro, Ugo Giordano
Bambino Gesù Children's Hospital, IRCCS, Rome, Italy

Background and Aim: Objective assessment of functional capacity and disease severity is essential in repaired Tetralogy of Fallot (rToF), in whom symptoms are often unreliable. Cardiopulmonary exercise testing (CPET), cardiac magnetic resonance (CMR), and circulating cardiac biomarkers provide complementary information; however, their integrated relationships are not fully understood. To investigate the relationships between CPET-derived parameters, circulating cardiac biomarkers (NT-proBNP and troponin) and CMR measurements in rToF patients.
Methods: Patients with rToF and a recent CMR were prospectively enrolled. On the same day, CPET was performed and NT-proBNP and troponin levels were measured. NYHA functional class was assessed, and associations between CPET, biomarkers, and CMR parameters were analyzed.
Results: Among 119 patients (mean age 28.3 ± 7.5 years), nearly all were in NYHA class I. Mean values for peak VO_2, peak oxygen pulse, VE/VCO_2 slope, and oxygen uptake efficiency slope were 27.4 ± 5.8 mL/kg/min (69.2 ± 11.7% predicted), 11.9 ± 2.7 mL/beat (80.4 ± 14.6% predicted), 30.0 ± 4.4, and 2106 ± 533, respectively. CMR measurements included a RVEDVi 117.5 ± 24.2 mL/m^2, RVESVi 54.8 ± 16.9 mL/m^2, RVEF of 53.5 ± 6.4%, PR of 20.5 ± 16.8% and a LVEF of 58.3 ± 10.2%. Median NT-proBNP levels were 70 pg/mL (IQR 36–111), while median troponin concentrations were 4.4 pg/mL (IQR 3.0–5.9). NT-proBNP correlated positively with RVEDVi, RVESVi and PR and inversely with RVEF (all $p < 0.01$). NT-proBNP was inversely correlated with peak VO_2, OUES, VO_2 at anaerobic threshold (all $p < 0.001$) peak oxygen pulse ($p < 0.05$) and positively with VE/VCO_2 slope ($r = 0.199$, $p < 0.05$). Troponin showed positive correlations with absolute peak VO_2 ($p < 0.01$), peak oxygen pulse ($p < 0.01$), OUES ($p < 0.05$), and inverse correlations with RVEF and LVEF (both $p < 0.01$), without significant associations with ventricular volumes.
Conclusions: NT-proBNP and troponin provide complementary but distinct information in rToF. NT-proBNP reflects right ventricular volume load and impaired exercise capacity,



whereas troponin is more closely related to systolic function and absolute performance, supporting a multimodal approach to disease severity assessment.



O-099 / #279

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

FACTORS ASSOCIATED WITH POST-TRANSPLANTATION SURVIVAL IN ADULTS WITH CONGENITAL HEART DISEASE: A SINGLE CENTER ANALYSIS

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Background and Aim: The purpose of this study is to review our single center experience of cardiac transplantation in ACHD over 38 years and assess risk factors associated with post-transplantation survival.
Methods: We performed a retrospective review of all ACHD patients at out institution undergoing heart transplantation from March 1987 to January 2025. Patients with prior heart transplants (n=3) were omitted. Post-transplant survival was assessed using Kaplan-Meier analysis with a log-rank test. A multivariable Cox proportional hazards model was constructed to assess factors associated with post-transplantation survival.
Results: A total of 73 ACHD patients underwent heart transplantation at our center. The median age at transplantation was 29.4 years [IQR=20.8-42.6], median weight was 67.1 kg [IQR=51.1-83.9], and median height was 170 cm [IQR=160-176]. 12/73=16.4% were supported with mechanical ventilation at the time of transplantation, and 8/73=10.9% were supported with mechanical circulatory support at the time of transplantation (6/73=8.2% with VAD and 2/73=2.7% with ECMO). 13/73=17.8% were multiorgan transplants. Median cardiopulmonary bypass time was 156 minutes [IQR=128-206], and median cross clamp time was 93 minutes [IQR=74-114]. Overall Kaplan-Meier estimated 1-year survival for all patients was 86.3% (95%CI=78.8%-94.6%) and estimated 5-year survival was 75.1% (95%CI=65.4%-86.3%) (**Figure 1**). On univariable and multivariable Cox survival analysis we found that increasing cardiopulmonary bypass time (per minute) was associated with an increased hazard of death (HR: 1.01 [1.004–1.016], p = 0.001) (**Table 1**).

Figure 1. 15-Year unadjusted Kaplan-Meier survival curve of all ACHD patients who received a heart transplant at the University of Florida from March 1987 to January 2025.

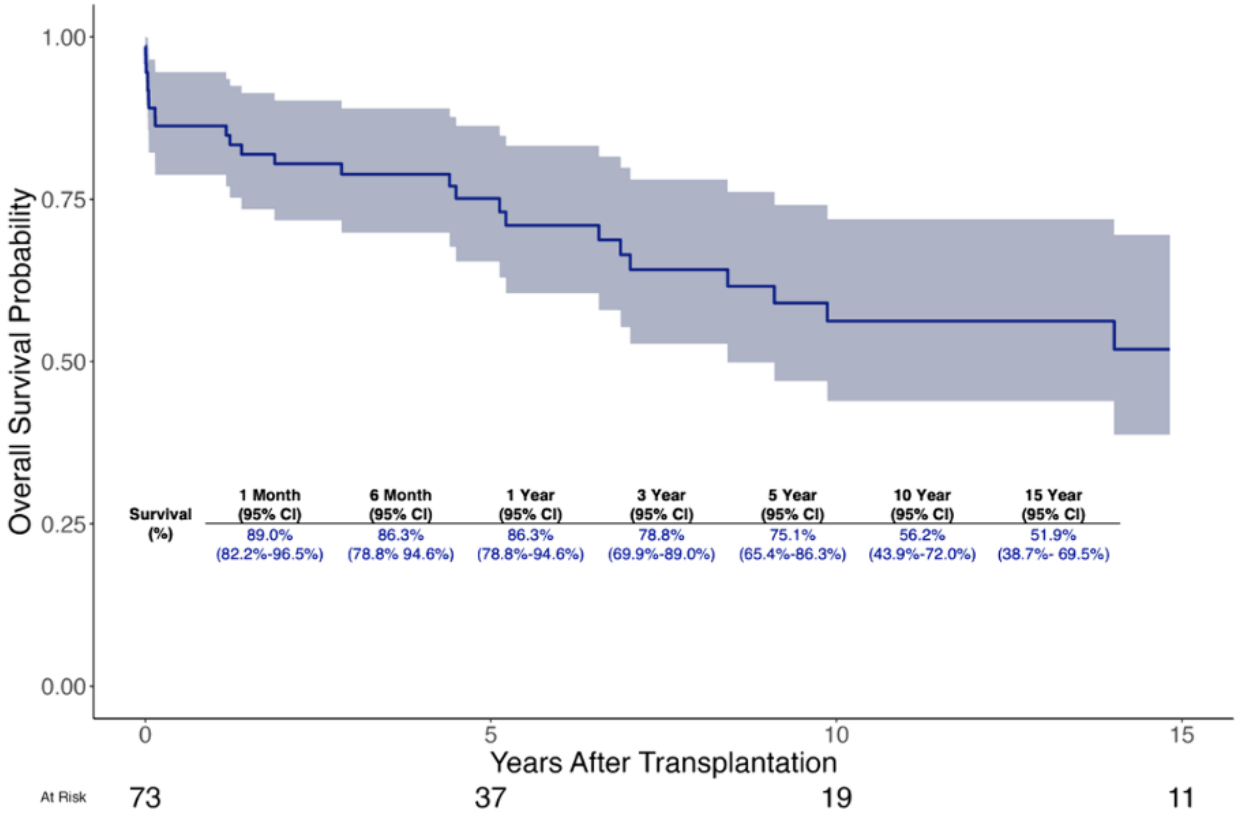


Table 1. Univariable and multivariable Cox-regression analysis

	Univariable analysis		Multivariable analysis	
Variable	**HR (95% CI)**	***P* value**	**HR (95% CI)**	***P* value**
Gender, female	1.787 [0.811–3.937]	0.150	1.182 [0.458–3.050]	0.730
Age	0.989 [0.960–1.019]	0.459	0.984 [0.944–1.026]	0.451
Weight	0.991 [0.975–1.007]	0.259	–	–
Functionally univentricular heart	0.937 [0.423–2.075]	0.847	–	–
Mechanical ventilation	0.592 [0.177–1.978]	0.394	–	–
Bypass time	1.010 [1.004–1.016]	0.001	1.010 [1.004–1.016]	0.001
MCS at transplantation	1.126 [0.337–3.757]	0.847	–	–
Multiorgan transplantation	1.724 [0.646–4.599]	0.277	–	–

Conclusions: Cardiac transplantation provides excellent outcomes for patients with ACHD and end-stage heart failure. However, shorter cardiopulmonary bypass times are associated with better post-transplant outcomes.



O-100 / #591

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

DIASTOLIC DYSFUNCTION, ATRIAL MECHANICS AND FUNCTIONAL CAPACITY IN FONTAN CIRCULATION: CLINICAL IMPLICATIONS FOR PATIENTS SURVEILLANCE AND HEART TRANSPLANT CONSIDERATION

Ylenia Bartolacelli[1], Massimo Casale[1], Anna Balducci[1], Gabriele Egidy Assenza[1], Cristina Ciuca[1], Valentina Gesuete[1], Daniela Palleri[1], Luca Ragni[1], Emanuela Angeli[2], Andrea Donti[1]
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Background and Aim: Complex Congenital heart defects (CHDs) palliated with Fontan surgery result in a functional single ventricle. The impact of dominant ventricular morphology on outcomes remain controversial and role of strain in Fontan patient is still to be defined. We aimed to characterize the relationship between atrial strain function in patients with Fontan palliation and functional capacity at cardiopulmonary exercise test (CPET).
Methods: 86 Fontan patients from our Hospital underwent CPET and were split into 2 groups: systemic right ventricle (SRV, 27) and systemic left ventricle (SLV, 59). The 2 groups were compared and atrail strain function was assesed with active (LASct), conduit (LAScd) and reservoir phase (LASr). A mean clinical follow up of 8.2 ± 3.1 years was observed.
Results: SRV and SLV patients underwent CPET at same age (p= 0.30) and showed no differences in maxVO2 (p=0.57), max RER (p=0.202), maxWork Load (p=0,359), VO2W slope (p= 0.424), O2Ppulse (p=0.473) between groups. When comparing SRV versus SLV, peak Oxygen VO2 (considered normal when > 59% than predicted) was ewas equally distributed (p=0.14) such as LASct (p=0.252) and LAScd (p= 0.422). LASr (19.3 ± 7.4 vs 23.5 ± 8.6; p=0.0204) and atrial volume (p=0.037) showed a difference between SRV and SLV ventricle. At multivariate regression analisys, higher VO2 were associated with younger age, lower LA reservoir strain and lower BSA for SLV (p=0.018, p=0.04, p=0.039 respectively) but not for SRV (p=0.164, p=0.485, p=0.948 respectively). During follow-up, 5 patients died, 5 patients underwent heart transplantation or enlisting for heart transplantation, 4 patients experienced an hospitalization for heart failure. VO_2 max (β = -0.18 ± 0.08) and LASr (β = -0.18 ± 0.08) were associated with adverse events (death/HTx/enlisting), p = 0.003, R^2 = 0.29.
Conclusions: In Fontan patients, CPET is useful in evaluating functional capacity and atrial



strains parameter are compromised, expecially in SRV and may be usefull to provide risk stratification. This single-center retrospective analysis suggests that dominant single ventricle morphology may not be associated with an appreciable difference in exercise performance in adult survivors with a Fontan palliation. During FU, LASr phase seems predictive for Fontan events such as death, Heart transplant and enlisting, especially when associated to VO2 max



O-101 / #1313

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

IDENTIFICATION OF RISK FACTORS INFLUENCING THE ONSET OF FONTAN FAILURE

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Background and Aim: Advances in surgical techniques, preoperative patient selection, and postoperative surveillance have enabled most Fontan-palliated patients to reach adulthood. However, given the intrinsic hemodynamic limitations, they eventually face Fontan circulation failure. To identify risk factors for and indicators of Fontan failure as well as their interaction, we analysed large longitudinal data sets using advanced statistical methods.
Methods: In this retrospective study we analysed longitudinal data of 284 out of 630 patients who received a Fontan operation between 1985 and 2021. Each patient dataset contained around 100 variables. Statistical analysis included univariable and multivariable Cox regression, classification and regression trees (CART), joint longitudinal models, and parametric regression with dual time scales.
Results: Left systemic ventricle with Fontan operation at an age between 2.5–12.8 years demonstrated the longest Fontan-failure free survival (median 30.8 years) in CART analysis. Patients with hypoplastic left heart syndrome (HLHS; HR 4.46, p=0.001) and unbalanced atrioventricular septal defect (AVSD; HR 3.76, p=0.006) had a significantly higher risk for Fontan failure compared to tricuspid atresia in multivariable Cox regression. Two years after the Fontan operation, hazard rates reach a peak with a subsequent decline before rising again substantially after 10 years. Comparison of extracardiac and intracardiac Fontan types revealed no significant differences for Fontan failure (HR 1.21, p=0.466). Joint modeling of longitudinal and time to event data demonstrated that a decrease of mean baseline SpO2 was associated with a higher instantaneous risk of Fontan failure (HR 2.38 for 5% decrease, p<0.001), whereas an increase in baseline heart rate was associated with increased risk (HR 1.16 for 5% increase, p<0.001). A reduction of ejection fraction was associated with increased Fontan failure risk (HR 1.09 for 5% decrease, p<0.001). Increasing pulmonary artery pressure was associated with a higher Fontan failure risk (HR 1.56 for 5% increase, p<0.001), while the transpulmonary gradient was not significantly associated with outcome.



Conclusions: Preliminary longitudinal analysis of our Fontan database identified several risk factors, including underlying diagnosis, ventricular morphology, Fontan modification, and age at operation, that may help define high-risk subgroups for Fontan failure. Joint models described the association between routinely collected clinical data and Fontan failure. Inclusion of more patients and variables might reveal additional risk factors and facilitate clinical decisions.



O-102 / #1359

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

FOLLOW-UP STRATEGIES AND MULTIDISCIPLINARY MANAGEMENT OF PATIENTS WITH FONTAN CIRCULATION: PRELIMINARY RESULTS OF AN AEPC SURVEY

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Background and Aim: Patients with Fontan circulation require lifelong, structured, and multidisciplinary follow-up. However, organization of care and surveillance strategies may vary considerably across centers. The AEPC ACHD Working Group initiated a survey to evaluate current follow-up practices among European congenital heart disease units
Methods: A web-based survey was distributed to heads of pediatric, ACHD, and combined congenital cardiology units. The questionnaire explored organizational models of care, cardiac and extracardiac surveillance, anticoagulation strategies, management of Fontan-associated liver disease (FALD), lymphatic complications, transition, reproductive counseling, and access to multidisciplinary services.
Results: At the time of analysis, responses had been received from 18 Centers across Europe. Responding units were predominantly ACHD centers (9/18, 50%), followed by pediatric cardiology units (5/18, 28%), with the remainder being combined congenital units (4/18, 22%). Most were tertiary referral centers. Most units reported structured cardiac follow-up with regular clinical assessment, echocardiography, ECG monitoring, and periodic advanced imaging. In contrast, significant heterogeneity was observed in the surveillance of extracardiac complications. Surveillance of Fontan-associated liver disease was routinely performed in the majority of centers (>85%), although approaches varied. Liver assessment most commonly included biochemical testing (>80%), with imaging strategies comprising ultrasound or elastography (~70%) and liver MRI (~50%). Liver biopsy was generally reserved for selected cases. Management of lymphatic complications demonstrated marked heterogeneity. While medical and nutritional treatments were available in most centers (>70%), access to specialized lymphatic imaging or interventional lymphatic procedures was reported by less than half of units. Anticoagulation strategies varied substantially across centers and patient age groups. Although multidisciplinary collaboration was reported by most units (>75%), formal transition programs, structured



reproductive counseling, and access to specialized lymphatic expertise are not uniformly available.

Conclusions: These preliminary results highlight substantial variability in the follow-up and multidisciplinary management of patients with Fontan circulation across European centers. While awareness of multisystem involvement is high, standardized protocols and equitable access to specialized services remain limited. These findings support the need for shared ACHD-focused recommendations, structured care pathways, and strengthened multidisciplinary networks to improve long-term outcomes for Fontan patients.



O-103 / #131

ADULT CONGENITAL HEART DISEASE ABSTRACT SESSION
15-05-2026 14:30 - 16:00

EXPERT-RECOMMENDED INTEGRATED CARDIO-OBSTETRIC PATHWAY FOR PRECONCEPTION CARE IN WOMEN WITH INTERMEDIATE- TO HIGH-RISK CARDIOVASCULAR CONDITIONS

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Background and Aim: Pregnancy places a significant haemodynamic strain on the body, thereby increasing the risk of complications to both mother and fetus in women with pre-existing cardiovascular disease (CVD). Preconception care (PCC) is essential to provide safe reproductive planning, comprehensive risk assessments and person-centered counselling. PCC for women with intermediate to high-risk CVD should be a cornerstone of cardio-obstetric care. Although specialist pregnancy heart teams (PHTs) can improve care and decision-making during pregnancy and postpartum, the implementation of cardio-obstetric PCC remains underused and inconsistent. Our aim was to develop an expert-Recommended Integrated Cardio-Obstetric PCC Pathway for women with Intermediate- to High-Risk CVD.
Methods: A comprehensive review was conducted of guidelines, consensus statements and recommendations, which were combined with our research/clinical team's expertise.
Results: Our proposed care pathway starts with referral of women with modified World Health Organisation (m-WHO) 2.0 class II–III or higher with an active child wish to a specialised, interdisciplinary PHT. Subsequently, three components entail the basis of

PCC: 1) comprehensive assessment and risk stratification, 2) person-centered, interdisciplinary counselling and 3) health optimisation (Figure 1). Comprehensive risk assessment should include cardiac evaluation, obstetric review of reproductive history, as well as lifestyle, psychosocial and genetic assessments (Figure 1). Risk stratification is subsequently provided based on the prior assessment findings. Person-centered, interdisciplinary counselling involves shared decision-making with the patient and covers discussions about risk estimates, follow-up planning and targeted interventions, including cardiac optimisation, switch to safer medications, assisted pregnancy and/or genetic interventions and provision of psychosocial support when needed. Then, health optimisation interventions are performed where needed, based on the results of the person-centered interdisciplinary counselling. These three steps can be repeated until health optimisation is
complete.

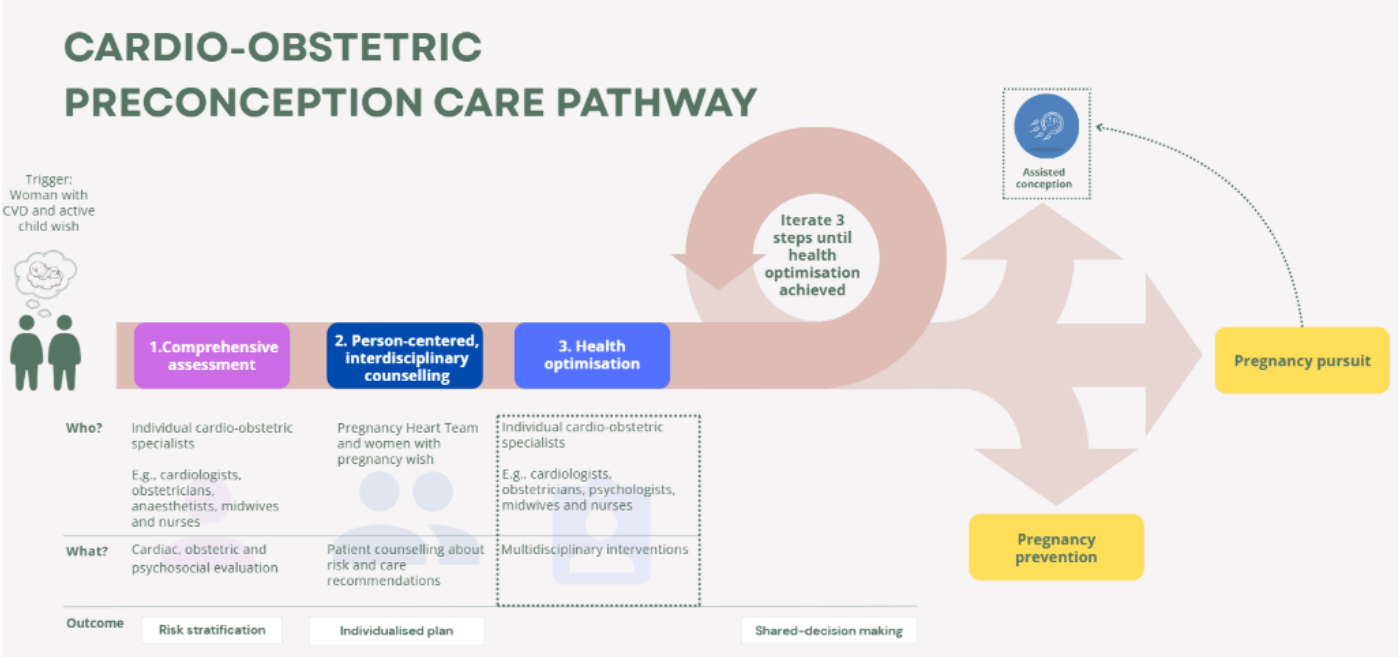


Figure 1: Overview of general steps for PCC in cardio-obstetrics. Figure legend: CVD = CardioVascular Disease. Depending on the patient's situation, the steps outlined in dotted lines may be optional.

Conclusions: The development of a cardio-obstetric, integrated PCC pathway provides structured guidance for cardio-obstetric health professionals to better support women with intermediate to high-risk CVD plan for pregnancy. Further research is needed to study implementation strategies to enable routine implementation.



O-104 / #675

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

MID-TERM OUTCOMES OF ECHOCARDIOGRAPHY-GUIDED BEDSIDE ARTERIAL DUCT CLOSURE IN PREMATURE INFANTS IN THE NEONATAL INTENSIVE CARE UNIT

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German Heart Center, TUM University Hospital, Technical University of Munich, Department Of Congenital Heart Disease And Pediatric Cardiology, Munich, Germany

Background and Aim: Currently, most interventional closures of a persistent arterial duct (PDA) in premature infants are performed under ionizing radiation. As recently shown by our team at the German Heart Centre Munich, echocardiography-guided bedside closure in the NICU is a feasible and potentially safer alternative for these vulnerable patients. In this study, we present the first cardiac mid-term results of this innovative approach.
Methods: So far, 21 children who underwent successful percutaneous interventional closure of the PDA exclusively under echocardiographic guidance between August 2020 and November 2024, at least one year before follow-up, were examined in this prospective study. Standardized clinical and echocardiographic parameters were assessed, including height, weight, right upper and lower extremity blood pressure, heart rate, oxygen saturation, and vessel status. Patency of inguinal and femoral vessels was confirmed sonographically, and an ECG was performed to exclude relevant arrhythmias. Echocardiography included chamber size and ventricular function assessment, valvular evaluation, branch pulmonary artery measurements, screening for aortic coarctation, estimation of right ventricular systolic pressure, and detection of residual ductal flow.
Results: The median age at follow-up was 3.1 years (range 1–6.3 years), and the median weight was 14.4 kg (range 7.3–20.0 kg). Clinical examinations were unremarkable, and no abnormalities of the access vessels were detected. Moderate tricuspid regurgitation was present in three patients (14%); except for one child (5%) with mildly elevated right ventricular pressure (RVP approx. 36 mmHg + CVP), no signs of right ventricular hypertension were observed. LPA and RPA diameter z-scores were within normal limits in all but two patients, without indication for intervention. Two patients required LPA stenting due to device-related obstruction. Mild aortic isthmus narrowing was identified in one child. No residual shunt was detected, and all devices remained in situ. The median follow-up duration was 36 months (range 12–75 months).
Conclusions: This study demonstrates that percutaneous PDA closure in preterm infants performed exclusively under echocardiographic guidance is safe and effective, including



during mid-term follow-up. However, in some cases, the occluder may cause stenosis of adjacent structures such as the LPA or aortic isthmus, potentially requiring further intervention. Venous vascular access was not associated with any significant vessel damage.



O-105 / #413

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

NOVEL BAILOUT TECHNIQUE IN MELODY VALVE VALVE IN VALVE PROCEDURE: ENSEMBLE BALLOON RUPTURE AND SIDE CELL BALLOON RESCUE STRATEGY

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FORTIS ESCORTS HEART INSTITUTE, Consultant, Paediatric Cardiology, NEW DELHI, India

Background and Aim: Percutaneous pulmonary valve implantation (PPVI) using the Melody valve in a failed surgical bioprosthesis (valve-in-valve) is an established therapy for right ventricular outflow tract (RVOT) dysfunction. Although the Ensemble delivery system offers controlled expansion and deployment, intra-procedural rupture of the Ensemble balloon is rare but potentially catastrophic, risking stent migration, incomplete deployment, and procedural failure. This report describes a novel bailout strategy using side-cell balloon stabilization followed by rescue dilatation to safely complete Melody valve deployment.
Methods: A 19-year-old male with a history of repaired Tetralogy of Fallot, prior pulmonary valve replacement and Redo PVR with a 23-mm EPIC bioprosthesis, presented with prosthetic valve calcification and RVOT dysfunction. Following pre-procedural echocardiography and catheterization, a Melody valve-in-valve PPVI was attempted using the Ensemble delivery system. Balloon dilatation of the calcified pulmonary valve with a 24 × 4 cm Atlas balloon done. Simultaneous prestenting with an Andra bare stent were undertaken prior to Melody deployment.
Results: During inflation, the Ensemble outer balloon ruptured prematurely, resulting in only partial stent expansion and instability of the Melody-mounted stent frame. A second balloon catheter was immediately advanced through a side cell of the semi-expanded stent and inflated to stabilize the stent and prevent displacement. After stabilization, the ruptured Ensemble system was safely withdrawn. A 23 mm × 4 cm Z-Med balloon was then used to achieve complete, controlled expansion of the Melody valve. Fluoroscopic and hemodynamic assessment confirmed optimal valve position, no residual regurgitation, and satisfactory RV gradient. The procedure was completed without conversion to surgery or periprocedural complications. At early follow-up, the patient demonstrated stable valve function and symptomatic improvement.
Conclusions: In Melody valve-in-valve PPVI, rupture of the Ensemble balloon during deployment can be effectively salvaged by advancing a secondary balloon through a side stent cell to stabilize the partially expanded frame, enabling safe system retrieval and transition to an alternative balloon for valve delivery. This novel bailout strategy prevents



stent collapse or migration, avoids emergent surgical intervention, and preserves procedural success. Adoption of this technique may enhance safety during complex PPVI, particularly in simultaneous prestenting scenarios



O-106 / #456

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

TWELVE YEARS OF ARTERIAL DUCTAL STENTING FOR PULMONARY PERFUSION: PREDICTORS OF TECHNICAL SUCCESS AND EFFECTIVE PALLIATION TO THE INTENDED ENDPOINT

Katarzyna Gendera[1], Doaa Abdel Aziz[1], Nora Lang[2], Sarah Hartmann[3], Pinar Bambul-Heck[1], Stanimir Georgiev[1], Julia Danner[1], Alfred Hager[1], Julia Lemmer[1], Kristina Borgmann[1], Dunja Renner[1], Andreas Eicken[1], Paul Philipp Heinisch[4], Peter Ewert[1], Daniel Tanase[1]
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Background and Aim: Over the past few decades, arterial duct stenting has become a well-established alternative to the modified Blalock–Taussig–Thomas (mBTT) and other aortopulmonary shunts for maintaining pulmonary blood flow in patients with duct-dependent circulation. Despite increasing experience and numerous studies, the procedure remains technically challenging, and successful palliation to the intended clinical endpoint is not always achieved. While factors influencing acute procedural success are well established, data on long-term palliation success and achievement of the intended endpoint remain limited.
Methods: Ductal anatomy was classified into four groups: (1) straight ducts, (2) ducts with one curve, (3) ducts with two curves, and (4) helical ducts with a >360° loop. All patients who underwent ductal stenting at our center were retrospectively analyzed to assess acute procedural success and the predefined clinical endpoint (successful corrective surgery, completion of a cavo-pulmonary anastomosis, or no further surgical intervention). Associations of weight, height, univentricular physiology, and annual success rates with short- and long-term outcomes were evaluated.
Results: From August 2013 to December 2024, a total of 110 patients (female, n=49; 45%) underwent ductus arteriosus stenting. The median age at the time of ductal stent implantation was 6 days (IQR 4-11), and the median weight was 3.0 kg (IQR 2.6-3.4). Acute procedural success was achieved in 92 patients (84%), while the intended clinical



endpoint was reached in 80 patients (73%). Ductal morphology significantly influenced outcomes ($p < 0.001$), independently of other factors, with the best results in group 1 and the poorest in group 4 for both procedural success and clinical endpoint. Patients with a univentricular circulation were significantly more likely to reach the intended endpoint ($p = 0.023$).

Conclusions: Helical ducts forming a loop of more than 360° were associated with lower success rates of palliation using a balloon-expandable stent in patients with duct-dependent pulmonary circulation, yet successful implantation was still achievable in a subset of these complex cases. For mid-term clinical success, further balloon dilatations of the stent or a stent-in-stent procedures are often necessary.



O-107 / #536

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

COMPREHENSIVE LONG-TERM FOLLOW-UP OF BALLOON ANGIOPLASTY IN NEWBORNS, INFANTS AND CHILDREN

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Background and Aim: Background: Balloon angioplasty has been an established treatment modality for decades but has been competing with stent implantation and is now deemed inferior by many operators. However, recent comprehensive long-term follow-up studies of balloon angioplasty are missing.
Methods: The cardiac catheterization database was utilized to identify all pediatric patients that had undergone balloon angioplasty for vascular stenosis. All angiograms and catheterization reports were reviewed for all initial and follow-up procedures. The electronic medical record was used to identify subsequent stent implantations, surgical interventions and latest follow-up. The data were entered in an Excel spreadsheet and statistical evaluation was performed using SPSS.
Results: 464 balloon angioplasties were performed in 366 patients as young as one month with a median age of 12 months and at a body weight of 3.0 to 103 kg with a median of 8.9 kg. The maximum follow-up was up to 27 years. 12% of patients died during follow-up. At least one repeat catheterization targeting the balloon dilated vessel was performed in 55.2% and up to four repeat catheterizations were performed in 0.6% of the patients. Repeat balloon dilations were performed in 29.3% at the first follow-up, in 15.7% at the second follow-up, in 30.4% at the third follow-up, and in none at the fourth follow-up catheterization. During follow-up, stent implantation was performed in 6.3% of balloon dilated vessels. Surgical revision on the balloon dilated vessel was performed in 25.2% after a median of 9 months.
Conclusions: Conclusion: The strategy of balloon angioplasty requires repeat balloon angioplasty for 21.3% of treated vessels but remains the only treatment modality for 68.5% of the treated vessels.



O-108 / #650

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

USE OF ATRIAL FLOW REGULATOR IN PEDIATRIC PATIENTS WITH CONGENITAL HEART DISEASE AND CARDIOMIOPATIES.

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Background and Aim: The Atrial Flow Regulator (AFR) is a self-expandable double nitinol disc device with central fenestration (4-10 mm diameter). Initially intended for interatrial communication and right atrial decompression in patients with pulmonary hypertension, it is now useful in patients with complex congenital heart disease and cardiomyopathy.
Methods: We present data on AFR implantation in Poland. We analyze the type of CHD, indications for implantation, type of vascular access, implantation technique, and immediate and long-term outcomes.
Results: Over the past five years, the AFR has been implanted in 26 pediatric patients (age from 1.5-18 years; mean age 6.4 years) in eight centers. The indications for AFR implantation were: AS (critical neonatal aortic stenosis after previous intervention) in 9 patients, RCM (restrictive cardiomiopaties) in 6 HLHS (hypoplastic left heart syndrom) in 5, failing Fontan circulation in 3, DCM (dilatated cardiomiopties) in 2, and peripheral pulmonary stenosis in 1. Venous access was femoral, except for one jugular vein and the transhepatic in 3. Different types of balloon (from 8-14 mm in diameter) were used to perform atrioseptostomy. A 6 mm AFR was implanted in 15 patients, 4 mm in 10, and 8 mm in one. Fluoroscopy time ranged from 8.5-110 minutes (mean 34.4 minutes). Immediately after implantation, due to flow restriction, 3 AFRs required re-dilation, and 1 required stent implantation. The hemodynamic outcome was positive in all patients. There was one death



on the first 24 hours after the procedure for unknown reasons, and one death 2 years after the procedure in a patient with RCM and severe intellectual disability whose parents had discontinued HTX (heart transplatation). All patients are alive during the 2 to 5-years follow-up period; 4 patients required AFR re-dilation. Three patients underwent HTX: 2, 15, and 16 months after AFR implantation.

Conclusions: 1. AFR implantation is safe, create a stable interatrial communication, and has a positive effect on the hemodynamics of the defect. 2. AFR has great potential in the treatment of complex CHD. 3. AFR increases the chance of HTX by improving the hemodynamics of the defect, clinical status, and extending the survival period.



O-109 / #665

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

ACHIEVING A BIVENTRICULAR CIRCULATION AFTER PULMONARY VALVE PERFORATION IN NEONATES WITH PULMONARY ATRESIA AND INTACT SEPTUM

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Background and Aim: Pulmonary atresia with intact ventricular septum (PA/IVS) is a rare congenital heart disease. Transcatheter perforation of the atretic pulmonary valve (PVP) followed by balloon dilation of the valve has emerged as a promising alternative to surgery in the initial palliation of neonates with PA/IVS and non-RVDCC.
Methods: A retrospective descriptive study was conducted among the patients with PA/IVS who underwent transcatheter perforation of the pulmonary valve in the German Heart Center Munich in the last 10 years, describing their immediate results, inter-stage palliation, and their final surgical outcome.
Results: A total of 31 patients with a median age of 5 days (1-180 d) and median body weight of 3.35 kg (1.8-5.5 kg) who underwent transcatheter perforation of the pulmonary valve using radiofrequency (RF) perforation were included in the study. 25 patients had membranous atresia, and 4 patients had dysplastic pulmonary valves. The RV was tripartite in all the studied patients. The median tricuspid valve Z score was 1.06 (-0.68-2.8). The tricuspid-to-mitral annulus was 1.1 (1-1.3). All patients had no coronary fistulas except for 4 patients who had small fistulas either to the RCA or CX. In 27 patients (87%), achievement of forward flow over the pulmonary artery was successful, while in 4 patients (13%) complications had occurred and they required immediate surgery. Two patients died, one after the procedure and one because of sepsis. 15 patients required re-intervention or palliative surgery after a median duration of 7 days (1-86 days) in the form of PDA stent in 7 patients, re-dilatation of RVOT in 5 patients, 3 patients required BT shunt, and 1 patient required central shunt. 21 patients were followed up for the long term (median duration of 13 months (0.5-131)). 17 patients (80%) achieved a biventricular repair, 3 patients (17%) achieved a univentricular repair, and one patient had one and a half repair at the end of the study.
Conclusions: Patients with PA/IVS who underwent transcatheter pulmonary valve perforation can achieve a biventricular repair in 80% of cases. Proper selection of patients



with suitable RV size and anatomy and close follow-up is crucial to achieve the optimal long-term outcome.



O-110 / #700

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

OUTCOMES OF TRANSCATHETER PULMONARY VALVE-IN-VALVE IMPLANTATION: A SINGLE-CENTRE OBSERVATIONAL STUDY

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Background and Aim: As prevalence of patients with congenital heart disease increases, many patients who have previously undergone pulmonary valve replacement develop dysfunction of the bioprosthesis. Transcatheter pulmonary valve-in-valve implantation (TPViV) is an option of treatment of failing pulmonary bioprosthetic valves, but extensive data are not yet available. The aim of this study was to evaluate the procedural performance, safety and long-term outcomes of transcatheter pulmonary valve-in-valve in a single-centre cohort.
Methods: We retrospectively analysed 60 patients who underwent TPViV within a failing surgical or percutaneous valve in our Centre since January 2009 to August 2025, collecting procedural data and echocardiographic findings before and after the procedure. Primary outcome at long-term follow-up was a composite of death or reintervention.
Results: 60 patients were included (mean age 34.1 ±14.6 years; two-thirds male), primarily with an underlying diagnosis of Tetralogy of Fallot (two-thirds) and a history of ≥2 previous cardiac surgeries. The predominant mechanism of valve dysfunction was mixed stenosis and regurgitation. All 60 patients underwent successful TPViV (37 Sapien, 20 Melody and 3 Myval) with no deaths or conversions to open-heart surgery. The procedure significantly reduced peak RVOT gradients (mean reduction 30.7 ±19.5 mmHg, $p<0.001$) and right ventricular systolic pressure (mean reduction 25.7 ±19.5 mmHg, $p<0.001$), with only one more-than-mild pulmonary regurgitation at discharge. At a mean follow-up of 42.2 months, the composite endpoint of death or reintervention occurred in 17.2% of patients (2 deaths, 8 reinterventions), with infective endocarditis as the main cause. Reintervention-free survival remained >90% at 1000 days.
Conclusions: TPViV is a safe and effective strategy for managing dysfunctional pulmonary



bioprosthetic valves. Long-term follow-up reinforces that while durability is generally high, endocarditis remains a primary mechanism of late failure requiring reintervention.



O-111 / #1231

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

OUTCOMES OF TRANSCATHETER PATENT DUCTUS ARTERIOSUS CLOSURE IN INFANTS WEIGHING 2 TO 6 KG

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Background and Aim: Transcatheter patent ductus arteriosus (PDA) closure is safe in < 2-kg infants and in ≥ 6-kg patients, but major safety concerns remain when applied to the intermediate weight range. We aimed to assess outcomes of transcatheter PDA closure in 2- to 6-kg infants.
Methods: An international, multicenter, retrospective cohort study was conducted in 31 tertiary hospitals in 17 countries between 2000 and 2023, investigating all infants who underwent attempted transcatheter PDA closure with a procedural weight of 2-to-6 kg.
Results: Attempted transcatheter PDA closure was performed in 1231 infants (median [Q1-Q3] weight, 4747 [3700-5300] g; median age, 132 [83-194] days; ex-preterm, n = 581 [56.8%]) with a 95.0% success rate. A composite outcome of procedural failure or major adverse events was observed in 173 (14%) patients, including device embolization in 64 (3.7%), device-induced left pulmonary artery stenosis in 47 (2.7%), and procedural death in 2 (0.2%). Logistic regression model analysis identified a 2- to 3.9-kg procedural weight,



increased pulmonary artery pressure, and window-type or tubular ductal morphologies as independent predictors of the composite outcome. Based on propensity score matching analysis, 2- to 3.9-kg infants had a risk ratio of 2.19 (95%CI, 1.25-3.83) for experiencing the composite outcome, compared with 4- to 5.9-kg infants.

Conclusions: Transcatheter PDA closure in 2- to 6-kg infants was feasible in most patients. Procedural failure or major adverse events occurred in 14% and several independent risk factors were identified, including the 2- to 3.9-kg weight range identified as a higher-risk subgroup. These findings may improve risk stratification and the decision-making process.



O-112 / #506

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

OUTCOMES OF PATENT DUCTUS ARTERIOSUS STENTING IN DUCT-DEPENDENT PULMONARY CIRCULATION: A PROSPECTIVE–RETROSPECTIVE STUDY FROM A TERTIARY CENTER IN INDIA

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Background and Aim: This study examined the role of patent ductus arteriosus (PDA) stenting in children with cyanotic congenital heart disease (CCHD) and duct-dependent pulmonary circulation, conditions that require reliable pulmonary blood flow for survival. Complex lesions such as Tetralogy of Fallot with Pulmonary Atresia and Double Outlet Right Ventricle with Pulmonary Atresia often mandate early palliative interventions. Traditionally, surgical systemic-to-pulmonary shunts have been used, but they are associated with significant morbidity, especially in low-weight infants. Limited data from the Indian subcontinent regarding outcomes of PDA stenting motivated this study, which aimed to evaluate the intermediate results of the procedure, procedural success, complications, pulmonary artery growth, and overall safety.
Methods: A mixed prospective and retrospective observational study was conducted on 121 children under five years of age who underwent PDA stenting at the Narayana Health between March 2019 and August 2023. Detailed clinical,echocardiographic, and computed tomography assessments were used to characterize ductal anatomy, pulmonary artery dimensions, coronary artery patterns, and associated anomalies. PDA stenting was performed primarily using retrograde carotid or femoral arterial access with coronary guidewires and fluoroscopic guidance. Post-procedural management included dual antiplatelet therapy, and intensive monitoring. Follow-up evaluations focused on oxygen saturation, stent patency, pulmonary artery growth, and the need for further interventions.
Results: The study demonstrated a procedural success rate of 99.1%, with a median age of 8.5 months and median weight of 6.5 kg. Oxygen saturation improved significantly from a mean of 64.68% pre-procedure to 87.22% post-procedure. Pulmonary artery dimensions and Z-scores increased markedly, indicating effective stimulation of pulmonary artery growth. Complications were infrequent and manageable, including occasional stent thrombosis, branch pulmonary artery jailing, and access-related problems. In-hospital mortality was 3.3%, mainly in infants under six months, primarily due to pulmonary overcirculation and sepsis. Follow-up showed sustained pulmonary artery growth and



satisfactory stent patency in most patients.

Conclusions: In conclusion, PDA stenting emerged as a safe, effective, and less invasive alternative to surgical shunts for children with duct-dependent pulmonary circulation. It promoted balanced pulmonary artery growth and reduced perioperative risk. The findings support wider adoption of PDA stenting, particularly in resource-limited settings, and provide important region-specific evidence for optimizing the management of complex CCHD.



O-113 / #696

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

LONG-TERM FOLLOW UP AFTER TRANSCATHETER VALVE REPAIR IN CONGENITALLY CORRECTED TRANSPOSITION OF THE GREAT ARTERIES

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Background and Aim: In patients with congenitally corrected transposition of the great arteries (CC-TGA) the systemic ventricle has a right ventricular morphology. Over time, right ventricular dilatation with dysfunction leads to an enlargement of the tricuspid annulus resulting in significant tricuspid valve regurgitation. Due to the high perioperative risk in patients with reduced systemic ventricular function an interventional technique – percutaneous clipping of the systemic tricuspid valve – was performed in 7 patients. Data regarding the long-term outcome of this method in this patient cohort are lacking.
Methods: From 2016 to 2018, seven patients underwent percutaneous repair of the tricuspid valve, because surgery was deemed high-risk. For the procedure, a mitral clip (*Mitra Clip*) was used and placed in the site of the maximal regurgitation. We analyzed the long-term outcome of the procedure retrospectively, using patients reports between 2018 and 2025 in our clinic. The following variables were investigated: echocardiography, arrhythmias, NYHA class, NT-proBNP-course, cardiac MRI, necessary re-interventions, need of assist device or heart transplantation and mortality.
Results: Seven patients in total were investigated. The follow up time was 7 years on average. All patients survived. Four patients deteriorated after clipping over time. One patient required replacement of the tricuspid valve 9 years after the clipping. One patient presented with severe decompensation 2 years after clipping; recompensation was not possible, and the patient received an assist device. Two patients showed a slow decline in NYHA class. Three out of the seven patients benefitted from the intervention and sustained good clinical outcomes during the follow up period.
Conclusions: Percutaneous clipping of the tricuspid valve in CCTGA patients is feasible and a low-risk procedure. Our results show that, while the intervention is effective, around half of the patients experience clinical deterioration over time. Therefore, a standardized follow up program, including cardiac MRI, NT-proBNP measurements and cardiopulmonary exercise testing, is necessary to evaluate the outcome of these patients.



O-114 / #1283

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

SUBCLINICAL LEAFLET THROMBOSIS AFTER PERCUTANEOUS PULMONARY SELF-EXPANDABLE VALVES: THE KEY ROLE OF VALVE UNDEREXPANSION.

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Background and Aim: Hypoattenuating leaflet thickeness (HALT) is a well described phenomenon in biological aortic valves and it is becoming an increasingly worrisome phenomenon after percutaneous pulmonary valve implantation with self-expandable valves. Numerous reports have described HALT after PPVI, but clear risk factors have not yet been identified. Aim of our study was to describe the incidence of HALT after PPVI with self-expandable valves and to find factors related to this phenomenon.
Methods: We retrospectively analyzed the data of 30 patients who underwent PPVI in our center from2022to2025 with self-expandable valves. All the patients underwent a CT scan 3months after the procedure.
Results: From 2022 to 2025, 30patients underwent PPVI with a self-expandable valve. Mean age of the patients was 29years(range12-48years), mean weight was 57Kg(range32-97Kg). Twenty two patients had a corrected tetralogy of Fallot, 6 patients had a critical pulmonary stenosis and underwent a pulmonary valvuloplasty, 1 patient had transposition of great arteries and one patient had a pulmonary atresia with VSD with a conduit. Indications for PPVI were pulmonary insufficiency in almost all the cases except the patient with the conduit which presented also a moderate stenosis. Seventeen patients were implanted with a VenusPvalve, 7 patients with an Alterra and an Edwardsvalve and 6 patients with a Harmonyvalve. Almost all the patients were discharged with anticoagulation therapy for 3 months. By CT scan HALT was detected in 10patients(31%): 5 in the Venus group(31%), 3 in the Harmony group(29%) and 2 in the Alterra group(22%). Analyzing factors such as the cardiac disease, the patient's age, anticoagulation therapy, valve type, underexpansion (defined as a final diameter of the valve-hosting segment at least 3 mm smaller than the nominal diameter) and valve positioning (supranular, transannular), only underexpansion was statistically related to HALT (p 0.04). All the patients with HALT had no valve gradient but only a mild eccentric valve insufficiency that became relevant only in one patient during the follow up.
Conclusions: HALT has a concerning incidence of 31% after self-expandable valve



implantation, irrespective of valve type. Underexpansion seems associated with an increased risk of HALT but multicenter studies are needed in order to confirm our results.



O-115 / #558

INTERVENTIONAL CARDIOLOGY ABSTRACT SESSION
15-05-2026 16:30 - 18:00

TRANSCATHETER PULMONARY VALVULOPLASTY IN NATIVE TETRALOGY OF FALLOT – IS IT PROFITABLE? AEPC INTERVENTIONAL WORKING GROUP GRANT

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Background and Aim: Transcatheter pulmonary valvuloplasty (TPV) is an option for postponing complete correction in selected patients with native tetralogy of Fallot (TOF). Consensus is lacking regarding the exact indications and expected outcomes with respect to pulmonary vascular growth and the feasibility of valve-sparing (VS) versus transannular patch (TAP) repair. The goal of this study was to analyse the impact of TPV on pulmonary



artery growth and to identify the group of patients who would benefit most.

Methods: Retrospective multicentre analysis of patients with native TOF who underwent primary TPV in years 2010-2025. Baseline characteristics, right ventricle outflow tract morphology, TPV outcomes, and surgical approaches were analysed. Logistic regression was conducted (excluding patients with interim interventions other than repeated TPV) in order to define predictive factors of: significant pulmonary vasculature growth (z-score change >1) and successful VS surgery.

Results: Total 179 patients from 17 centres were included. Median age and weight at TPV were 4 weeks (IQR:2–8) and 3.5 kg (IQR:2.8–4.4). Saturation increased from 81.2±9.1% to 91.8±5.9% ($p<0.001$), there were 1.1% major complications. Reintervention was needed in 18.4%: 5.5% repeated TPV, 13.4% other (mostly aorto-pulmonary shunt). Z-scores increased for PV (-3.4±1.0 to -3.2±1.0;$p=0.029$), main (-3.2±1.1 to -2.8±1.5;$p=0.005$), right (-1.4±1.1 to -0.8±1.4;$p<0.001$), and left pulmonary artery (-1.8±1.1 to -1.2±1.3;$p<0.001$). Total surgical correction was performed in 97.2% patients at median 19.7 weeks (IQR:9–32) post-TPV with 1.7% early mortality; weight at surgery was 6.5 kg (IQR:5.3–8.2); 25.6% had anoxemic spells while awaiting. Surgery types were: TAP 61.5%, VS 28.8%, conduit implantation 8% (technique unknown 1.7%). Smaller primary PV and main pulmonary artery z-scores, lower weight at TPV, and right ventricle outflow tract obstruction limited to PV were predictors of significant pulmonary valve growth. Primary pulmonary valve z-score was the only predictor of VS repair.

Conclusions: TPV in native TOF is a safe and effective procedure to improve pulmonary vasculature and to postpone corrective surgery in selected cases, especially useful in small neonates with small PV z-scores. However, a considerable number of patients are at risk of anoxemic spells and need for reinterventions. Primary pulmonary valve z-score was the only predictor of VS surgery technique.



O-116 / #97

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

PHENOTYPE IN MARFAN SYNDROME WITH HIGH CARDIOVASCULAR RISK. WHO NEEDS SURGERY DURING CHILDHOOD?

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Background and Aim: Many individuals with Marfan syndrome (MFS) undergo cardiac surgery at some point in their lives, most commonly aortic root replacement or mitral valve repair/replacement. Because these procedures are uncommon in children and adolescents, early recognition of patients who may benefit from timely surgical intervention is especially important. This study sought to identify clinical variables associated with an elevated risk of early cardiac surgery.
Methods: Since 2008, 1006 children have been evaluated at our Marfan clinic, 214 patients with a pathogenic *FBN1* variant (12.4±5.7y; m:49.5%). The surgical group comprised 20/214 patients (11.5±5.5y; m:70%) who underwent valve-sparing aortic root replacement (10/20, 14.0±5.5y), mitral valve surgery (4/20, 11.7±0.8y), or both (6/20, 10.5±4.7y). The non-surgical group included 194/214 patients (12.5±5.7y; m:47.4%). There were no differences between the two groups in terms of sex or age. Binary logistic regression was performed to identify risk factors for early cardiac surgery. Variables included MFS-typical facial features, wrist/thumb sign, pectus excavatum, pectus carinatum, scoliosis, pes planus, hindfoot deformity, ectopia lentis, myopia, pneumothorax, and striae atrophicae (Gent Nosology).
Results: We found strong associations between certain phenotypic characteristics and the likelihood of early cardiac surgery in children with MFS. Patients exhibiting MFS-typical facial features (OR 5.03; 95% CI 1.57–16.09; p=0.006), pes planus (OR 4.27; 95% CI 1.04–17.51; p=0.04), hindfoot deformity (OR 5.54; 95% CI 1.61–19.04; p=0.007), or myopia (OR 4.29; 95% CI 1.04–13.13; p=0.01) had a significantly increased risk of requiring surgery during childhood.
Conclusions: This study shows that specific phenotypic traits—such as facial features



typical of MFS, pes planus, hindfoot deformity, and myopia—serve as strong predictors of early cardiac surgery in children with MFS and underscore a clear association between musculoskeletal and ocular findings and early cardiovascular morbidity. Early identification of these features offers an important opportunity for risk stratification, more intensive clinical monitoring, and timely initiation of pharmacological treatment to postpone surgery. Our findings emphasize the value of incorporating straightforward clinical observations into early management strategies for patients with MFS. These consistent results may also provide a reliable foundation for developing a risk score to predict the need for cardiac surgery in pediatric MFS patients.



O-117 / #190

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

USE AND OUTCOME OF ANTICOAGULANT THERAPY IN CHILDREN WITH CONGENITAL HEART DISEASE: INSIGHTS FROM A NATIONWIDE POPULATION BASED STUDY

Jana Logoteta[1], Karen Fischhuber[2], Anselm Uebing[3], Astrid Lammers[4], Gerhard Diller[4]
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Background and Aim: The aim of this study was to provide population-based outcome data on antithrombotic regimens after operation or intervention in pediatric congenital heart defect (CHD) patients with a special focus on Fontan patients.
Methods: Using data from one of Germanys largest Health insurers CHD patients who underwent an intervention or surgery between 2005 and 2023 and before the age of 18 were assessed for prescription of antithrombotic therapy. Patients were followed from each procedure until their 18th birthday or a subsequent procedure. Primary endpoints were death, thrombosis and bleeding. Outcomes were analyzed in relation to time-varying anticoagulation therapy and adjusted for individual patient risk profiles. Fontan-type procedures were analyzed separately.
Results: A total of 6506 CHD patients (47% female) with 9484 procedures were included. Median age at intervention was 1 year (interquartile range [IQR] 0 - 6) with a median follow-up of 3.1 years (IQR 0.7 - 7.7) after each procedure. Among the 30% of cases in which antithrombotic therapy was administered, 79% received antiplatelet therapy (APT), 15% vitamin K antagonists (VKA), 20% heparin, and 2% NOAC/DOAC. All-cause mortality was not different in the groups. A total of 236/86 initial minor and major thrombotic events and 771/106 initial bleeding events were found. After adjustment for patient characteristics and risk factors, VKA was not associated with a lower risk of thrombosis or death of any cause compared to APT (HR 1.56, 95% CI 0.97–2.53, p=0.07) or with a lower risk of bleeding or death of any cause (HR 1.19, 95% CI 0.80-1.79, p=0.39) on multivariable analysis. Similar results were observed in a subgroup analysis of 326 Fontan-type procedures (median follow-up 6.4 years, IQR 2.4–11.6). The HR for thrombosis or death was 3.08 (95% CI 0.83-10.71, p=0.08), while the HR for bleeding or death was 0.79 (95% CI 0.37-1.63, p=0.51)
Conclusions: Major thrombosis and bleeding are rare in pediatric CHD patients. In this real-world nationwide analysis, CHD patients on APT do not appear to have a statistically



noticeable higher risk for thrombotic events compared to those receiving VKA. These findings do not support the routine use of VKA over APT, particularly in Fontan patients.



O-118 / #531

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

RIGHT AORTIC ARCH FROM FETAL TO LONG-TERM FOLLOW-UP: DIAGNOSIS, MANAGEMENT AND OUTCOMES IN MORE THAN 30 YEARS

Cosimo Marco Campanale[1], Paola Giordano[2], Patrizio Moras[1], Marco Masci[3], Serena Ventrella[1], Adriano Carotti[1], Luciano Pasquini[4], Alessandra Toscano[1]
[1]Bambino Gesù Children's Hospital, Rome, Italy, [2]sapienza, roma, Italy, [3]The Hospital for Sick Children, Cardiology, Elizabeth St, Toronto, ON, Canada, [4]2- Department of Maternal-Fetal Medicine, Policlinico A. Gemelli IRCCS, Rome, Italy, ital, Italy

Background and Aim: Right aortic arch (RAA) is present as isolated or associated to other malformations. We aimed to report our experience with RAA and its variants, its association with complete vascular ring (CVR), congenital heart disease (CHD) or extracardiac malformations and to describe the long-term follow-up in terms of symptoms and surgery.
Methods: We collected clinical and instrumental data from 502 patients with RAA referred at our tertiary center from January 1995 to February 2025
Results: 157 patients (31.3%) had fetal diagnosis (medium follow-up 7.6 years). 330 (65%) had CHD and 89 (17%) genetic anomalies, with DiGeorge syndrome the most frequent (9.5%). Genetic disorders were significantly more frequent in those with CHD (23% versus 7.5%, $p < 0.001$). 58 (11%) had extracardiac anomalies. Among the RAA not forming CVR, left anterior ductus arteriosus with mirror-image (MI) branching pattern of epiaortic vessels (RAA/LADA/MI) was present in 29, 100% associated with CHD (conotruncal in 72%). Right ductus arteriosus (RAA/RDA/MI) was found in 8, 4 with complex CHD. CVR was present in 246 (49%): the most frequent were RAA, left posterior ductus arteriosus with aberrant left subclavian artery (RAA/LPDA/ALSA - 163 cases, 66%) and double aortic arch (DAA - 66 cases, 27%), Left posterior ductus arteriosus (LPDA) with MI branching (RAA/LPDA/MI - 12 cases, 5%) and aberrant left innominate artery (RAA/LPDA/ALIA - 5 cases, 2%) were rare. CVR were most frequently associated with minor CHD (26% versus 17% major CHD). Seventy-one (29%) pts had respiratory symptoms (29 in the first 2 months of life, 22 within the first year of life, 20 afterwards). 80 pts performed lung-function test, 28 (35%) were positive. At CT mean tracheal compression was 46% (57% for DAA, 43% for RAA/LPDA/MI. 109 (45%) were operated (median age 31.2 months). Three among 16 pts were re-operated for persistent symptomatic compression, the majority being DAA.
Conclusions: RAA is commonly associated with CVR, asymptomatic in 2/3 of cases but



requiring surgery in 50%. Symptoms resolves almost completely and reoperations are reserved to the DAA. RAA is present along with major CHD in half cases and these patients are at higher risk of genetic syndromes, however not frequent.



O-119 / #677

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

VSD-PROVE: INTERIM RESULTS OF SURGICAL CLOSURE OF LARGE VSD WITH SEVERE PAH IN CHILDREN OLDER THAN 2 YEARS

Saurabh Gupta, Shivaprasad Pm, Ankur Handa, Lamk Kadiyani, Pradeep Reddy, Sivasubramanian Ramakrishnan, Palleti Rajashekar, V Devagourou
All India Institute of Medical Sciences, New Delhi, India

Background and Aim: Operability assessment in late presenters with large ventricular septal defects (VSDs) is complex. In low- and middle-income countries, late presentation is common, but outcome data are limited. The VSD-PROVE study (**PRO**specti**VE** evaluation of outcomes in large VSDs operated after age 2) prospectively evaluates outcomes in children deemed operable after a comprehensive evaluation.
Methods: Forty-five children with large VSD and severe pulmonary hypertension (PH) underwent clinical evaluation, echocardiography, and cardiac catheterization with oxygen vasoreactivity testing. Thirty-seven children (mean age 6.5±3.7 years, range 2–18) deemed operable underwent surgical VSD closure and received dual pulmonary vasodilator therapy (sildenafil and bosentan) for 1 year. Follow-up included clinical and echocardiographic monitoring and repeat catheterization at 1 year.
Results: Resting and exertional SpO_2 were 97.6±1.9% and 94.4±4.1%, respectively. Baseline mean PA pressure and PVRI were 70.9±9.2 mmHg and 9.2±3.4 WU·m^2. With oxygen, mean PA pressure and PVRI decreased to 66.3±11.1 mmHg and 5.5±2.5 WU·m^2. All 37 patients underwent successful VSD closure with no mortality or PAH crisis. One patient required a pacemaker for postoperative heart block. No postoperative heart failure was observed. Till now, 20 patients have undergone follow-up cardiac catheterization 1 year after surgical VSD closure. Of these, 19 patients had mean PA pressure ≤30 mmHg, one had 34 mmHg, with 79% patients having ≤25 mmHg. For the remaining 17 patients, 6-month echocardiography showed predicted RV systolic pressure of 39.4±5.8 mmHg.
Conclusions: Surgical closure of large VSD with elevated PVRI in carefully selected children is safe and effective. Near normalization of pulmonary pressures at 1 year in the majority is encouraging. A longer follow-up is needed to confirm sustained benefits.



O-120 / #1448

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

MAPPING CARE PATHWAYS IN THE LAST YEAR OF LIFE IN CONGENITAL OR ACQUIRED COMPLEX CHRONIC HEART CONDITIONS: A PEDIATRIC OBSERVATIONAL STUDY

Ashley Ridley[1], Fanny Bajolle[2], Sophie Malekzadeh-Milani[2], Diala Khraiche[2], Olivier Raisky[2], Daphné Madec[2], Damien Bonnet[2], Neil Derridj[2]
[1]Necker Enfants Malades, Pediatric Palliative Care, Paris, France, [2]Necker Children's Hospital, Cardiology, Paris, France

Background and Aim: Complex chronic conditions (CCC) represent an increasing burden in pediatrics, reflecting both clinical progress and limits of curative care. Those with congenital or acquired heart disease (CAHD) account for the largest subgroup of CCC inpatient deaths. This study aimed to characterize healthcare utilization over the last year of life management and circumstances of death among children with CAHD.
Methods: We conducted an observational study at Necker Children's Hospital (Paris, France). Patients aged 1–18 years with CAHD meeting criteria for CCC, with at least one year of follow-up after diagnosis, who died between 2013 and 2023 were included. Data were extracted from a prospectively maintained mortality database and electronic medical records. Collected variables included diagnostic categories, genetic and extracardiac comorbidities, healthcare utilization during the last year of life, end-of-life care, and circumstances of death.
Results: A total of 190 patients were included. Congenital heart disease (CHD) accounted for 57.8% of diagnoses, followed by cardiomyopathies (18.8%), pulmonary arterial hypertension–related disease (10.9%), and rhythm disorders (12.5%). A prenatal diagnosis was documented in 45.3% of patients, predominantly in CHD (70.3%). Genetic syndromes or extracardiac anomaly were reported in 51%. During the last year of life, 86% were hospitalized (median cumulative stay 13 days), mainly for acute symptoms (45%) or scheduled procedures (48%). Catheterization (34%) and cardiac surgery (41%) were performed at a median of 82 days and 38 days before death respectively, with 52% intended to be curative. Care intensity increased markedly in the final two weeks, and 70% of deaths occurred in the ICU following active resuscitation (40%), withdrawal (13%), or non-escalation (12%) of life-sustaining treatment. At death, 41% were intubated, 11% received non-invasive ventilation, 33% inotropes, and 14% were supported with ECMO. Overall, 21% were referred to pediatric palliative care at a median of 24 days before death.
Conclusions: Children with CCC and CAHD follow highly complex care trajectories, in



which curative and palliative needs often overlap, making anticipatory planning challenging. Earlier integration of pediatric palliative care beyond the terminal phase may support shared decision-making and improve the quality of care throughout advanced stages of disease.



O-121 / #27

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

COMPREHENSIVE ASSESSMENT OF THE RISK OF DEVELOPING CORONARY ARTERY ANEURYSM IN KAWASAKI DISEASE: KAWACOR SCORE STUDY

Stasa Krasic[1], Sanela Nikolic Tepic[2], Srdjan Pasic[1], Sanja Ninic[1], Sasa Popovic[1], Tijana Djeric[1], Stefan Kotlajic[1], Djurdja Palic[1], Vladislav Vukomanovic[1]
[1]Mother And Child Health Institute Of Serbia, Belgrade, Serbia, [2]University Clinical Centre of the Republic of Srpska; Banja Luka, Republic of Srpska, Banja Luka, Bosnia and Herzegovina

Background and Aim: Background: Early identification of high-risk patients is crucial for stratifying treatment algorithms of Kawasaki disease (KD) and selecting patients at risk for severe disease who would benefit from intensification of first-line treatments. The primary aim of our study was to develop a new scoring system to predict the risk of developing CAA during acute KD and the persistence of giant CAA during follow-up.
Methods: Methods: A retrospective cohort study included 151 patients (97 boys; 34 months, IQR 19-53 months) diagnosed with KD and treated at the Mother and Child Health Institute of Serbia between 2011 and 2025.
Results: Results: A total of 25 patients (16.5%) developed CAA**,** while in the follow-up period, aneurysms were registered in 9 patients. Based on the values obtained according to the univariate analysis, a scoring system was created. It included age < 6 months, receiving IVIG treatment beyond 7 days, refractory KD, leucocytosis (>17x10^9), neutrophilia (>16x10^9), thrombocytosis (>400x10^9), anaemia (<103 g/L), hypoproteinemia (<54 g/L), and hypoalbuminemia (<32 g/L). Patients with a score ≥5 have an almost 9-fold higher risk of developing CAA (OR 8.7, 95% CI 3.4–22.6; p<0.001), while if the score was ≥8 he risk for chronic aneurysms was 71 times higher (OR 71.5, 95%CI 8.5 – 597.7; p<0.001). Based on the ROC curve, a score of ≥7 has a sensitivity of 99% and a specificity of 80% for the CAA development (AUC=0.87). On the other hand, a score ≥9 has 100% sensitivity and 85% specificity for the development of giant aneurysms (AUC 0.87). An increase in the score by one increases the risk almost 2-fold for the development of CAA (OR 1.9, 95%CI 1.5–2.5; p<0.001), as well as giant aneurysms in the acute phase (OR 1.97, 95%CI 1.4–2.7; p<0.001; Hosmer–Lemeshow test 0.5) and during the follow-up period (OR 2.3, 95%CI 1.3–4.06; p=0.002; Hosmer–Lemeshow test 0.75). Available on: https://www.imd.org.rs/kawacor-score/.
Conclusions: Conclusion: The KawaCOR score is the first scoring system in our region



specifically designed to predict CAA development. The existence of the KawaCOR score provides opportunities to elucidate the pathophysiology of KD and to develop proper treatment to prevent CAA.



O-122 / #256

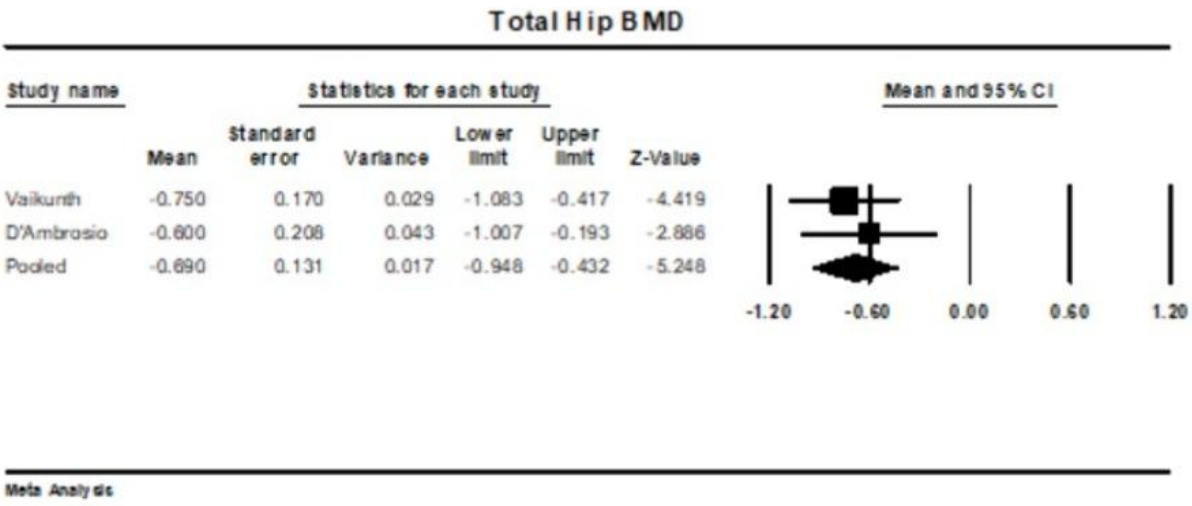
PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

METABOLIC BONE DISEASE IN FONTAN PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Kerri Munn-Bookless, Scott Kendall, Martin Dempster, Frank Casey
QUB (University), Belfast, United Kingdom

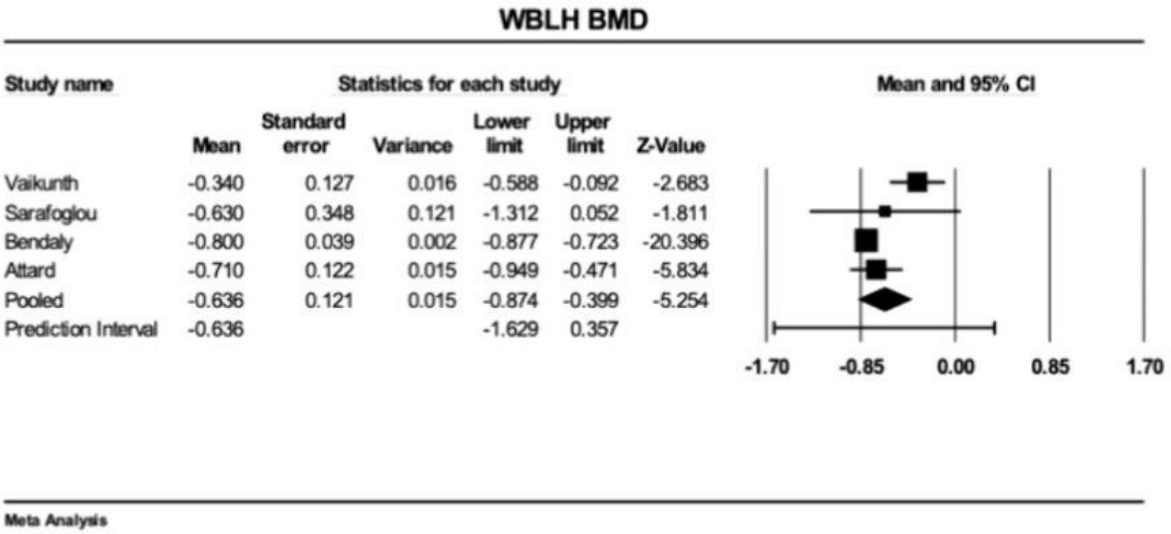
Background and Aim: The Fontan procedure is a palliative surgical approach for patients with single ventricle congenital heart defects to direct systemic venous return to the pulmonary arteries without passing through a sub-pulmonary ventricle. Whilst improvements in surgical techniques and post-operative management have led to increased life expectancy, the burden of morbidity remains high. Recent data suggests the prevalence of short stature is significantly increased in Fontan patients. This is likely multifactorial, and the same pathophysiological mechanisms may also contribute to increased risk of metabolic bone disease (MBD). Several recent studies have sought to investigate the extent of this risk. This systematic review and meta-analysis aimed to evaluate the prevalence of MBD in children and young adults with a Fontan circulation.
Methods: This systematic review was conducted according to PRISMA guidelines. Outcomes included bone mineral density (BMD) as measured using Dual Energy X-ray Absorptiometry (DEXA) or peripheral Quantitative Computed Tomography (pQCT). Fontan patients with a known diagnosis of protein losing enteropathy (PLE) or those taking steroids were excluded. When the data allowed, meta-analysis was performed using Comprehensive Meta-Analysis Version 4. Random effects meta-analysis of BMD Z scores was performed.
Results:





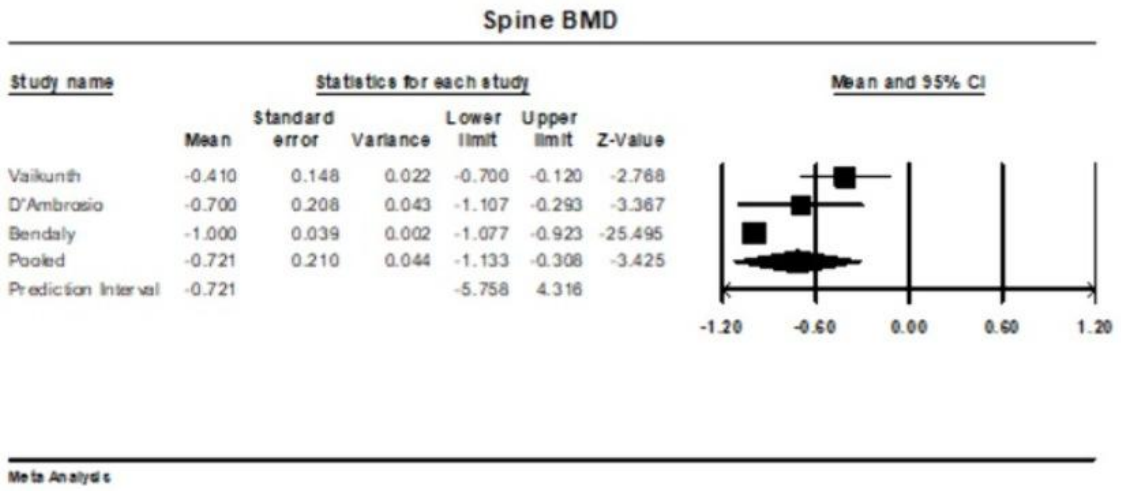
BMD = bone mineral density
CI = confidence interval
WBLH = whole body less head
HA = height adjusted

Figure 1. Forest plot total hip bone mineral density



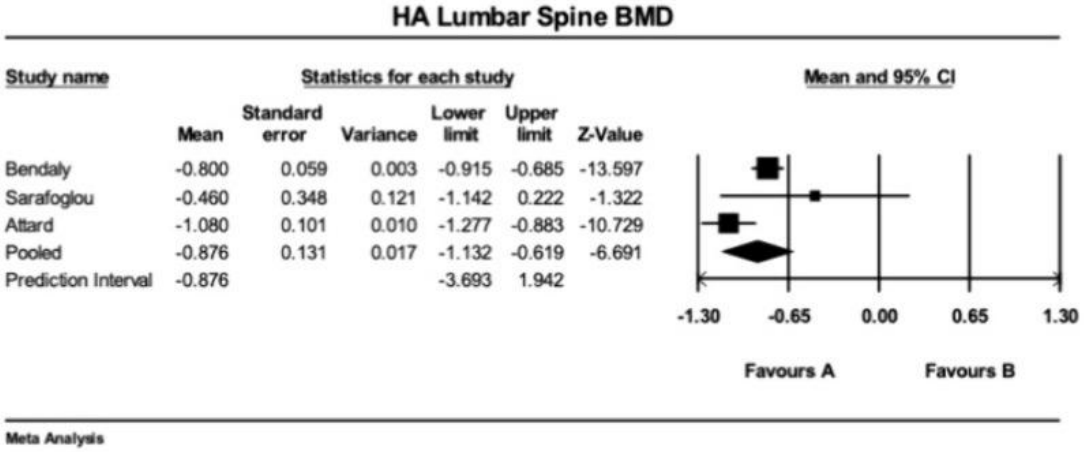
BMD = bone mineral density
CI = confidence interval
WBLH = whole body less head
HA = height adjusted

Figure 2. Forest plot whole body less head bone mineral density



BMD = bone mineral density
CI = confidence interval
WBLH = whole body less head
HA = height adjusted

Figure 3. Forest plot spine bone mineral density



BMD = bone mineral density
CI = confidence interval
WBLH = whole body less head
HA = height adjusted

Figure 4. Forest plot height adjusted lumbar spine bone mineral density

Literature review resulted in 745 articles with full text eligibility, from which a total of 7 articles were included. Owing to heterogeneity in the reporting methodologies for pQCT data, the meta-analysis was restricted to DEXA studies. Data was available for lumbar



spine, whole spine, total hip and whole body less head. BMD was significantly reduced for Fontan patients when compared with healthy age-matched peers, in all 4 bodily areas. Z score varied from -0.64 to -0.79 (see Figures 1-4).

Conclusions: This meta-analysis demonstrates that individuals with a Fontan circulation have significantly reduced bone mineral density when compared with healthy age and sex matched controls, suggesting that MBD is a significant sequela of Fontan physiology. The underlying mechanisms for this are not fully understood but they are likely multifactorial, reflecting chronic venous congestion, altered hormonal and nutritional status and limited physical activity. Given the growing population of Fontan survivors, further longitudinal studies are needed to clarify causative pathways, define clinical significance and guide evidence-based strategies for screening, prevention, and management of bone health in this unique group.



O-123 / #387

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

EARLY ECHOCARDIOGRAPHIC RISK STRATIFICATION FOR AORTIC VALVE PROLAPSE AND REGURGITATION IN INFANTS WITH ISOLATED VENTRICULAR SEPTAL DEFECT

Buse Günyel[1], Sinan Işik[1], Fatma Sevinç Şengül[1], Okan Yildiz[2], Nujin Uluğ Murt[1], Pelin Ayyildiz[1], Alper Güzeltaş[1]
[1]University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Department Of Pediatric Cardiology, Istanbul, Turkey, [2]University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Istanbul, Turkey, Department Of Pediatric Cardiovascular Surgery, Istanbul, Turkey

Background and Aim: Perimembranous-outlet ventricular septal defects (PM-VSD) lie in close continuity with the aortic valve and may predispose to aortic cusp prolapse (AVP) and subsequent aortic regurgitation (AR). Although the Venturi mechanism has been proposed to explain cusp distortion, reliable early-life echocardiographic predictors of AVP remain insufficiently defined. This study aimed to identify echocardiographic determinants of AVP and AR occurring before 2 years of age in infants with PM-VSD.
Methods: This retrospective single-center cohort included infants with isolated PM-VSD (2010-2025) who underwent baseline transthoracic echocardiography between 0–24 months and were subsequently evaluated at four standardized intervals (0–6, 6–12, 12–18, and 18–24 months). Echocardiographic parameters included BSA-indexed 2D and color Doppler VSD diameters and maximal Doppler-derived transseptal gradient. AVP and AR were defined as the first imaging occurrence of any degree of cusp prolapse or regurgitation. Variables with $p<0.10$ in univariable analysis entered multivariable logistic regression. Model performance was assessed with ROC analysis.
Results: Ninety-six infants were analyzed (59 boys,61.5%;37 girls,38.5%). Median age at first echocardiography was 3.3 months (IQR 1.2–9.3), and median follow-up was 52.5 months (IQR22.7–95.2). AVP occurred in 39.6% (38/96) and AR in 30.2% (29/96). Infants who developed AVP had significantly lower maximal gradients at baseline compared with those who did not (median 65mmHg vs 82mmHg, p=0.012). In multivariable analysis (AVP model), lower maximal gradient remained the only independent predictor of AVP (OR 0.97 per mmHg; 95%CI 0.94–0.99; p=0.013), while diameter-based indices were not predictive(all $p>0.10$). A gradient-derived model risk probability ≥0.38 identified a high-risk group with significantly increased AVP (53.1% vs25.5%;OR 3.3; p=0.006) and AR (44.9%



vs14.9%;OR 4.7; p=0.001). For AR prediction, the model showed excellent discrimination (AUC 0.94), with AVP as the sole independent predictor (OR ≈164; p<0.001). Interpretation of the gradient relationship requires caution: infants with large, truly nonrestrictive defects and very low gradients underwent early repair and were excluded from the analysis. Thus, the findings reflect hemodynamic behavior of small-to-moderate PM-VSD rather than contradicting the Venturi mechanism.

Conclusions: Within the small-to-moderate PM-VSD spectrum, gradient-derived risk stratification effectively identifies infants at elevated risk for early AVP/AR progression, supporting closer surveillance and timely surgical intervention before irreversible cusp deformation occurs.



O-124 / #388

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

RELATIONSHIP BETWEEN BASELINE NT-PROBNP, PHENOTYPE AND OUTCOMES IN CHILDREN WITH HYPERTROPHIC CARDIOMYOPATHY

Giuseppe Izzo[1], Ella Field[2,3], Annabelle Barnes[2], Elena Cervi[2,3], Gabrielle Norrish[2,3], Juan Kaski[2,3]
[1]Humanitas University, Department Of Biomedical Sciences, Pieve Emanuele, Italy, [2]Centre for Inherited Cardiovascular Diseases, Great Ormond Street Hospital, Department Of Cardiology, London, United Kingdom, [3]Centre for Paediatric Inherited and Rare Cardiovascular Disease, Institute of Cardiovascular Sciences, University College London, London, United Kingdom

Background and Aim: N-terminal pro-BNP is associated with disease severity and mortality in adults with hypertrophic cardiomyopathy (HCM). Childhood-onset HCM is more heterogenous, with a lower incidence of heart failure events, and it is unclear how NT-proBNP relates to prognosis. This study aimed to describe the relationship between NT-proBNP and clinical characteristics and outcomes in children with HCM.
Methods: Single centre retrospective cohort study of 218 consecutive children (≤18 years) with HCM with contemporaneous NT-proBNP measurements and echocardiography. The relationship between NT-proBNP and clinical characteristics was investigated.
Results: Median age at time of NT-proBNP measurement was 11 years (±5.3); 140 patients (64.2%) were male. 164 patients (75.2%) had a raised BNP (>125pg/mL) at baseline (median=742pg/mL, range=20-36,000pg/mL). NT-proBNP levels did not differ by sex (male median=789pg/mL (IQR=89-2599) vs. female median=581pg/mL (IQR=187-1670), p-value=0.2742) and were not correlated with age (r=0.04, p-value=0.45). NT-proBNP differed by aetiology, with highest measurements in patients with a RASopathy syndrome (RASopathy [n=45] median 799, (IQR=193-3450) vs. Sarcomeric/non-syndromic [n=132] 998 (IQR=208-2357) vs. Friedreich ataxia [n=17] 61 (IQR=27-217), p-value=0.001). Patients with heart failure symptoms had higher median NT-proBNP values (NYHA 1 449 (IQR=81-1727) vs. NYHA >=2 2341 (IQR=1329.5-4937.5), p-value=0.0001). NT-proBNP levels were positively correlated with maximal left ventricular wall thickness (r=0.67, p-value=0.0001), lateral E/E' (r=0.49, p-value=0.0001) and resting LVOT gradient (r=0.45, p-value=0.0001). There was no association with measures of systolic function. Over a median follow-up of 1.7y (IQR=0.92-2.95), 26 patients (11.9%) experienced an adverse outcome (death n=7, ventricular arrhythmic event n=19, heart failure event n=6). Median baseline NT-proBNP



levels were higher in those who experienced an event (2447.5 (IQR=690-6471) vs 6471 (IQR=106-2270), p-value 0.002), but incidence was not significantly different by BNP tertile (p-value=0.096).

Conclusions: NT-proBNP levels are highly variable but elevated in most children with HCM and depend on the underlying aetiology and phenotype. NT-proBNP levels are higher in patients experiencing a disease related adverse event.



O-125 / #660

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

CARDIAC AND AUTONOMIC CHARACTERISTICS OF CHILDREN WITH DUCHENNE AND BECKER MUSCULAR DYSTROPHY

Betül Seda Guzelhan[1], Sibel Öz[2], Ebru Aypar[1], Uğur Özçelik[3], Göknur Haliloglu[2], Tevfik Karagöz[4]
[1]Hacettepe University, Pediatric Cardiology, ankara, Turkey, [2]Hacettepe University, Pediatric Neurology, Ankara, Turkey, [3]Hacettepe University, Pediatric Pulmonology, Ankara, Turkey, [4]Hacettepe University, Pediatric Cardiology, Ankara, Turkey

Background and Aim: Duchenne and Becker muscular dystrophies (DMD/BMD), are frequently complicated by cardiomyopathy and autonomic dysfunction. Comparative data across disease subtypes and the interplay between ambulation, respiratory impairment, and cardiac involvement remain limited. This study aimed to evaluate LV systolic function, heart rate variability (HRV), myocardial fibrosis, and pulmonary status in boys with DMD/BMD, and to investigate functional relationships across these domains.
Methods: This cross-sectional study included echocardiography (n=95), 24-hour Holter monitoring (n = 46), and cardiac magnetic resonance imaging (CMR) (n = 35). LV function, HR and HRV indices, ambulation status, spirometry findings (SFT), polysomnography (PSG) results, and LGE burden were analyzed. Age-adjusted and multivariable linear regression models were constructed to assess the independent associations between cardiac, pulmonary, and functional parameters.
Results: A total of 103 boys (86 DMD, 17 BMD) were evaluated. Median ages were 12 years for DMD and 16 years for BMD. In DMD, LV dysfunction increased markedly with age (0% in 0–9 years; 21.4% in 10–13 years; 42.4% in 14–18 years; $p = 0.012$) and was more prevalent in non-ambulant patients (43.2% vs 8.1%, $p < 0.001$). BMD patients showed a higher unadjusted LV dysfunction prevalence than DMD (47.1% vs 23.2%, $p = 0.045$), though this difference was not significant after adjustment. HRV parameters were consistently higher in BMD, and multivariable models confirmed disease type as an independent predictor of multiple HRV indices (all $p < 0.001$). Ambulation status influenced EF and SF in univariate analyses but not after age adjustment. Pulmonary restriction (abnormal SFT) was associated with significantly reduced HRV and blunted HR amplitude (all $p < 0.05$), and remained independently associated with Max HR, Min HR, SDNN, and Triangular Index in adjusted models. Neither PSG-defined apnea severity nor LGE burden independently predicted LV function or HRV.



Conclusions: Cardiac systolic dysfunction in dystrophinopathies is primarily age-driven, while autonomic impairment differs by disease subtype and is strongly influenced by pulmonary restriction. Myocardial fibrosis detected on CMR did not translate to measurable autonomic or systolic differences. These findings underscore the importance of integrated cardiac–pulmonary monitoring to identify early risk markers in DMD/BMD.



O-126 / #702

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

THE IMPORTANCE OF VITAMIN D MONITORING IN THE FONTAN POPULATION.

Suzie Swedan, Abdulla Tarmahomed, Tristan Ramcharan
Birmingham Children's Hospital, Cardiology Department, Birmingham, United Kingdom

Background and Aim: Vitamin D deficiency is highly prevalent among patients palliated with a Fontan circulation, with reported rates of 50–70%.
Fontan physiology is characterised by chronically elevated systemic venous pressure, reduced vascular perfusion and consequent organ dysfunction. Chronic venous hypertension impairs gastrointestinal perfusion, contributing to intestinal inflammation, protein-losing enteropathy, and malabsorption of fat-soluble vitamins and calcium. Furthermore, Fontan-associated liver disease is common and impairs hepatic hydroxylation of vitamin D, further exacerbating deficiency. Fontan palliated patients demonstrate reduced bone density, increased bone resorption, and reduced skeletal muscle mass due to a combination of vitamin D deficiency, reduced cardiac output, and chronic hypoxia.
Given the importance of muscle function in supporting venous return in Fontan circulation, maintaining skeletal muscle strength is critical. Vitamin D plays an essential role in musculoskeletal and cardiovascular health, and deficiency has been linked to vascular dysfunction, arterial stiffness, and ventricular dysfunction.

To determine the prevalence of vitamin D deficiency among Fontan palliated patients and assess current screening practices.
Methods: A retrospective single-centre cohort study of patients who underwent Fontan completion between 2010 and 2024 and had serum vitamin D levels measured during follow-up was undertaken. Vitamin D deficiency was defined as a serum level <50 nmol/L. Descriptive statistics were used for analysis.
Results: 544 patients underwent Fontan completion during the 15-year study period. Of these, 103 patients (18.9%) had serum vitamin D levels assessed. The mean vitamin D level among the tested cohort was 49.9 nmol/L. Vitamin D deficiency was identified and treated in 59 patients (57.3%), with a pre-treatment mean level of 35 nmol/L. The remaining 44 patients (42.7%) had sufficient vitamin D levels with a mean value of 70.25 nmol/L.
Conclusions: Vitamin D deficiency is expectedly highly prevalent among Fontan patients in our cohort, affecting more than half of those who were tested. Despite the important role



of Vitamin D, less than a fifth of the total Fontan population underwent vitamin D assessment. These findings highlight the need for routine screening and proactive management of vitamin D deficiency as part of serial long-term follow-up in Fontan patients to improve musculoskeletal, cardiovascular, and functional outcomes.



O-127 / #238

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

ABNORMAL GLUCOSE METABOLISM IN INDIVIDUALS WITH A FONTAN CIRCULATION: A SYSTEMATIC REVIEW OF PREVALENCE, PATHOPHYSIOLOGY, AND CLINICAL IMPLICATIONS

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Background and Aim: Introduction. Individuals with a Fontan circulation (FP) are at risk of developing significant comorbidities across their lifespan. Among these, abnormal glucose metabolism (AGM) has emerged as an important but underappreciated problem, affecting 35 to 50% of the Fontan population. **Objective.** This systematic review compiles the current understanding of AGM in FP, including its prevalence by age and comorbidity groups, plausible underlying pathophysiological mechanisms, clinical associations, risk factors, diagnostic approaches, prognostic implications, currently existing therapeutic



strategies and future research directions in FP.

Methods: Methods. Comprehensive search on PubMed/MEDLINE and Cochrane Library for studies on human beings combining metabolic terms ("insulin resistance", "glucose", "diabetes") with Fontan-related terms ("Fontan," "single ventricle," "cavopulmonary", "univentricular") from May 1971 (first publication on Fontan circulation (FC)) to July 2025 (last update on July 18th, 2025) in English. Extraction was done on July 18th, 2025. Reference lists and citable conference abstracts were manually searched. Original research and reviews were included if they specifically addressed glucose metabolism in FP. Prevalence of AGM in Fontan was compared with that in the general population. A pathophysiological framework of glucose metabolism and its dependencies and impact on organ function in FC was established.

Results: Results. 24 publications met inclusion criteria. Definitions of AGM varied markedly across reports. AGM was consistently more prevalent among Fontan patients than in the general population. Unlike in the general population, AGM in Fontan patients appeared to be largely independent of traditional metabolic risk factors such as obesity or family history. Instead, it was associated with longer time elapsed since Fontan operation, reduced exercise capacity, and higher morbidity and mortality.

Conclusions: AGM is a frequent and clinically significant complication in FP, arising from the unique hemodynamic and metabolic milieu rather than traditional risk factors. Chronic venous congestion, hypoxia, hepatic dysfunction, and altered body composition interact to drive progressive insulin resistance from adolescence onward. Early, multidisciplinary screening and individualized management, including lifestyle modification and emerging pharmacologic therapies, are key to mitigating long-term metabolic and additional cardiovascular risk in FP. It will be key to reconsider the definition of diabetes mellitus or insulin resistance in those patients with hypersplenism, hypoxemia, and secondary erythrocytosis.



O-128 / #693

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

IMMUNOMODULATORY TREATMENT STRATEGIES AND CLINICAL OUTCOMES IN PEDIATRIC PARVOVIRUS B19 MYOCARDITIS: INSIGHTS FROM THE MYKKE REGISTRY

Nele Rolfs[1,2,3,4,5], Tobias Hecht[6], Dorothee Böcker[7], Thushiha Logeswaran[8], Eva Gatzweiler[9], Gleb Tarusinov[10], Walter Knirsch[11], Malika Khedim[12], Felix Anderheiden[13], Johannes Weickmann[14], Marcus Fischer[15], Karin Klingel[16], Eicke Schwarzkopf[1,2], Stephan Schubert[6], Franziska Seidel[1,2,3,4,5]
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Background and Aim: Following the SARS-CoV-2 pandemic, the incidence of Parvovirus B19 (B19V) infections and myocarditis as a rare complication increased across Europe. The severe disease course and pronounced myocardial inflammation in some paediatric patients prompted immunomodulatory therapies. This study evaluated immunomodulatory regimens in children with biopsy-proven B19V myocarditis enrolled in



the *MYKKE* registry.

Methods: The *MYKKE* registry, a multicentre prospective database for paediatric myocarditis, served as study platform. We included patients diagnosed between August 2023 and June 2025 with biopsy-confirmed myocarditis, myocardial B19V-PCR >500 copies/µg DNA, and immunomodulatory therapies — including interferon-β (IFN-β), corticosteroids, or interleukin-1 receptor antagonist (IL-1Ra). Comparative analyses focused on patients receiving IFN-β plus corticosteroids (IFN/P) versus IL-1Ra monotherapy; those with mixed or changing regimens were excluded for this purpose.

Results: During the observation period, 71 of 244 (29%) registered patients had biopsy-confirmed B19V myocarditis, of whom 35 (49%) received immunomodulatory therapy beyond intravenous immunoglobulins (median age 1.5 years (IQR 1-1.9), 66% female). All presented with acute heart failure; median left ventricular ejection fraction (LVEF) at admission was 24% (IQR 20-26). Nineteen patients were treated with IFN/P, seven with IL-1Ra alone, eight with mixed regimens, and one with prednisolone only. All required inotropes, and 40% (14/35) underwent ventricular assist device (VAD) therapy, of whom 11 (79%) recovered sufficiently for explantation. Three remain on VAD support and are listed for transplantation. No deaths occurred. Median LVEF at last follow-up (7.8 months, IQR 6-13.9) was similar between IFN/P and IL-1Ra groups (52% vs. 50%, p=0.660). Among those, follow-up biopsies were available in 60% (15/25), showing reduced lymphocytic infiltrates in 11 and persistent inflammation in four patients . Myocardial B19V load decreased in eight patients and increased in six, independent of treatment regime. Among patients with ≥6-month follow-up, 69% (11/16) regained LVEF ≥50%, irrespective of treatment. No severe infections occurred during immunomodulatory therapy.

Conclusions: In this cohort of severe paediatric B19V myocarditis, both IFN/P and IL-1Ra therapies were safe, with comparable mid-term ventricular recovery. Despite high initial morbidity, most patients showed substantial cardiac recovery. A deeper understanding of the underlying mechanisms as well as larger longitudinal studies are needed to define optimal biopsy-guided immunomodulatory strategies.



O-129 / #1348

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

PULMONARY ABNORMALITIES IN PATIENTS WITH PULMONARY HYPERTENSION OF GREATER THAN 6 UNITS.M2 BY DIGITAL SUBTRACTION ANGIOGRAPHY.

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Joe DiMaggio Children's Hospital, The Heart Institute, Hollywood, United States of America

Background and Aim: The gold standard for evaluation of pulmonary hypertension (PH) is by cardiac catheterization, whereby the pulmonary pressures and resistance are measured. Angiography identifies pulmonary vascular abnormalities that facilitates diagnosis, guides management and may predict prognosis. Digital subtraction angiography (DSA) reduces the contrast load in patient's with significant PH. This study reviews our experience with DSA in these patients.
Methods: A retrospective review was conducted of patients with PH in our institution with pulmonary resistance (PVRi) of greater than 6 Units.M^2, who underwent DSA in 2018 to present. The DSA were analyzed using a protocol based on the arterial, capillary and venous phase. The angiograms were analyzed by a single reviewer (KCC) and verified by a second reviewer (MD). The arterial phase was analyzed for peripheral tapering ("pruning") and the appearance of decrease in vascularity ("tree in winter" appearance). The capillary phase was analyzed for capillary blush and the amount of broncho-pulmonary segments (BPS) perfused. The venous phase was analyzed for delay in venous return and the presence of pulmonary venous obstruction.
Results: 79 patients with PH underwent catheterization with 21 patients having a PVRi > than 6 Units.M^2 (Table

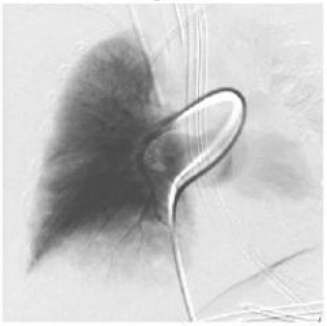
Table 1

Total patients with PVR > 6	20
Mean age (years)	7.2 ± 6
Male	11
Female	9
Mean PA pressure (mmHg)	46.6 ±7.8
PCWP (mmHg)	11.2 ± 2.4
LPA wedge (mmHg)	11.1 ± 2.3
RPA wedge (mmHg)	11.7 ± 2.6
Rp	11.7 ± 4.2
Qs	3.3 ± 0.9

1). Compared to normal digital subtraction angiograms (Fig 1), these patients show the following abnormalities: Arterial phase shows all patients except 1 had the "tree in winter" appearance (Fig 2) with 17 patients showing "pruning" (Fig 3). The capillary phase shows perfusion of 90% of BPS in 15, 4 patients 75-89% and 2 with 50-74% of BPS. There were no

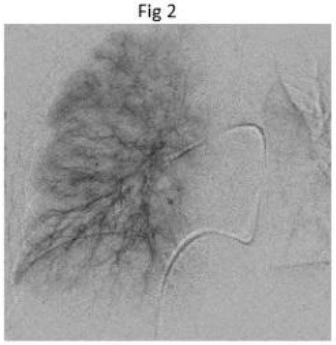
patients with less than 50% perfusion. The venous phase shows 3 patients with discrete pulmonary venous stenosis. Peripheral PA stenosis were demonstrated in 1 patient (Fig 4). All patients show unique patchy hypo-perfused areas during the late arterial and capillary phase.

Fig 1



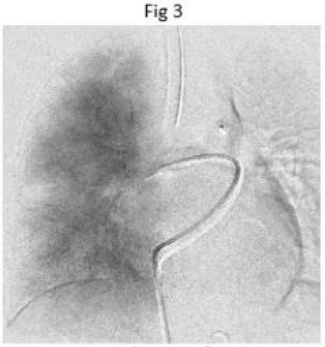
Normal

Fig 2



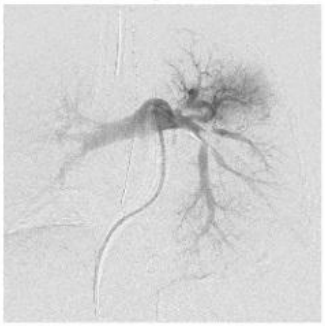
"Tree in Winter"

Fig 3



"Pruning"

Fig 4



Peripheral PA Stenosis

Conclusions: DSA can be performed safely in patients with significant PH. DSA identifies the abnormalities of PH with analysis of the arterial, capillary and venous phase. A unique patchy hypo-perfusion areas not seen with standard angiography that were associated with severe PH were seen with DSA. DSA provides added safety and may provide additional information not seen with standard angiography.



O-130 / #271

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

TOTALITY OF EVIDENCE FOR SELEXIPAG IN PEDIATRIC PULMONARY ARTERIAL HYPERTENSION: INTEGRATED ANALYSIS OF PHASE 2 AND PHASE 3 TRIAL DATA USING PEDIATRIC EXTRAPOLATION

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Background and Aim: Pediatric pulmonary arterial hypertension (PAH) remains a rare, life-threatening disease with limited therapeutic options. Selexipag is being evaluated in pediatric PAH patients in three clinical trials. Based on data in adults, N-terminal pro-B-type natriuretic peptide (NT-proBNP) was established and agreed with US Food & Drug Administration as a bridging biomarker for pediatric extrapolation. We present a comprehensive totality of evidence in efficacy and safety with data from these trials.
Methods: The three pediatric trials are: Phase 3 SALTO trial (NCT04175600, randomized, placebo-controlled, n=138), Phase 2 pharmacokinetic and safety trial AC-065A203 (NCT03492177, single-arm, open-label, n=63), and Japanese Phase 2 trial NS304P-P2-1 (single-arm, open-label, n=6). Efficacy assessments included NT-proBNP reduction from baseline at Week 24-28, time to disease progression (TTDP), WHO Functional Class (WHO-FC), 6-minute-walk-distance (6MWD) and pulmonary vascular resistance index (PVRi). For the NT-proBNP endpoint, analyses in subgroups with elevated baseline NT-proBNP (≥300 ng/L [n=51/37/1] or age-adjusted Zlog ≥2.58 [n=42/30/1]) were performed for each of the individual trials and and the selexipag pool. Propensity score (PS) and Bayesian approaches were applied to SALTO and AC-065A203 data, accounting for between-trial variability.
Results: Signals of selexipag effects on NT-proBNP, WHO-FC and 6MWD were observed in all three trials, and on TTDP in SALTO and AC-065A203. NS304P-P2-1 demonstrated a mean PVRi reduction of 5.55 Wood units·m^2. In NT-proBNP elevated subgroups, selexipag

demonstrated consistent and clinically meaningful NT-proBNP reductions across all trials (Figure). SALTO showed geometric mean ratio (GMR) of selexipag versus placebo of 0.75 (300 ng/L threshold) and 0.63 (Z-log threshold). PS-weighted analysis integrating SALTO and AC-065A203 data yielded GMR of 0.73 (95% CI 0.46–1.15) and 0.58 (95% CI 0.36–0.94) using the two thresholds. Bayesian analysis showed ≥86% posterior probability that selexipag outperforms placebo when borrowing weight ≥25% for AC-065A203. Safety profile among all participants was consistent with the adult prostacyclin receptor agonist class, with no unexpected adverse events across all pediatric studies.

Figure. Individual pediatric trials and naive pool, NT-proBNP change from baseline



Conclusions: This comprehensive totality of evidence suggests that selexipag is efficacious, and well-tolerated in pediatric PAH patients. Consistent treatment effects across trials using multiple analytical approaches support pediatric extrapolation and establish selexipag, first-in-class oral formulation as a therapeutic option for children with PAH.



O-131 / #132

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

NOVEL APPROACHES IN PEDIATRIC PULMONARY ARTERIAL HYPERTENSION TRIALS: OUTCOMES OF SELEXIPAG AND MACITENTAN PEDIATRIC DEVELOPMENT PROGRAMS – CHALLENGES AND SUCCESSES

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Background and Aim: Pulmonary arterial hypertension (PAH) is a rare disease, and traditional efficacy endpoints such as 6-minute walk distance or time to disease progression (TTDP) are either unfeasible or impractical for pediatrics. Given these challenges, pediatric development programs of selexipag and macitentan were redesigned utilizing extrapolation concepts – bridging biomarker, exposure matching and/or descriptive efficacy.
Methods: The Phase 3 studies for both pediatric programs (NCT04175600, NCT02932410) were initially designed with TTDP as the powered primary endpoint, based on previous adult Phase 3 studies. Adult Phase 3 trial data were evaluated to assess whether N-terminal pro-B-type natriuretic peptide (NT-proBNP) could be qualified as a bridging biomarker for selexipag and macitentan. Treatment effects on NT-proBNP were then assessed in pediatric trials, including pooling and sub-group analysis.
Results: For selexipag, NT-proBNP met all criteria as a bridging biomarker for pediatric extrapolation, and the Phase3 pediatric trial was modified to power for NT-proBNP analysis. Selexipag effect was consistent across trials and met FDA agreed upon threshold across analyses (**Fig 1 and 2**). For macitentan, NT-proBNP did not meet the criteria to qualify as a bridging biomarker. The primary endpoint was modified to pharmacokinetics (PK) and TTDP changed to a secondary endpoint. Given lack of power, efficacy results (**Fig. 3**) were deemed inconclusive by FDA, and label was updated with no indication. EMA approved macitentan for pediatric PAH based on PK extrapolation, and the totality of the data
available.

Fig. 1 Selexipag SALTO: NT-proBNP change from baseline to Week 24, expressed as ratio between geometric mean (GM) of (Week24/Baseline) in selexipag and in placebo. The bars are the ratio of GM minus 1, with negative values in favor of selexipag

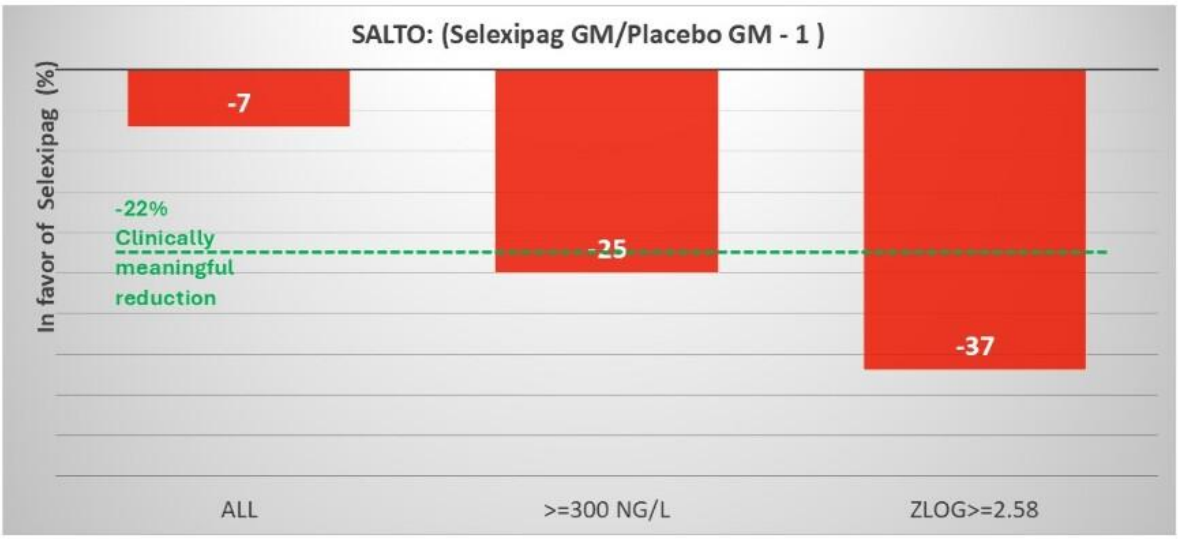


Fig. 2 Selexipag: NT-proBNP change from baseline, expressed as geometric mean (GM) of (Week 24-28/Baseline) in each treatment group and study. The bars are (GM - 1), with negative values for improvement and positive values for worsening from baseline

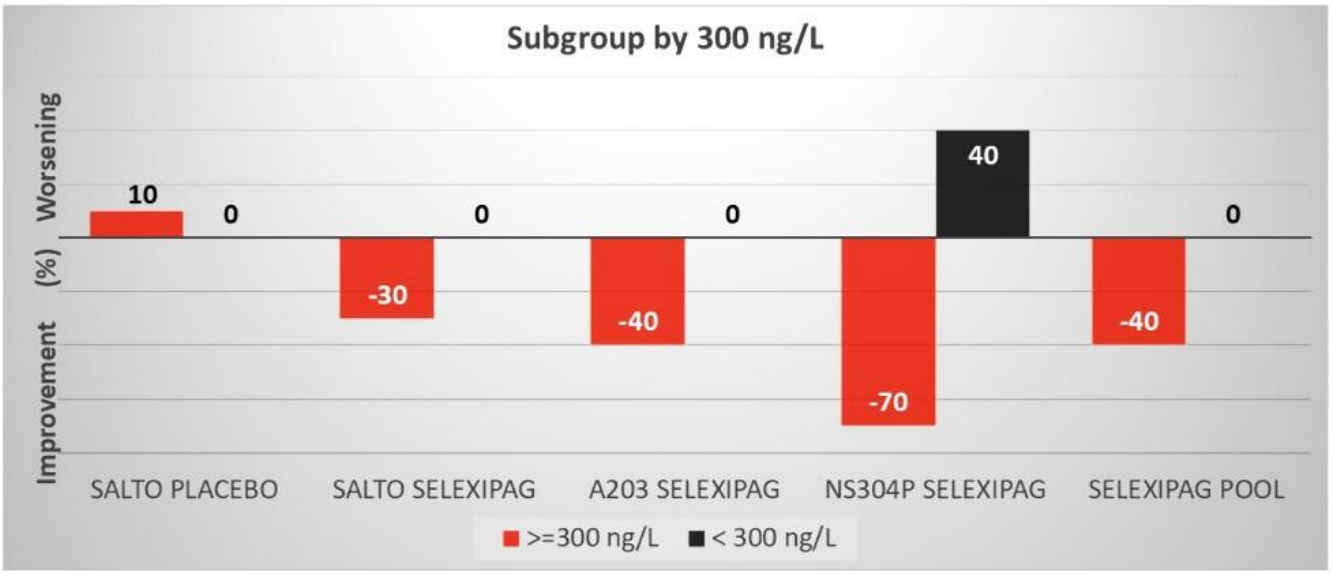
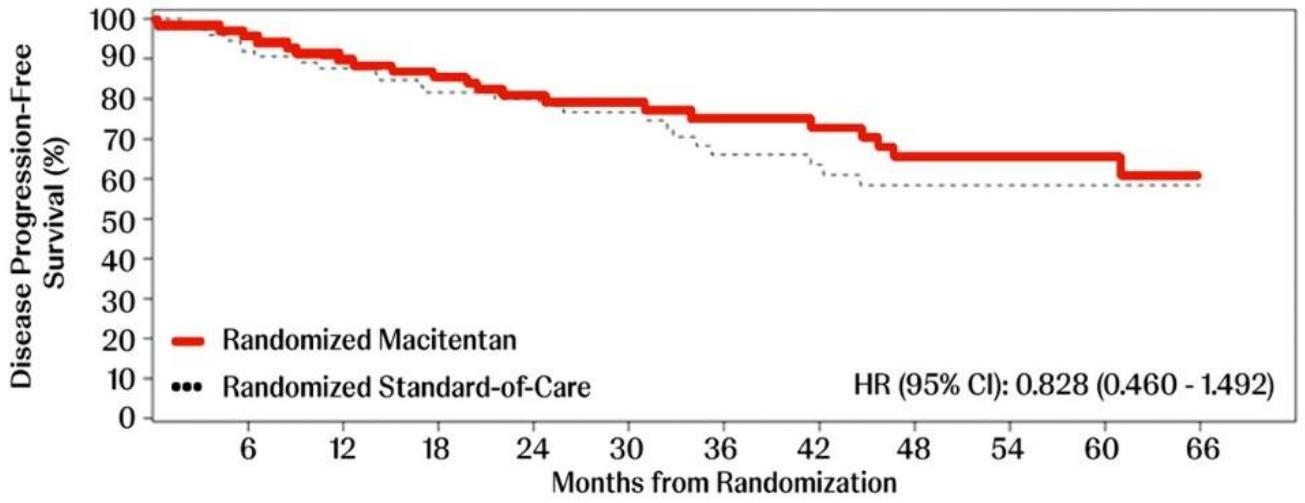


Fig. 3 Macitentan TOMORROW Study: Kaplan–Meier Curves of Time to First CEC-confirmed Disease Progression Event (TTDP) for Subjects ≥2 Years Old



Conclusions: These programs illustrate innovative strategies in drug development for rare pediatric diseases. For the first time in pediatric PAH, NT-proBNP was established as a bridging biomarker for the selexipag pediatric program, enabling a feasible, scientifically rigorous path to seek regulatory approval. For macitentan, the case highlights the need for robust comparable data collection in adult studies to enable validation of alternative endpoints. Totality of the data across both programs is one of the largest in pediatric PAH (>350 patients) and may serve as relevant source of information for patients, physicians, industry and regulators for data analysis to help establish novel, non-invasive, feasible endpoints to help accelerate development and approval of drugs in pediatric PAH.



O-132 / #367

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

OPTICAL COHERENCE TOMOGRAPHY REVEALS EARLY CARDIAC ALLOGRAFT VASCULOPATHY ASSOCIATED WITH GRAFT DYSFUNCTION AND LOSS IN PEDIATRIC HEART TRANSPLANT RECIPIENTS

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Background and Aim: Cardiac allograft vasculopathy (CAV) is a leading cause of graft failure following pediatric heart transplantation (HT). Early detection could improve long-term outcomes, but conventional coronary angiography often misses early-stage disease. Optical coherence tomography (OCT), a high-resolution intravascular imaging modality, may enable earlier and more sensitive CAV detection.
Methods: This retrospective study analyzed pediatric HT recipients who underwent OCT between 2012-2024. OCT-derived maximal intima thickness (MIT) and cross-sectional area ratios were correlated with coronary angiography findings, hemodynamic data, established CAV risk factors, and immunosuppressive regimens. Longitudinal analysis was performed in patients with serial OCT.
Results: In 214 examinations (386 vessels) from 67 patients (median age 3.1 years, IQR 1.8-8.2, 49 % female, median 5.1 years post-HT, IQR 2.6-9.4), OCT-detected CAV (MIT ≥ 0.3 mm) was present in 31.9 % of vessels versus 8.0% detected by angiography. MIT was significantly higher in patients with angiographic CAV ($p<0.001$) and in those with restrictive hemodynamics ($p=0.015$). MIT correlated with recipient and donor age ($R=0.165$, $p = 0.001$ and $R=0.278$, $p=0.001$, respectively), and donor-recipient age difference ($R=0.325$, $p<0.001$). MIT was higher in recipients with episodes of antibody-mediated rejection ($p=0.020$) and in adult donor grafts ($p<0.001$). Treatment with everolimus was associated with significant reduced intimal proliferation ($p < 0.001$). Donor age and episodes of AMR were independent predictors of the development of OCT-CAV in multivariable analysis (OR 1.048, 95%CI 1.032-1.065 and 2.832, 95%CI 1.405-5.711, respectively). Over time, 73 % of grafts showed OCT-CAV with earlier onset ($p=0.037$) and higher incidence ($p=0.005$) in vessels from adult donors. MIT significantly increased from baseline OCT examination to



the last follow-up (p = 0.002) with a mean change of 0.015 mm. Presence of angiographic or OCT-detected CAV was associated with increased risk of graft loss or dysfunction (log rank p = 0.044, HR 4.21, 95%CI 1.16-15.28).

Conclusions: OCT identifies early CAV changes in pediatric heart transplant recipients with substantially greater sensitivity than angiography. Everolimus may mitigate early CAV progression. These findings support that OCT offers significant potential as a tool for early CAV surveillance and risk-stratified therapeutic decision-making.



O-133 / #446

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

REGENERATIVE INTERVENTIONS IN CHILDREN

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[1]Children´s Cardiac Centre, National Institute of Cardiovascular Diseases, Department Of Paediatric Cardiology, Bratislava, Slovak Republic, [2]Children´s Cardiac Centre, National Institute of Cardiovascular Diseases, Cardiac Intensive Care Unit, Bratislava, Slovak Republic, [3]Children´s Cardiac Centre, National Institute of Cardiovascular Diseases, Department Of Functional Diagnostics, Bratislava, Slovak Republic

Background and Aim: Heart transplantation (HTx) is inaccessible for many young children with advanced heart failure (HF). Myocardial regenerative capacity is age-dependent and highest in infancy. We evaluated outcomes in children <2 years with dilated cardiomyopathy (dCMP) and preserved right ventricular function treated with regenerative strategies: pulmonary artery banding (PAB), restrictive atrial septal defect (rASD) creation, or left ventricular assist device (LVAD) as bridge to recovery.
Methods: This retrospective single-center study included children <2 years with dCMP and HF unresponsive to intensive care between 01/2022 and 09/2025 who received one of the regenerative interventions. Patients with confirmed myocarditis and/or biventricular failure were excluded. Transplant-free survival, functional status, and echocardiographic and laboratory markers of reverse remodeling (pre-intervention vs. last follow-up) were assessed. The paired t-test was used for statistical analysis; data are presented as mean ± SD.
Results: Fifteen children <2 years with severe dCMP were identified. Three did not undergo a regenerative intervention; one recovered and two died. Twelve patients met inclusion criteria (median age 7 months, range 1–23). Six were not HTx candidates due to social factors (n = 4), parental refusal (n = 1), or medical reasons (n = 1). Three required extracorporeal membrane oxygenation (ECMO); two subsequently received LVADs and one was weaned. Nine underwent PAB (one during ECMO weaning); in four, PAB was preceded by rASD. Three additional PAB patients had a persistent foramen ovale, and rASD creation failed in one. One patient underwent rASD alone. Transplant-free survival was 91.7 % (no deaths; one HTx from LVAD) over a median follow-up of 14 months (range 2–40). Ross class improved from IV to I–II in all but one patient. LV ejection fraction increased from 24 ± 7 % to 47 ± 9 % ($p < 0.0001$), LV end-diastolic dimension Z-score decreased from +9.3 ± 4.1 to



+2.6 ± 2.7 (p = 0.0003), and NT-proBNP declined from 17 969 ± 11 705 to 1 884 ± 3 953 ng/L (p = 0.001).

Conclusions: Regenerative strategies in young children with severe dCMP were associated with high medium-term transplant-free survival and reverse remodeling. PAB with rASD may represent an alternative to HTx in selected patients.



O-134 / #539

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

OVARIAN CYST RUPTURE AS A RARE CAUSE OF ABDOMINAL PAIN AND HYPOTENSION IN FEMALE LVAD PATIENTS: A THREE-CASE SERIES

Burcu Acar Alkan[1], Zülal Ülger[1], Çağatay Engin[1], Eser Doğan[1], Burcugül Karasulu Beci[1], Hakan Kurt[1], Meral Yilmaz[1], Şeyma Şebnem Ön[2], Pınar Yazici Özkaya[2], Tülay Öztürk Atasoy[3], Ertürk Levent[1]
[1]Ege University, Pediatric Cardiology, izmir, Turkey, [2]Ege University, Pediatric Intensive Care, izmir, Turkey, [3]Ege University, Radiology, izmir, Turkey

Background and Aim: Ovarian cyst rupture is an uncommon but potentially life-threatening complication in female recipients of left ventricular assist devices (LVADs). Continuous anticoagulation increases bleeding risk, making gynecologic hemorrhage particularly hazardous. This study describes the clinical features, diagnostic challenges, and management of three adolescent female LVAD recipients presenting with abdominal pain and hypotension due to hemorrhagic ovarian cyst rupture.
Methods: We retrospectively reviewed three LVAD-supported adolescent girls who presented with acute abdominal symptoms and hemodynamic instability. Clinical presentation, laboratory findings, imaging, management strategies, and outcomes were analyzed. Diagnosis was established using ultrasonography and computed tomography (CT), with multidisciplinary involvement from pediatric cardiology, cardiac surgery, gynecology, and intensive care.
Results: All three patients developed acute abdominal pain with significant hemoglobin decline.
Case 1: A 17-year-old presented with ventricular fibrillation and profound shock. Ultrasonography revealed only a regressing adnexal hematoma; however, persistent symptoms prompted CT, which demonstrated limited hemoperitoneum plus a second bleeding focus—a left pelvic extraperitoneal hematoma displacing the bladder, containing higher-density areas suggestive of a contained arterial bleed—yet both were judged self-limited. Conservative management led to full recovery. **Case 2:** An 18-year-old with rapidly falling hemoglobin underwent CT showing a 6-cm hemorrhagic adnexal mass with active bleeding. Emergency laparotomy evacuated 1.5 L hemoperitoneum and repaired the ruptured cyst. She stabilized and later developed a small rectus sheath hematoma that resolved conservatively.
Case 3: A 16-year-old initially underwent laparoscopic drainage of a large hemorrhagic



cyst. Three years later, she re-presented with recurrent rupture causing hemoperitoneum requiring laparoscopic bilateral cystectomy and evacuation of 1 L blood. She declined hormonal suppression therapy but recovered uneventfully. Across cases, acute hemorrhage caused significant intravascular volume loss, decreased LVAD preload, and hemodynamic compromise; one patient experienced LVAD suction–induced ventricular fibrillation.

Conclusions: Hemorrhagic ovarian cyst rupture should be promptly considered in any female LVAD patient presenting with abdominal pain, dizziness, or unexplained hypotension. Continuous anticoagulation amplifies bleeding risk, and delayed diagnosis may result in catastrophic hypovolemia or arrhythmic arrest. Early imaging , particularly CT , and coordinated multidisciplinary management are essential for survival.



O-135 / #1203

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

LEFT ATRIAL HYPERTENSION AND POSTCAPILLARY PULMONARY HYPERTENSION IN INFANTS, CHILDREN AND YOUNG ADULTS WITH CONGENITAL AND ACQUIRED HEART DISEASES: A CONSENSUS STATEMENT FROM THE EPPVDN

Georg Hansmannn[1,2], Sarosh Batlivala[3], Rebecca Beroukhim[4], Henri Justino[5], Raman Kumar[6], Ina Behnke[7], Shaine Morris[8], Laura Muiño Mosquera[9], Almudena Ortiz-Garrido[10], Michael Schmidt[11], Hari Tunuguntla[8], Rachel Vanderlaan[12], Inga Voges[13], Nadeem Aslam[14], Babar Hasan[15]
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Background and Aim: Left atrial hypertension (LAH) and postcapillary pulmonary hypertension (pcPH) are prevalent but under-recognized contributors to morbidity and mortality in infants, children, and young adults with congenital and acquired heart diseases. Pediatric disease phenotypes differ substantially from adult pathologies, and conventional guidelines do not adequately address the unique physiology, diagnostic challenges, and management pathways in children. This consensus statement by the



European Pediatric Pulmonary Vascular Disease Network (EPPVDN), endorsed by international societies, aims to address this gap by providing a comprehensive pediatric-specific framework for the diagnosis, classification, and management of LAH and pcPH, including special considerations for low- and middle-income regions (LMIRs).

Methods: A multidisciplinary international writing group systematically reviewed pediatric and congenital cardiology literature, integrating updated classifications of pulmonary hypertension (WSPH 2024), invasive hemodynamic standards, multimodality imaging approaches, and emerging medical, surgical, interventional, and mechanical circulatory support strategies. Consensus was achieved through iterative review, expert discussion, and incorporation of supplementary evidence supporting recommendations across diverse etiologies and resource settings.

Results: The statement delineates pediatric-specific pathophysiology of LAH and pcPH, clarifying the spectrum from isolated postcapillary PH to combined post and pre-capillary disease. It outlines structured diagnostic pathways integrating echocardiographic indices of LA pressure, advanced cardiac MRI markers, and comprehensive right- and left-heart catheterization with simultaneous PAWP and LVEDP measurement. Condition-specific recommendations are provided for HLHS/HLH variants, pulmonary vein stenosis, cardiomyopathies (RCM, HCM, DCM), left-sided obstructive lesions, complex CHDs, and developmental lung disorders. Medical management emphasizes careful diuresis, neurohormonal modulation, limited and selective use of PAH-targeted therapies, and emerging roles for SGLT2 inhibitors. Interventional and surgical strategies - including relief of left-sided obstruction, sutureless repair for pulmonary vein stenosis, and transcatheter LA unloading via atrial septostomy or atrial flow regulator - are reviewed. Mechanical circulatory support and transplant considerations are addressed. Additional sections highlight disparities in LMIRs and propose context-appropriate adaptations.

Conclusions: This consensus statement provides the first comprehensive pediatric-focused guidance on LAH and pcPH, integrating modern hemodynamic definitions, multimodal diagnostics, disease-specific management algorithms, and global health considerations. It establishes a unified framework to improve early recognition, standardize care, guide interventional and transplant decision-making, and support equitable access to high-quality cardiovascular care worldwide.



O-136 / #1274

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

COMPARISON OF HEMODYNAMIC EFFECTS OF TREPROSTINIL AND SURGICAL PROGNOSIS BETWEEN PATIENTS COMBINED WITH PULMONARY HYPERTENSION FOLLOWING GLENN AND FONTAN PROCEDURES

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Background and Aim: Pulmonary hypertension is a crucial factor affecting the recovery after both Glenn and Fontan procedures for single ventricular patients. This study elucidated the distinctions in the application of Treprostinil following surgery to decrease pulmonary pressure in these two high-risk patient groups, and assessed the differences in their postoperative recovery.
Methods: We retrospectively included pediatric patients at our single center from 2015 to 2022 who underwent the Glenn or Fontan procedure with a mean pulmonary artery pressure (mPAP) >15 mmHg. Patients who required postoperative extracorporeal membrane oxygenation were excluded. Patients received Glenn procedure were included in Group 1, and patients received Fontan procedure were included in Group 2.
Results: A total of 79 patients were included in the study. Group 1 consisted of 28 cases, group 2 consisted of 51 cases. In terms of demographics, pulmonary artery pressure, Treprostinil dosage, and surgical characteristics, the proportion of patients in Group 1 who underwent additional cardiac procedures was significantly higher than that in Group 2 (75% vs. 49%, p=0.025). After a 24-hours observation period, the mPAP decreased from 17 ± 3 to 13 ± 3 mmHg ($p < 0.001$) in group 1 and decreased from 17 ± 3 to 15 ± 2 mmHg ($p < 0.001$) in group 2; the group 1 had better effect than group 2 ($p < 0.001$). In terms of postoperative recovery, the proportion of resuscitation in group 1 was higher than that in group 2 (29% vs. 6%, p=0.014) as well as mortality rate (11% vs. 0, p=0.041). In Group 1, the chest tube drainage volume was lower, 31 (12, 88) ml/kg vs. 251 (142, 464) ml/kg (p=0.002), as well as duration of chest tube placement, 7 (6, 15) days vs. 29 (18, 46) days, ($p < 0.001$). In Group 1, the postoperative length of stay was also less, 21 (15, 33) days vs. 35 (25, 58) days (p=0.002).
Conclusions: Treprostinil effectively reduces mPAP in acute postoperative period following both Glenn and Fontan procedures, with a significantly greater magnitude of effect



observed after Glenn surgery. Fontan patients, while exhibiting lower mortality, face prolonged morbidity dominated by pleural effusions linked to lymphatic dysfunction.



O-137 / #1293

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

CARDIOMEMS DEVICE FOR MONITORING TREATMENT RESPONSES IN PULMONARY ARTERIAL HYPERTENSION: PRELIMINARY EXPERIENCE IN A SINGLE CENTRE

Jose Manuel Puyana Rodriguez[1], María Toledano Navarro[1], Katarzyna Polak[1], María Guadalupe Izquierdo Del Monte[1], Isabel Barranco Fernández[1], Isabel Molina Borao[1], Natalia Rivero Jiménez[1], María Elvira Garrido-Lestache Rodríguez-Monte[1], María Álvarez Fuente[1], Jesús Javier Martín Pinacho[2], Pedro Torres Rubio[2], María Ángeles Fernández Méndez[2], Miguel Navarro Fernández-Hidalgo[2], Javier Alarcón Rodríguez[2], María Jesús Del Cerro Marín[1]
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Background and Aim: CardioMEMS is an implantable, wireless hemodynamic monitoring system approved for adult patients with heart failure. Implanted in a branch of the pulmonary artery, it enables remote measurement of pulmonary artery pressure, allowing early and individualized treatment adjustment.
In pediatric patients, experience with CardioMEMS is limited. Continuous pulmonary pressure monitoring may optimize therapeutic management and reduce the need for repeated catheterizations and hospitalizations. Recent reports suggest that implantation is feasible and safe in selected children.
The aim of this study was to describe the initial experience with CardioMEMS implantation in pediatric and adolescent patients with pulmonary arterial hypertension (PAH) at our centre.
Methods: This descriptive, single-centre study included pediatric and adolescent patients with PAH evaluated for CardioMEMS implantation. Clinical characteristics, procedural data, follow-up, safety, and clinical utility of hemodynamic monitoring were analyzed.
Results: Seven patients were evaluated; CardioMEMS implantation was successful in five (60% male), aged 13–19 years (mean 16.2 years). Implantation was not feasible in two patients with TBX4 variants due to small pulmonary artery branches. Two patients had corrected dextro-transposition of the great arteries, one presented mitral valve prosthesis in a repaired complete atrioventricular septal defect and two had familial PAH. Median age at PAH diagnosis was 7 years. At baseline, three patients were in functional class I, one in class II, and one in class III. Two patients received triple therapy and three dual therapy. All



devices were implanted under conscious sedation and local anesthesia, with a mean follow-up of 6 months and no procedure or device-related adverse events. We explored the correlation between cardiac output measurements obtained using the CardioMEMS system and those derived from cardiac magnetic resonance imaging. In three patients, the device enabled real-time assessment of pulmonary artery pressures during cardiopulmonary exercise testing and supported therapy optimization, leading to clinical improvement.

Conclusions: Pulmonary artery pressure monitoring with CardioMEMS was feasible and safe in our cohort and it provides clinically relevant information to support therapeutic optimization and exercise recommendations. Larger studies are needed to define its role in pediatric clinical practice.



O-138 / #1461

PULMONARY HYPERTENSION, HEART FAILURE AND TRANSPLANTATION ABSTRACT SESSION
16-05-2026 11:00 - 12:30

REDEFINING PEDIATRIC HEART FAILURE THERAPY: EARLY EXPERIENCE WITH SACUBITRIL/VALSARTAN

Rania Gargouri[1], Amal Kchaw[1], Marwa Jarraya[2], Hela Fendri[1], Leila Abid[2]
[1]Hedi chaker hospital, Sfax, Tunisia, [2]Hedi Chaker Hospital, Cardiology, Sfax, Tunisia

Background and Aim: Pediatric heart failure is associated with significant morbidity and mortality and may lead to major disability for affected children and their families. Therapeutic management remains challenging due to limited pediatric-specific evidence and restricted pharmacological options. Sacubitril/valsartan has demonstrated clear benefits in adult heart failure; however, its efficacy and safety profile in children with left ventricular systolic dysfunction remain insufficiently established. We aim to evaluate the **safety, tolerability, and efficacy** of sacubitril/valsartan in children with heart failure by assessing its impact on hospitalizations, clinical status, biological markers, and echocardiographic parameters.
Methods: This was a **prospective, prognostic, multicenter study** conducted between **March 2024 and March 2025** in pediatric cardiology departments of Hedi Chaker University Hospital (Sfax), private cardiology centers in the Sfax region, Cardiology Department B of Fattouma Bourguiba University Hospital (Monastir), and Kasserine Regional Hospital.
Children aged **1 month to 18 years**, symptomatic (NYHA ≥ II or Ross ≥ II), with **systemic ventricular dysfunction (LVEF ≤ 45%)** were included. Patients were evaluated at baseline and after **3 months** of sacubitril/valsartan therapy (dose range: **0.8–3.1 mg/kg/day**).
The **primary endpoint** was a hierarchical global composite clinical score. **Secondary endpoints** included NT-proBNP, quality of life (PGIS, PedsQL), NYHA/Ross class, echocardiographic parameters (LVEF and global longitudinal strain), and treatment-related adverse effects.
Results: A total of **20 patients** were included. Mean age was **5.3 years** (range: 1–15 years), with **65% females**. Etiologies included **primary cardiomyopathy (45%)**, **secondary cardiomyopathy (40%)**, and **congenital heart disease (15%)**.
At 3 months, the primary composite outcome improved significantly: **65%** of patients improved to category 5, **10%** remained stable, **5%** worsened, **10%** deteriorated, and **10%** died from non-cardiac causes. Significant improvements were observed in **NT-proBNP** (1396 vs 475 pg/mL), **quality of life scores**, **global longitudinal strain** (−10.95%



vs −15%), and **LVEF** (29.6% vs 37.4%) (all $P < 0.05$). NYHA and Ross classifications also improved significantly.

Sacubitril/valsartan was **well tolerated**; mild adverse effects occurred in **35%** of patients (hyperkalemia, hypotension, nausea) without treatment discontinuation.

Conclusions: Sacubitril/valsartan appears to be **effective and well tolerated** in pediatric heart failure, leading to significant improvements in clinical status, quality of life, and left ventricular function



O-139 / #315

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

FACTORS AND OUTCOMES ASSOCIATED WITH TIME FROM FEVER ONSET TO INITIAL TREATMENT WITH INTRAVENOUS IMMUNE GLOBULIN FOR PATIENTS WITH ACUTE KAWASAKI DISEASE

Brian Mccrindle[1], Audrey Dionne[2], Michael Portman[3], Todd Nowlen[4], Geetha Raghuveer[5], Seda Tierney[6], Michael Khoury[7], Nagib Dahdah[8], Melissa Wehrmann[9], Megan Gunsaulus[10], Luis Martin Garrido-Garcia[11], Deepika Thacker[12], Sean Lang[13], Cedric Manlhiot[14], Ashraf Harasheh[15]
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Background and Aim: Optimal management of acute Kawasaki disease (KD) comprises initial treatment with intravenous immune globulin (IVIG) within 10 days of fever onset. We sought to determine the association between timing of IVIG and demographics, clinical features and outcomes.
Methods: Patients with acute KD were enrolled into the International KD Registry. Demographic, clinical, treatment and outcome data were reported, and verified by the Data Coordinating Center. Time from fever onset to treatment with initial IVIG was calculated, and patients were grouped. Associated factors were explored.
Results: From January 2020 to September 2025, n=2856 patients hospitalized with acute KD were enrolled from 45 sites in 8 countries; we excluded 298 with possible/positive



COVID-19, 102 without timing information and 84 who did not receive IVIG, leaving 2372 patients included. IVIG was received at day 3-5 for 392 (16.5%), day 6-10 1587 (66.9%), day 11-15 276 (11.6%), day 16-19 68 (2.9%) and day 20+ for 49 (2.1%) patients. Increasing time to treatment was more strongly associated with increasing time from fever onset to hospital admission (ie. delayed presentation/diagnosis; $r=0.90$, $p<0.001$), than admission to treatment ($r=0.27$, $p<0.001$). Relative to day 6-10 group, only day 3-5 patients differed regarding age (significantly younger; $p<0.001$), with no differences between groups regarding sex distribution. Additional doses of IVIG were given to 25% for day 3-5, 12% day 6-10, 13% day 11-15, 7% day 16-19 and 20% for day 20+ group ($p<0.001$). Steroids were given to 45% for day 3-5, 34% day 6-10, 34% day 11-15, 43% day 16-19 and 57% for day 20+ group ($p<0.001$). Coronary artery aneurysms (CAA) were significantly associated with timing, with medium-large CAA noted for 9.3% day 3-5, 6.3% day 6-10, 11.7% day 11-15, 22.2% day 16-19 and 35.9% for day 20+ ($p<0.001$).

Conclusions: Treatment delay impacts 16.6% of patients and is associated with a significantly increasing risk of CAA, and greater need for additional IVIG and steroids. Interestingly, early treatment was associated with younger age and greater use of additional IVIG and steroids, and a slightly greater risk of CAA relative to those with optimally timed treatment. Increased awareness is needed to prevent delays and improve outcomes.



O-140 / #582

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

CARDIAC STRUCTURE AND FUNCTION IN MODERATE-TO-LATE PRETERM NEWBORNS

Eleonora M. Gjerløff[1], Marie Højgaard Andersen[1], Sofie Dannesbo[1,2], Heather Boyd[3], Giaan Ninh[1], Anna Eltvedt[1], Niels Vejlstrup[2], Kasper Iversen[1,4], Henning Bundgaard[2,4], Anne-Sophie Sillesen[1,2], Anna Axelsson Raja[2,4], R. Ottilia B. Vøgg[1]
[1]Copenhagen University Hospital Herlev-Gentofte, Department Of Cardiology, Herlev, Denmark, [2]Copenhagen University Hospital Rigshospitalet, Department Of Cardiology, Copenhagen, Denmark, [3]Statens Serum Institut, Department Of Epidemiology Research, Copenhagen, Denmark, [4]University of Copenhagen, Department Of Clinical Medicine, Faculty Of Health And Medical Sciences, Copenhagen, Denmark

Background and Aim: Preterm birth (<37 weeks' gestation) has implications for the child's long-term health, including increased cardiovascular disease risk and mortality. We investigated whether cardiac structure and function differ between moderate-to-late preterm and term newborns.
Methods: The study population included newborns who participated in the Copenhagen Baby Heart Study in 2016–2018. Moderate-to-late preterm birth was defined as delivery between 32 and 36 completed weeks' gestation. Left ventricular (LV) structure and function, and minor congenital heart disease (CHD) were ascertained by transthoracic echocardiography (TTE). Minor CHD comprised persistent foramen ovale (PFO), atrial septal defect (ASD), ventricular septal defect (VSD), open ductus arteriosus (DA), and bicuspid aortic valve (BAV). LV parameters were compared using multiple linear regressions, and minor CHD were assessed using logistic regressions. Models were adjusted for sex, weight (g), length (cm), and age (days) at examination.
Results: We included a total of 1,199 moderate-to-late preterm newborns (48% female, median age at TTE 11 days, IQR 13), and 24,297 newborns born at term (48% female, median age at TTE 11 days, IQR 7). Compared with term newborns, moderate-to-late preterm newborns had significantly smaller mean interventricular septal thicknesses (adjusted mean difference (aMD) -0.06 mm [95%CI -0.09; -0.03], p<.0001) and LV internal diameters in systole and diastole (aMD -0.16 mm [-0.24; -0.08], p=0.0001 and aMD -0.2 mm [-0.3; -0.1], p<.0001, respectively). Mean LV posterior wall thicknesses in end-diastole, fractional shortening, end-systolic and end-diastolic volumes, and stroke volumes did not differ significantly. Moderate-to-late preterm birth was associated with higher odds of open DA (adjusted odds ratio (aOR) 2.3 [95%CI 1.51-3.41], p<.0001) and ASD (aOR 1.7,



[1.19;2.38], p=0.003), and lower odds of PFO (aOR 0.76, [0.62;0.93], p=0.008). We observed a trend toward higher odds of VSD (aOR 1.34, [0.99;1.91], p=0.051) among preterm newborns, although the result did not reach statistical significance. Odds of BAV were lower, though insignificant, in the preterm group (aOR 0.6, [0.24;1.34], p=0.294).
Conclusions: Moderate-to-late preterm newborns exhibited smaller LV chambers and reduced interventricular septal thicknesses compared with term newborns, while LV systolic function did not differ. Moderate-to-late preterm birth was associated with increased risk of open DA and ASD but not of other minor CHDs.



O-141 / #793

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

PDA AND ASD CLOSURE IN PRETERM INFANTS: SAFETY AND EARLY OUTCOMES

Kristina Migell[1], Olof Broberg[2], Elin Friberg[1], Petru Liuba[1,2]
[1]Skåne University Hospital and Lund University, Children's Heart Center, LUND, Sweden, [2]Region Skåne University hospital Lund, Pediatric Heart Center, Lund, Sweden

Background and Aim: Patent ductus arteriosus (PDA) and atrial septal defect (ASD) are common in infants born very prematurely and may contribute to bronchopulmonary dysplasia (BPD), pulmonary hypertension (PHT), and prolonged respiratory support. While transcatheter PDA closure in extremely low–birth-weight neonates is well established, data on shunt closure later in infancy or early childhood in ex-preterm patients remain sparse. Evidence regarding ASD closure is more limited, and concerns persist that an interatrial shunt may act as a protective "pop-off" in patients with impaired pulmonary vascular adaptation. No prior studies have reported outcomes of combined PDA+ASD closure in ex–extremely-preterm children. The aim was to evaluate clinical characteristics and early outcomes after transcatheter PDA and/or ASD closure in ex-preterm infants with significant cardiorespiratory morbidity.
Methods: Retrospective single-centre study including infants born at 23–36 gestational weeks who underwent transcatheter PDA and/or ASD closure between 2018–2025. Clinical characteristics, indications, comorbidities, procedural details, complications, reinterventions, mortality, and most recent echocardiographic findings were analysed.
Results: Fifty-two ex-preterm infants underwent device closure: 29 (55.8%) were born extremely preterm and 23 (44.2%) very/moderately preterm. Median age and weight at intervention were 14.8 months and 8.9 kg, with earlier intervention in the extremely preterm group (10.7 vs 23.4 months). Extracardiac comorbidities were common (48.1%), including BPD in 21.2%. PDA was closed in 47 patients (isolated n=42; combined PDA+ASD n=5), and isolated ASD in 5. No procedure-related complications occurred. Post-procedural PICU admission was more frequent in the extremely preterm subgroup (44.8% vs 17.4%). Six patients (11.5%) underwent reintervention, mostly elective recatheterisation for haemodynamic reassessment or coiling of aortopulmonary collaterals; no device explants were required. One infant (1.9%) died one month after combined PDA+ASD closure due to severe gastrointestinal infection. At latest echocardiography, residual shunts were absent or trivial in nearly all patients. PHT therapy remained necessary in 7 of 52 children (13.5%), mostly those with established pulmonary disease.



Conclusions: Transcatheter PDA and/or ASD closure in ex-preterm infants with significant cardiorespiratory morbidity is feasible and safe, with low reintervention rates. Combined PDA+ASD closure was achievable without procedural complications. Larger multicentre studies are needed to refine selection criteria, particularly for ASD closure in children with persistent pulmonary vulnerability.



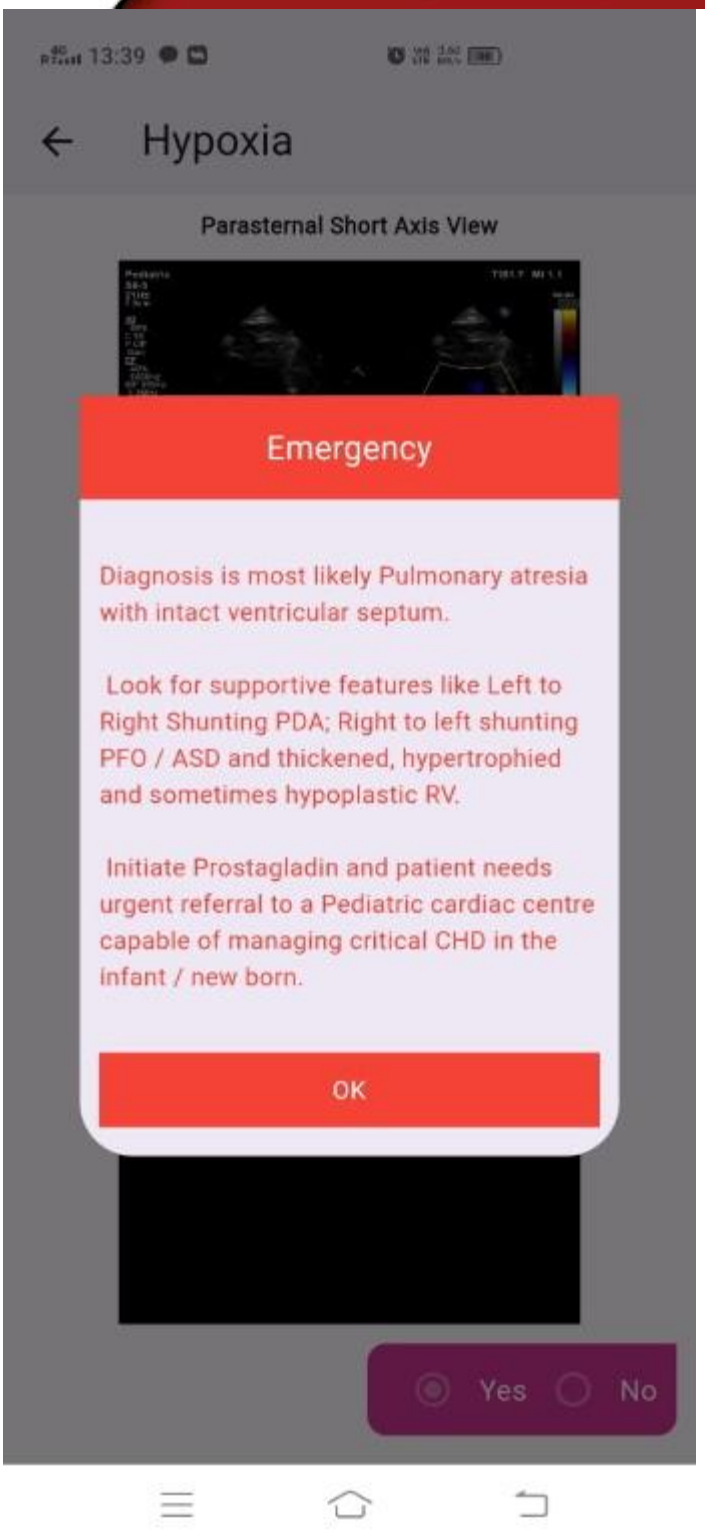
O-142 / #58

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

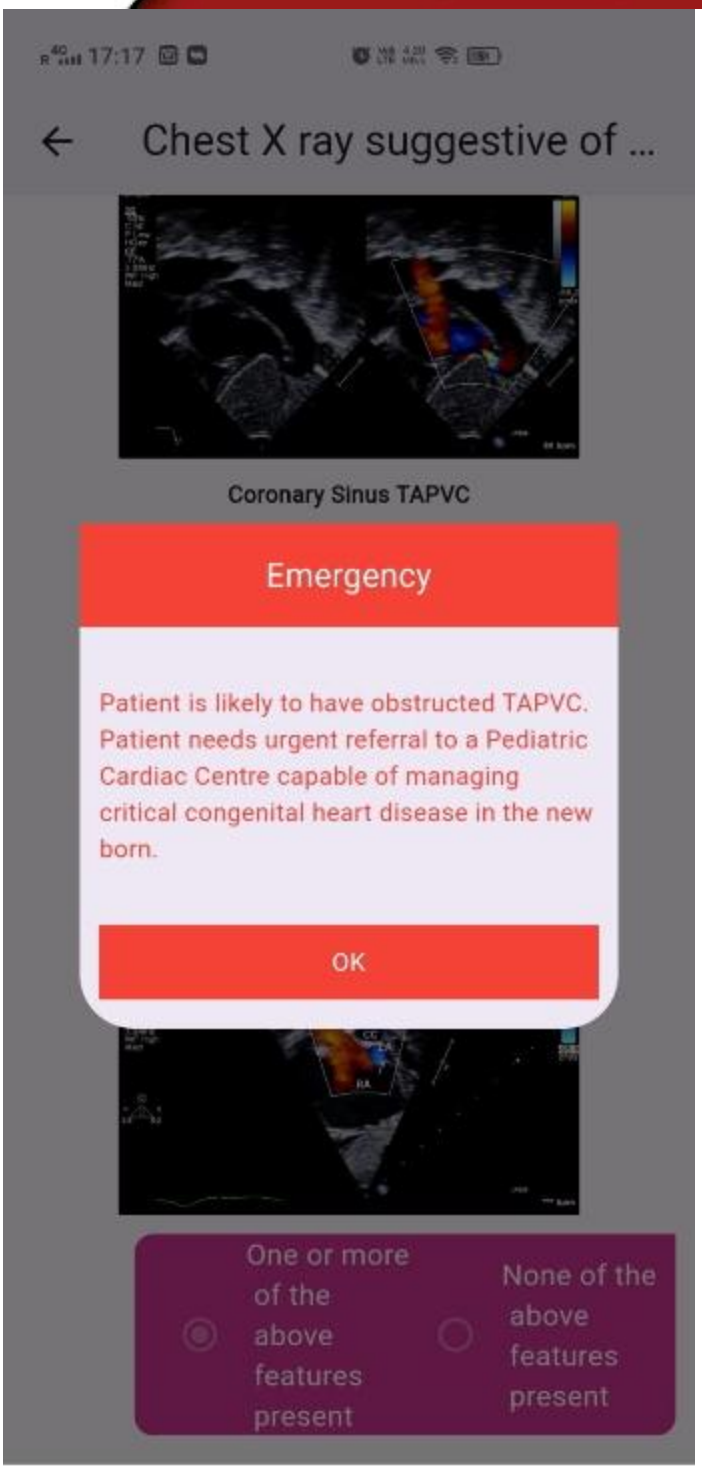
REAL WORLD UTILITY OF A MOBILE APPLICATION BASED ECHOCARDIOGRAPHIC TRIAGE TOOL FOR EARLY DETECTION AND REFERRAL OF NEONATES WITH CRITICAL CONGENITAL HEART DISEASE .

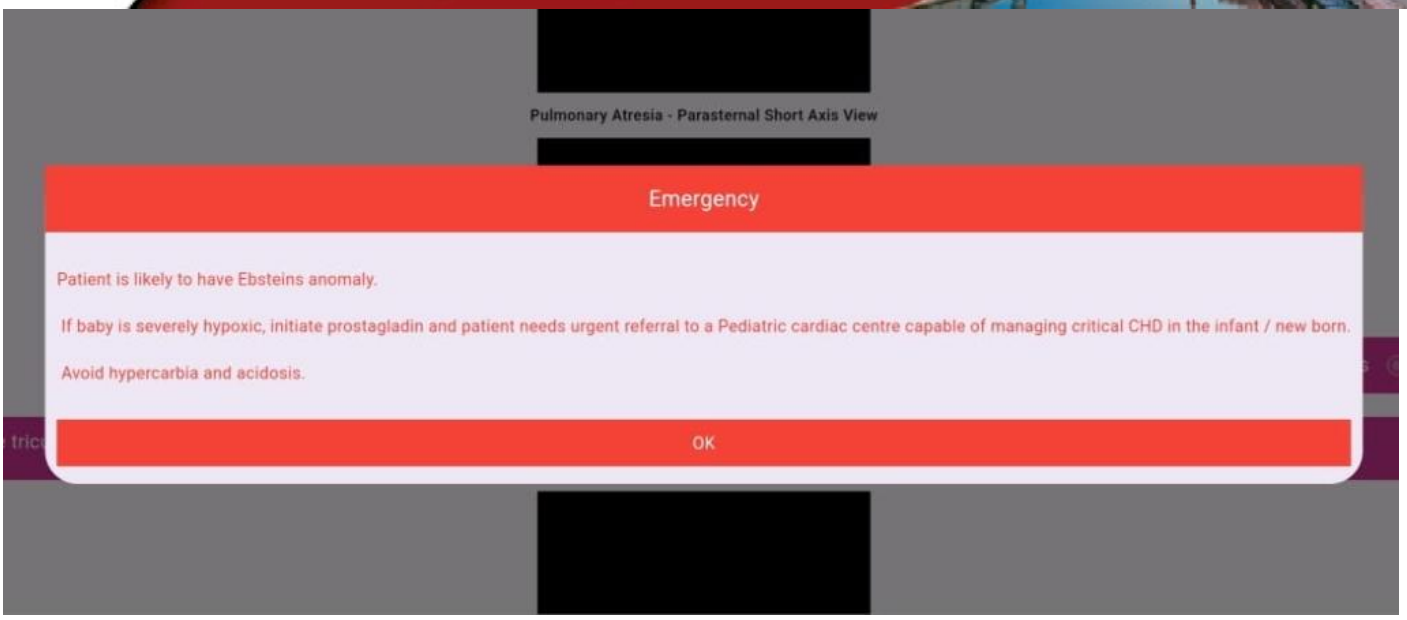
Navaneetha Sasikumar[1,2], Krishna Prasenan[1], Seeja Raji[1], Prathik Bandiya[3], Subodh Shetty[4], Gokuldas Punnadan Koroth[5], Uzma Firdaus[6], Vaishnavi Raman[7], Akkatai S Teli[8], Usha Sastry[9], Shaad Abqari[10], Renu Parameshwara Kurup[11], Harapriya Balasubramanian[12]
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Background and Aim: : The care continuum for CCHD (Critical congenital heart disease); a major cause of infant mortality, begins with timely detection. Specialized workforce is scarce in many health systems. “Smiling heart” is an APP (mobile application) developed to assist primary care providers in early identification, triage and timely referral of neonates with CCHD. The study aimed to compare the results of echocardiograms performed by Neonatologists independently using the ATT (APP based triage tool) with those done by PC (pediatric cardiologists) and treatment recommendations made thereafter.
Methods: Prospective multi-centre study, involving 5 NICUs (Neonatal Intensive Care Units) and their designated PCs. All neonates suspected to have heart disease underwent echocardiography and decision making by treating neonatologists, assisted by the ATT, followed by evaluation by PC. Diagnoses and recommendations were documented (usual treatment pathways unaffected, ethics cleared). Sample size was 33. Inter-observer agreement of diagnoses between the neonatologist and the PC was assessed using Kappa statistics, and difference in recommendations using Mc Nemar Test


13:39
Hypoxia
Parasternal Short Axis View
Emergency
Diagnosis is most likely Pulmonary atresia with intact ventricular septum.
Look for supportive features like Left to Right Shunting PDA; Right to left shunting PFO / ASD and thickened, hypertrophied and sometimes hypoplastic RV.
Initiate Prostagladin and patient needs urgent referral to a Pediatric cardiac centre capable of managing critical CHD in the infant / new born.
OK
Yes
No

.


17:17
Chest X ray suggestive of ...
Coronary Sinus TAPVC
Emergency
Patient is likely to have obstructed TAPVC. Patient needs urgent referral to a Pediatric Cardiac Centre capable of managing critical congenital heart disease in the new born.
OK
One or more of the above features present
None of the above features present



Results: 348 out of 4304 NICU admissions from September 2024 to June 2025, were suspected to have heart disease, 218 were confirmed, 46 (median(IQR) age 2(5)days, weight 2800 (200)g) had CCHD (3 Persistent Pulmonary hypertension). The commonest presentation was hypoxia (89%). Heart failure (17%) and shock (15%) were less frequent. Agreement between the diagnoses made by the Neonatologists independently using ATT with those by PC was substantial (kappa 0.969, 95% CI 0.911-1.000, p<0.001). The recommendations made by the Neonatologists and PCs regarding urgency of treatment were aligned, no statistically significant difference (p0.250). Neonatologists recommended prostaglandin infusion for more babies compared to PCs (0.031).The latter facilitates safe transport on prostaglandin to a centre where nuanced assessment and decision making can follow.

Conclusions: This investigation, carried out in a real world setting demonstrated substantial concordance in diagnosis and management recommendations between the neonatologists and PCs for CCHD. The ATT is a robust digital decision support system to augment diagnostic and triage capacity, especially in resource constrained settings with potential to bridge a major gap. Further assessments directed at generalizability across heterogenous health systems, economic impact and outcomes are desirable.



O-143 / #1499

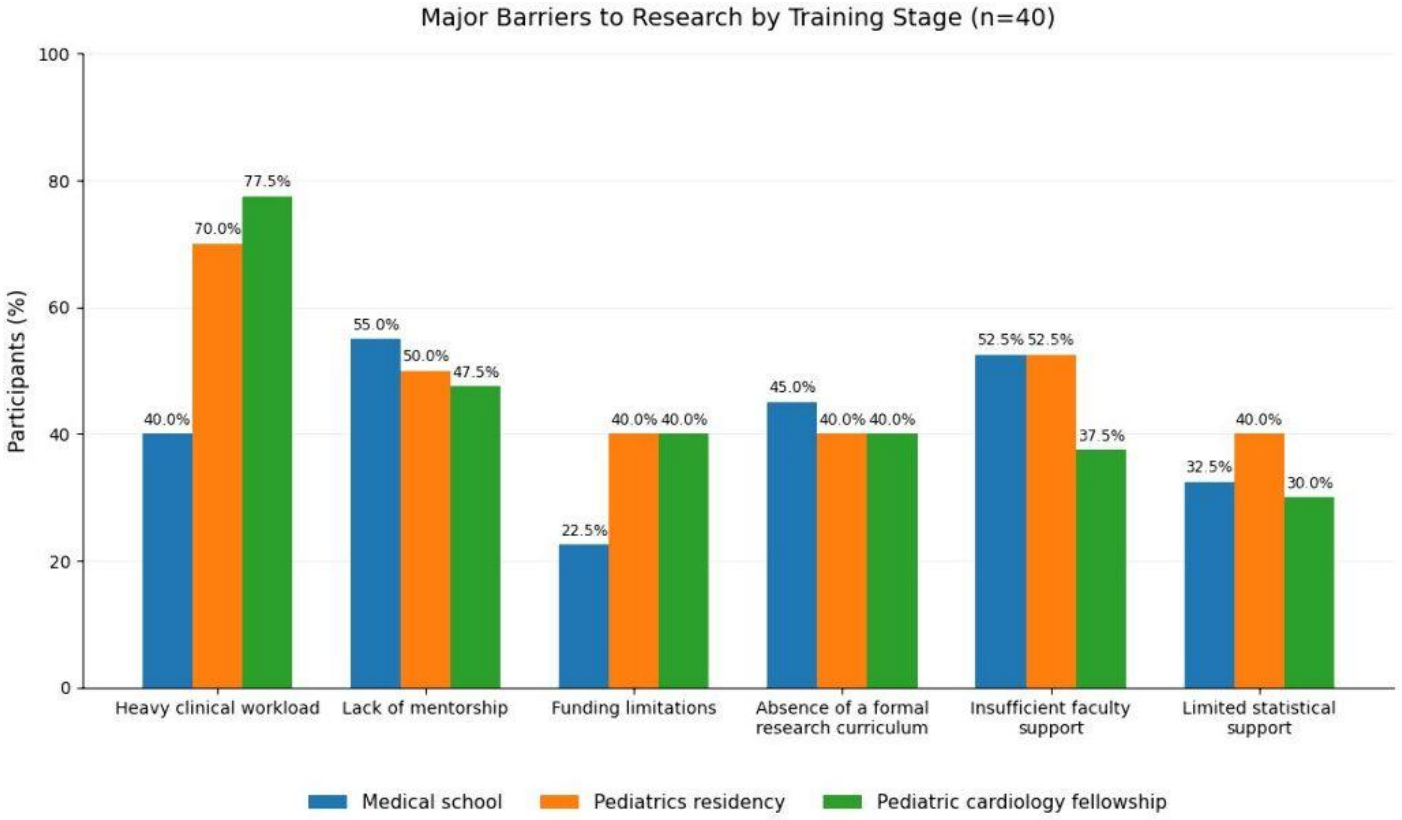
CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

RESEARCH OPPORTUNITIES ACROSS MEDICAL TRAINING AMONG PEDIATRIC CARDIOLOGY FELLOWS AND SPECIALISTS: INTERIM RESULTS OF A NATIONWIDE SURVEY FROM TURKIYE

Mete Kizilkaya[1], Boran Cakan[2,3], Ender Odemis[1]
[1]Koc University, Pediatric Cardiology, Istanbul, Turkey, [2]Koc University, School Of Medicine, Istanbul, Turkey, [3]Koc University, Graduate School Of Science And Engineering, Istanbul, Turkey

Background and Aim: Scientific research competency is a core expectation in pediatric cardiology training; however, structured research education, mentorship, and institutional support remain heterogeneous. Data on longitudinal research exposure from medical school through pediatric cardiology subspecialty training are scarce. This study aimed to assess research opportunities, academic productivity, and perceived barriers among pediatric cardiology fellows and specialists in Türkiye.
Methods: A nationwide, cross-sectional, web-based survey was conducted among pediatric cardiology fellows and board-certified pediatric cardiologists, with ethics approval. The survey assessed research exposure during medical school, pediatrics residency, and pediatric cardiology fellowship, including protected research time, formal research methodology and biostatistics training, access to institutional resources, mentorship, academic output, and barriers to research. Descriptive statistical analyses were performed. Interim results from the first 40 respondents are reported; data collection is ongoing.
Results: Forty participants (25 female, 62.5%) completed the survey, including pediatric cardiology fellows (27/40, 67.5%) and specialists (13/40, 32.5%). During medical school, 33 participants (82.5%) reported no formally protected research time, and most spent ≤2 hours per week on research. Institutional access to major research databases was absent or unknown for 25 respondents (62.5%), and structured education in biostatistics or research methodology was inconsistently provided. During pediatrics residency, clinical workload was substantial, with 34 participants (85%) reporting ≥40 weekly clinical hours and no protected research time. Academic productivity remained limited, with most respondents reporting no first- or corresponding-author publications. Across all training stages, the most frequent barriers included heavy clinical workload (70%), lack of mentorship (55%), insufficient faculty support (52.5%), absence of formal research

curriculum (45%), limited statistical support (40%), and funding constraints (40%). Over half rated their programs' contribution to research competency as low to moderate (≤3/5 Likert scale). Reported research barriers across medical school, pediatrics residency, and pediatric cardiology training were shown
below.



Conclusions: This interim nationwide analysis reveals significant deficiencies in structured research education, mentorship, and institutional support across pediatric cardiology training. Despite rising academic expectations at advanced training levels, persistent systemic barriers constrain research productivity. Implementing standardized research curricula, protected research time, and formal mentorship programs is essential. Data collection is ongoing, and final analyses will include a larger national cohort.



O-144 / #370

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

FROM NETFLIX TO THE BEDSIDE: TRANSFORMING PAEDIATRIC CARDIOVASCULAR CRITICAL CARE TRAINING FOR TODAY'S TRAINEES

David Ferri Rufete[1], María Clara Escobar Díaz[1], África Pertierra Cortada[2], Sergi César Díaz[1], María Núñez Talavera[3], Antonio Martínez Monseny[4], Paola Hernández Martínez[5], Elisabeth Esteban[6], Jose María Quintilla Martínez[7], Joan Sánchez De Toledo[1]
[1]Sant Joan de Deu Children's Hospital, Pediatric Cardiology, Barcelona, Spain, [2]Sant Joan de Deu Children's Hospital, Neonatal Intensive Care Unit, Barcelona, Spain, [3]Germans Trias i Pujol Hospital, Intensive Care, Badalona, Spain, [4]Sant Joan de Deu Children's Hospital, Medical Genetics, Barcelona, Spain, [5]Sant Joan de Deu Children's Hospital, Teaching Area, Barcelona, Spain, [6]Sant Joan de Deu Children's Hospital, Paediatric Intensive Care Unit, Barcelona, Spain, [7]Sant Joan de Deu Children's Hospital, Clinical Simulation Unit, Barcelona, Spain

Background and Aim: Traditional training in Paediatric Cardiovascular Critical Care is increasingly misaligned with the learning styles, expectations, and cognitive habits of today's trainees. To bridge this gap, we designed *eKardio*, a six-week hybrid bootcamp that reimagines cardiovascular education through contemporary learning formats. The programme integrates a serialised, "Netflix-like" curriculum, CrossFit-inspired procedural drills, a clinical escape room, and high-fidelity simulation, each grounded in current evidence and bedside pathophysiology. We aimed to evaluate its impact on knowledge acquisition, self-confidence, and clinical behaviours among paediatric practitioners.
Methods: We conducted a prospective, longitudinal, quasi-experimental study involving 138 paediatricians and residents from Spanish hospitals, using paired pre–post assessments (January–July 2025). The main outcomes were changes in paediatric cardiovascular knowledge (0–100), clinical self-confidence (Likert 1–5), and self-reported behaviours (Likert 1–5). Learner engagement and satisfaction were also evaluated.
Results: Baseline readiness was low, highlighting a structural competence gap in knowledge (32.2±9.6), self-confidence (2.33±0.51) and behaviours (2.59±0.61), within critical areas of paediatric cardiovascular care. After the bootcamp, knowledge improved to 57.3±17.7 ($p<0.001$), self-confidence rose to 3.60±0.54 ($p<0.001$), and evidence-supported behaviours increased to 3.24±0.70 ($p<0.001$). Gains were sustained across key domains: functional echocardiography, arrhythmias, and integral cardiovascular management. Results remained consistent regardless of clinical role, prior experience,



age, sex or professional category. Increased self-confidence showed a moderate association with greater adoption of desirable behaviours (ρ=0.48; p<0.001). Digital engagement remained exceptionally high and rose slightly along the learning pathway (4.50 to 4.67; p=0.006), with small but significant correlations with both confidence and behaviour gains. Satisfaction clustered at the top of the scale (median 5/5).

Conclusions: (1) eKardio Bootcamp sharpens pathophysiological reasoning, builds clinical self-confidence, and moves practice toward quality-aligned paediatric cardiovascular care. (2) Creativity-driven educational models that leverage emotion and deliberate practice can close structural training gaps, reduce variability, and reshape bedside behaviour in critical settings. (3) This approach is highly scalable and holds potential for adaptation to other disciplines. When learning resonates emotionally, clinicians seem to feel braver, think sharper, and do better.



O-145 / #29

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

MORBIDITY AND PREDICTORS OF SERIOUS EVENTS IN CHILDREN AND ADOLESCENTS WITH REPAIRED TETRALOGY OF FALLOT: A SWEDISH NATIONWIDE STUDY

Misha Bhat[1,2], Marie Bartos[3,4], Kalliopi Kazamia[5,6], Mats Synnergren[3,4], Phan Kiet Tran[2,7]
[1]Skåne University Hospital, Lund University, Children's Heart Center, LUND, Sweden, [2]Lund University, Department Of Clinical Sciences, Lund, Sweden, [3]Sahlgrenska University Hospital, Paediatric Heart Center, Göteborg, Sweden, [4]Sahlgrenska Academy, University of Gothenburg, Institute Of Clinical Sciences, Göteborg, Sweden, [5]Karolinska University Hospital,, Children's Heart Center Stockholm-uppsala, Solna, Sweden, [6]Karolinska Institutet, Department Of Women's And Children's Health, Stockholm, Sweden, [7]Skåne University Hospital, Dept Of Pediatric Cardiac Surgery, LUND, Sweden

Background and Aim: Repaired tetralogy of Fallot (rTOF) carries excellent survival but notable long-term morbidity. We aimed to describe burden and predictors of morbidity in children and adolescents following repair.
Methods: Patients with rTOF born 2000–2023 who underwent repair in Sweden, excluding complex variants, were included retrospectively. Demographic, anatomic and surgical data were collected. Outcomes included serious perioperative complications (NICOR-defined), length of stay (LOS), reinterventions including pulmonary valve replacement (PVR), severe arrhythmias, endocarditis, and composite serious cardiac events (intervention, arrhythmia, endocarditis, death). Descriptive statistics, Kaplan–Meier estimates, and regression analyses were used to evaluate morbidity and risk factors.
Results: Demographic and surgical characteristics of the 567 included patients are summarized in Table 1.



Table 1: Patient Characteristics

	Overall* (N=567)	ASR (N=257)	TAP (N=295)	Conduit (N=8)	p-value
Sex (Female), n (%)	241 (43)	110 (43%)	123 (42)	4 (50)	0.876
Prematurity (born <37 weeks), n (%)	97 (17)	42 (16)	52 (18)	1 (13)	0.871
Prenatal Diagnosis, n (%)	159 (28)	73 (28)	81 (27)	2 (25)	0.954
Either Genetic or Extracardiac Abnormalities, n (%)	199 (35)	75 (29)	116 (39)	4 (50)	0.030
Staged Repair n (%)	112 (20)	25 (10)	79 (29)	4 (50)	<0.001
Age at Total Repair in months, Median (Q1-Q3)	5.1 (3.6-6.9)	4.9 (3.6-6.5)	5.3 (3.7–7.2)	6.2 (2.1-11.0)	0.3431
Weight at Total Repair in kilograms, Mean (SD)	6.5 (1.7)	6.4 (1.7)	6.5 (1.7)	6.0 (1.9)	0.956
Follow-Up Length in years, Median (Q1-Q3)	12.4 (7.5-17.8)	12.2 (6.4-18.2)	12.8 (8.5-17.5)	10.9 (6.0-13.8)	0.3549
Moderate RVOTO after repair** n (%)	53 (9.7)	28 (11.2)	24 (8.3)	0 (0)	0.348
PV Z-score at repair Mean (SD)	-2.4 (1.4)	-1.4 (0.92)	-3.4 (1.1)	-2.8 (1.7)	0.004
Rate of reintervention 10 years after repair (95% CI)	23% (19-27%)	15% (11-21%)	27% (22-33%)	69% (36-95%)	0.0466
Rate of PVR 10 years after repair (95% CI)	12% (9.6-16%)	2.9% (1.3-6.3%)	19% (14-24%)	58% (25-93%)	<0.0001

ASR = annulus sparing repair; TAP = trans-annular patch ; RVOTO = right ventricular outflow tract obstruction; PVR = pulmonary valve replacement;

Categorical variables were compared using chi2. Continuous variables were analyzed using Kruskall-Wallis and ANOVA respectively. For rates of reintervention and PVR, log rank test was used.

Results are presented as mean (SD) for normally or nearly normally distributed data and median [Q1-Q3] (the range between the 25th percentile [Q1] and the 75th percentile [Q3]). For rates of reintervention and PVR, results are presented as % (95% CI)

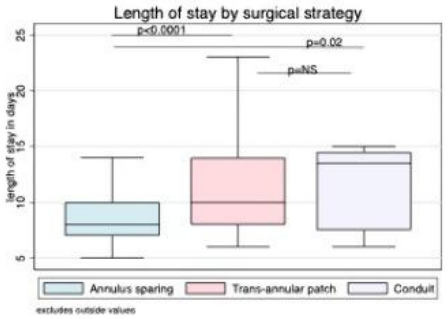
*Numbers of surgical patients are fewer because of preoperative deaths.

** The percentage (%) is estimated as n/N x100, where N is the number of patients with known echo data (N=548). Moderate RVOTO defined are peak gradient >= 40 mmHg or mean gradient >=30 mmHg.

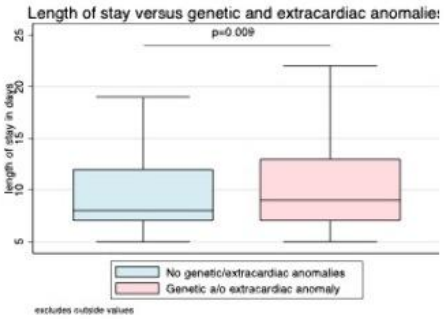
Median LOS was 9 days (IQR 7–12), shortest after annulus-sparing repair (ASR) at 8 days, versus 10 days after trans-annular patch (TAP) and 13.5 days after conduit repair (p=0.0001, Figure 1). In multivariable regression, LOS was longer in patients with extracardiac/genetic abnormalities (p=0.026), serious perioperative complications (p<0.001), and TAP repair

(p=0.001).

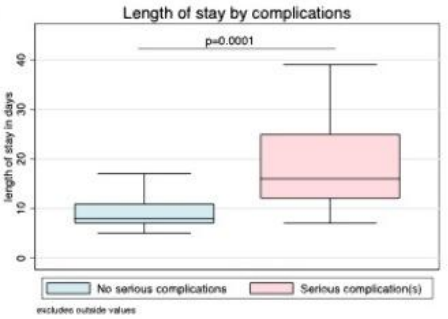
Figure1. Length of stay versus risk parameters



Box plot illustrating length of stay versus type of primary repair. Median length of stay was 8 days (IQR 7-10) with annulus sparing repair (ASR) versus 10 days (IQR 8-14) with trans-annular patch (TAP) and 13.5 days (7.5-14.5) with conduit repair. Kruskal Wallis p= 0.0001. P-values are indicated in figure.



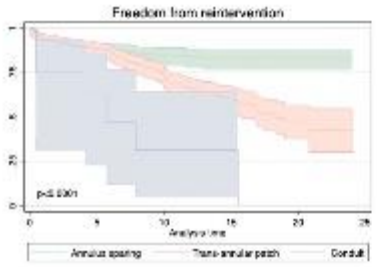
Box plot illustrating length of stay versus presence of genetic and/or extracardiac anomalies. Median length of stay was 8 days (IQR 7-12) if no abnormality vs 9 days (IQR 7-13) if there genetic and/or extracardiac anomalies. Kruskal Wallis used to compare groups. P-values are indicated in figure.



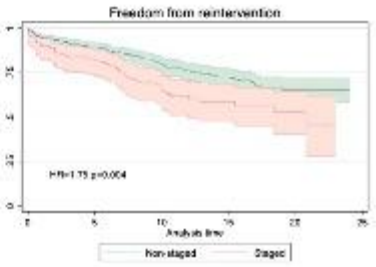
Box plot illustrating length of stay versus severe perioperative complication(s). Median LOS was 8 days (7-11) if no perioperative complication versus 16 days (12-25) if severe perioperative complication(s) were present. Kruskal Wallis used to compare groups. P-values are indicated in figure.

Serious perioperative complications occurred in 10.6% and were associated with repair type (TAP OR=2.1, p=0.005; conduit OR=6, p=0.02 versus ASR). Reintervention rates were 23%, 30% and 37% at 10, 15 and 20 years. Rates were higher in conduit (HR=2.4, 95% CI 1.6-3.5, p<0.001) and TAP (HR=8.9, 95% CI 3.7-21.2, p<0.001) and after staged repair (HR=1.7, 95% CI 1.2-2.5, p=0.005, Figure 2). Residual ≥moderate pulmonary stenosis was associated with increased reintervention at 5 years

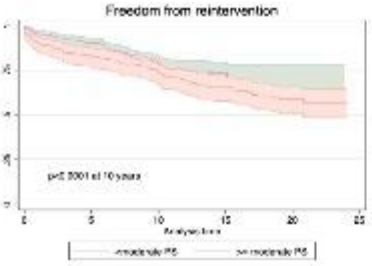
Figure 2. Freedom from complications



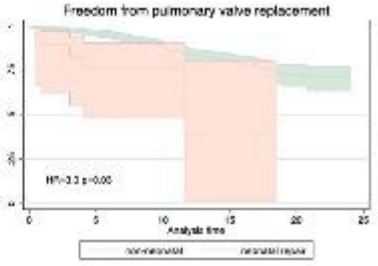
Kaplan-Meier curve illustrating freedom from reintervention depending on surgical strategy at the time of primary repair. Cox proportional hazards model: Annulus sparing repair vs trans-annular patch (HR 2.4 CI 1.6-3.5, p<0.001), Annulus sparing repair vs conduit (HR 8.7 CI 3.7-21.2, p<0.001).



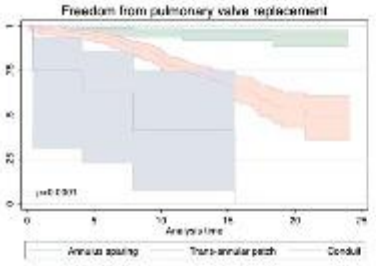
Kaplan-Meier curve illustrating freedom from reintervention in patients undergoing staged vs non-staged approach. Hazard ratio calculated using Cox proportional hazards model.



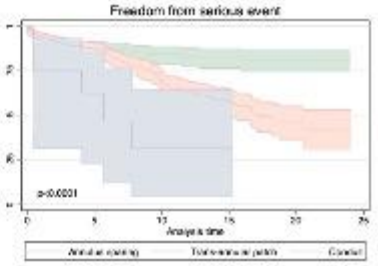
Kaplan-Meier curve illustrating freedom from reintervention vs >=moderate residual pulmonary stenosis after surgery (Peak gradient >=40 mmHg or mean gradient >=30 mmHg.
P-value at 10 years calculated using log-rank.



Kaplan-Meier curve pulmonary valve replacement vs neonatal vs non-neonatal repair. Hazard ratio calculated using Cox proportional hazards model.



Kaplan-Meier curve illustrating freedom from pulmonary valve replacement depending on surgical strategy at the time of primary repair.
Cox proportional hazards model: Annulus sparing repair vs trans-annular patch (HR 9.5 CI 4.6-19.7, p<0.001), Annulus sparing repair vs conduit (HR 51.9 CI 16.7-161.0, p<0.001).



Kaplan-Meier curve illustrating freedom from serious events depending on surgical strategy at the time of primary repair.
Cox proportional hazards model: Annulus sparing repair vs trans-annular patch (HR 2.4 CI 1.7-3.5, p<0.001), Annulus sparing repair vs conduit (HR 8.4 CI 3.5-20.0, p<0.001).

(p<0.0001). PVR occurred in 12%, 20% and 23% at 10, 15 and 20 years. Rates were lowest after ASR versus TAP (HR=9.5, 95% CI 4.5-19.7, p<0.0001) and conduit repair (HR=51.9, 95% CI 16.7-161, p<0.0001), and lower in non-neonatal repairs (HR=3.3, 95% CI 1.4-8.3, p=0.03). Endocarditis occurred in 1.1%; none in transcatheter valves. Arrhythmia-related interventions occurred in 9 (1.5%).



Serious events occurred in 25%, 32% and 39% at 10, 15 and 20 years. Rates were higher with TAP (HR=2.4, 95% CI 1.7-3.5, p<0.0001) and conduit (HR=8.4, 95% CI 3.5-20, p<0.0001) versus ASR.

Conclusions: Morbidity, particularly reintervention, is common in rTOF. Surgical strategy at initial repair is a major determinant of both short- and long-term outcomes.



O-146 / #553

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

ENTRUSTABLE PROFESSIONAL ACTIVITIES AS AN ASSESSMENT TOOL FOR A GLOBAL PEDIATRIC CARDIOLOGY CURRICULUM: RESULTS FROM AN INTERNATIONAL SURVEY – AN EMPOWERING HEARTS GLOBALLY INITIATIVE

Ruchika Karnik[1], Wyman Lai[2], Ruth Heying[3], Colin Mcmahon[4], Lowell Frank[5], Nana-Akyaa Yao[6], Babar Hasan[7], Shubhika Srivastava[8]
[1]Yale School of Medicine, Pediatric Cardiology, New Haven, United States of America, [2]Children's Hospital of Orange County, Orange, United States of America, [3]UZ Leuven, Leuven, Belgium, [4]Children's Health Ireland, Crumblin, Ireland, [5]Children's National Hospital, WASHINGTON DC, United States of America, [6]National Cardiothoracic Center, Accra, Ghana, [7]Sindh Institute Of Urology and Transplantation, KARACHI, Pakistan, [8]Nemours Childrens Health, Pediatric Cardiology, Wilmington, United States of America

Background and Aim: Entrustable professional activities (EPA) is a newer assessment tool in the competency-based medical education framework. EPAs are essential tasks a trainee needs to perform to provide safe , effective patient care. While the development and integration of EPAs in some developed countries such as the United States(US) and Canada is well-known, their generalized applicability, cultural and contextual alignment to the low- and middle-income countries (LMICs) needs assessment. Empowering Hearts Globally (EHG), a non-profit organization is working on building a scalable and sustainable resource of a global pediatric cardiology (PC) curriculum for LMICs. This study aims to understand the potential role of EPAs as assessment tool for such a curriculum by collecting valuable input from clinicians and educators across diverse settings globally.
Methods: This is a qualitative study of an anonymous online survey of PC providers on the advisory committee and membership of EHG across the world. Items explored their scope of practice, awareness of EPA methodology, perceived usefulness of EPA-based assessment, and the appropriateness of specific PC EPAs in the US to various global PC programs and institutions. Quantitative data were summarized using counts and percentages. Our key outcome was endorsement of each EPA ; we planned binomial 95% confidence intervals and one-sample exact binomial tests to assess whether endorsement exceeded a 50% “no clear majority” threshold.
Results: Thirty-eight respondents completed at least one survey item. Respondent characteristics are shown in Table 1. The endorsement for individual EPAs, (“Yes”) was



high, exceeding the 50% threshold for all.Percentages of Endorsement for the EPAs is shown in Table
2.

Table 1: Respondent Characteristics

Characteristic	Category	n / N	%
Scope of practice (N = 38)	General pediatric cardiology (± echo)	27/38	71
	Electrophysiology	2/38	5
	Interventional cardiology	5/38	13
	Cardiac intensive care	7/38	18
	Pediatric cardiac anesthesiology	1/28	3
	Other	4/38	11
Awareness of EPA methodology (N = 38)	Aware of EPA-based evaluation	24/38	63
	Not aware	14/38	37
Among EPA-aware respondents (N = 24)	Understand use for trainee assessment	22/24	92
	Support EPA-based evaluation for EHG curriculum	23/24	96
Geographical regions (N=32)	Africa	4/32	12
	North America (Canada, US)	15/32	47
	Latin America(Brazil, Argentina)	2/32	6
	Asia(Pakistan, Malaysia)	4/32	12
	Europe (Lithuania, Italy, Ireland, Greece, Switzerland)	5/32	16
	Australia	1/32	3
	Other	1/32	3



Table 2. Endorsement of EPAs as assessment tools for core activities (respondents with item-level data, N = 33)

Proposed EPA activity (Total respondents N=33)	Yes n (%)	May n (%)	No n (%)
Acquire imaging skills required for all aspects of pediatric cardiology care	30 (91)	2 (6)	1(3)
Acquire cath/hemodynamic knowledge (indications, complications, interpretation, application to care)	26 (79)	6(18)	1(3)
Diagnose and manage arrhythmias and conduction abnormalities	27 (82)	4(12)	2 (6)
Diagnose, initially manage, and refer advanced/end-stage HF and/or pulmonary hypertension	21 (64)	8(24)	4(12)
Diagnose and manage congenital/acquired cardiac problems (inpatient/outpatient) including indications for further testing	28 (85)	4 (12)	1(3)
Diagnose and manage acute congenital/acquired cardiac problems requiring intensive care	27 (82)	5(15)	1(3)
Lead interprofessional teams to provide collaborative, family-centred care	24 (73)	7(21)	2(6)
Apply quality-assurance principles in patient care and relate them to patient outcomes	24 (73)	7(21)	2(6)

Additional domains to develop EPAs included healthcare economics and cost-effective care in resource-limited environments; research and quality-improvement methods; simulation and crisis resource management; cross-sectional imaging; local infectious and systemic diseases with cardiac sequelae; palliative care; emergencies; patient-centred



and culturally sensitive care; professionalism.

Conclusions: In this initial international sample, awareness of EPA methodology remains moderate, but agreement for using EPAs to assess a global PC curriculum is high. Respondents emphasize LMIC-relevant domains, tailored to regional needs that should be incorporated into future EPA definitions, faculty-development strategies, and pilots of EPA-based assessment across diverse global training sites.



O-147 / #550

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

VIRTUAL REALITY AS AN EDUCATIONAL AID FOR PEDIATRIC CARDIOLOGY TRAINEES IN DIAGNOSING COMPLEX CHD LESIONS

Leonard Grossmann[1], Francesco Bertelli[2], Hannah Seatle[2], Brandon Peel[2], Shi-Joon Yoo[2], Israel Valverde[1,2], Conall Morgan[1]
[1]SickKids, Division Of Cardiology, Toronto, Canada, [2]SickKids, Department Of Diagnostic Imaging, Toronto, Canada

Background and Aim: A deep understanding of congenital heart disease (CHD) anatomy is critical in the training of pediatric cardiologists. Traditional learning focuses on 2D echocardiography and pathological specimens which have inherent limitations when trying to understand complex spatial relationships. Recent advances in virtual reality (VR) offer promising solutions to these problems. To evaluate the utility of VR when used in conjunction with 2D echo to improve anatomical understanding of complex CHD in pediatric cardiology trainees and to establish the user experience with VR.
Methods: We prospectively enrolled 16 pediatric cardiology trainees at SickKids, Toronto into a non-randomized cross-over study. 3 complex CHD cases were selected that had both echo and a 3D model that was derived from patient specific CT/MRI data with incorporated graphically designed valves; (1) DORV VSD with anterior aorta; (2) DORV with subpulmonary VSD, coarctation and straddling mitral valve; (3) Heterotaxy with unbalanced AVSD, pulmonary atresia and infracardiac TAPVC. 3D models were viewed in VR using the Meta Quest 3 headset. Participants were scored in their diagnostic accuracy using echo images only vs echo with the addition of VR models. A likert scale from 1-5 (strongly disagree to strongly agree) was used to assess participants' experience using VR.
Results: In 48 paired assessments, there was a significant improvement in the overall correct diagnosis in all 3 cases with the addition of VR [72% (n=35) vs 85% (n=41), p=0.03]. There were no instances where the addition of VR led to a reduction in diagnostic accuracy. In case 1, there was an improvement in the correct diagnosis from 81% (n=13) to 94% (n=15), case 2 there was no change and in case 3 there was an improvement from 63% (n=10) to 88% (n=14). 100% of participants strongly agreed or agreed that VR improved their understanding of CHD, improved their spatial understanding of anatomy and should be implemented into regular anatomy teaching sessions.
Conclusions: VR improves the diagnostic capabilities of pediatric cardiology trainees



when used as an adjunct to conventional 2D echocardiography. Trainees universally enjoyed the experience of VR.



O-148 / #52

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

ABERRANT SUBCLAVIAN ARTERY IN INTERRUPTED AORTIC ARCH WITH SEVERE LEFT VENTRICULAR OUTFLOW TRACT OBSTRUCTION: RANDOM OCCURRENCE OR PURPOSEFUL ADAPTATION DURING EMBRYONIC DEVELOPMENT?

Takeshi Tsuda[1], Lazaros Kochilas[2]
[1]Nemours Children's Hospital Delaware, Nemours Cardiac Center, Wilmington, United States of America, [2]Emory University, Pediatric Cardiology, Atlanta, United States of America

Background and Aim: Aberrant subclavian artery (ASCA) is frequently observed in interrupted aortic arch (IAA) with severe left ventricular outflow tract obstruction (LVOTO). The developmental significance of ASCA in IAA remains poorly understood.
Methods: Patients with IAA during infancy were examined from 1982 to 2003 in Pediatric Cardiac Care Consortium Registry database. Subtypes of IAA (A, B, or C), grade of LVOTO, and DiGeorge syndrome (DGS) were studied in line with the presence of ASCA.
Results: In 391 patients with IAA, type A 107 (27.4%), B 278 (71.1%), and C 6 (1.5%) were identified: A2 and B2 indicate those with ASCA whereas A1 and B1 represent those without. The incidence of ASCA was noted in 8.4%, 34.9%, and 0% in type A, B, and C, respectively ($p < 0.00001$), suggesting ASCA is strongly associated with type B. The relative risk (RR) of having severe LVOTO amongst B2 vs. B1 was 1.44 (95% CI: 1.03-2.02, $p = 0.03$), indicating ASCA is strongly associated with severe LVOTO among all type B. DGS was diagnosed in 120 (30.7%) of all IAA, a majority being of type B (114 or 95%). Among DGS patients with IAA type B, the RR of severe LVOTO in B2 against B1 was 1.804 (95% CI: 1.10-2.95, $p = 0.019$), suggesting ASCA is strongly associated with severe LVOTO among DGS patients with IAA. Among patients with severe LVOTO, the odds ratio (OR) for ASCA after adjustment for the presence of DGS is 1.83 (95% CI: 1.023 - 3.26, $p = 0.042$), suggesting among patients with severe LVOTO, the risk of ASCA after the adjustment for the presence of DGS is statistically significant.
Conclusions: Occurrence of ASCA is highly associated with the severity of LVOTO in type B IAA. A significant risk of ASCA among those with severe LVOTO in IAA type B was also noted after adjustment for the presence of DGS. As LVOT formation occurs earlier than ASCA development, it is plausible that ASCA is induced as an additional source of cerebral blood flow in IAA type B with severe LVOTO, indicating a “brain-sparing” initiative as another possible determinant of cardiovascular morphogenesis.



O-149 / #294

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

MORPHOLOGICAL ANALYSIS OF 109 CASES OF DOUBLE-OUTLET VENTRICLES USING IMMERSIVE 3D VIRTUAL REALITY AND DIGITAL DISSECTION

Sakthi Saravanan, Harikrishnan Anilmaya, Sarin Xavier, Brijesh Kottayil, Raman Kumar, Mahesh Kappanayil
Amrita Institute of medical sciences, Pediatric Cardiology, Kochin, India

Background and Aim: Double outlet ventricles, including double outlet right, left, and both ventricles (DORV, DOLV, DOBV, respectively), are morphologically diverse and spatially complex forms of congenital heart disease (CHD).'Modifiers' help in understanding and categorization. However, traditional training (without morphological specimens) and conventional imaging often leave cognitive gaps in spatial comprehension. Immersive 3D Virtual Reality (3DVR) visualization provides powerful new opportunities for deeper morphological understanding of these complex lesions. We describe the morphological spectrum, modifiers, and determinants of 109 digital specimens of double outlet ventricles using 3DVR tools.
Methods: 3D modelling software (Vea Simulations) and VR hardware (Meta Quest, GPU) were used to visualize and analyse consecutive cases of complex DOVs that underwent CT/MRI scans for decision-making (2018–2025) at a tertiary care centre in South India with a dedicated cardiovascular VR lab. Critical anatomical determinants/modifiers included orientation of the outlet septum, great artery relationships, VSD type.Presence and extent of the muscular infundibulum, spatial relationship of the VSD to the annulus along the septal leaflet of the tricuspid valve,presence or absence of aortic or pulmonary outflow tract obstruction
Results: 109cases (82 prospective, 27 retrospective) were studied. 99 were characterized as DORV and 6 as DOBV,4 as DOLV. Among DORV,70% (69/99) were Simple (without major segmental/structural/rotational defects),while 33% had major defects like ventricular inversion, atrioventricular canal defects, and rotational/tilting abnormalities (e.g., crisscross and upstairs and downstairs ventricle hearts)(Table 1) Among Type 1 DORV: VSD was subpulmonary in 51% (50/99), subaortic in 41% (40/99),and doubly committed in 8% (8/99).The outlet septum (OS) was parallel to the interventricular septum (IVS) in 41% (41/99);75% (30/41) had the pulmonary artery (PA) wedged between OS and IVS, with pulmonary stenosis in 75% (22/30).OS was perpendicular to IVS in 35.8% (35/99); 12 had VSD committed to PA, 18 had VSD committed to aorta, and 5 doubly committed. In 23%,



OS was angulated to IVS (>45° in 15/99,<45° in 9/99).Complex DORV cases added morphological variables affecting surgical planning (Table 4).DOBV cases (6/99) featured a saddle-shaped, doubly committed VSD with perpendicularly OS.

Conclusions: 3DVR visualization and virtual dissections enabled deeper insights into morphological determinants, enhancing surgical planning precision.



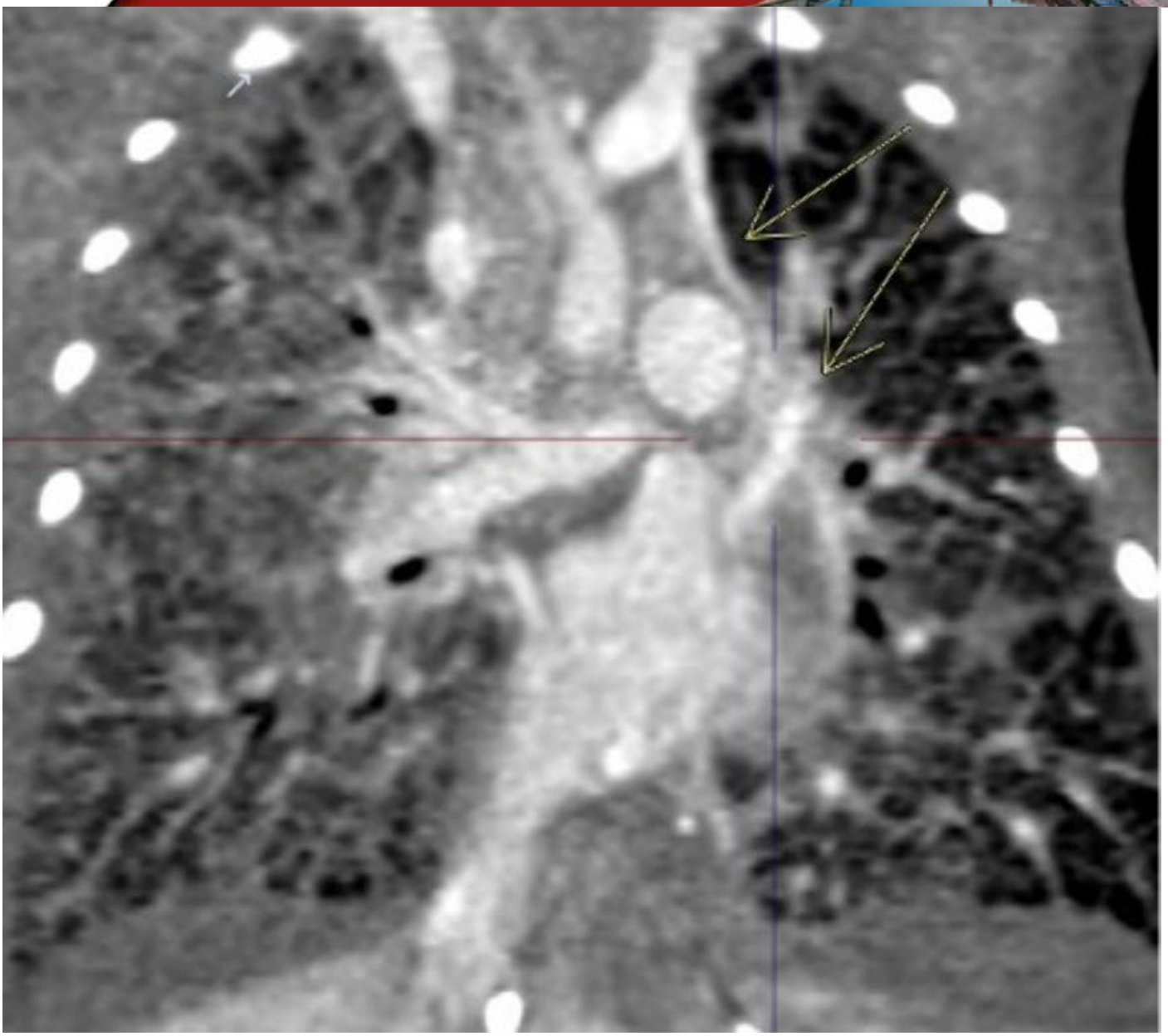
O-150 / #1339

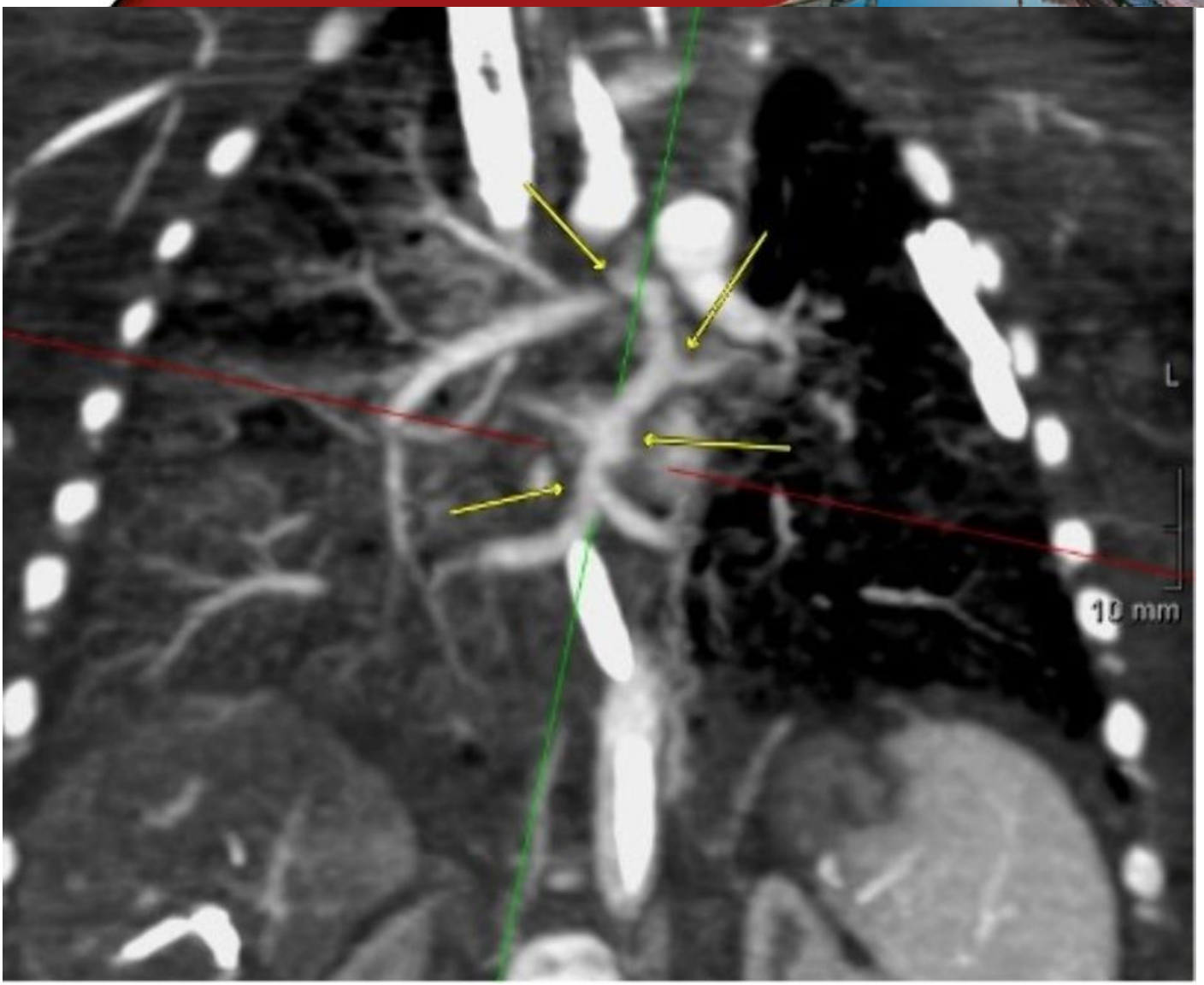
CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

THE MORPHOLOGICAL SPECTRUM OF FATAL TAPVD: A 25-YEAR SINGLE CENTRE EXPERIENCE

Saad Ahmad Malik[1], Esther Poole[2], Tristan Ramcharan[2], Milind Chaudhari[2]
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Background and Aim: Total anomalous pulmonary venous drainage (TAPVD) is generally amenable to surgical repair. A substrate of TAPVD however is considered inoperable due to diffuse, progressive and complex morphology which underlies poor surgical candidacy and fatal outcome. This study aimed to define the anatomical and clinical factors in a subgroup of inoperable TAPVD patients guiding multidisciplinary decision making for palliative care.
Methods: We retrospectively reviewed 181 patients diagnosed with TAPVD, either isolated or associated with other congenital cardiac anomalies, between 2000 and 2025, identified from a prospectively maintained database. A predefined subgroup analysis of inoperable patients was performed to characterize the spectrum of fatal TAPVD.
Results: Of 181 patients diagnosed with TAPVD, 19(10%) were considered inoperable. Subgroup analysis demonstrated that 9/19(47%) had obstructed pulmonary venous drainage at presentation. Supra-cardiac TAPVD was the most prevalent subtype (12/19), followed by infra-cardiac (3/19), with mixed and cardiac types observed in two patients each. 13/19(68%) had associated congenital cardiac anomalies, of whom 10 exhibited univentricular physiology including 5 cases with right atrial isomerism. Cardiac CT was performed in 8/19(42%), whereas diagnostic catheterization was undertaken in 2/19(11%) patients to delineate pulmonary venous anatomy. Six cases were confirmed to have pulmonary vein sclerosis on CT, representing the most severe form of obstructed TAPVD. Extracorporeal life support (ECLS) was initiated in two patients: one as bridge to cardiac CT in an unstable newborn, with CT confirming pulmonary vein sclerosis, and the other for septic shock secondary to necrotizing enterocolitis; care was withdrawn in both. All cases were reviewed by the regional multidisciplinary team, which unanimously recommended palliative care owing to anatomically unfavourable substrates.





Conclusions: In this 25-year cohort, 10% of TAPVD patients were inoperable due to complex anatomy and associated anomalies, most commonly pulmonary venous obstruction, with sclerosis being the most severe form. Cardiac CT was pivotal for accurate delineation of anatomy and early identification of high-risk patients, supporting its routine use. Multidisciplinary evaluation enabled timely, individualized palliative care. Management remains largely supportive, focusing on nutrition, infection prevention, diuretics, and pulmonary vasodilators. While catheter interventions offer temporary benefit, lung or heart–lung transplantation is definitive in selected cases but not widely available.



O-151 / #916

CARDIOVASCULAR MORPHOLOGY & EDUCATION / TRAINING & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 11:00 - 12:30

EMPOWERMENT OF ADOLESCENTS AND YOUNG ADULTS WITH CONGENITAL HEART DISEASE

Elettra Pomiato[1], Marina Perdibon[2], Elena Reffo[1], Roberta Biffanti[1], Alessia Cerutti[1], Francesco Prati[1], Martina Avesani[1], Biagio Castaldi[1], Giuseppina Sequi[2], Giovanni Di Salvo[1]
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Background and Aim: Health care transition (HCT) is the complex and structured process through which adolescents gradually assume responsibility for the management of their medical care. Suboptimal management of this delicate step can result in discontinuity of care and increased morbidity and mortality. The aim of the present study was to explore transition readiness in a cohort or adolescents and young adults with CHD and compare it with other chronic illness.
Methods: Longitudinal multicentric study. A self-report questionnaire was administered to adolescents and young adults with CHD or other chronic illness aged between 14 and 25 years attending our pediatric outpatient clinic. Patients were divided in 4 groups: CHD, rheumatologic disease (RD), gastroenterological disease (GD), and mixed group (MG). The questionnaire involved 47 items divided in 3 main areas: autonomy in disease management (A), knowledge of the disease and its treatment (B) and autonomy in daily life (C). Scores were analysed and compared between groups.
Results: 369 patients (44.1% males, mean age 17.3 ± 2,4 y.o.) were enrolled in the study; 80 (21.7%) CHD, 134 (36.3%) RD, 64 (17.3%) GD, 91 (24.7%) MG. Females reached significantly higher scores compared to males in each section. In (B), a weak linear correlation was observed between disease knowledge and age ($r = 0.141$, $p = 0.007$) and age at diagnosis ($r = 0.242$, $p < 0.001$). In the same area, CHD Group had significantly lower score compared with other disease groups ($p = 0.001$). Results are summarised in Table 1.



Table 1

	Females	Males	p-value	CHD	RD	GD	MG	p-value
Autonomy in disease management (A)	1.99±0.92	1.78±0.88	**0.025**	1.67±0.33	1.72±0.50	1.61±0.28	1.69±0.40	ns
Knowledge of the disease and its treatment (B)	3.19±0.46	2.84±0.85	**<0.001**	2.7±0.94	3.06±0.76	3.07±0.72	3.27±0.78	**0.001**
Autonomy in daily life (C)	3.52±0.46	3.29±0.72	**<0.001**	3.44±0.72	3.50±0.53	3.35±0.56	3.34±0.60	**0.024**

Conclusions: Our study highlights a significant lack in disease awareness among young patients with CHD. The establishment of a dedicated multidisciplinary health care transition (HCT) service represents a clinical priority to enhance consistency and motivation in self-management, thereby preventing loss to follow-up and long-term disease-related complications.



O-152 / #909

NEURODEVELOPMENT AND PSYCHOSOCIAL CARE & PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE ABSTRACT SESSION
14-05-2026 16:30 - 18:00

USE OF EPOPROSTERENOL IN PERIOPERATIVE PERIOD IN PATIENTS WITH CONGENITAL HEART SURGERY

Samet Paksoy[1], Pelin Ayyildiz[1], Cenk Baykan[1], Ömer Faruk Dönek[1], Hacer Kamali[1], Sertaç Haydin[2], Alper Güzeltaş[1]
[1]University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Department Of Pediatric Cardiology, Istanbul, Turkey, [2]University of Health Sciences, Istanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Istanbul, Turkey, Department Of Pediatric Cardiac Surgery, ISTANBUL, Turkey

Background and Aim: To evaluate the effectiveness and safety of intravenous epoprostenol in pediatric patients with congenital heart disease who required prolonged pediatric cardiovascular intensive care unit (PCICU) stay due to postoperative heart failure, pulmonary hypertension, cyanosis. The primary objective was to assess the impact of epoprosterenol dosage and time to target dose, on PCICU discharge. The secondary objective was to evaluate the tolerability of achieving the target dose within different time intervals.
Methods: This retrospective study included pediatric patients with congenital heart disease who received intravenous epoprostenol in the postoperative period in a PCICU(pediatric cardiac intensive care unit). Clinical parameters including arterial oxygen saturation, systemic blood pressure, vasoactive inotropic score (VIS), epoprostenol duration, peak dose, time to reach peak dose and pre- and post-treatment BNP levels were recorded. Also the performed operations and STAT scores were recorded. The primary outcome was PCICU discharge, while secondary outcomes included mortality and treatment tolerability.
Results: A total of 25 patients were analyzed; 60% were male, with a median age of 9 months (min-max: 0-132) and a mean body weight of 7.3 ± 4.6 kg(min-max: 3-24) at treatment initiation. The median target dose of epoprostenol was 20 ng/kg/min (min–max: 6–45 ng/kg/min). Detailed data are presented in Table 1. When patients were analysed ın subgroups according to tıme to peak dosage, ones who reached the target dosage of 15–25 ng/kg/min within 24–60 hours demonstrated the highest PCICU discharge rate (80%). Discharge occurred in 73% of patients who reached the target dose within <24 hours, whereas delayed escalation beyond 60 hours was associated with prolonged PCICU stay



and increased mortality. Longer time to target dose correlated with higher exitus rates. Epoprostenol therapy was generally well tolerated, and no major drug-related adverse events were observed. (Table 1).

Table 1. Comparison of Clinical Variables Between Exitus and Discharged Patients

Variable	Exitus (n=6)	Discharged (n=19)	p-value
Body weight (kg)	6.56 ± 3.7	8.86 ± 5.9	**0.18**
Age at initiation (months)	15.9 ± 18.6	26.7 ± 38.2	**0.79**
Epoprostenol duration (days)	10.3 ± 6.1	9.5 ± 5.4	**0.59**
Peak dose (ng/kg/min)	27.0 ± 9.1	19.0 ± 10.7	**0.083**
Days to peak dose	2.67 ± 1.2	2.93 ± 3.4	**0.35**
VIS at initiation (VIS_0)	18.1 ± 17.9	16.9 ± 18.5	**0.88**
VIS after titration (VIS_1)	19.1 ± 19.8	16.8 ± 15.4	**0.98**
Baseline BNP (pg/mL)	9,655 ± 7,214	6,535 ± 8,940	**0.23**
Post-epoprostenol BNP (pg/mL)	5,120 ± 4,620	7,735 ± 10,980	**0.79**
PCICU length of stay (days)	24.9 ± 13.2	43.8 ± 53.0	**0.33**
Total hospital stay (days)	33.9 ± 25.9	57.9 ± 58.5	**0.20**

Conclusions: In pediatric patients with congenital heart disease requiring postoperative PCICU care, intravenous epoprostenol therapy appears to be safe and feasible when appropriately titrated. Reaching a target dose of 15–25 ng/kg/min within 24–60 hours may be associated with improved discharge rates from the PCICU without compromising tolerability.



O-153 / #543

PAEDIATRIC CARDIOVASCULAR INTENSIVE CARE & GENERAL CARDIOLOGY ABSTRACT SESSION
16-05-2026 09:00 - 10:30

THE CHALLENGE OF LATE REPAIR OF TETRALOGY OF FALLOT IN CHILDREN

Beatriz Picazo-Angelin[1], Lourdes Conejo-Muñoz[1], Gonzalo Cortazar-Rocandio[1], Almudena Ortiz-Garrido[1], Francisco Vera-Puente[2]
[1]Regional University Hospital Malaga, Paediatric Cardiology, Malaga, Spain, [2]Regional University Hospital Malaga, Paediatric Cardiovascular Surgery, Malaga, Spain

Background and Aim: Late diagnosis and lack of surgical facilities in low and middle income countries (LMICs) may delay surgical treatment of children with tetralogy of Fallot (ToF). Some of these patients undergo surgical repair with the support of NGOs, either in their country of origin through international missions, or by being transferred to other countries to receive treatment. The aim of this study is to describe a single-centre retrospective case series of late repair of ToF in this setting.
Methods: All cases of ToF in patients younger than 14 years, supported by non-profit organizations, who underwent repair of ToF between 2016-2025 at our institution, were included.
Results: A total of 22 patients were treated, with a mortality of 0%. Their ages ranged between 7 months and 12 years of age (median 3 yr). They are divided into two groups: 19 stable patients (SaO2 75-90%) and 3 critically cyanotic patients (SaO2 <50%). In the first group (19/22) 11 patients (57%) received a transannular patch, 2 (10%) a Hancock conduit, 7 (36%) did not require a transannular patch. The hospital stay ranged from 7 to 16 days with a mean of 8.7 days. In the second group (3/22) the first patient was 1.8 y, SaO2 45%, with severe infundibular stenosis and pulmonary valve hypoplasia. After an emergency total correction, he developed low cardiac output with a severely restrictive LV, needing ECMO support and reoperation: opening of a VSD and pulmonary banding. At the age of 4.5 y, complete repair was achieved. The second critically cyanotic patient (2 years of age, SaO2 50%) underwent an emergency BT shunt and was brought back at the age of 3 (SaO2 80%) for complete correction. The third patient was also 2 years old (SaO2 40%) and underwent emergency complete correction with a transannular patch.
Conclusions: ToF is frequently encountered in children brought by NGOs. The result of surgical repair can be excellent even after infancy, with low morbidity and mortality, although challenges arise such as the need of emergency procedures, RV dysfunction, restrictive LV, abundant collateral circulation, the effects of chronic cyanosis, and sometimes the need for a staged repair.



FLASH TALK ABSTRACTS



FT-001 / #381

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

COGNITIVE OUTCOME IN FONTAN PATIENTS FROM PRESCHOOL TO SCHOOL AGE: STABILITY AND PREDICTORS

Claudia Jessen[1], Katy Rinne[1], Ina Twelkemeyer[1], Inga Voges[1,2], Juliane Schulze-Nagel[1], Jens Scheewe[3], Tim Attmann[3], Anselm Uebing[1,2], Jan H. Hansen[1,2]
[1]University Hospital Schleswig-Holstein, Department Of Congenital Heart Disease And Pediatric Cardiology, Kiel, Germany, [2]DZHK (German Center for Cardiovascular Research), partner site Hamburg/Kiel/Lübeck, Kiel, Germany, [3]University Hospital Schleswig-Holstein, Department Of Cardiovascular Surgery, Kiel, Germany

Background and Aim: In the growing population of Fontan patients, long-term cognitive outcome and its modifiers are important. Late-childhood IQ strongly predicts academic achievement. This single-centre study aimed to identify factors that may limit optimal cognitive development of Fontan patients.
Methods: Single-ventricle patients born between 2004 and 2016 who underwent standardized neurocognitive testing with age-appropriate Wechsler intelligence scales after staged univentricular palliation were identified. Patients with serial assessments at preschool (4-6 years) and school age (8-16 years) were enrolled. Lack of cognitive improvement was defined as a decline of more than 7.5 IQ points between tests or a full-scale IQ (FSIQ) below 85 points at second assessment.
Results: Overall, 66 Fontan patients with serial neurocognitive assessment were identified (45 males, 21 females). Median age at Fontan completion was 2.7 (IQR 2.2-3.0) years. The first examination was performed at 4.8 (IQR 4.3-5.4) years, the second at 10.8 (IQR 9.4-14.0) years. Mean FSIQ was in the lower-normal range for both assessments (94.3 ±12.9 and 97.9 ±13.4), with a slight increase over time ($p<0.001$). Rank order of FSIQ changed, indicating limited individual stability. Cognitive performance did not improve in 13 patients. In these patients, duration of cardiopulmonary bypass for neonatal surgery and cumulative bypass time across all surgical stages were longer compared to the remainder (157 ±22 vs. 113 ±69 min, $p=0.029$; 396 ±32 vs. 342 ±83 min, $p=0.024$). Higher parental education (OR 4.8, $p=0.028$) and older age at the second test (OR 1.4, $p=0.012$) increased the likelihood of being placed in the highest-performing group at school age (FSIQ>100), whereas longer cumulative hospital length of stay reduced this likelihood (OR 0.96, $p=0.001$). FSIQ at school age was significantly lower in 12 patients with attention deficit hyperactivity



disorder (ADHD) concerns (84.2 ±14.9 vs. 101.0 ±11.2, p<0.001).

Conclusions: Neurocognitive outcomes in Fontan patients from preschool to school age remain within the normal range, but individual trajectories are dynamic. Lack of cognitive improvement between tests was not associated with the need for cardiopulmonary bypass surgery during the neonatal period, but with longer duration of support. The high ADHD prevalence may put school-aged Fontan patients at risk for impaired cognitive performance.



FT-002 / #219

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

THERAPY UTILIZATION IN CHILDREN WITH CONGENITAL HEART DISEASE: A RETROSPECTIVE STUDY AT THE CHILDREN'S HEART CENTER VIENNA

Anna Scholten, Sulaima Albinni, Maja Daurach, Christiane Pees, Elisabeth Seidl-Mlczoch
Pediatric Heart Center Vienna, Vienna, Austria

Background and Aim: Congenital heart defects (CHD) are the most common congenital anomaly worldwide, affecting approximately 9–10 per 1000 live births. Advances in diagnostics, surgery, and medical management have markedly improved survival, enabling systematic assessment of long-term neurocognitive and psychosocial outcomes. About half of children with complex CHD develop neurological impairments, including language, attention, learning, and motor deficits, as well as challenges in self-regulation and executive function. Neurodevelopment in CHD resembles that of preterm infants, but structured follow-up programs are still relatively recent. This study evaluates the proportion receiving neurodevelopmental assessments and subsequent therapies, identifying gaps in structured follow-up and intervention in children born with CHD at the department of Pediatric Cardiology at Vienna General Hospital.
Methods: We conducted a retrospective cohort study including 183 children between the age of 6 months and 18 years with congenital heart disease (CHD) treated at the Pediatric Heart Center Vienna between 2008 and 2025. All types of heart defects were included to compare therapy utilization across different subgroups. It was also recorded whether the children had undergone developmental neurological assessments. Heart defects were categorized as shunts, transposition of the great arteries (TGA), valve stenosis, Tetralogy of Fallot, left- or right-sided hypoplasia and complex defects, coarctation, and others (such as cardiomyopathy, right sided aortic arch,..). The therapies assessed included physiotherapy, speech therapy, psychotherapy, nutritional therapy, and occupational therapy.
Results: Overall, 48.1% of children received therapy, and 20.8% had undergone neurodevelopmental assessments. Among those who received therapy, 65.9% underwent physiotherapy, 39.8% speech therapy, 37.5% occupational therapy, 22.7% psychological therapy, and 12.5% nutritional therapy. Therapy utilization differed significantly by heart defect type: children with shunt lesions were more likely to receive therapy ($\chi^2 = 0.011$), whereas those with valve stenoses were less likely ($\chi^2 = 0.004$). No significant differences were observed for the other defect categories.
Conclusions: Despite improved survival, less than half of children with CHD receive



therapy and only one-fifth undergo neurodevelopmental assessments. Therapy utilization varies by heart defect type, highlighting under- and over-treatment in specific subgroups. These findings underscore the need for structured neurodevelopmental follow-up programs to ensure timely assessment and intervention for all children with CHD.



FT-003 / #810

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

FIVE – YEAR NEURODEVELOPMENT IN CHILDREN WITH CONGENITAL HEART DISEASE: INSIGHTS FROM A MULTIDISCIPLINARY PROGRAM IN SPAIN.

Alba Mendoza Jiménez[1], Marta Pérez[2], Emma Grau[3], Carin Walter[3], Alba Rivas Piorno[1], Joan Sánchez De Toledo[3], Marta Camprubí-Camprubí[1]
[1]Sant Joan de Déu Children´s Hospital, Neonatology, Esplugues de Llobregat, Spain, [2]Sant Joan de Déu Children´s Hospital, Psychology, Esplugues de Llobregat, Spain, [3]Sant Joan de Déu Children´s Hospital, Pediatric Cardiology, Esplugues de Llobregat, Spain

Background and Aim: Children with congenital heart disease (CHD), particularly those requiring surgery during the first year of life, are at increased risk of neurodevelopmental impairments across cognitive, motor, language, and socio-emotional domains,. Although substantial evidence supports the effectiveness of structured follow-up programs improving neurodevelopment outcome, such initiatives are not yet a priority in many healthcare systems. To address this need, Sant Joan de Déu Hospital launched a Neurodevelopmental Follow-up Program in 2019, integrating clinical care, research, and continuous family support. This study reports neurodevelopmental outcomes at 5 years of age among children enrolled in this program.
Methods: A structured, multidisciplinary protocol was implemented to nearly 400 children with CHD requiring corrective or palliative surgery within the first year of life. Neurodevelopment was systematically evaluated at 1, 2, 4, and 5 years using standardized tools (ASQ-3, Bayley-III, Vineland-II), and specifically the WPPSI-IV at 5 years to assess cognitive outcomes in greater depth. During the COVID-19 pandemic, telemedicine formats were introduced to ensure continuity, later becoming part of a hybrid model to facilitate follow – up among families living in other regions.
Results: At the 5-year assessment, overall cognitive scores were within the age-expected ranges. However, significant variability was observed in executive functioning: aproximatelly 50% of the patients demosntrated working-memoryperformance in the borderline to low-average range, and processing-speed weaknesses were common(20% low, 10% borderline, 5% very low). These patterns indicate early attentional vulnerabilities and potential later academic difficulties. Additionally, motor and/or language delays were indentified in roughly 30% of children, prompting referral to early-intervention or physiotherapy services.
Conclusions: This experience shows that a structured, multidisciplinary neurodevelopmental follow-up program for children with CHD is both feasible and



essential for the early detection of developmental vulnerabilities. The hybrid in-person and telematic model ensures equitable access and continuity of care. Sant Joan de Déu Hospital is currently one of only three centers in Spain with a structured neurodevelopmental program and the only one offering systematic follow-up up to 5 years of age.



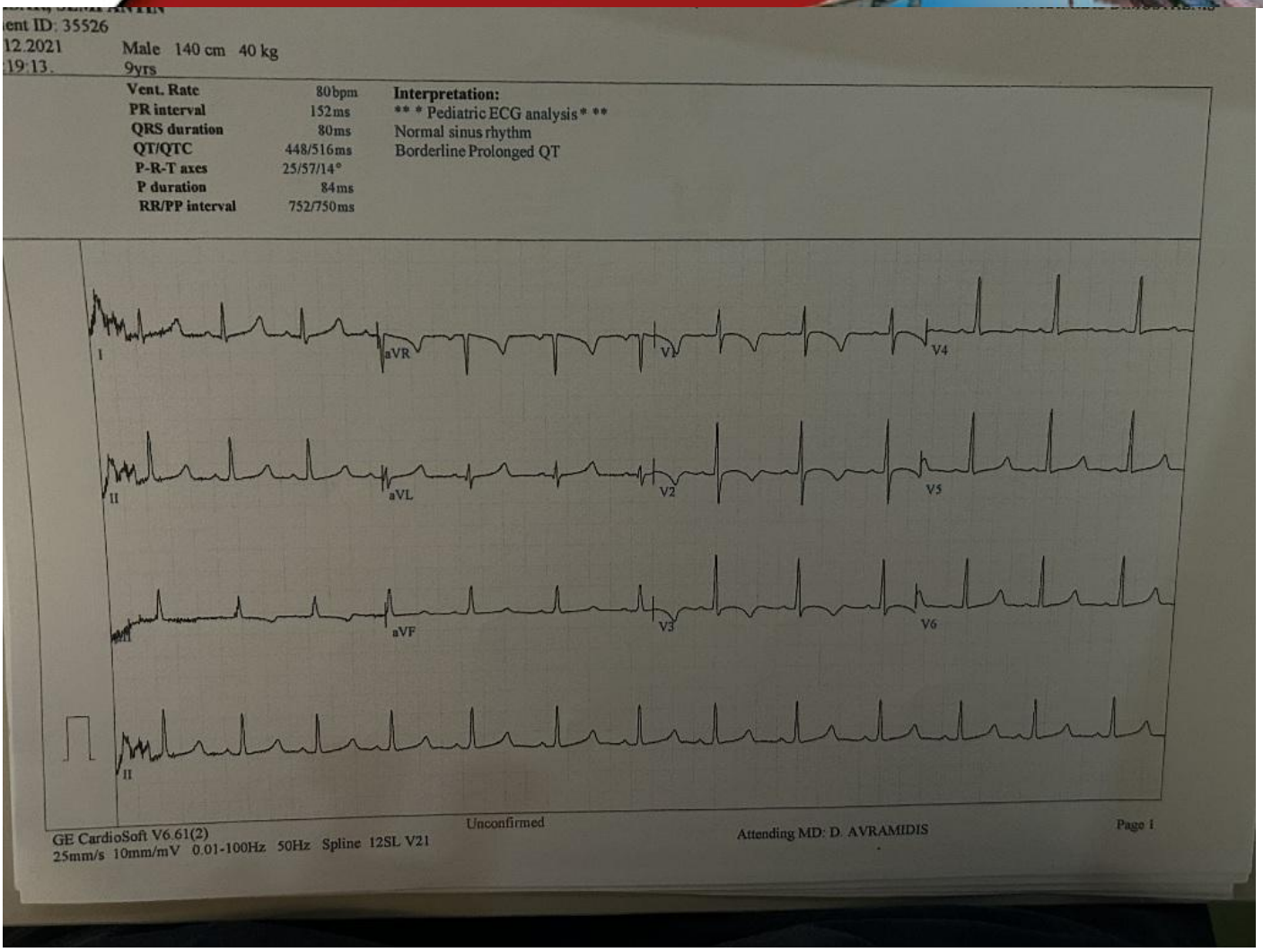
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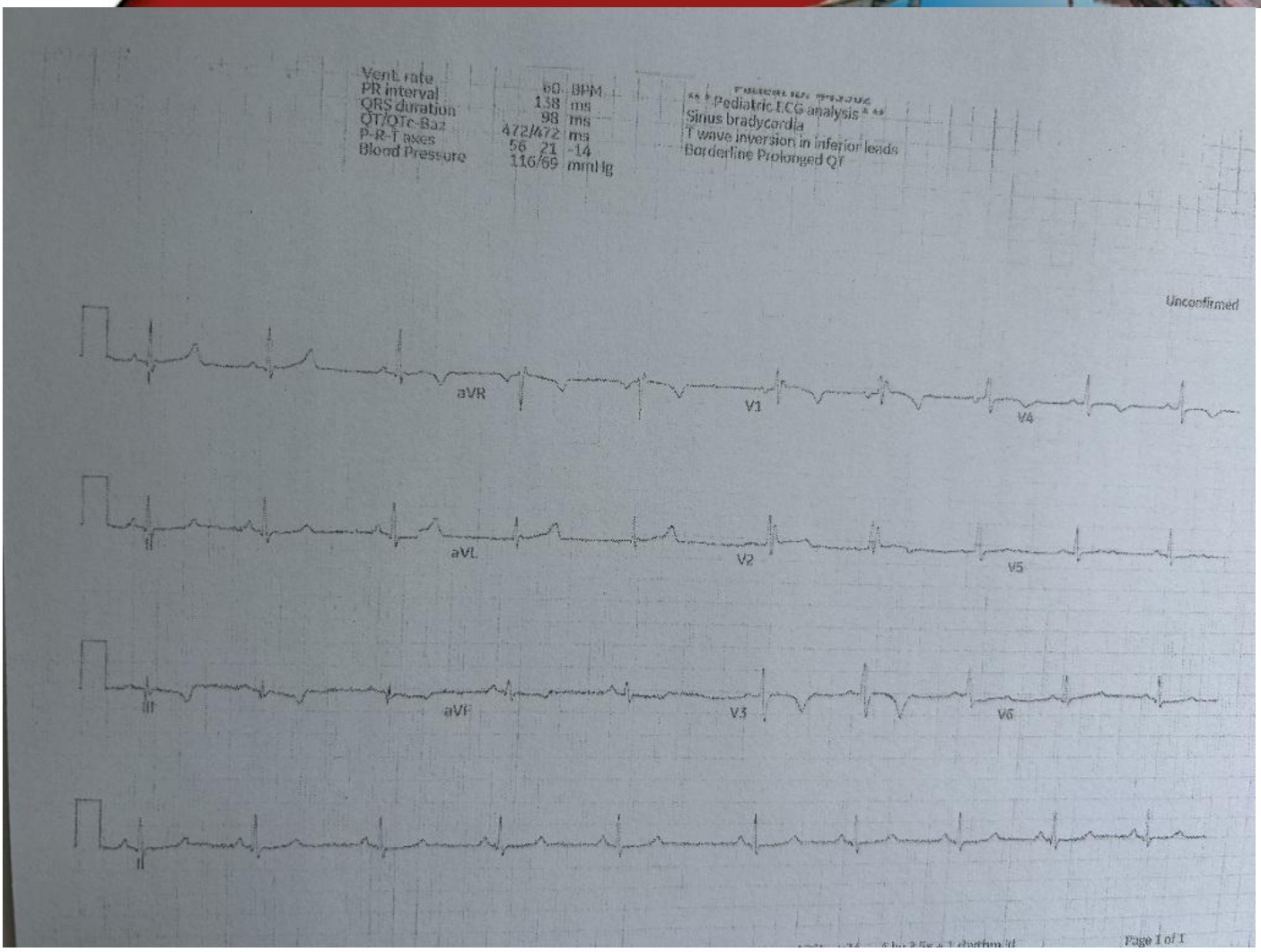
FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

MANAGEMENT OF PATIENTS WITH SCN5A MUTATION WITH POSSIBLE MIXED-PHENOTYPE

Vasiliki Tsolaki[1], Sofia Loukopoulou[1], Dimosthenis Avramidis[2], Panagiota Papachristou[1], Georgios Servos[1], Ioannis Papagiannis[3]
[1]"P. & A. Kyriakou" Children's Hospital, Pediatric Cardiology, Athens, Greece, [2]Mitera Hospital, Pediatric Cardiology, Athens, Greece, [3]Onasseio Hospital, Pediatric Cardiothoracic And Adult Congenital Heart Diseases, Athens, Greece

Background and Aim: Mutations in the SCN5A gene can cause various genetic arrhythmia syndromes, including Brugada syndrome (BrS), long QT type 3 (LQT3), progressive conduction system disease, multifocal ectopic Purkinje premature contraction syndrome and cardiomyopathy. The purpose of this study was to describe two patients with an SCN5A mutation that can cause a mixed-phenotype of BrS and LQT3.
Methods: of evaluation included clinical history, 12-lead ECG, Holter monitoring, exercise-testing and genetic
testing.


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12.2021
19:13.
Male 140 cm 40 kg
9yrs
Vent. Rate 80 bpm
PR interval 152 ms
QRS duration 80 ms
QT/QTC 448/516 ms
P-R-T axes 25/57/14°
P duration 84 ms
RR/PP interval 752/750 ms
Interpretation:
*** Pediatric ECG analysis ***
Normal sinus rhythm
Borderline Prolonged QT
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
GE CardioSoft V6.61(2)
25mm/s 10mm/mV 0.01-100Hz 50Hz Spline 12SL V21
Unconfirmed
Attending MD: D. AVRAMIDIS
Page 1



Results: Two adopted siblings (ages 6 and 9) had prolonged QTc (472 and 516 msec respectively) during pre-participation screening. The younger one was asymptomatic, but the older one had episodes of syncope and ventricular arrhythmias in a Holter monitor. In addition, he had attention-deficit disorder (ADHD). Genetic testing demonstrated a mutation in the SCN5A gene (p. Glu1784Lys) in both siblings, which has been associated with an overlap syndrome of BrS and LQT3. Both patients were treated with mexiletine. The younger received also propranolol, but the older one did not because of worsening of his ADHD.The older patient received an implantable cardiac defibrillator prophylactically, because of longer QTc, episodes of syncope and ventricular arrhythmias, in the context of ADHD and need for treatment with stimulant medications. No life-threatening arrhythmias have been detected so far during 3 years of follow-up. The ECG manifestation so far has been consistent only with LQT3, without ST segment elevation, although a drug challenge with procainamide or ajmaline has not been performed. Treatment with mexiletine has been reported to be beneficial in patients with LQT3 and has been well tolerated in patients with BrS, despite theoretical concerns with sodium channel blockers in BrS. In addition,



the penetrance of p.Glu1784Lys for spontaneous type 1 BrS pattern has been reported to be low (18%). However, as both patients are pre-adolescents, continued attention will be required for manifestations related to BrS which can occur later in life.

Conclusions: Patients with SCN5A mutations can present with various phenotypes and require individualized treatment.Genetic testing offers potential benefits in choosing appropriate medical therapy and follow-up.



FT-005 / #1376

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

R222Q MUTATION OF THE SCN5A GENE IN PEDIATRIC AGE: PHENOTYPE AND RESPONSE TO PHARMACOLOGICAL THERAPY

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Background and Aim: Introduction: R222Q mutation of SCN5A gene favors the development of extrasystoles and progression to dilated cardiomyopathy that respond better to antiarrhythmic therapy than to conventional heart failure therapies. **Study Aim:** To observe clinical characteristics and response to pharmacological therapy in pediatric patients carrying this mutation.
Methods: We observed patients referred to our Center for atrial and ventricular arrhythmias who were carriers of the R222Q variant.
Results: Four patients were observed, three males and one female, aged between 0 and 12 years at first evaluation. The first patient had a family history of sudden death, dilated cardiomyopathy and cardiac rhythm disorders. Arrhythmia was present in fetal life; then the patient developed first- and second-degree atrioventricular block, junctional rhythm, ventricular extrasystoles, and runs of non-sustained polymorphic ventricular tachycardia. Echocardiography was normal. Low-dose flecainide achieved satisfactory control of tachyarrhythmias. The second patient, with no family history, had been followed since the age of 8 years for polymorphic, repetitive ventricular extrasystoles, poorly responsive to therapy with propafenone, flecainide, nadolol and sotalol. Echocardiography and cardiac MRI showed minimal impairment of left ventricular contractile function. Ventricular extrasystoles did not disappear during exercise. At 15 years of age an implantable defibrillator was placed for primary prevention. The third patient had a family history of arrhythmias. At the age of 6 years, atrial tachycardia was detected, poorly responsive to flecainide but well controlled with sotalol; isolated ventricular extrasystoles later appeared. Echocardiography showed no abnormalities. The fourth patient, a cousin of the third, developed repetitive ventricular extrasystoles at the age of 12 years. Echocardiography was normal; Holter ECG also documented junctional rhythm. He responded satisfactorily to flecainide therapy.
Conclusions: Our study shows that R222Q mutation of the SCN5A gene is responsible for frequently malignant arrhythmias already in pediatric age and is associated with a variable phenotype, including variability in therapeutic response, possibly due to still unknown



factors modulating gene expressivity. Only one patient with pharmacologically resistant arrhythmia showed contractile dysfunction. Dilated cardiomyopathy in these patients may therefore be a consequence of a high arrhythmic burden and may present later if arrhythmia is untreated because unrecognized. Early diagnosis and genetic evaluation are essential.



FT-006 / #623

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

EXPLORING GENETIC VARIANTS ASSOCIATED WITH PULMONARY VALVE SIZE IN TETRALOGY OF FALLOT: A GENOME-WIDE ASSOCIATION STUDY

Noor Al Kharusi[1], Naser Elmi[2], Siamak Saber[2], Almundher Al Maawali[3], Nadia Al Hashmi[1], Ahmed Al Amri[1], Fahad Al Zadjali[4], Hamood Al Kindi[5]
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Background and Aim: The pulmonary valve annulus (PVA) size varies widely among patients with Tetralogy of Fallot (ToF), influencing the feasibility of valve-sparing repair. The genetic basis underlying this variability remains poorly understood. This study aimed to identify potential genetic variants associated with PVA Z-scores in non-syndromic ToF patients.
Methods: This single-centre study included non-syndromic ToF patients who underwent surgical repair between 2016 and 2020. Echocardiographic measurements of PVA diameter and corresponding Z-scores were recorded at initial diagnosis. Blood samples were collected for DNA storage and whole exome sequencing (WES) was performed using the Illumina NextSeq 2000 platform and Agilent SureSelect V6 kit. Variant calling was performed using the GenAP pipeline and BCFtools. Genome-wide association analysis (GWAS) was conducted with PLINK2. Gene expression data were evaluated using the GTEx Portal and Human Protein Atlas. Familial pedigrees were constructed for patients with a positive family history.
Results: Seventy-eight patients were included (53% male; median age at repair 9 months, IQR 7–12). The median PVA diameter at diagnosis was 6 mm (IQR 5.0–7.43), with a median Z-score of −1.99 (IQR −2.47 to −1.35).
Pathogenic variants previously linked to ToF were not observed in the cohort. However, WES identified **two pathogenic variants in LZTR1** (rs148031742 and rs189150283) in two unrelated non-syndromic ToF patients. Sanger sequencing of their relatives identified **two asymptomatic carriers** with normal cardiac evaluations.
GWAS identified two significant variants associated with lower PVA Z-scores: **rs2071071 (LRRC23)** and **rs116101674 (CERS3)** ($P < 5 \times 10^{-8}$). Expression analysis confirmed LRRC23 activity in cardiac tissue, particularly during foetal development, suggesting a possible role



in annular growth and remodelling.

Conclusions: This is the first GWAS exploring genetic determinants of PVA size in ToF using WES. The detection of pathogenic **LZTR1** variants in two patients highlights the potential relevance of RAS-MAPK pathway genes in non-syndromic ToF. The association between **cilia-related gene LRRC23** and PVA variability warrants further functional and translational studies to clarify its role in pulmonary valve development and potential impact on surgical decision-making.



FT-007 / #926

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

LINKING PLASMA-DERIVED EXTRACELLULAR VESICLE MICRORNAS TO CARDIAC REMODELING MECHANISMS IN PEDIATRIC CONGENITAL HEART DEFECTS

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Background and Aim: In congenital heart disease (CHD), chronic hemodynamic overload due to structural defects leads to progressive myocardial remodelling, a major determinant of long-term cardiac dysfunction. Identifying circulating biomarkers predictive of cardiac remodelling could improve CHD patient management and risk stratification. Extracellular vesicles (EVs) released from injured myocardium regulate angiogenesis and fibrosis and may protect against cardiac remodelling. We investigated plasma-derived EV microRNAs as biomarkers of overload-induced cardiac remodelling in CHD patients with distinct hemodynamic defects: atrial septal defect (ASD), ventricular septal defect (VSD), and tetralogy of Fallot (TOF).
Methods: Our initial study included a total of 15 CHD children (5 in each disease subgroup) admitted for corrective cardiac surgery. 15 non-CHD patients under 18 years of age were also included as controls. Plasma EV miRNAs were analyzed by RNA sequencing. Levels of NT-proBNP, troponin T and ST2 were measured in patient plasma samples as markers of myocardial stress and inflammation.
Results: Analysis of microRNAs in circulating EVs showed distinct expression profiles between CHD and non-CHD patients, with 59 upregulated and 46 downregulated miRNAs (FDR < 0.1). Pathway enrichment analysis revealed significant involvement of the Hippo signalling and unfolded protein response pathways. Subgroup comparisons identified differential miRNA expression between TOF and ASD, including seven miRNAs targeting these pathways, potentially reflecting distinct hemodynamic and cardiac alterations. Plasma troponin T levels were higher in TOF (mean±SD: 467.1±1466 pg/mL) and VSD patients (50.3±42.8 pg/mL) than in ASD patients (5.4±1.7 pg/mL)(p = 0.008 and 0.01,



respectively). NT-proBNP (VSD: 1956±2404 ng/mL; ASD: 145±48.2 ng/mL) and ST2 levels (VSD: 10.1±3.2 ng/mL; ASD: 6±2 ng/mL) were higher in VSD patients than in ASD patients ($p = 0.006$ and 0.003, respectively).

Conclusions: Plasma-derived EV miRNAs are differentially expressed in CHD. Interestingly, the identified miRNAs are involved in critical pathways that protect the heart from adverse fibrotic remodeling, and they could therefore play a role as diagnosis or prognosis biomarkers of cardiac alterations in CHD and other pediatric cardiomyopathies.



FT-008 / #596

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

ZNF516 IDENTIFIED AS A NOVEL GENETIC REGULATOR OF HEART DEVELOPMENT AND CONGENITAL HEART DISEASE

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Background and Aim: Congenital heart disease (CHD) has diverse and incompletely understood genetic causes. Germline homozygous loss of zinc finger protein 516 (Zfp516), the mouse ortholog of human zinc finger protein 516 (ZNF516), leads to unresolved neonatal lethality. We aimed to investigate the role of Zfp516 in embryonic cardiac development and assess the relevance of ZNF516 to human CHD.
Methods: Zfp516 knockout mice were generated and characterized and assessed for cardiac morphology, conduction system development, innervation, and embryonic heart rhythm using histology, immunofluorescence, High Resolution Episcopic Microscopy HREM and 3D modelling, and in vivo ultrasound. Bulk RNA-sequencing of embryos and hearts was performed to identify underlying pathways, and in silico motif analysis was used to predict ZNF516 binding sites. Human genomic datasets (>400,000 individuals across UKBB, gnomAD, PCGC, DDD, GeneDx, and Chromosome 18 cohorts) were analyzed for ZNF516 loss-of-function variants and CHD-associated phenotypes.
Results: Loss of *Zfp516* results in fully penetrant outflow tract malalignment and highly



penetrant valve, septal and venous pole anomalies, including hypoplasia of the sinoatrial node. Transcriptomic profiling revealed ectopic expression of neuronal gene programs, enrichment of neuronal processes and disrupted patterning of genes involved in left-right asymmetry, leading to impaired autonomic innervation, absent heart rate variability, sinoatrial node dysfunction and perinatal lethality. *In silico* analysis identified a high-affinity *ZNF516* binding peak near the Pitx2 transcription start site, supporting a direct regulatory role. Within the pediatric cardiac genomic consortium (PCGC), a probable loss-of-function variant was found in a patient with a hypoplastic right ventricle, dysplastic tricuspid valve, and pulmonary atresia. Additionally, our data identifies ZNF516 as the critical CHD gene in individuals with 18q. deletion.

Conclusions: These findings establish Zfp516/ZNF516 as essential regulators of cardiac development and identify ZNF516 as a novel human CHD gene.



FT-009 / #1342

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

MALE VIOLENCE REPROGRAMS CARDIAC CELL IDENTITY, DRIVING MALADAPTIVE REMODELING IN FEMALE MICE

Marie Anne Makoudjou[1], Elettra Pomiato[2], Aurora Gastaldello[1], Giuseppe Persico[1], Lucia Bernardele[1], Marco Giorgio[1], Tania Zaglia[1], Nazareno Paolocci[1], Giovanni Di Salvo[2], Jacopo Agrimi[1]
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Background and Aim: Women display heightened cardiovascular vulnerability to psychosocial stress, yet the effects of chronic stress on the female heart remain insufficiently investigated, particularly in the context of intimate partner violence. Moreover, preclinical studies of stress-induced cardiac remodeling have been conducted primarily in males. To address this gap, we employed the Reiterated Male-to-Female Violent Interaction (RMFVI) model to characterize structural, functional, and molecular cardiac responses to psychosocial stress in female mice.
Methods: Adult female mice underwent echocardiography before and after RMFVI exposure. Cardiac histology was assessed using HE and Masson's trichrome staining. LV transcriptomic profiling was performed.
Results: RMFVI exposure induced a consistent pattern of eccentric left ventricular remodeling. Echocardiography revealed a significant increase in left ventricular internal diameter in diastole ($p = 0.00005$) and systole ($p = 0.0058$), indicating progressive chamber dilation. Conversely, systolic function remained preserved, with no significant changes in ejection fraction. No compensatory hypertrophy was observed. Heart rate increased significantly following RMFVI exposure ($p = 0.0006$). Histological analysis unveiled increased interstitial fibrosis ($p = 0.013$) with LV chamber dilation and right ventricular wall hypertrophy. Transcriptomic analysis supported active extracellular matrix (ECM) remodeling, with a marked upregulation of tissue Inhibitor of metalloproteinases 1 and 3 (TIMP1 and TIMP3) and downregulation of matrix metalloproteases (MMP9, MMP14), and Adam19. The fibroblast activation markers, Ddr2 and Fn1, were also increased. While Col1a1 expression remained unchanged, the Col1a1/Col3a1 ratio increased, further supporting ECM remodeling. Disease and function analysis identified significant activation of infarct size ($z = 2.61$), myocardial infarction ($z = 2.31$), interstitial fibrosis ($z = 2.39$), and systolic pressure elevation ($z = 2.00$). Canonical pathway analysis revealed enrichment of



neutrophil extracellular trap signaling (z = 3.27), ferroptosis (z = 3.05), and MMP inhibition (z = 2.45). Upstream regulator analysis demonstrated coordinated activation of inflammatory, metabolic, circadian, and profibrotic transcriptional programs, alongside inhibition of regulators of contractile gene expression. Notably, neurotrophic signaling was altered, with downregulation of BDNF and NGF.

Conclusions: Chronic psychosocial stress induced by RMFVI elicits profound structural remodeling and genomic reprogramming of the female heart, characterized by chamber dilation, fibrotic remodeling, inflammatory and redox-associated signaling, and altered neuro-cardiac pathways.



FT-010 / #89

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

REFINED CLINICAL DIAGNOSIS IN LOEYS-DIETZ-SYNDROME: THE NEED FOR A DISTINCT NOSOLOGY.

Veronika Stark, Constanze Schulze Buschhoff, Jakob Olfe, Fridrike Stute, Caja Langkat, Johanna Kanitz, Rainer Kozlik-Feldmann, Thomas Mir
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Background and Aim: At present, the diagnosis of Loeys–Dietz syndrome (LDS) relies on genetic testing. Unlike Marfan syndrome (MFS), for which the revised Ghent criteria (RGC) serve as well-established clinical diagnostic guidelines, no comparable framework exists for evaluating LDS manifestations. Furthermore, genetic analyses often yield inconclusive findings, as variants of uncertain significance are commonly detected. Our data provide the foundation for developing a clinical nosology for LDS.
Methods: We screened 1006 children in our pediatric Marfan clinic and 30 patients were diagnosed with LDS (9.0±6.0 years, m:53%): 10/30 TGFBR1 (8.9±6.3y, m:50%), 16/30 TGFBR2 (9.0± 6.1y, m:50%), 4/30 TGFB2 (9.4±6.1y, m:75%). We established a set of criteria with proven LDS manifestations including RGC criteria (cardiovascular, skeletal, ophthalmological, neurological, gastroenterological, integumentary and others). We analysed the prevalence in the entire LDS group and in TGFBR1/TGFBR2 subgroups and compared them with those of MFS patients. TGFB2 was not subanalysed due to the small number of patients.
Results: The most common LDS manifestations not mentioned in the RGC are tricuspid valve prolapse (TVP, 80%), abnormal uvula (71%), high gothic palate (58%), transparent skin (55%). In TGFBR1 patients: TVP (80%), rheumatic disease/joint or bone pathology (60%), abnormal uvula (60%), gastroenterological abnormalities (57%). In TGFBR2 patients: abnormal uvula (89%), vascular elongation (82%), TVP (81%), transparent skin (64%). Regarding RGC, hypermobile joints were more frequent and lens dislocations less frequent in LDS ($p<0.05$). In TGFBR1, dilatation of the sinus valsalvae aortae, hernias and hypermobile joints were more frequent ($p<0.05$). Hypermobile joints, thoracic asymmetry, retrognathia and pectus carinatum were more common in TGFBR2 than in MFS ($p<0.05$).
Conclusions: Pediatric patients with LDS exhibit a broad range of extracardiac manifestations that are not captured by the RGC, including abnormal uvula, translucent skin, vascular tortuosity, rheumatologic features, skeletal anomalies, and gastrointestinal involvement. Because genetic diagnosis is not always readily accessible or feasible,



clinical classification must rely on phenotypic presentation. In addition, precise distinction between LDS subtypes — which may follow different clinical courses — is crucial for individualized management. This underscores the need for a comprehensive, clinically applicable set of diagnostic criteria that encompasses the full phenotypic spectrum of LDS.



FT-011 / #1264

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

CARDIAC INVOLVEMENT IN NOONAN SYNDROME: GENOTYPE-PHENOTYPE CORRELATIONS

Silvia Passantino, Francesca Girolami, Mattia Zampieri, Alessandra Milazzo, Attilio Zema, Luca Varnier, Stefano Stagi, Silvia Favilli, Iacopo Olivotto
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Background and Aim: Background: Noonan syndrome (NS) is a congenital genetic condition with an estimated incidence of 1 in 1,000-2,500 live births. Typical clinical features include cardiovascular involvement (CI), short stature, distinctive facial characteristics, chest anomalies, and varying degrees of cognitive impairment. NS is caused by pathogenic variants in genes involved in the RAS/MAPK signalling cascade, resulting in significant clinical and genetic variability. **Aims:** To evaluate the prevalence of specific genetic mutations and their correlation to cardiac defect in NS.
Methods: This retrospective observational study included 56 individuals with genetically confirmed NS. Collected data comprised genotype, cardiac abnormalities, and anthropometric measurements. Standard deviation (SD) scores were determined using Italian population growth references.
Results: Complete data were available for 56 NS patients (51,7% male). The most prevalent mutations were identified in PTPN11 (60%) and SOS1 (10%), with additional variants detected in LZTR1, RAF1, RIT1, CBL, KRAS, SOS2, BRAF, and MAP2K1. CI was present in 62% of the cohort, with PTPN11 and RIT1 mutations predominantly linked to pulmonary valve stenosis (PS), while RAF1 mutations were associated with hypertrophic cardiomyopathy (HCM). All patients with HCM carried a RAF1 mutation and exhibited an obstructive phenotype with a propensity for development of arrhythmias. Less frequent heart defects, such as atrial and ventricular septal defects and abnormalities of the mitral or aortic valves, showed no clear genotype-phenotype correlation. Short stature was present in 42% of patients; among affected patients, the average height was -2.84 SD. Growth hormone treatment was administered to 37% of patients, the significant majority of whom carried PTPN11 mutations (74%, $p<0.05$). In 28% of the cohort, both short stature and cardiac defects coexisted, though no significant genotype association was observed for this combination.
Conclusions: This study underscores the high frequency of cardiac defects and short stature in NS, with distinct genotype-phenotype correlation for cardiovascular abnormalities. These findings highlight the genetic and clinical variability of NS and



emphasize the necessity for larger studies to enhance our understanding of genotype-phenotype correlations.



FT-012 / #613

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

PSYCHOLOGICAL ASPECTS AND MENTAL HEALTH RISKS IN CHILDREN AND ADOLESCENTS WITH CONGENITAL HEART DEFECTS

L.Eliza Chiperi[1,2], Cristina Tecar[3,4]
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Background and Aim: Congenital heart defects (CHD) are the most common congenital anomalies, and survival into adulthood now exceeds 90% due to major advances in pediatric cardiology and surgery. Today, increasing attention has shifted from purely cardiac outcomes toward the psychological, psychiatric, and neurodevelopmental risks. Evidence shows that children and adolescents with CHD experience elevated rates of mental health difficulties. The aim of this systematic review was to synthesize current knowledge on psychological outcomes, psychiatric morbidity, cognitive and neurodevelopmental profiles, quality of life, and family-related factors in pediatric CHD, highlighting risk patterns and emerging interventions.
Methods: A systematic search across six databases, identified studies published between 2015 and 2025 which included children and adolescents aged 0–18 years with any form of CHD and reported on at least one psychological, psychiatric, cognitive, or neurodevelopmental outcome. Observational studies, interventional programs, and neuroimaging investigations were included. Two independent reviewers performed screening, full-text assessment, data extraction, and risk-of-bias evaluation following PRISMA 2020 guidelines. Sixty-one studies met inclusion criteria and were synthesized narratively due to methodological heterogeneity.
Results: Children with CHD exhibited significantly increased rates of ADHD, autism spectrum disorder, anxiety, depression, and medically related post-traumatic stress, particularly in cases of complex CHD, cyanosis, single-ventricle physiology, or early neonatal surgery. Emotional and behavioral dysregulation, including irritability and social difficulties, were consistently reported, with parental stress and overprotection acting as important mediators. Cognitive impairments affected attention, executive functions, working memory, and processing speed, supported by neuroimaging evidence of reduced hippocampal and caudate volumes and altered functional connectivity.



Neurodevelopmental delays were more frequent in children undergoing multiple surgeries or requiring intensive early-life interventions. Quality of life was reduced across physical, emotional, and social domains, strongly influenced by socioeconomic status and parental mental health. Emerging psychological and cognitive interventions showed preliminary benefit but remain limited in scope.

Conclusions: This review demonstrates a consistent pattern of psychological vulnerability in children and adolescents with CHD, driven by interactions between biological risk, medical complexity, and family context. Early psychological screening, integrated mental health services within cardiology programs, and targeted interventions are essential to improve long-term emotional, cognitive, and social outcomes for this high-risk population.



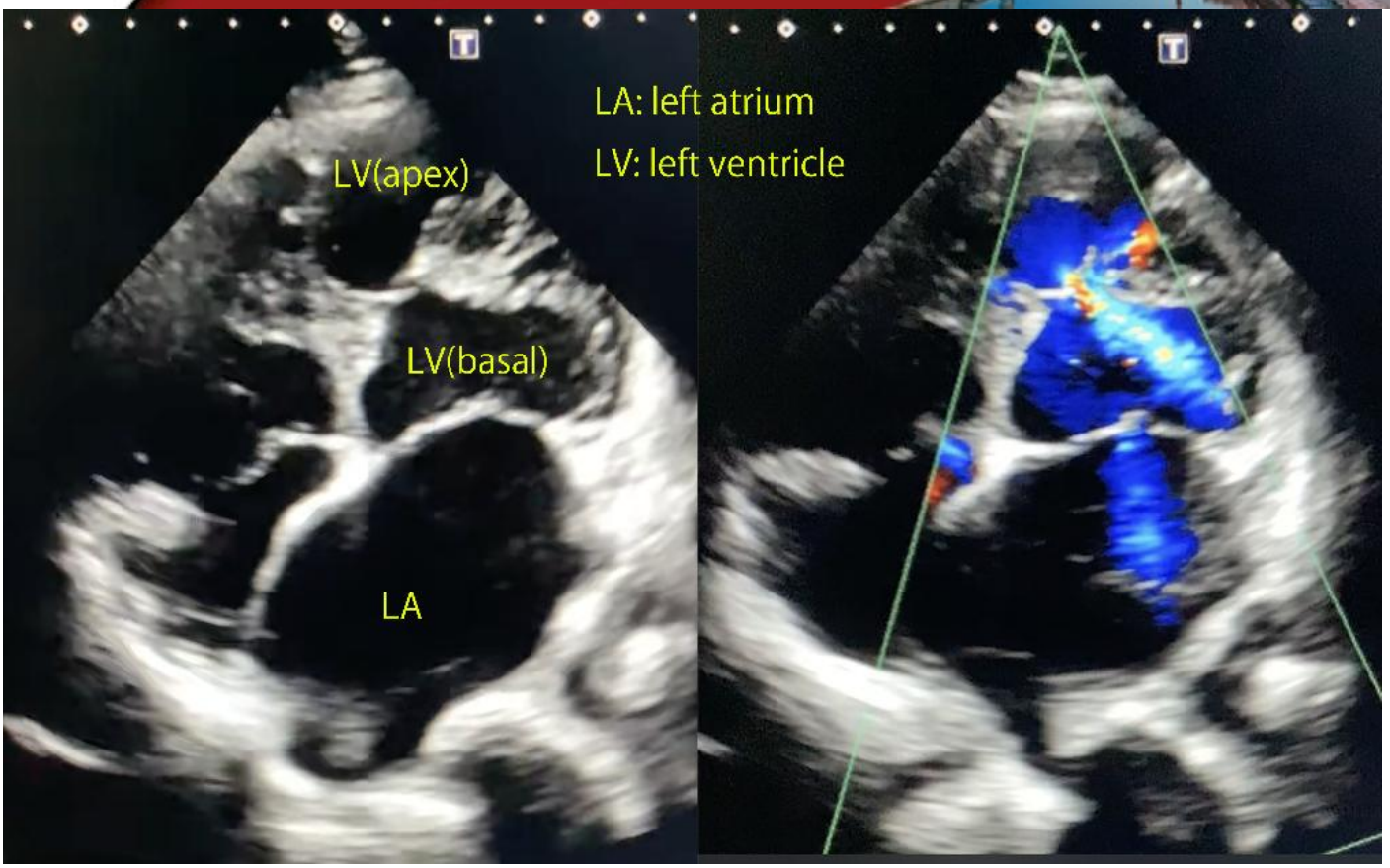
FT-013 / #108

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

DOUBLE-CHAMBERED LEFT VENTRICLE ASSOCIATED WITH LEFT VENTRICULAR NON-COMPACTION AND AN MYBPC3 VARIANT PRESENTING WITH RESTRICTIVE PHYSIOLOGY IN AN ADOLESCENT

Hirokuni Yamazawa, Atsuhito Takeda, Ayako Chida-Nagai, Daisuke Sasaki, Yuto Suzuki, Hiroshi Yamanaka
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Background and Aim: Double-chambered left ventricle (DCLV) is a rare congenital heart disease with generally favorable prognosis.
Methods: We report a 16-year-old female with DCLV, restrictive physiology, and left ventricular non-compaction (LVNC) in whom determining appropriate treatment was challenging.
Results: At 1 year of age, echocardiography demonstrated a mid-ventricular abnormal muscle bundle dividing the left ventricle into basal and apical chambers, together with prominent trabeculations consistent with LVNC. Genetic testing identified *MYBPC3* p.Ile1049Thr. According to ACMG criteria, this was classified as a variant of uncertain significance. However, the same variant was identified in her father, who is being followed in cardiology for dilated cardiomyopathy or dilated-phase hypertrophic cardiomyopathy, suggesting pathogenicity. Over the next decade she developed hemodynamics resembling restrictive cardiomyopathy; estimated right ventricular systolic pressure increased from 40 mmHg at 11 years to 65 mmHg at 14 years, consistent with backward pulmonary hypertension. Cardiac catheterization at 16 years showed a left ventricular end-diastolic pressure (LVEDp) of 24 mmHg in the basal chamber and 17 mmHg in the apical chamber, and a mean pulmonary artery pressure of 36 mmHg. Endomyocardial biopsy was performed. Optical microscopy revealed no fibrosis, granulomas, or myocardial disarray, and only mild myocyte hypertrophy. Shortly thereafter, she developed pulmonary congestion, which fortunately responded to diuretic therapy.



Conclusions: *MYBPC3* variants have been reported in LVNC and may attenuate contractile force during ventricular morphogenesis. Impaired force generation and disturbed mechano-dependent maturation of cardiomyocytes may allow coarse trabeculae to persist (LVNC). With growth, blood flow and wall stress may concentrate on selected trabeculae, which might then hypertrophy and fuse into an abnormal muscle bundle that subdivides the ventricle into basal and apical chambers, potentially giving rise to DCLV. The patient developed pulmonary congestion, so we initially considered surgical intervention. It remains unclear whether the variant in this case contributes to diastolic dysfunction; however, calculations indicate that even after resection of the abnormal muscle bundle, LVEDp would improve only to 19 mmHg. Furthermore, because the abnormal bundle includes papillary muscles, valve replacement would be required, raising concern for postoperative systolic dysfunction. Consequently, surgery was deferred, and the patient is receiving medical therapy while awaiting heart transplantation.



FT-014 / #607

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

ORAL HYGIENE BEHAVIOR AND KNOWLEDGE ON PREVENTION OF INFECTIVE ENDOCARDITIS IN TRANSITION-AGED ADOLESCENTS WITH CONGENITAL HEART DISEASE

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Background and Aim: To ensure appropriate cardiac follow-up care throughout the lifespan, adolescents and young adults (AYA) with congenital heart disease (CHD) are getting transferred from pediatric to adult care. Ideally, this transfer is embedded into a long-term transition process supporting AYA on their journey to adulthood and independence. For example, it includes gaining knowledge on common complications such as infective endocarditis (IE), a possibly life-threatening bacterial infection of the heart. Individual factors such as the presence of neurodevelopmental impairments may be associated with IE knowledge. We aim to describe the level on IE knowledge in transition-aged AYA with CHD.
Methods: In total, 90 CHD patients (*M*=17.9 years [SD=1.3]) completed the Leuven Knowledge Questionnaire–CHD and the Health Behavior Scale–CHD, to assess IE knowledge and dental hygiene behaviors, respectively. Clinical data was extracted from patient charts. Proportions were described in percentages and subgroups were compared using Chi-square tests.
Results: Overall, only 55.6% of AYA recognized the correct definition of IE and only 46.7% of those indicated its most characteristic symptom. The proportion of AYA knowing the definition of IE was lower in AYA with (mild) intellectual disability (25%, 2/8) than in those without intellectual disability (58.5%, 48/82, $p<0.001$). There was no difference between AYA with other types of neurodevelopmental impairments (e.g., ADHD) and those without any impairments ($p=1$). 79.2% of AYA were aware about the importance of good oral hygiene. Self-reported oral hygiene was mostly good with 83.7% of AYA indicating to brush



their teeth at least twice daily and 88.3% having visited the dentist within the past year. Only 11.8% of AYA indicated to use dental floss regularly.

Conclusions: Despite only half of AYA recognizing the definition of IE and its characteristic symptom, most still indicated to know about the importance of good oral hygiene. This was reflected in self-reported behaviors, with an exception in the use of dental floss. Psychoeducation on IE remains important, especially during transition, as patients become increasingly autonomous and manage their disease more independently. AYA with intellectual disabilities need special support and their understanding of IE should be fostered in suitable ways, to maximize their autonomy and health-competence.



FT-015 / #1270

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

CARDIOGAME: A FAMILY-ORIENTED GAME-BASED APPROACH TO HEALTH EDUCATION IN PEDIATRIC CONGENITAL HEART DISEASE

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Background and Aim: Congenital Heart Disease (CHD) is the most common congenital anomaly and remains a major cause of morbidity from early infancy into adulthood. Although advances in medical and surgical management have significantly improved survival, many patients face long-term complications. Adequate health knowledge among patients and their families is essential for the early recognition of clinical deterioration, adherence to treatment, and the adoption of healthy lifestyles. However, previous studies have shown that parents' and caregivers' health literacy regarding CHD is often insufficient.
Methods: Prospective, family-centered educational pre–post intervention study based on the development of a novel cooperative board game designed to improve cardiovascular health knowledge in families of children with CHD. Over a 12-week study period, participating families are instructed to play the game at home at least eight times. Health knowledge is assessed before and after the intervention using the Leuven Knowledge Questionnaire for Congenital Heart Disease, previously translated and psychometrically validated in Spanish by our group.
Results: Recruitment is ongoing and data collection is in progress. Preliminary baseline assessment revealed 18.6% of parents misidentified their child's CHD diagnosis, 83% were unable to identify all general heart failure symptoms, 66.6% were unaware of potential medication side effects or interactions, 60.6% were unfamiliar with endocarditis and 88.2% could not identify its symptoms. Additionally, 84.5% of parents were unaware of the heritability of CHD.
Conclusions: This project explores a novel, home-based, and family-oriented approach to health education in pediatric CHD. By integrating structured medical content into a cooperative game, the intervention aims to enhance health literacy, promote family empowerment, and support continuity of care beyond the hospital setting. If effective, this strategy could represent a practical, and scalable complement to standard clinical follow-up in pediatric congenital cardiology.



FT-016 / #633

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

GENETIC TESTING IN CONGENITAL HEART DISEASE: A 6-YEAR NEONATAL COHORT EXPLORING GENOTYPE–PHENOTYPE ASSOCIATIONS

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Background and Aim: Congenital heart disease (CHD) is strongly associated with a range of genetic anomalies, and advances in genomic diagnostics have improved early identification, risk stratification, and clinical management. Many of these genetic conditions present with additional extracardiac malformations, underscoring the importance of comprehensive evaluation in affected neonates. This study aimed to determine the prevalence of genetic anomalies among newborns diagnosed with CHD, characterize the types of genetic tests performed, and assess associations between cardiac and extracardiac malformations. We also evaluated whether testing occurred prenatally or postnatally to better understand current diagnostic practices.

Methods: We conducted a retrospective review of all neonates with CHD admitted to a tertiary neonatal unit between 2019 and 2024. Data collected included prenatal versus postnatal diagnosis, type of genetic testing performed, identified genetic anomalies, and the presence of extracardiac malformations.
Results: A total of 524 newborns were evaluated, of whom 303 had major CHD. Among them, 254 (83.8%) had a prenatal diagnosis. Genetic testing was performed in 251 infants (82.8%), with 62% tested prenatally and 30.4% postnatally; abnormal results were identified in 25.7% of those tested. Prenatally, the most frequently used testing modalities were array-CGH (51.8%) and karyotyping (17.8%), whereas postnatal evaluations most frequently involved exome sequencing (14.5%) and array-CGH (14.2%). We identified 81 patients with genetic anomalies (32,3%), being the most common aneuploidies (30), microdeletions (18), and monogenic disorders (17). Exome sequencing showed an overall diagnostic yield of 48.3%. Extracardiac malformations were identified in 82 patients (27.1%) and were the main independent predictor of a genetic abnormality (OR 3.93; $p<0.001$). The likelihood of genetic anomalies increased progressively with the burden of



extracardiac anomalies (78.9% with ≥2 categories; p<0.001).

The CHD most strongly associated with abnormal genetic findings included atrioventricular canal defects (26.9%), ventricular septal defects (19.2%), tetralogy of Fallot (12.8%), double outlet right ventricle (8.9%), aortic coarctation (6.4%), truncus arteriosus (8.9%), and hypoplastic left heart syndrome (5%).
Conclusions: The high prevalence of both syndromic CHD and extracardiac malformations emphasizes the need for systematic genetic evaluation. Broader implementation of genetic testing may strengthen prognostic assessment, guide therapeutic planning, and improve long-term clinical outcomes in neonates with CHD.



FT-017 / #1545

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

NEUROIMAGING FINDINGS BEFORE AND AFTER CARDIAC SURGERY IN NEONATES AND INFANTS WITH CRITICAL AND NON-CRITICAL CONGENITAL HEART DISEASE.

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Background and Aim: Newborns and infants with congenital heart disease (CHD) are at increased risk of neurological injury, as widely reported in the literature. Commonly, critical forms of CHD are thought to be at higher neurological risk. The aim of this study was to evaluate the incidence of neuroimaging findings (NIF) according to the severity and hemodynamic instability of CHD, in order to identify whether a specific group is at higher risk of neurological damage
Methods: We retrospectively reviewed the clinical data of neonates with CHD referred to the Perinatal Cardiology Unit of our tertiary center. Patients with known genetic syndromes or pre-existing neurological abnormalities documented before surgery were excluded. The study population was divided into two groups: “critical CHD” were all those requiring surgery within 28 days, while “non-critical CHD” were all those requiring surgery between 1 month and 1 year of age. Major and minor neurological injury was identified on the basis of brain magnetic resonance imaging (MRI) and/or neurosonografy either before cardiac-surgery and after cardiac surgery (palliative or corrective). Major neuroimaging finding (NIF) were defined as white matter injury (WMI) more than 3 foci and at least one larger than 2 mm, intracranial hemorrage or stroke. Minor NIF were all the remaining lesions.
Results: Among 99 patients critical CHD we 59, while non-critical were 40. Overall, 19% had NIF before surgery, of which 4 (21%) major and 15 (79%) minor. Among major NFI 3 were WMI and 1 hemorrage. Pre-op NFI were 10 in critical CHD and 9 in non-critical CHD with no differences among groups (p=0.5). After cardiac surgery, new major NFI were 9 (9%) of which 6 in the critical and 3 in the non-critical group, without statistically significant difference between groups. Overall, after cardiac surgery an cumulative burden of 28% NIF was present.
Conclusions: newborns and infants with CHD show a relevant risk of neurological injury



irrespective of critical or non-critical forms. These findings suggest that neurological risk is not related to the severity or hemodynamic instability and affects management and outcomes in CHD. Neurological monitoring pre and post cardiac surgery in all neonates with CHD is needed.



FT-018 / #101

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

REVISITING THE CONCEPT OF "PHENOTYPE" IN PEDIATRIC HYPERTROPHIC CARDIOMYOPATHY USING MYOCARDIAL STIFFNESS AND STRAIN VARIATIONS ASSESSED BY ULTRAFAST ULTRASOUND IMAGING

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Background and Aim: Pediatric hypertrophic cardiomyopathy (HCM) is associated with significant morbidity and mortality. While identified as a genetic disease mainly involving sarcomeric genes, the association between genotypical variation and phenotypic expression is not fully established. Developments in ultrafast ultrasound imaging allows quantifying myocardial stiffness using shear waves elastography (SWE). When combined with strain measurements, myocardial work can be computed, offering new insights into phenotype myocardial properties.
Methods: An age-matched population of 20 healthy volunteers (HVs, mean age=11.1 ± 4.5 years), 20 HCM (genotype- and phenotype-positive, mean age=11.6 ± 5.3 years) and 20 genotype (genotype-positive, phenotype-negative, mean age=11.1 ± 4.8 years) were included in the study. Each participant underwent conventional echocardiography and a full cardiac-cycle exploration of the basal anteroseptal segment consisting of: (1) myocardial stiffness by SWE, (2) segmental strain and thickness, which are used to compute one-beat work, the stress-strain loop area, contributive and dissipative work.
Results: Mean diastolic myocardial stiffness (DMS) and peak myocardial strain (PMS) distinguished the HCM group (DMS=23.7 ± 8.7kPa; PMS= -6.64 ± 5.9%) from HV group (DMS=7.2 ± 0.7kPa, $p<0.01$; PMS= -19.9 ±4.1%, $p<0.01$). No significant differences were observed in DMS and PMS between HVs and Genotype groups. One-beat work and stress-strain loop areas showed significant differences among all 3 groups ($p<0.01$) and could distinguish the genotype group (one-beat work= 318.2 ± 100.2µJ/mm; stress-strain loop area=33.2 ± 10.6kPa.%) from HVs (one-beat work= 582.4 ± 137µJ/mm; stress-strain loop area= 66.8 ± 19.8 kPa.%), and the HCM group (one-beat work= 38.2 ± 107.1µJ/mm, stress-strain loop area=5.8 ± 6.5kPa.%), $p<0.01$.
Conclusions: Combining ultrafast ultrasound with speckle-tracking echocardiography, we



demonstrate that one-beat work and stress-strain relationship, obtained by combining myocardial stiffness, strain, and thickness have the potential to distinguish genotype-positive, phenotype-negative patients from healthy controls. Clinical outcome studies are needed to determine the prognostic value of these parameters in phenotype-positive HCM patients.



FT-019 / #332

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

CLINICAL AND ECHOCARDIOGRAPHIC PROFILE OF PEDIATRIC CARDIOMYOPATHIES IN CHILDREN IN A TERTIARY CARE CENTRE IN INDIA

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Background and Aim: Background Cardiomyopathies in children are rare but serious myocardial disorders, presenting with varied symptoms and complex underlying etiologies. Early diagnosis is challenging due to overlap with other cardiac and systemic illnesses. This study aims to delineate the clinical spectrum, echocardiographic findings, and genetic profiles of pediatric cardiomyopathies managed at a tertiary care centre.
Methods: Materials and Methods
This retrospective observational study included 49 children under the age of 18yrs diagnosed with cardiomyopathy (excluding structural and ischemic heart disease) over a 5-year period. Data collected included clinical history and examination, echocardiographic parameters, ECG findings, laboratory markers and genetic testing results
Results: The median age at presentation was 4.5 years (range: 2 months to 18 years); 59% were female. Common presenting complaints included fast breathing (63%), poor feeding (29%), and lethargy or syncope (14%). The predominant phenotypes were dilated cardiomyopathy (DCM, n-36, 73%), non-compaction cardiomyopathy (NCCM, n-9, 18%), HOCM (n-5, 10%), RCM (n-3, 6%) and 1 case of Arrhythmogenic right ventricle. Most common ECG finding was sinus tachycardia with LVH and low voltage complexes seen in 60%. The mean (LVIDd) was 81.9 mm +/-3.4mm, mean Ejection fraction was severely reduced at 25.3%, with over 60% of patients having EF <30%. Global longitudinal strain (GLS), showed a mean value of 9.5% & diastolic dysfunction in 39%, moderate to severe mitral regurgitation in 26%, and reduced TAPSE/MAPSE in advanced cases. Mean NT pro BNP was 14,000 (1,017 -70,000)pg/ml. Genetic mutations were identified in 24% of tested patients—common variants included TPM1, PKP2 mutations. Medical management included Diuretics, Beta blockers, ACE inhibitors with ARNI used in 20% (n-16) with advanced DCM.
Conclusions: Conclusion Pediatric cardiomyopathies exhibit diverse phenotypes and genotypes with considerable overlap. Nonspecific clinical symptoms make early diagnosis difficult, emphasizing the need for high degree of suspicion among primary pediatric care providers. Detailed echocardiographic assessment and targeted genetic testing are pivotal for accurate diagnosis, risk stratification, and individualized therapy.



FT-020 / #339

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

SCREENING FOR PSYCHIATRIC SYMPTOMS AND MENTAL HEALTH SUPPORT IN DANISH CHILDREN AND ADOLESCENTS WITH TETRALOGY OF FALLOT

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Background and Aim: One of the most frequent complex congenital heart defects (CHD) is Tetralogy of Fallot (TOF). A higher risk of mental health difficulties in patients with TOF has been described in a few studies. We have previously found that only half of children and adolescents with complex CHD and a psychiatric disorder had received any mental health support. This study aimed to screen for mental health difficulties in children and adolescents in Denmark born with TOF and to investigate their received mental health support.
Methods: This study is a part of the larger Mind the Heart Study. Parents of all 178 children and adolescents (age 5-17) with TOF in Denmark were asked to answer the well-validated Strengths and Difficulties Questionnaire (SDQ) brief behavioral screening tool to assess their mental health, and a de novo-made questionnaire about received mental health help. As part of the SDQ, the impact of psychiatric problems on daily life is determined. Furthermore, it can be used for predicting a psychiatric diagnosis at three levels: Unlikely, Possible, Probable. In the current study, we combined the first two categories to "No diagnosis".
Results: At least one parent accepted participation in the study in 96 children and adolescents, corresponding to a participation rate of 53% (96/178). The mean age of the participating children was 10.9 (SD 3.8) years; most were males (63.5%), and all had undergone cardiac surgery. We found that 26% (n=25) of the participants have parental-reported symptoms suggesting a psychiatric disorder, where most could be categorized as hyperactivity problems (65%). Of the 26%, 40% (n=10) had an already known psychiatric disorder, and 52% (n=13) had received some sort of mental health support.
Conclusions: One quarter of children and adolescents with TOF had a parent-reported SDQ score suggesting a probable psychiatric disorder, with Hyperactivity disorders being the most prevalent. Only 40% of the children and adolescents with a probable psychiatric



disorder had a prior diagnosed psychiatric disorder, and only half had received mental health support.



FT-021 / #1473

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

EFFICACY OF NADOLOLO IN RASOPATHIES WITH OBSTRUCTIVE HYPERTROPHIC CARDIOMYOPATHY: A CASE SERIES.

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Background and Aim: Obstructive hypertrophic cardiomyopathy (oHCM) is a common cause of heart failure in children and is often associated with RASopathies, such as Noonan Syndrome (NS). High-dose beta blockers remains the first-line option in patients with OHCM. In this case series, we aim to describe the effect of high-dose of Nadolol on left ventricular outflow tract(LVOT) gradient, NTproBNP levels and functional class.
Methods: We report four pediatric patients (mean age 10 years) with oHCM and NS: two carrying *RAF1* mutations, one with a *SOS1* mutation, and one with a *LZTR1* mutation. Initially three patients were treated with high-dose propranolol (mean dose 7,2 mg/kg/die) and one with bisoprolol (0,5 mg/kg/die). Clinical evaluations were performed at baseline and after 6 months, including measurements of LVOT gradient, NTproBNP levels, and Ross/NYHA functional class. Subsequently patients were switched to nadolol at a median dose of 2,2 mg/kg/die . Follow-up assessments were conducted after an additional 6 months.
Results: At baseline, all patients exhibited elevated LVOT gradients (mean LVOT: 50 mmHg) and increased NTproBNP levels (mean NTproBNP: 3200 pg/mL), with Ross/NYHA class II. After 6 months of Propanolol or Bisoprolol therapy, mean heart rate target (HRT) was 77 bpm, there was no significant improvement in LVOT gradient (mean LVOT: 48 mmHg) or NTproBNP levels (mean: 3100 pg/mL). After transitioning to Nadolol, all patients showed a substantial reduction in HRT with a mean value of 60bpm, descrease in LVOT gradient (mean 25 mmHg, p=0,02),a marked decrease in NTproBNP levels (mean 1200 pg/mL, p=0,03), and an improvement in Ross class (mean class I). No adverse effects were reported during the follow-up period.
Conclusions: Our findings suggest that high-dose of Nadolol is an effective treatment for oHCM in pediatric patients with NS. The switch from Propranolol/Bisoprolol to Nadolol



resulted in significant improvements in clinical, instrumental and biochemical markers. This suggests that Nadolol may be a superior option for managing this condition, warranting further investigation into optimal dosing and long-term outcomes.



FT-022 / #831

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

NOVEL DIGENIC INHERITANCE INVOLVING TTN AND CTNNA3 TRUNCATING VARIANTS IN FAMILIAL DILATED CARDIOMYOPATHY: FROM ACUTE HEART FAILURE TO SUBCLINICAL DISEASE

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Background and Aim: Dilated cardiomyopathy (DCM) represents a major cause of heart failure and remains the leading indication for heart transplantation in young adults. Its clinical expression is highly variable, spanning from silent ventricular dysfunction to severe heart failure, life-threatening arrhythmias, and sudden cardiac death
Methods: Whole-exome sequencing (WES) was conducted on germline DNA from the index patient, followed by targeted segregation analysis of candidate variants in relatives using Sanger sequencing.
Results: The proband, a 2-year-old boy presenting with acute heart failure, carried two heterozygous truncating variants: a nonsense mutation in **TTN** (c.95008C>T, p.Arg31670*) and another nonsense variant in **CTNNA3** (c.2023G>T, p.Glu675*). Familial segregation demonstrated that both variants track with the DCM phenotype across affected family members. To our knowledge, this is the first documented case describing the co-inheritance of pathogenic or likely pathogenic truncating variants in *TTN* and *CTNNA3* in patients with familial DCM.
Conclusions: This observation broadens the genetic landscape of DCM in North African populations and highlights the relevance of comprehensive genetic testing to uncover complex inheritance patterns in familial cardiomyopathies.



FT-023 / #634

FLASH TALK SESSION 1
14-05-2026 11:30 - 13:00

INDICATORS OF PARENTAL DISTRESS AFTER INFANT HOSPITALIZATION IN PAEDIATRIC CARDIAC INTENSIVE CARE UNITS: A TWO - CENTRE OBSERVATIONAL STUDY

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Background and Aim: Children with Congenital Heart disease (CHD) often undergo cardiac surgery within the first year of life. Studies show that about 30-50% of parents of children with CHD experience moderate to severe emotional distress. However, studies investigating emotional distress in the context of infant hospitalization in Pediatric Cardiac Intensive Care Units (PCICUs) are limited, and insights into risk and protective factors are scarce. We hypothesized that high parental satisfaction with Family-Centred Care (FCC) during PCICU stay correlates with lower parental distress. Furthermore, we explored associations between medical, sociodemographic characteristics and parental distress.
Methods: In this prospective observational study, parents of infants with CHD treated at two German PCICUs participated. Data were collected within 24 hours after PCICU discharge. We assessed parental satisfaction with FCC using the EMPATHIC-30, and emotional distress using the DASS-21 and PSS:NICU-2. Data collection began at the onset of the COVID-19 pandemic. To address restricted family-access, the child's main visitor at the PCICU during the past week was participating.
Results: A total of N = 305 parents participated (n = 149 in center 1, n = 156 in center 2; n = 52 fathers, n = 273 mothers and n = 23 couples with joint responses). Multilevel modelling revealed that younger parents experienced more anxiety. Younger parents, mothers, and individuals with a migration background experienced more depression and stress. Living with a partner was associated with higher stress, while the presence of siblings, prematurity, being on leave and living farther from the hospital were associated with less depression. EMPATHIC-30 scores showed a negative quadratic association with PSS:NICU-



2 scores. Additionally, mothers reported higher PSS:NICU-2 scores, whereas parents of older infants had lower scores.

Conclusions: High parental satisfaction with FCC may buffer against PCICU-related parental stress. Younger parents, mothers, and those with a migration background face more emotional distress, highlighting the need for targeted psychosocial support during PCICU stay. Targeted interventions to reduce emotional distress in parents of children with CHD are essential beyond the provision of good mental health care: early emotional reactions predict later psychological symptoms and may impact child development.



FT-024 / #62

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

PHARMACOLOGICAL MANAGEMENT OF FOETAL SVT: A SINGLE-CENTRE RETROSPECTIVE STUDY

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Background and Aim: Foetal supraventricular tachycardia (SVT), defined as a sustained heart rate above 180 bpm, is the most common foetal tachyarrhythmia. Management relies on maternally administered antiarrhythmic therapy, yet no standardised protocol exists and hydrops foetalis remains prognostically important. This study evaluated single-agent and dual therapies for foetal SVT in hydropic and non-hydropic presentations.
Methods: A retrospective review of foetal SVT cases at a tertiary foetal cardiology centre (2001–2024) was performed. Diagnosis was confirmed using M-mode and Doppler foetal echocardiography. Outcomes were antenatal SVT resolution, therapeutic agent use, time to sinus rhythm (SR), hydrops resolution and live birth outcome including early neonatal death.
Results: Thirty-seven foetuses receiving transplacental therapy were included and stratified as hydropic (n=11) or non-hydropic (n=26). Overall, antenatal SVT resolution occurred in 27/37 cases (73%). See table 1 for summary of management and outcomes.
Table 1: Summary of management and
outcomes



	Hydropic (n=11)	Non Hydropic (n=26)
Nos treated with medications	11	26
Therapeutic agents used -single agent (received only one drug) - more than one agent (sequential or combination therapy)	6 5	10 16
Antenatal SVT resolution	7/11 (63.6%)	20/26 (76.9%)
Time to sinus rhythm (corrected cases)	Median 7 days (range 4–20)	Median 11 days (range 3–66)
Hydrops resolution	6/11 (54.5%)	Not applicable
Pregnancy outcome	All liveborn (11/11)	All liveborn (26/26)
Neonatal deaths	2 (non-cardiac causes)	0
Drug exposure (patients may appear in more than one category due to escalation to a different drug)	Digoxin 7; Flecainide 8; Sotalol 1	Digoxin 21; Flecainide 15

Hydropic group (n=11): SVT resolved in 7 and 4 remained in SVT. 6 were treated with a single agent and 5 required >1 agent, but 2 still remained in SVT. Median time to SR in corrected cases was 7 days. Hydrops resolved in 6. Flecainide was used in 8, digoxin in 7 and sotalol in 1 (non-exclusive exposures). Non-hydropic group (n=26): SVT resolved in 20. 10 were treated with a single agent and 16 required >1 agent, with 6 remaining in SVT despite escalation. Median time to SR in corrected cases was 11 days. Digoxin was predominantly used, with 21 receiving digoxin and 15 receiving flecainide. Across both groups, digoxin monotherapy corrected 8/10 and flecainide 5/6. Combination therapy corrected 7/13, while switching agents achieved cardioversion in 8/8 cases. Among foetuses treated with >1 agent (n=21), 8 (38.1%) did not achieve antenatal cardioversion. All treated foetuses were liveborn; 2 early neonatal deaths occurred from non-cardiac causes.

Conclusions: Transplacental antiarrhythmic therapy was effective in hydropic and non-hydropic SVT. Hydropic foetuses showed lower cardioversion rates, although hydrops resolved in more than half. Monotherapy with digoxin or flecainide was effective, and switching therapy was successful when initial treatment failed. Findings support tailoring management to presentation and treatment response while awaiting standardised guidance from prospective trials.



FT-025 / #496

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

A FOUR-YEAR RETROSPECTIVE ANALYSIS OF FETAL CARDIOLOGY REFERRALS BASED ON NATIONAL FETAL ANOMALY SCREENING CRITERIA IN WALES

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Background and Aim: The National Health Service (NHS) Fetal Anomaly Screening Programme (FASP) implemented in Wales in 2016 aims to standardize prenatal screening between 10+0 and 20+6 weeks of gestation to detect congenital heart disease (CHD) early. Effective antenatal diagnosis influences clinical management, parental counselling, and outcomes. This study hypothesized that structured implementation of FASP referral criteria significantly enhances antenatal detection of CHD and improves clinical decision-making.
Methods: This retrospective analysis evaluated fetal echocardiography referrals made according to FASP criteria at a tertiary center in Wales from January 2020 to December 2023. Data were obtained from clinic letters and maternal-fetal unit (MFU) records. Referrals were categorized by maternal, fetal, or familial criteria, each further subdivided as per FASP guidelines. Annual trends, timing relative to 20-week anomaly scans, echocardiographic findings, associated chromosomal abnormalities, and pregnancy outcomes were analyzed.
Results: During the study period, 1,563 patients underwent fetal echocardiography. The majority (64%) were referred under fetal indications, predominantly due to suspected cardiac abnormalities identified on the routine 20-week anomaly scans. Inclusion of maternal diabetes as a referral criterion in 2021 significantly increased maternal referrals from 4 cases in 2020 to 115 cases in 2023, exceeding familial referrals for the first time. Importantly, 14% of referrals with initially normal anomaly scans revealed significant cardiac abnormalities on echocardiography, including Tetralogy of Fallot, transposition of great arteries, hypoplastic left heart syndrome, and tricuspid atresia. Associated chromosomal anomalies were documented, and several cases resulted in pregnancy termination following diagnosis. Additionally, 49% of referrals initially suspected of CHD were found to have normal echocardiography results.



Table 1: Annual Distribution of Fetal Echocardiography Referrals (2020-2023)

Year	Total Referrals (n)	Fetal Indications (%)	Maternal Indications (%)	Familial Indications (%)
2020	350	230(65.7%)	4(1.1%)	116(33.1%)
2021	384	245(63.8%)	29(7.6%)	110(28.6%)
2022	404	255(63.1%)	72(17.8%)	77(19.1%)
2023	425	268(63.1%)	115(27.1%)	42(9.9%)
Total	1563	998(63.8%)	220(14.1%)	345(22.1%)

Conclusions: Adherence to FASP criteria markedly improved prenatal CHD detection in Wales, underscoring the importance of structured screening programs. The inclusion of maternal diabetes significantly increased detection rates, suggesting continual updates of these criteria could further optimize antenatal management strategies and parental counselling effectiveness.



FT-026 / #1476

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

PRACTICAL EXPERIENCE IN APPLYING REAL-TIME ARTIFICIAL INTELLIGENCE-BASED PRENATAL ECHOCARDIOGRAPHY

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Background and Aim: Prenatal echocardiography is the primary method for diagnosing congenital cardiovascular pathologies, including structural malformations and secondary manifestations of fetal cardiac remodeling in response to adverse intrauterine conditions. However, the effectiveness of this examination is strongly correlated with the specialist's experience and requires a significant amount of time to obtain multiple scans. The quality of ultrasound assessment can be significantly limited by fetal position, changes in the anterior uterine wall, and the thickness of the maternal anterior abdominal wall, which can lead to false-negative results in prenatal detection of fetal cardiac pathology. The aim of this study was to evaluate the effectiveness of intelligence (AI)-based prenatal echocardiography based on Deep Learning technology with automatic classification, annotation, and measurement of fetal cardiac structures in real time scanning.
Methods: This was a prospective cohort observational study conducted at a single tertiary center in 2025. It included patients with singleton pregnancies at 18-22 weeks and maternal risk factors for fetal cardiac abnormalities according to AIUM data. All studies were conducted by one trained expert in Maternal-Fetal Medicine with over 10 years of experience.
In each case, fetal echocardiography was performed using curved array transducers CA3-10F (Samsung Hera Z20; Samsung Medison) with and without real-time AI-based technology with automatic classification, annotation, and all necessary structure measurements (absolute values andn z-scores based on gestational age or fetal biometry)..
The feasibility (%) and time (sec, Me (Q1-Q3)) of obtaining all sections were assessed. The Fisher exact test and Mann-Whitney U test were used. The result was significant at $p < .05$.
Results: A total cohort of 120 pregnant women was included in the study.
In scanning with and without real-time AI-based prenatal echocardiography, all necessary scans and measurements were obtained in 95.0% (111/120) of cases, compared to 92.5% (119/120) (p=.01). The total examination time was 35.2 minutes and 14.5 minutes,



respectively (p<.001).

Conclusions: The real-time AI-based prenatal echocardiography, compared to standard examination, is more effective in obtaining and measuring fetal cardiac and vascular structures with a significant reduction in examination time.



FT-027 / #1303

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

DIFFERENTIATING PSEUDO-DELTA WAVES FROM TYPICAL PRE-EXCITATION IN POST-FONTAN HLHS: A MORPHOLOGICAL ANALYSIS

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Background and Aim: Hypoplastic Left Heart Syndrome (HLHS) patients undergoing Fontan palliation frequently exhibit electrocardiographic (ECG) features that mimic ventricular pre-excitation, slurring of QRS onset with short PR interval. Data distinguishing this morphology from true accessory pathway-mediated conduction remains limited. This study aimed to assess electrocardiographic changes in post-Fontan HLHS population, focused on QRS morphology.
Methods: A retrospective review of ninety-nine HLHS patients who survived Fontan palliation was performed. Anatomic subtypes and clinical endpoints were collected from medical records. The most recent 12-lead ECG was analysed for quantitative metrics—rhythm, PR interval and QRS duration(QRSd)—and quantitative metrics—QRS morphology description in leads V1 and V6 and delta wave presence, visually classified as absent, intermediate (atypical slurred QRS upstroke mimicking pre-excitation), or typical delta.
Results: The mean age at ECG analysis was 17.4 years. Quantitative analysis revealed that seventy patients maintained PR interval>120 ms ($p<0.05$) and seventy-seven exhibited QRSd<120ms ($p<0.05$), deviating from the classic triad of ventricular pre-excitation. Predominant rhythms included sinus rhythm (67.7%) and sinus with competing junctional rhythm(7.1%). ECGs with competing junctional rhythm and varying PR intervals without change in QRS morphology highlighted how PR interval influences the appearance of pre-excitation (Figure 1). Morphologically, atypical right bundle branch block(RBBB) with QRSd<120ms was the dominant pattern(81.8%). Common V1 waveforms included RSR' (35.4%) and QR(32.3%), while RS prevailed in V6 (66.7%). Absence of septal Q-waves in V6 was significant ($n=92$; $p<0.05$). Delta waves were classified as absent in 73.7%, intermediate in 21.2%, and typical in 2.02% of the patients. Intermediate/typical delta waves were observed in 37.0% of MS/AA, 22.2% of MS/AS, and 17.8% of MA/AA anatomical subtypes.

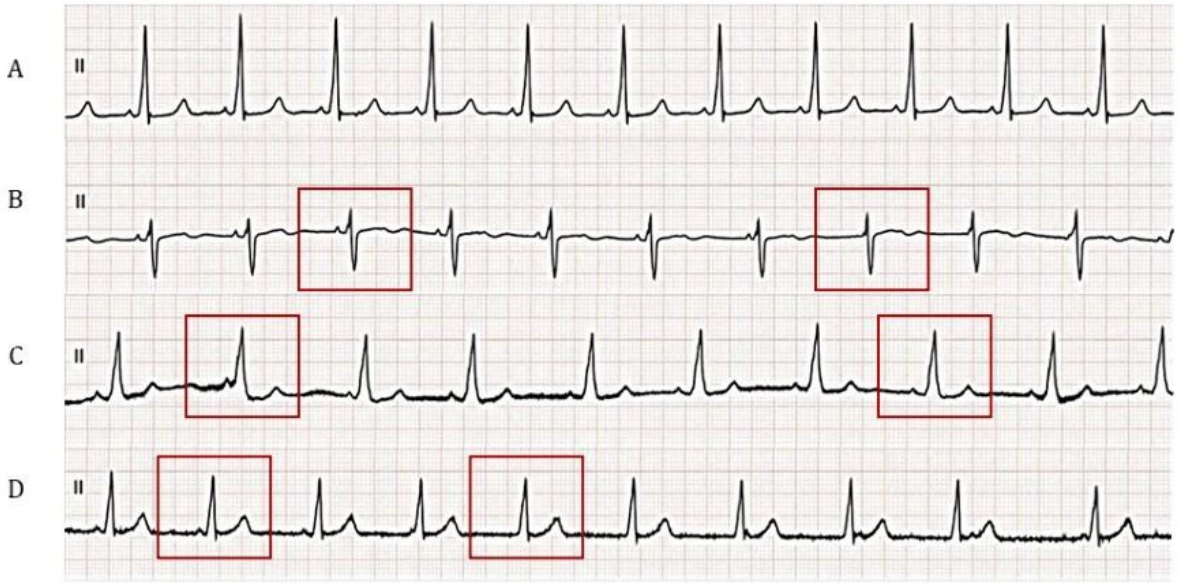


Figure 1. Lead II rhythm strips of four different ECGs identified as 'WPW pattern – probable anterolateral accessory pathway' on the automated interpretation and considered 'intermediate' for visual delta.
On strip A, a slurred onset of QRS was present in every lead, and the PR interval remained unchanged. However, typical pre-excitation can be excluded in strips B-D as the slurred upstroke to the QRS and QRS morphology remains unchanged during the varying PR intervals of competing sinus and junctional rhythm.

Conclusions: In the absence of clinical concerns of arrhythmias, these 'pseudo-delta waves' should be noted, but may not represent typical AV accessory pathways. In the setting of HLHS, we may speculate that there is a potential for abnormal development of the left bundle branch and fascicles. Even if more unusual accessory pathways exist, such as a fascicular-ventricular connection, they pose a low risk for re-entry or pre-excited tachyarrhythmias. Further investigation into post-Fontan myocardial and conduction system is warranted to define the mechanisms of QRS slurring and atrioventricular nodal adaptations following staged palliation.



FT-028 / #423

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

DUCTUS VENOSUS AGENESIS: DIAGNOSTIC CHALLENGES AND OUTCOMES FROM FETAL TO NEONATAL LIFE

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Background and Aim: Agenesis of the ductus venosus (DV) is a rare fetal venous anomaly that may be associated with portal system malformations and other congenital defects. Accurate prenatal diagnosis is essential for planning delivery and early postnatal management. The aim of this report is to present a case of prenatally diagnosed DV agenesis with complex portal venous anomalies and to describe the neonatal course and early follow-up.
Methods: A 34-year-old gravida with unremarkable medical history had a normal first-trimester aneuploidy screen. In the second trimester, biparietal diameter measured below the 10th percentile. At 27 weeks, fetal echocardiography was performed for suspected DV agenesis. Cardiac anatomy was normal (HA/CA 0.34; AoV and PV +2 z-score). Venous assessment demonstrated a dilated umbilical vein, absence of the normal rightward continuation of the umbilical vein, non-visualization of the DV, and dilated hepatic veins. DV agenesis with anomalous hepatic drainage was suspected and later confirmed in a tertiary center. Delivery was planned accordingly.
Results: A female infant was born vaginally at 37+3 weeks (2600 g; 23rd percentile), with Apgar scores 9/8. Adaptation was complicated by transient respiratory distress requiring short nCPAP support, hypoglycemia, and jaundice. Postnatal ultrasound revealed right kidney agenesis and portal venous malformations, including two porto-systemic shunts between the middle hepatic vein and the left portal vein, along with multiple atypical venous vessels. Early laboratory findings showed normal ammonia levels, coagulation profile, and liver and renal function. At 3 weeks of age, elevated GGTP and bile acids were detected. Metabolic and genetic causes, including Alagille syndrome and tyrosinemia, were excluded. Supplementation with vitamins A, E, K and ursodeoxycholic acid was initiated. Multidisciplinary follow-up (hepatology, cardiology, nephrology) continued. At 4 months of age, spontaneous closure of the porto-systemic shunts was documented, with bile acids showing a decreasing trend.
Conclusions: This case demonstrates the importance of detailed fetal venous assessment



and planned perinatal management in DV agenesis. Despite complex vascular abnormalities, early postnatal organ function was preserved, and spontaneous shunt closure suggests a potentially favorable prognosis in selected infants.



FT-029 / #1546

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

RIGHT AORTIC ARCH WITH RIGHT DUCTUS ARTERIOSUS: CLINICAL SPECTRUM AND OUTCOMES FROM FETAL LIFE TO POST-NATAL FOLLOW-UP.

Cosimo Marco Campanale[1], Paola Giordano[2], Luciano Pasquini[3], Yeva Guk[1], Marco Masci[4], Patrizio Moras[5], Serena Ventrella[6], Alessandra Toscano[5]
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Background and Aim: Right aortic arch with right ductus arteriosus (RAA/RDA) is a rare variant of RAA not forming a complete vascular ring. For this reason, it has traditionally been considered a benign anatomical variant and has been poorly investigated in the literature. However, emerging evidence suggests that RAA/RDA may be associated with congenital heart disease, extracardiac anomalies, and genetic syndromes, potentially impacting clinical management and prognosis. Our aim is to describe clinical presentation and outcomes of this anomaly in a tertiary center experience.
Methods: We performed a retrospective analysis of patients diagnosed with RAA at our tertiary center for pediatric cardiology, between january 2010 and december 2025. Data regarding prenatal diagnosis, associated cardiac and extracardiac anomalies, pulmonary and epiaortic vessel abnormalities, and genetic findings were collected and analyzed. Diagnosis of RDA was confirmed at either fetal echocardiography or post-natal ultrasound and/or Computed tomography (CT) or surgical exploration.
Results: Among 668 patients with RAA, 25 (3.7%) had RDA. Prenatal diagnosis was achieved in 18 patients (72%). Associated congenital heart disease (CHD) was present in 12 patients (48%). Extracardiac anomalies were identified in 3 patients (12%), involving the gastrointestinal system (n=1), respiratory system (n=1), or both (n=1). Genetic syndromes or chromosomal abnormalities were detected in 11 patients (44%), including DiGeorge syndrome (n=3). Left pulmonary artery (LPA) abnormalities were common: LPA disconnection occurred in 5 patients (20%) needing open surgery, while LPA hypoplasia or under-over arrangement was observed in 11 (44%). Disconnection of epiaortic vessels was found in 5 patients (20%), with complex patterns of aberrant vascular supply. Six patients (24%) were found to have a bilateral ductus arteriosus at CTscan: within this subgroup, 4 (67%) presented with LPA disconnection and 2 (33%) with epiaortic vessel disconnection.



Conclusions: Although RAA/RDA does not form a vascular ring, it should not be considered a uniformly benign condition. The high prevalence of associated CHD, complex vascular anomalies of surgical interest, and genetic syndromes highlights the need for comprehensive diagnostic evaluation and multidisciplinary follow-up strictly after birth. These findings contribute to redefining the clinical significance of a rare and previously underestimated anatomical variant.



FT-030 / #1491

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

BORDERLINE LEFT VENTRICLE (BLV): A CHALLENGE IN FETAL AND POSTNATAL PERIOD

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Background and Aim: Borderline left ventricle (BLV) comprises a heterogeneous group of fetuses with hypoplastic left-sided cardiac structures in whom prediction of postnatal suitability for biventricular repair (BiV) remains challenging. This study aimed to determine whether fetal echocardiographic parameters improve prediction of postnatal management pathways and outcomes.
Methods: This retrospective study included fetuses assessed at Great Ormond Street Hospital between September 2014 and February 2025. Inclusion required at least two echocardiographic features: mitral, aortic valve z-score or left ventricular dimensions < –2, hypoplastic aortic arch or coarctation, or mild to moderate left-sided valve stenosis. Fetuses with unequivocal hypoplastic left heart syndrome, critical aortic stenosis or unbalanced atrioventricular septal defect were excluded. The primary outcome was successful BiV circulation. Secondary outcomes were single-ventricle palliation or death. Prenatal echocardiographic parameters were evaluated as independent variables, and receiver operating characteristic analysis was used to determine discriminatory cut-off values.
Results: Thirty-five fetuses met inclusion criteria; median gestational age at referral was 20.1 weeks. Seven pregnancies underwent termination (median 22.2 weeks). Four fetuses (11.4%) had extracardiac abnormalities. All liveborn infants required neonatal intervention. Eighteen infants (51.4%) achieved biventricular circulation; 3/18 (16.7%) underwent hybrid palliation and 5/18 (27.8%) required reintervention, including mitral valve replacement, repair of subaortic stenosis and re-coarctation. Seven infants followed a univentricular pathway; one died at 3 months due to lymphatic complications. Two infants had early failed BiV circulation and were converted to univentricular circulation. One infant was not offered active treatment due to significant comorbidities associated with Kabuki syndrome. Median follow-up was 4 years 3 months. Overall survival was 96.3% (n=26/27); survival in the univentricular pathway was 88.9% (n=8/9). At diagnosis, median mitral valve z-score was –3.3 and median aortic valve z-score was –2.5. Left-to-right foramen ovale flow, abnormal mitral valve morphology, and mitral valve z-score < –3.9 correctly identified 80%



of infants managed with a single-ventricle pathway.

Conclusions: In our cohort, mitral valve morphology, severity of mitral hypoplasia, and atrial shunting pattern were key prenatal discriminators of postnatal pathway. Incorporation of these parameters into fetal assessment may improve risk stratification, parental counselling, and early postnatal planning in this complex population.



FT-031 / #386

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

PRIMARY JUNCTIONAL ECTOPIC TACHYCARDIA IN CHILDREN: A 15-YEAR SINGLE-CENTER EXPERIENCE

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Background and Aim: Junctional ectopic tachycardia (JET) is a rare arrhythmia occurring without prior cardiac surgery, potentially resistant to medical therapy and associated with significant morbidity. Primary JET includes congenital and idiopathic forms, which are much less frequently reported than postoperative JET. This study aimed to review our center's experience with primary JET and present clinical characteristics, management, and outcomes.
Methods: We retrospectively reviewed patients diagnosed with primary JET (congenital or idiopathic) and followed at our institution between 2010 and 2025. Demographic data, Holter parameters, echocardiographic measurements, medical therapies, electrophysiological procedures, and follow-up outcomes were analyzed. Patients without accessible follow-up information were excluded.
Results: Seventeen patients with primary JET were included; eight had congenital JET and nine had idiopathic JET. Twelve patients (70.5%) were male. Median age was 180 months (42–288), median age at diagnosis was 72 months (1–192), and median follow-up duration was 48 months (7–144). Mean shortening fraction at diagnosis was significantly lower in congenital JET (26 ± 3.4%) than in idiopathic JET (40 ± 3.1%). Regarding medical therapy, 29.4% (n=5) received quadruple, 11.8% (n=2) triple, 35.3% (n=6) dual, and 23.5% (n=4) single-agent therapy. Mean heart rate decreased from 117 bpm before treatment to 89 bpm after treatment (P=0.003). Electrophysiological study was performed in 29.4% (n=5) of patients, and one patient underwent successful JET ablation. During follow-up, rhythm cure was achieved in 41% (n=7) of patients.
Conclusions: Primary JET, although rare, may present with significant cardiac dysfunction, particularly in congenital cases. The lower shortening fraction at diagnosis suggests a more severe phenotype. The frequent need for multiple antiarrhythmic agents reflects the potentially refractory nature of the arrhythmia, while the significant reduction in heart rate demonstrates treatment effectiveness. The favorable cure rate observed during follow-up



supports that appropriate medical management and surveillance can lead to good long-term outcomes. Larger cohort studies are required to develop standardized management strategies for primary JET.



FT-032 / #931

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

ELECTRICAL, MECHANICAL, AND STRUCTURAL REMODELING AFTER CARDIAC RESYNCHRONIZATION THERAPY IN PEDIATRIC AND YOUNG ADULT PATIENTS

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Background and Aim: Cardiac resynchronization therapy (CRT) is becoming more common for children and young adults with congenital heart disease (CHD) and heart failure. However, the results are still uneven because of the wide variety in heart structure and the underlying conduction issues in these patients. This study aimed to evaluate electrical, mechanical, and structural remodeling following CRT and to identify response patterns in this population.
Methods: A retrospective analysis was performed on pediatric patients who underwent CRT implantation at our cardiology center from January 2010 to December 2025. Demographic data, 12-lead ECG findings, echocardiographic measurements, clinical presentations, therapeutic strategies, and outcomes were extracted from medical records. Electrical remodeling was assessed through alterations in QRS duration, whereas mechanical and structural remodeling were evaluated using systemic ventricular ejection fraction (EF) and cardiothoracic ratio. CRT response was categorized as hyper-response, response, or non-response, in accordance with pre-established criteria.
Results: A total of 34 pediatric and young adult patients were analyzed; 73.5% were male (n=25). At implantation, the median weight was 30 kg (range 10–85) and the median age was 9.5 years (range 1.67–34.42). CHD was present in 88.2% of patients. Systemic ventricle morphology included left ventricle in 82.4%, right ventricle in 14.7%, and single-ventricle physiology in 2.9%. Primary indications for CRT were pacing-induced dyssynchrony (58.8%), left bundle branch block-related dyssynchrony (23.5%), systemic ventricular dysfunction (11.7%), and congenitally corrected transposition (5.8%). Epicardial implantation was performed in 73.5%, followed by hybrid (17.6%) and transvenous (8.8%) approaches. The median total follow-up duration was 118 months (IQR



101). (Table
1)

Table 1. Patient characteristics (n=34)	
Variable	**Value**
Age at CRT implantation, years	Median 9.5 (range 1.67–34.42)
Age at first presentation, years	Median 6.17 (range 0–34.17)
Body weight at CRT implantation, kg	Median 30 (range 10–85)
Sex	Male 73.5% (n=25); Female 26.5% (n=9)
CHD present	88.2% (n=30)
Systemic ventricle morphology	LV 82.4% (n=28); RV 14.7% (n=5); Single ventricle 2.9% (n=1)
CRT indication	Pacing-induced dyssynchrony 58.8% (n=20); LBBB-related 23.5% (n=8); Systemic ventricular dysfunction 11.7% (n=4); CCTGA 5.8% (n=2)
Device type	CRT-P 50% (n=17); CRT-D 50% (n=17)
Implant approach	Epicardial 73.5% (n=25); Hybrid 17.6% (n=6); Transvenous 8.8% (n=3)
Prior pacemaker history	61.8% (n=21)
Total follow-up duration, months	Median 118 (range 1–194)

QRS duration (154.91±42.02 ms to 126.86±29.20 ms; p<0.001) and cardiothoracic ratio (0.6494±0.0750 to 0.5497±0.0741; p<0.001) were both significantly reduced by CRT. Systemic ventricular EF increased from 30.54±7.27% to 50.31±9.85% (p<0.001). Based on objective response criteria, 11.8% were non-responders, 29.4% responders, and 58.8% hyper-responders. (Table
2)

Table 2. Electrical and mechanical outcomes before and after CRT			
Parameter	**Pre-CRT**	**Post-CRT**	**p value**
QRS duration, ms	156.4 ± 36.0	128.1 ± 27.8	**<0.001**
Cardiothoracic ratio	0.649 ± 0.076	0.549 ± 0.074	**<0.001**
Systemic ventricular EF, %	30.9 ± 7.2	51.0 ± 9.5	**<0.001**

Conclusions: For children and young adults with electromechanical dyssynchrony and heart failure, especially those with pacing-induced dysfunction, CRT offers significant electrical and mechanical resynchronization. These results emphasize the need to further improve patient selection in order to optimize response and support CRT as a crucial treatment alternative when optimal medical therapy is insufficient.



FT-033 / #433

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

EFFICACY OF LEFT CARDIAC SYMPATHETIC DENERVATION IN CATECHOLAMINERGIC POLYMORPHIC VENTRICULAR TACHYCARDIA DURING MID- AND LONG-TERM FOLLOW-UP

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Background and Aim: Catecholaminergic polymorphic ventricular tachycardia (CPVT) is a life-threatening ion-channel disorder characterized by stress- or exercise-induced ventricular arrhythmias. Although left cardiac sympathetic denervation (LCSD), in combination with antiarrhythmic therapy, has been proposed as a therapeutic option to reduce the risk of malignant arrhythmias in CPVT Data on mid- and long-term efficacy is sparse. Assess mid- and long-term outcome of patients with CPVT following LCSD.
Methods: Data analysis of patients diagnosed with CPVT who had undergone LCSD and were followed at the Pediatric Heart Center, Goettingen, Germany. Clinical records, treatment data, and follow-up information were reviewed.
Results: A total of 13 CPVT patients (6 male; 46%) had undergone LCSD for symptomatic CPVT. RYR-2 mutation was present in 9/13 (69%). Before LCSD, all patients had received beta-blocker therapy and 9/13 (69%) had additionally been treated with flecainide. In two patients, flecainide had to be discontinued due to side effects. 11/13 (85%) patients had an ICD implanted. Despite medical treatment, all patients experienced recurrent symptoms/syncope and ICD shocks. LCSD was performed at a median age of 16 (range 6-43) years with an extension from T1 to T4/T5. Horner syndrome was evident in 4/13 patients (31%). All patients continued antiarrhythmics following LCSD. During a median follow-up of 3.7 (range 0.5–30.9) years LCSD resulted in a significant reduction of arrhythmic events. 6/13 patients could be followed > 5 years. The overall burden of clinically relevant arrhythmias decreased from 69% before LCSD to 15% after the procedure. Only one patient experienced an ICD shock for rapid atrial tachycardia while another patient developed PVCs during a treadmill test. The remaining 11/13 patients (85%) were free of significant arrhythmias, syncope, or ICD shocks. One patient died due to flecainide intoxication following mishandling.
Conclusions: During mid- and long-term follow-up LCSD continued to suppress effectively life-threatening arrhythmic events in patients with CPVT. Findings support LCSD as an



effective adjunctive treatment in patients with CPVT who continue to suffer from life-threatening arrhythmias despite optimized medical therapy.



FT-034 / #450

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

REGIONAL VARIATION IN PRENATAL AND NEONATAL SCREENING OUTCOMES FOR CRITICAL COARCTATION OF THE AORTA IN SWEDEN

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Background and Aim: In Sweden, screening for critical congenital heart defects (CCHD) includes prenatal ultrasound at 18–20w, postnatal pulse oximetry and neonatal physical examination. In a national cohort this identified 89% of all CCHD before discharge 2014-19. Of those discharged undiagnosed 88% had critical coarctation of the aorta (CoA) (Lannering et al 2023). Our aim was to assess regional differences in early detection of critical CoA 2014-19, and to compare two time periods (2014–2019 and 2020–2024) across two regions and, for the second period, gestational age at first suspicion of CoA.
Methods: This retrospective, nationwide, population-based study included all full-term liveborn infants with isolated or complex critical CoA in Sweden between 2014-2019. Critical was defined as surgery before 1 month of age or death before 1 month. Complex was defined as CoA being the main diagnosis with ventricular septal defect, bicuspid, aortic valve, mild aortic stenosis and persistent left superior vena cava accepted as additional diagnoses. Infants were classified according to one of the six residential healthcare regions and the prenatal and postnatal detection rates were calculated. For two of the six regions, one of which had the highest prenatal detection rate in the country, results were compared with corresponding data from 2020–2024.
Results: Between 2014-2019 184 infants (128 isolated and 56 complex CoA) were identified. Prenatal detection rates varied substantially between regions, ranging from 10% to 48% (national average 25%, 46/184). The proportion of infants discharged undiagnosed ranged from 15% to 48% (national average 30%, 56/184). For two regions with data also from 2020-2024, prenatal CoA detection increased from 21% (6/29) and 48% (12/45) to 37% (13/35) and 58% (11/19) between periods. The proportion discharged undiagnosed was 24%/24% 2014-19 and 17%/26% 2020-24. Data on gestational age at first suspicion of



CoA was available for 2020-24 and was >22w in 38%/55% and >28w in 23%/36% respectively in the two regions.

Conclusions: Important regional variation remains in the early detection of critical CoA. Although prenatal detection rates have improved, further gains appear achievable through consistent implementation of national screening recommendations and by offering increased opportunities for hands-on training, particularly in regions with lower prenatal detection rates.



FT-035 / #662

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

FETAL VENTRICULAR OUTPOUCHINGS - A CENTER'S EXPERIENCE

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Background and Aim: Fetal ventricular outpouchings (VOs) (aneurysms or diverticula), are a rare entity frequently associated with prenatal and postnatal morbidity and mortality We present our institutional experience with of 10 cases.
Methods: An institutional database search of fetal echocardiograms from 2012-2021 was performed for identification of cases with diagnosis of VO. Gestational age (GA) at diagnosis, prenatal and postnatal clinical presentation, imaging characteristics and prenatal and perinatal management with short-term outcome are reported
Results: Ten cases of VOs were identified with GA at initial diagnosis ranging from 21 to 35 weeks GA, and referral reasons were cardiomegaly, dilation of the involved chamber or presumed hypoplasia of the contralateral ventricle, arrhythmia and pericardial effusion. Three were located at the left ventricle (lV), six at the right ventricle (RV) and one at the ventricular septum. Five were associated with congenital heart disease (three with complex right sided lesions) and two with extracardiac anomalies. Location of the VOs was at the apex (two RV – two LV) and free wall (four RV – one LV), with three of the lesions characterized as an aneurysms, six as diverticula and one as mixed. Presentation was associated with arrhythmias in three cases - none requiring treatment - and ventricular dilation and dysfunction in the other two, one being a twin. Comfort care was elected in the RV VO case associated with complex CHD and one other had a fetal death. All remaining patients were delivered at term and remained alive and clinically stable at follow-up ranging from 1 month to 11 years of
age.



Table: Fetal Ventricular Outpouching Characteristics.

Case	Diagnosis	GA at Dx (weeks)	Location	Size	Cardiac Dysfunction	Associated Defects	Arrhythmias	Pericardial Effusion	Pregnancy Outcome	Postpartum size	Follow-up (months)
1	CVA	32	LV apex	Mod	No	No	PACs	No	Liveborn	No change	148
2	CVD	32	VS	Small	No	TAt, HRHS APVS	No	No	Liveborn	Decrease	52
3	CVD	19	RV apex	Small	No	No Myocarditis at 10 mos	No	Yes, Large	Liveborn	Resolution	80
4	CVD	23	RV free wall	Mod	Yes	VSD, AS, CoA	No	No	Liveborn Comfort care	No change	0.75
5	CVD	36	LV apex	Mod	No	VSD	PVCs	No	Liveborn	No change	22
6	CVD	30	RV apex	Small	No	ASD, VSD	No	No	Liveborn	Resolution	21
7	CVA	28	LV free wall	Large	No	No	PVCs	No	Liveborn	No change	20
8	CVD	18	RV apex	Small	No	Extracardiac Anomalies	No	Yes, large	Liveborn	Resolution	23
9	CVD	23	RV free Wall	Mod	Yes	TOF, APVS Cleft lip/palate	No	No	Fetal Demise		
10	CVD	33	RV free Wall	Mod	Yes	No	PACs and PVCs	No	Liveborn	No change	15

Abbreviations: CVA, congenital ventricular aneurysm; CVD, congenital ventricular diverticulum; LV, left ventricle; RV, right ventricle; Mod, moderate; Tat, tricuspid atresia; HRHS, hypoplastic right heart syndrome, APVS, absent pulmonary valve syndrome; VSD, ventricular septal defect; ASD, atrial septal defect; AS, aortic valve stenosis; CoA, coarctation; TOF, tetralogy of Fallot.

Conclusions: Ventricular outpouchings are rare but often associated with arrhythmias, pericardial effusion and myocardial dysfunction. Cardiomegaly or ectopy are the main mode of presentation, and their prenatal and postnatal course is determined by the degree of myocardial dysfunction and presence of CHD. Frequent in utero follow-up for surveillance of ventricular function, degree of ectopy and size of effusion is warranted, and outcome is overall favorable in cases with small lesions and less than moderate ventricular dysfunction.



FT-036 / #860

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

PREVALENCE OF CONGENITAL HEART DEFECTS IN TWINS: THE ROLE OF CHORIONICITY AND ASSISTED REPRODUCTION

Lucia Viola Camilla Mauri[1], Marta Latorre[2], Anna Maria Colli[3], Gaia Francescato[3], Irene Picciolli[3], Roberto Raschetti[3], Marco Reschini[3], Alessia Cappelleri[3], Alessandra Mayer[3], Silvia Orlandini[3], Cristina Cadonati[1], Simona Marcora[1], Monica Fumagalli[3], Marco Papa[1]
[1]ASST Grand Ospedale Metropolitano Niguarda, Pediatric Cardiology, Milan, Italy, [2]University of Milan, Milan, Italy, [3]Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy

Background and Aim: Objective: To evaluate the prevalence of congenital heart defects (CHDs) in neonates from twin pregnancies compared to singletons, with specific focus on the influence of chorionicity and the role of assisted reproductive technologies (ART) as potential cumulative risk factors.
Methods: Methods: This was a single-center retrospective study conducted at the Clinica Mangiagalli of IRCCS Ca' Granda Ospedale Maggiore Policlinico in Milan. All live births between 2017 and 2024 were included (n = 46,274). Clinical, familial, obstetric, neonatal, and cardiological data were collected and analyzed for the twin population (n=2,843), stratified by chorionicity (dichorionic vs monochorionic), hemodynamic factor (with vs without TTTS), and mode of conception (spontaneous vs ART). CHDs were classified as critical or non-critical based on the timing of required intervention.
Results: Results: The overall prevalence of CHDs was significantly higher in the twin population compared to singletons (6% vs 1.4%, p<0.001). This finding remained statistically significant in both the dichorionic group (4.1% vs 1.4%, p<0.001) and the monochorionic group (10.3% vs 1.4%, p<0.001). A higher incidence of CHDs was observed in twins conceived via ART, both in dichorionic and monochorionic subgroups, compared to ART-conceived singletons. Notably, among monochorionic twins, a statistically significant increase in CHD prevalence was found in those conceived via ART without TTTS compared to their spontaneously conceived counterparts (14.7% vs 6.6%, p=0.006).
Conclusions: Conclusions: This study confirms an increased prevalence of CHDs in the twin population, regardless of chorionicity, and identifies ART as a potential cumulative risk factor for CHD development in twins, independent of chorionicity and hemodynamic factors. Our findings support extending fetal cardiac screening to all twin pregnancies, irrespective of chorionicity, particularly in cases conceived through ART.



FT-037 / #225

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

IMPACT OF ELECTROPHYSIOLOGIC STUDY AND CATHETER ABLATION BEFORE CONVERSION TO TOTAL CAVO-PULMONARY CONNECTION

Keiko Toyohara
Tokyo Women's Medical University, Pediatric Cardiology And Adult Congenital Heart Disease, Tokyo, Japan

Background and Aim: Tachyarrhythmia (TA) remains a major clinical challenge in adults with longstanding Fontan circulation. Prior to conversion to total cavo-pulmonary connection (TCPC), many patients have significant atrial remodeling and multiple arrhythmogenic substrates, which may compromise postoperative outcomes. To optimize rhythm control after TCPC, we routinely performed preoperative electrophysiologic study (EPS) and catheter ablation (CA). This study aimed to evaluate the acute effectiveness of CA, characteristics of arrhythmogenic substrates, postoperative TA recurrence, and the need for device therapy and antiarrhythmic drugs following TCPC conversion.
Methods: Forty-two patients (age 20–50 years) who had previously undergone atrio-pulmonary connection or lateral tunnel Fontan procedures were included. The mean interval from the initial surgery to TCPC conversion was 21 years. High-density electroanatomical voltage mapping of the right atrium (RA) was performed in all patients and consistently revealed extensive low-voltage areas (LVA), reflecting chronic atrial dilation and fibrosis. Ablation was guided by activation mapping, entrainment, and assessment of conduction block.
Results: The predominant arrhythmias included atrial flutter and intra-atrial reentrant tachycardia (IART), with one case of atrioventricular reentrant tachycardia involving twin AV nodes. Twenty-nine patients (69%) had three or more IART circuits, highlighting the complexity of the substrate. The overall acute CA success rate was 62% (22/42).
At the time of TCPC conversion, surgical resection of RA LVA was performed, and two epicardial atrial and/or ventricular leads were placed in all patients. Device implantation was ultimately required in 22 patients (52%) due to sinus node dysfunction.
During follow-up after TCPC, TA recurred in 14 patients (33%). Among them, arrhythmias were well controlled in 13 patients with Class III antiarrhythmic agents and/or atrial anti-tachycardia pacing provided by the implanted device. One patient required repeat CA via trans-conduit puncture.
Conclusions: Preoperative EPS provides essential information on atrial arrhythmogenic substrates before TCPC conversion. A combined strategy of targeted CA, RA LVA resection,



and proactive device implantation effectively reduces postoperative TA burden and facilitates stable rhythm management after TCPC. These findings support the integration of EPS/CA into the routine preoperative assessment for patients undergoing Fontan conversion.

FT-038 / #222

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

OPTIMISATION OF FETAL STRAIN BY CMR AND ITS USE IN SUSPECTED COARCTATION OF THE AORTA

Katrin Fricke[1,2], Marjolein Piek[3,4], Einar Heiberg[3,5], Anthony Aletras[3,4,6], Erik Hedström[3,4,7,8]
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Background and Aim: Prenatal diagnosis of coarctation of the aorta (CoA) is challenging with low detection rates and high false positive rates. It is unknown whether left ventricular strain is reduced already prenatally in fetuses that develop CoA (true CoA) postnatally and if strain aids in improving prenatal CoA diagnosis. Further, strain by fetal CMR needs improvement and validation. This study aimed to *1)* optimise fetal strain assessment by CMR; and *2)* explore fetal strain by CMR to differentiate between true and false positive CoA, and healthy controls.
Methods: Cine images gated by Doppler ultrasound (Northh Smart-sync, Germany) were acquired at 1.5 T (Siemens Aera, Germany) in 42 third trimester fetuses. Left and right ventricular 4-chamber strain were assessed by feature tracking and endocardial shortening, respectively (Segment v4.1.0.0, Sweden). Optimisation of strain assessment was performed by systematically adjusting parameters for contour stiffness and tracking distance between timeframes. Parameters were derived both visually and quantitively by comparing to strain derived from myocardial centreline shortening. Fetal echocardiography was used to assess ratios suggested to correlate to outcome: *1)* mitral to tricuspid valve ratio (MV/TV), *2)* the aortic isthmus-to-arterial duct ratio (I/D) in the three-vessel trachea (3VT) view, *3)* the I/D_{3VT} x MV/TV ratio (product of the I/D3VT and the mitral-to-tricuspid valve ratio), and *4)* the carotid-subclavian artery index (CSAI).
Results: Fetal strain by CMR was assessable in 35 of the included fetuses (9 true CoA; 18 false positive; 8 controls). Figure 1 shows strain changes related to parameter optimisation. Despite the visual tendency towards lower left ventricular strain in fetuses with true CoA,

no significant difference was found between groups (Figure 2). In contrast, fetal echocardiography ratios differed between groups (Figure 3).

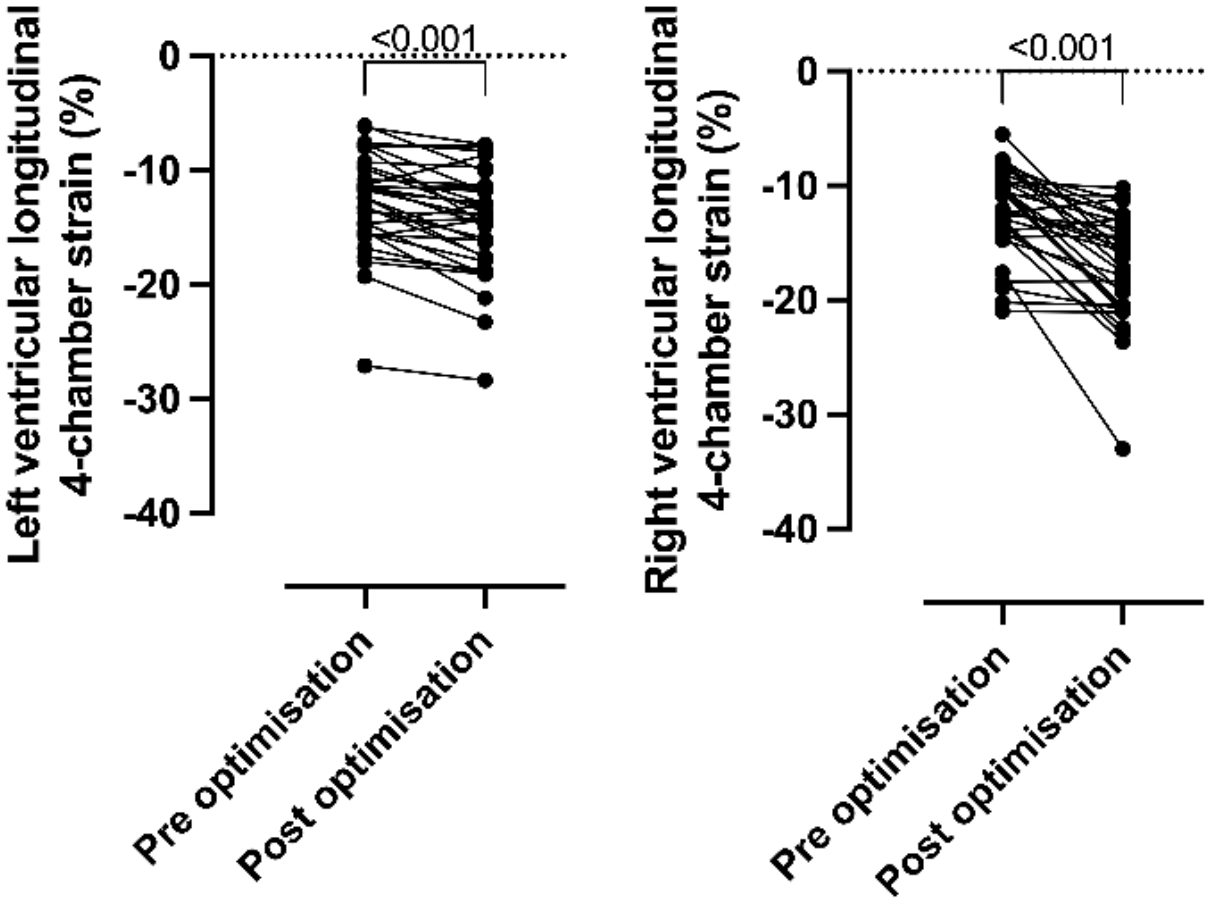


Figure 1: Longitudinal strain by CMR for the left (left) and right (right) ventricles pre and post optimisation of strain software parameters for contour stiffness and tracking distance between timeframes. Strain values differ with different parameter settings.

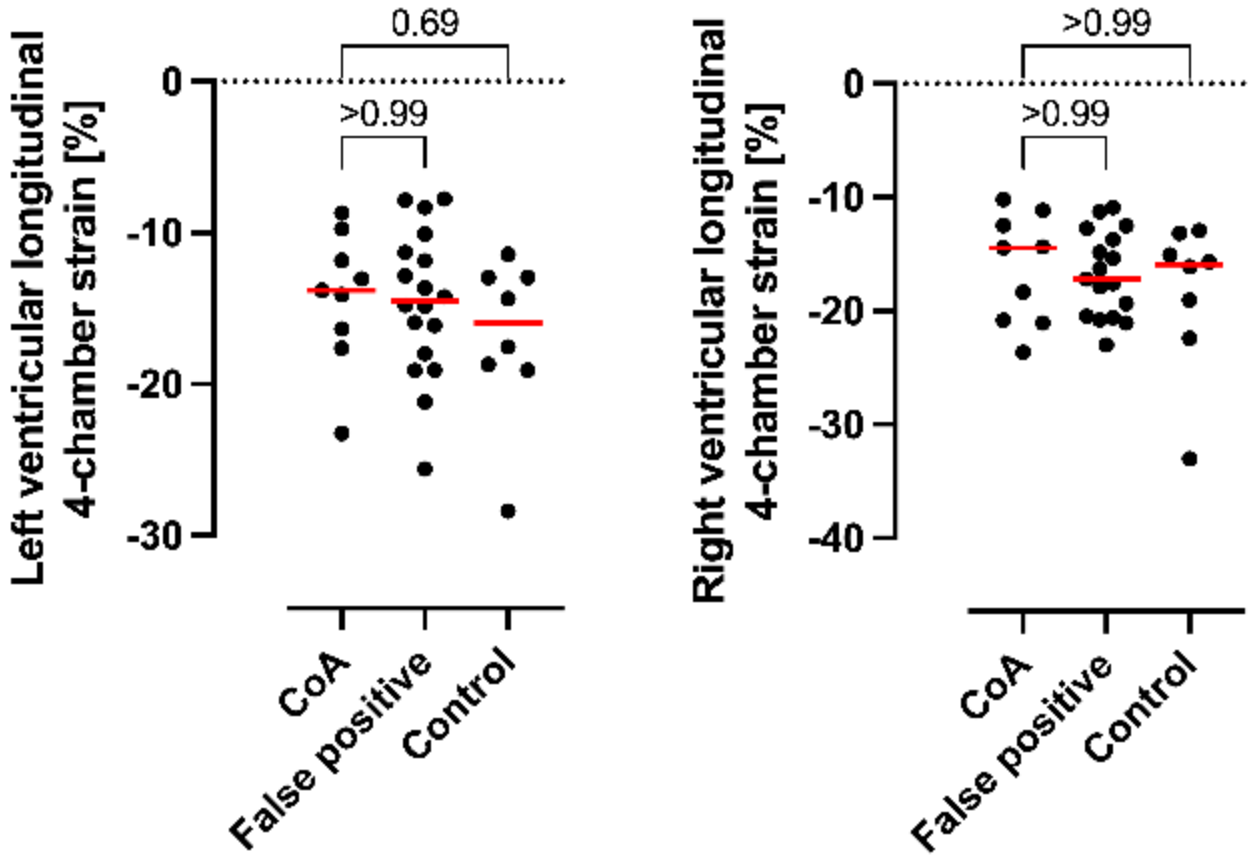


Figure 2. Longitudinal strain by CMR for the left (left) and right (right) ventricles in fetuses that developed CoA, fetuses suspected of CoA that were false positive, and in healthy controls. Although a visual tendency, trend analysis showed no trend (p=0.07) of less negative left ventricular strain values in fetuses that developed CoA after birth compared to false-positive cases and controls. Further, there was no difference between groups.

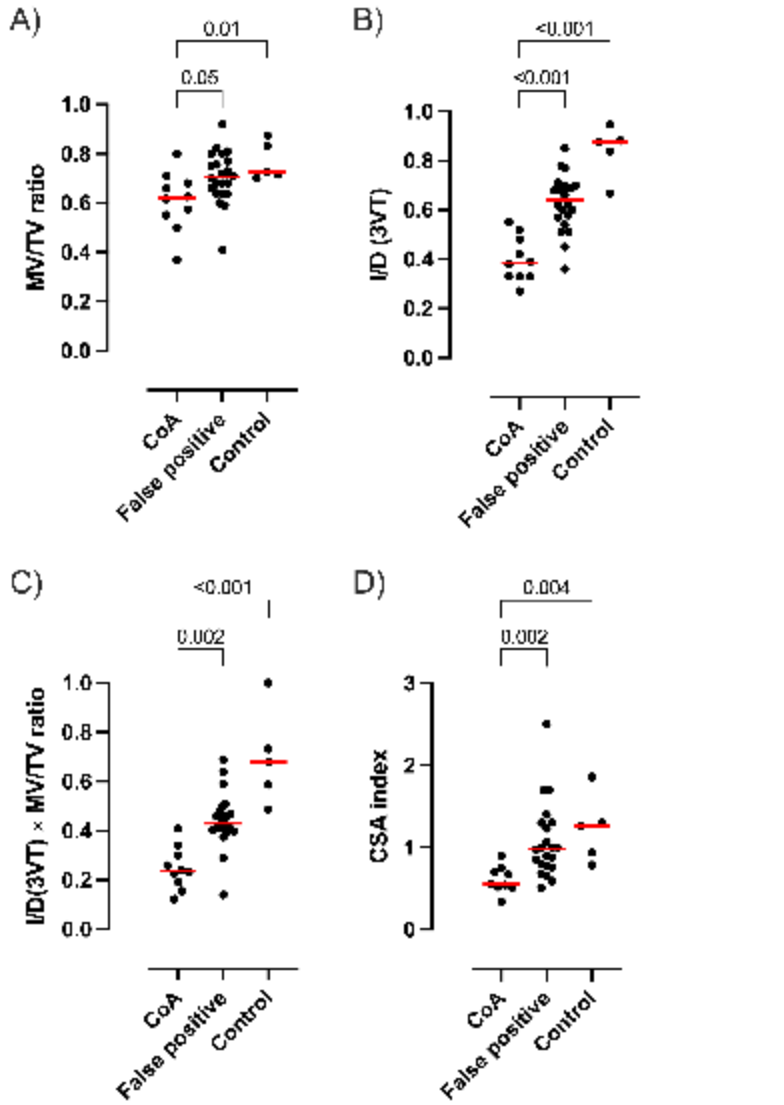


Figure 3. Fetal echocardiography ratios and their relation to outcome. Fetuses that developed CoA had smaller left-sided structures than fetuses suspected of CoA that were false positive, and healthy controls for all four ratios assessed; MV/TV ratio (**A**), I/D ratio (**B**), I/D_{3VT} x MV/TV ratio (**C**), and CSA index (**D**).

Conclusions: Fetal CMR-derived strain values change with optimisation, and strain by different ways of measurements are not interchangeable. Fetal echocardiography ratios are linked to outcome, but are less meaningful for individual patients due to overlap between groups, which highlight the need for additional diagnostic markers. According to



our current findings, fetal CMR-derived strain does not improve prenatal CoA diagnosis beyond the levels achieved using the above fetal echocardiography ratios in its current form.



FT-039 / #889

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

THE ADDED VALUE OF FETAL CARDIAC MAGNETIC RESONANCE IMAGING (4D-FLOW, BLACK-BLOOD AND CINE) IN PRENATAL CARDIAC CLINICAL DECISION-MAKING

Gal Sela[1], Roos De Lange[2], Reagan Tompkins[2], Joost Van Schuppen[2], Ingeborg Linskens[3], Pim Van Ooij[2], Nico Blom[1], Eva Pajkrt[3], Eric Schrauben[2], Annelies Van Der Hulst[1], Sally-Ann Clur[1]
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Background and Aim: Fetal echocardiography is the gold standard for diagnosis congenital heart disease, however, uncertainties in anatomical detail and severity assessment may persist.
Fetal cardiac magnetic resonance imaging(fCMR) is emerging as a complementary imaging modality, offering improved soft-tissue contrast, a larger field-of-view, and advanced post-processing capabilities.
We aimed to evaluate the role of fCMR in resolving diagnostic uncertainties and in influencing perinatal clinical decision-making.
Methods: All fCMRs performed at our center for clinical or research purposes were reviewed retrospectively. Scans were performed on a 3T-scanner, without sedation or contrast injection, and included black-blood, whole-heart 4D-flow with Doppler ultrasound-gating, and later cine sequences.
fCMRs were jointly reviewed by imaging physicists (research cases) or pediatric radiologist (clinical cases) and pediatric cardiologists. Added value was assessed by pediatric cardiologists by comparing echocardiographic uncertainties with fCMR findings focusing on the impact on counseling and/or perinatal management plan.
Results: fCMRs were performed on 12 fetuses, median gestational age 33+3 weeks(range 29-36). fCMR could have influenced clinical management in 8/12 cases(64%), including 3/3 clinically indicated scans(Table 1). E.g. 1)tumor characterization(case 11) can assist counselling and therapeutic choices, 2)and delivery in center with facilities for NICU and direct postnatal cardiac surgery(case 10) (Figures 1+2).
fCMR sequences showed complementary strengths:
- Black-blood: yielded reliable anatomical detail in 10/12(83%) cases.



- 4D-flow: highly informative when successful; failed in 6/12 scans(50%) due to loss of cardiac gating and fetal motion.
- Cine: provided insights into cardiac function; required breath-holds and cardiac gating.

In individual cases, single sequences were sufficient: 4D-flow alone enabled diagnostic conclusions in one case(case 1), while black-blood imaging was sufficient in another(case 4). Post-processing and scan interpretation were time-consuming.

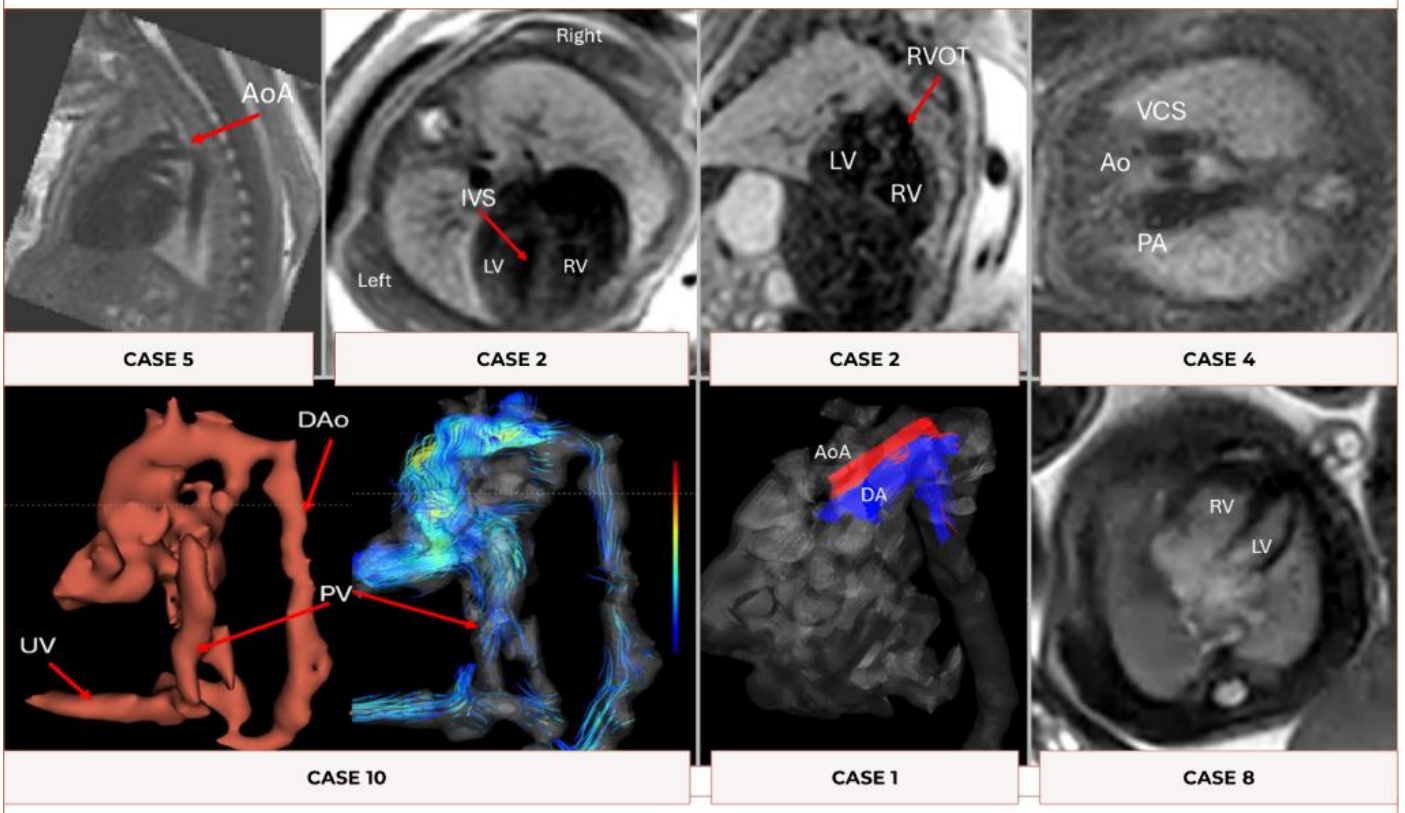


Table 1. Case summary and diagnostic contributions

CASE ID	ECHOCARDIOGRAPHIC FINDINGS	GA AT fCMR	MRI FINDINGS			fCMR BENEFIT
			BLACK-BLOOD	4D-FLOW	CINE	
1	Ventricular Septal Defect (VSD), hypoplastic aortic arch (AoA), coarctation (CoA)	35+3	Poor images	Retrograde flow from ductus arteriosus (DA) in left subclavian artery (LSCA)	-	✓
2	Pulmonary(P) and aortic(Ao) stenosis(S)	33+1	Thickened P valve; dilated ascending aorta (AAo); interventricular septum (IVS)	failed	-	✗
3	Tetralogy of Fallot	31+6	VSD; dilated Ao	failed	-	✗
4	Persistent left superior vena cava (PLVCS) + VSD + suspected CoA	34+3	PLVCS + VSD not seen on MRI or postnatally	failed	-	✓
5	CoA, narrow left ventricular (LV) outflowtract + borderline LV	33+5	AoA anatomy; LSCA from DAo; abnormal position brachiocephalic vein	CoA and LSCA flow detected	-	✓
6	Critical PS/atresia; hypoplastic RV; aortopulmonary window; hypoplastic AoA	30+0	Hypoplastic AoA; unable to asses RV size + AP window	failed	-	✗
7	Right-left ventricular disproportion with suspected coarctation.	33+3	Poor quality	failed	Left/right discrepancy; CoA	✗
8	Small LV and AoA without CoA	32+3	Small LV; hypoplastic AoA; CoA	failed	Left/right discrepancy; CoA	✓
9	Double aortic arch with an atretic segment between the LSCA and the descending aorta. A left ductal arch.	33+2	DAoA, left with atretic segment after LSA, left DA, PAs +PVs =systemic venous return well seen.	Successful	DAoA, good cardiac function, LA appendage, PV, RPA + left DA well seen	✓
10	Complex CHD: left isomerism; unbalanced atrio-ventricular septal defect (AVSD), totally anomalous pulmonary venous return (TAPVD), PA + main aorto-pulmonary collateral ateries (MAPCAs).	33+6	Unbalanced AVSD; azygos continuation of interrupted VCI; bilateral left lungs	successful after postprocessing. PA, MAPCAs and azygos continuation of interrupted VCI	Cardiac function; tricuspid regurgitation; azygos vein	✓
11	Intracardiac LV mass without inflow/outflow obstruction	34+0	Rhabdomyoma based on T2 and T1 weighted images	-	Only a few beats captured	✓
12	Right isomerism; right AoA, unbalanced AVSD; severe PS, Ao anterior, P artery posterior; mixed-type TAPVD – 3 veins infra-diaphragmatic to ductus venosus(DV)	29+5	Right AoA; significant PS; great artery arrangement + P veins well visualized;	Infra-diaphragmatic TAPVD to DV confirmed	-	✓

Cases 1-9 were scanned for research porpuses ; cases 10-12 were scanned for clinical indications.

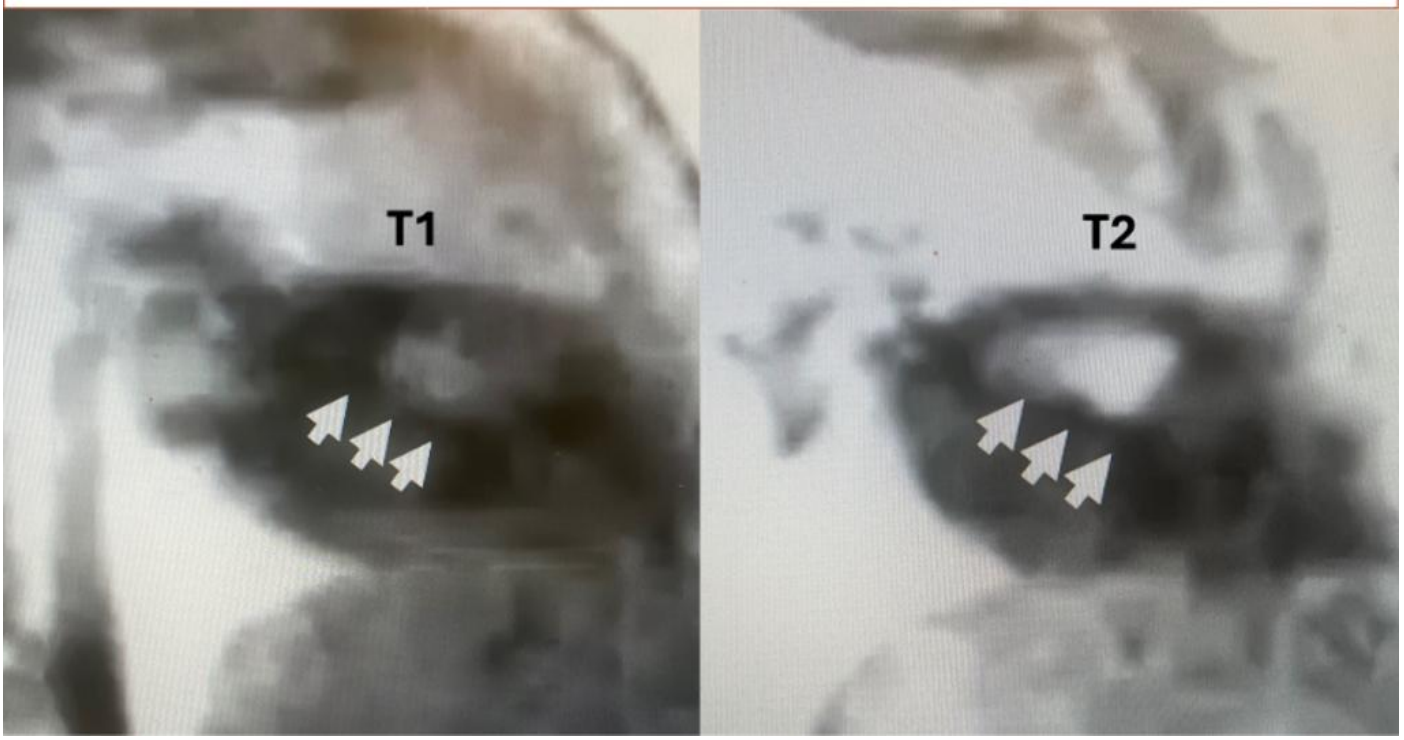
Figure 1. showing examples of fCMR images obtained- the top row shows black-blood images. The lower row shows segmentations and 4D-flow images with velocity pathline tracking for site of origin and an axial cine loop.



AoA: Aortic arch; LV: Left ventricle; RV: Right Ventricle; IVS: Interventricular Septum; RVOT: Right Ventricular Outflow Tract; VCS: Vena Cava Superior; Ao: Aorta; PA: Pulmonary Artery; UV: Umbilical Vein; DAo: Descending Aorta; PV: Pulmonary Vein; DA: Ductus Arteriosus



Figure 2. T1- and T2-weighted images used to characterize the tumor in Case 11, identified as a rhabdomyoma.



Conclusions: fCMR can provide additional diagnostic information, particularly when performed for a clinical indication.
No single sequence was universally sufficient. The complementary use of black-blood, 4D-flow, and cine sequences enhanced interpretation in complex cases.
The detailed information from successful 4D-flow acquisitions highlights the need for improved cardiac gating and motion correction to enhance clinical reliability.
fCMR is a new technique and the scan evaluation time is likely to reduce with improvements in the learning curve.



FT-040 / #1333

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

A PATIENT WITH CONGENITALLY CORRECTED TRANSPOSITION OF GREAT ARTERIES AND AN ACCESSORY PATHWAY THAT INVOLUTED OVER TIME

Gabriel-Laurentiu Cismaru, Mihai Puiu, Radu Rosu
Rehabilitation Hospital, Cluj-Napoca, Romania

Background and Aim: A non-competitive athlete with transposition of the great arteries was evaluated through transesophageal electrophysiology study (TEEPS) for WPW pattern. The 12-lead electrocardiogram indicated the presence of a right posteroseptal accessory pathway.
Methods: During TEEPS, antegrade effective refractory period of the accessory pathway (AERPAP) was 200 ms, with a minimum pre-excited RR interval of 210 ms. According to current guideliness, catheter ablation was proposed. During intracardiac electrophysiological study the AERPAP was 210 ms, and the minimum pre-excited RR interval 198 ms. However, there was no evidence of conduction through the atrioventricular node (AVN). Under these circumstances, the patient was informed that a potential ablation could result in complete atrioventricular block due to the absence of anterograde conduction through the AVN. The patient declined both ablation and pacemaker implantation. The potential risk of ventricular fibrillation associated with atrial fibrillation conducted anterogradely through the accessory pathway was also explained. However, the patient, declined any implantable device or antiarrhythmic therapy and continued his non-competitive athletic activity.
Results: One year and 6 months after his initial evaluation, a new TEEPS was performed which found an AERPAP of 340 ms and minimum pre-excited RR interval of 350 ms. He again declined antiarrhythmic drugs, catheter ablation or any implanted device. He persisted in his non-competitive sport activities without exhibiting symptoms.
Conclusions: In patients with CCTGA, the atrioventricular node is susceptible to degeneration. Furthermore, the accessory pathway may also undergo degeneration. The electrophysiological study performed after 1.5 years from the initial evaluation revealed an increase in the AERPAP from 210 ms to 340 ms. Such individuals will eventually require pacemaker implantation.



FT-041 / #216

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

EMPIRICAL ABLATION POINTS ON THE CORONARY OSTIUM - TRICUSPID LINE FOR THE AVNRT RF ABLATION IN CHILDREN.

Gabriel-Laurentiu Cismaru
Rehabilitation Hospital, Cluj-Napoca, Romania

Background and Aim: The slow pathway is frequently located between the tricuspid annulus and the coronary sinus. RF applications on the coronary ostium –tricuspid (COT) line is an approach to AVNRT ablation that may facilitate the procedure. In our center, AVNRT ablations were performed with the traditional RF current approach using the CARTO mapping system. The aim of this study was to analyze the results of COT RF ablations in pediatric AVNRT.
Methods: We analyzed all AVNRT ablations performed with COT approach in children between January 2023 and October 2025, and verified the early success rate as well as complications that occurred during and after the procedure. We also measured the distance between successful ablation point and the His bundle.
Results: The COT study group consisted of 12 children with a median age of 9.2, 41.6% being females. The mean number of RF applications was 3+/-2 per patient. Total procedural time was 118+/-44 minutes. The acute success rate was 100%. There was 1 complication: second degree AV block that persisted for 2 month after the ablation. At 6 months follow-up the patient that developed second degree AV block presented AVNRT recurrences. The distance between the His bundle and the sow pathway ablation site was 14.6 ± 6.2 mm
Conclusions: The COT RF ablation in children with AVNRT allows a limited number of applications and reduced RF and procedural times. The success rate was high and the complication rate low. Our experience shows that RF applications on the COT can be effectively used in RF ablations for children with AVNRT.



FT-042 / #925

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

TWO-STAGE FETAL INTERVENTION FOR CRITICAL AORTIC VALVE STENOSIS WITH HIGHLY RESTRICTIVE FORAMEN OVALE IN A TWIN PREGNANCY

David Kielmayer, Julian Hochpoechler, Iris Scharnreitner, Gerald Tulzer, Andreas Tulzer
Children's Heart Center Linz, Pediatric Cardiology, Linz, Austria

Background and Aim: Critical aortic stenosis (CAS) of the fetus may progress to hypoplastic left heart syndrome (HLHS) and, in combination with a highly restrictive or intact atrial septum, may lead to pulmonary congestion with possible fatal effects on the evolving lung, including severe pulmonary lymphangiectasia. Fetal aortic valvuloplasty (FAV) has been introduced to restore left ventricular (LV) function and prevent further disease progression. However, in some cases, severe endocardial fibroelastosis (EFE) may prevent LV recovery with residual left atrial hypertension. Here, we report the first case of a two-stage fetal intervention in a twin pregnancy with an in-utero atrial septal intervention following FAV.
Methods: A 35-year-old woman at 23+0 weeks of gestation with a dichorionic/diamniotic twin pregnancy was referred to our institution for FAV due to CAS with severe mitral regurgitation (MR) with highly restrictive atrial septum and third degree EFE. FAV was indicated given the high-risk constellation for poor postnatal outcome.
Results: FAV was performed at 23+0 weeks. The aortic valve (AV) was dilated with a balloon-to-valve ratio of 1.12 resulting in higher-grade aortic regurgitation (AR) and new antegrade systolic aortic arch flow. Pulmonary venous Doppler patterns improved with residual A-Wave reversal, though MR remained severe. Within 3 weeks after FAV, significant AV remodeling led to moderate AV re-stenosis with AR being only mild and MR still moderate to severe with again reduced pulmonary venous flow. Due to persistent left atrial hypertension and severe MR, another fetal intervention (atrial septum stenting with an Everolimus-eluting stent) was performed at 30+5 weeks. Following this intervention, pulmonary venous flow improved significantly and MR severity decreased to mild in the following weeks. No fetal complications occurred in either twin. Both procedures were performed with prophylactic 48 hour-tocolysis and no premature contractions were observed. The babies were born after elective C-section at 37+5 weeks with normal adaptation of both twins (now 2 days old).
Conclusions: Fetal cardiac interventions can be performed safely in selected twin pregnancies, including a second procedure in the early third trimester also avoiding



premature delivery. This case highlights the importance of close fetal monitoring in fetuses with severe EFE and LV dysfunction following successful FAV.



FT-043 / #801

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

A SINGLE-CENTER CASE SERIES OF PEDIATRIC REFRACTORY ATRIAL TACHYCARDIA TREATED WITH PULMONARY VEIN ISOLATION

Aycan Çelebi, Ilker Ertugrul, Tevfik Karagöz
Hacettepe University Faculty of Medicine, Department Of Pediatric Cardiology, ANKARA, Turkey

Background and Aim: Atrial tachycardia is rare in childhood, and pulmonary vein-origin atrial tachycardia (PV-AT) is a particularly rare subtype. Because this prolonged tachycardia can lead to tachycardia-induced cardiomyopathy, early diagnosis and timely intervention are crucial. Although pulmonary vein isolation (PVI) is an established treatment approach for adult atrial fibrillation, current evidence regarding its outcomes in pediatric patients with refractory atrial tachycardia is limited. This study aims to evaluate our center's experience, clinical characteristics, ablation strategies, and follow-up outcomes in four pediatric patients who underwent ablation for PV-AT.
Methods: Four pediatric patients without structural heart disease or prior cardiac surgery were retrospectively reviewed. Demographic characteristics, echocardiographic findings, details of ablation procedures, and follow-up data were analyzed.
Results: The patients' mean age was 14.5 ± 1.5 years, and their mean body weight was 48.6 ± 11 kg. At presentation, all were symptomatic, unresponsive to antiarrhythmic medications, and had undergone at least one previous unsuccessful ablation. Tachycardia-induced cardiomyopathy was detected in two patients, and one patient experienced improvement in left ventricular function after ablation. Ablation initially targeted the atrial tachycardia foci; when these foci failed, PVI was subsequently performed. The foci were located in the upper left, upper right, and lower right atrium, and one patient experienced multifocal tachycardia. One patient underwent atrial appendage cryoballoon ablation. Three patients underwent radiofrequency ablation, and one patient underwent cryoablation following unsuccessful radiofrequency therapy. Two procedures used a transseptal approach. No complications were observed during or after the procedure. Acute procedural success was achieved in all patients, but tachycardia recurred in two patients during follow-up. One patient required implantable cardioverter-defibrillator implantation due to rapid ventricular conduction and episodes of ventricular tachycardia; the other patient achieved stable arrhythmia control after repeated ablations.
Conclusions: Pulmonary vein isolation is a safe and effective treatment option for atrial tachycardias originating from the pulmonary veins, particularly in pediatric patients who



have failed medical therapy. Early intervention in patients with tachycardia-induced cardiomyopathy has been associated with improved ventricular function. However, recurrence rates may be higher in children compared to adults, and the small sample size limits the generalizability of these findings.



FT-044 / #534

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

A SINGLE CENTRE TWENTY YEAR EXPERIENCE OF VASCULAR RING REPAIR: COMPARISON WITH COMPLEX ARCH REPAIR, FREQUENCY OF PERSISTENT SYMPTOMS AND RATES OF REINTERVENTION.

Abigail Sharpe[1], Tara Bharucha[1], Adnan Bakir[2], Nicola Viola[3]
[1]University Hospital Southampton NHS Foundation Trust, Paediatric Cardiology, Southampton, United Kingdom, [2]University of Southampton, Southampton, United Kingdom, [3]University Hospital Southampton NHS Foundation Trust, Thoracic And Cardiovascular Surgery, Southampton, United Kingdom

Background and Aim: Vascular rings (VR) are rare congenital malformations, with associated aerodigestive symptoms most often secondary to extrinsic compression. Despite increased antenatal diagnosis there remain no management guidelines, while rates of persistent symptoms after surgery, and of reintervention vary significantly. We review outcomes of VR surgery against our experience with aortic arch anomalies (AAA).
Methods: Ethical approval was obtained. Data were retrospectively collected for all aortic arch anomalies referred for surgery between 2005-2025. Patients were identified using Heart-Suite database and categorised into vascular ring or complex arch anomaly. We used the electronic patient record (EPR) to collect demographics, aortic arch anatomy, additional diagnoses, procedure description, and post-operative mortality. Primary outcome was post-operative persistent aerodigestive symptoms. A focussed questionnaire was adapted from Self-Evaluation of Breathing and PEDI-EAT 10 questionnaires. If questionnaires were missing, data were gathered from the EPR. If persistent symptoms were reported, a clinician telephone assessment was performed. Secondary outcome was surgical reintervention. Data were analysed with SPSS software: Kaplan-Meier tests were performed.
Results: 247 patients were identified – of these, 17 had died; 20 had transferred their follow-up. 210 patients were included in the analysis. Of these, 93 (38%) had vascular rings; 154 (62%) had complex aortic arch anomalies. Mean follow-up 2.98 years. VR group: 36 patients (38%) had persistent aerodigestive symptoms, of which 3 underwent surgical reintervention. A further 2 patients with severe symptoms were not amenable to further surgical intervention; 1 patient declined intervention. Minimal aerodigestive symptoms were observed in 11 AAA patients (7%); most common problem was vocal cord palsy.
Conclusions: Our results are consistent with reported literature. The high rate of persistent symptoms after VR repair versus the lower rate in AAA group support the association with



an abnormal tracheo-oesophageal bundle in this group, which may require more extensive intervention beyond appropriate vascular repair. Management of patients with VR repair remains challenging with significant service burden, extra-cardiac care requirements and need for long-term follow-up. Some patients with severe persistent symptoms may require re-intervention, but this remains an infrequent outcome. Careful safety-net advice to parents and severity stratification of persistent aerodigestive symptoms are key to optimisation of outcomes and resources.



FT-045 / #170

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

CAROTID-FEMORAL PULSE WAVE VELOCITY AND STRAIN ECHOCARDIOGRAPHY IN NEONATES: IMPACT OF MATERNAL DIABETES AND HYPERTENSION

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Background and Aim: This study aimed to evaluate the association of arterial stiffness and echocardiographic findings with maternal factors and demographic and clinical characteristics in infants of mothers with gestational diabetes and/or hypertension during the neonatal period.
Methods: A total of 67 newborns between 12-29 days of age, including 15 neonates of hypertensive mothers, 26 neonates of diabetic mothers, and 26 neonates of the control group, were included. Carotid-femoral pulse wave velocity (cfPWV) was used as a marker of arterial stiffness and measurements were performed using echocardiography. Basic echocardiographic evaluations and atrial and ventricular strain assessments were also performed.
Results: The mean carotid-femoral pulse wave velocity value of infants of diabetic mothers (6.34 m/s) was significantly higher than that of infants of hypertensive mothers (4.65 m/s) and the control group (4.56 m/s) ($p<0.001$). Multivariate linear regression analysis revealed that increasing maternal age and the presence of diabetes in the mother were the factors predicting carotid-femoral pulse wave velocity values. Echocardiographic evaluation showed increased interventricular septum diameterin infants of diabetic and hypertensive mothers compared to the control group and increased relative wall thickness in infants of diabetic mothers compared to the control group. The right ventricular free wall longitudinal strain z-scores were higher in hypertensive infants, while no significant difference was found in other strain measurements.
Conclusions: The analysis of arterial stiffness in infants of diabetic mothers, infants of hypertensive mothers, and control groups showed that advanced maternal age and maternal diabetes were particularly associated with increased cfPWV. Although increased cfPWV has been shown to be associated with cardiovascular events and end-organ damage, its effect in newborns is not clearly known. Echocardiographic assessment revealed an increased thickness of the interventricular septum in infants born of mothers with diabetes and hypertension, as compared to the control group. This study highlighted the potential influence of maternal metabolic status on neonatal cardiac morphology and



vascular function. Based on the data presented, further research is warranted to investigate whether the observed effects on arterial stiffness in infants of diabetic mothers persist into older ages and have long-term implications for the health of these patients.



FT-046 / #174

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

DE-ESCALATION OF MILRINONE USING SACUBITRIL/VALSARTAN IN A CHILD UNDER 1-YEAR WITH DILATED CARDIOMYOPATHY

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Background and Aim: Dilated cardiomyopathy (DCM) has a poor prognosis in children, with nearly 40% needing heart transplant or dying within 2 years of diagnosis. Sacubitril/Valsartan is established in managing heart failure for over-1 year-olds. However, in the under-1s, there is lack of evidence for renal clearance and drug efficacy. We present a case of an infant diagnosed with severe DCM at 5-months old, with deterioration requiring re-admission at 7-months old due to worsening heart failure (NT-proBNP 7151ng/L). Despite optimised Angiotensin-Converting Enzyme Inhibitor (ACEi) therapy in hospital, she was unable to be weaned off IV milrinone over 5-weeks; a rare circumstance exception was sought to treat her with sacubitril/valsartan, as a method for weaning IV milrinone.
Methods: An individualised medication plan was developed. A starting dose of sacubitril/valsartan 0.4mg/kg twice daily was increased by 0.2mg/kg/dose every two-weeks, alongside de-escalation of IV milrinone by 100nanograms/kg/min, aiming to achieve 1.6mg/kg twice daily sacubitril/valsartan dosing, and stop IV milrinone, over a two-month period. Baseline and interval assessments included: LV EF%, NT-proBNP, cardiac troponin I, renal and liver function tests, vital signs (heart rate, blood pressure and respiratory rate).
Results: Initially, sacubitril/valsartan was tolerated well and milrinone de-escalated successfully. Physical examination and biochemistry were stable. NT-pro BNP and cardiac troponin I reduced and LVEF% was stable. Sacubitril/valsartan was briefly stopped and milrinone escalated due to intercurrent illness and renal injury. Subsequently, the plan was re-established, with a slower titration. Vital signs normalised, and milrinone was successfully stopped at week 13 after starting sacubitril/valsartan. X was discharged on 1.6mg/kg twice daily, with normalised NT-proBNP (348ng/L) and cardiac troponin I (7.7ng/L), and stable LVEF% at week
15.

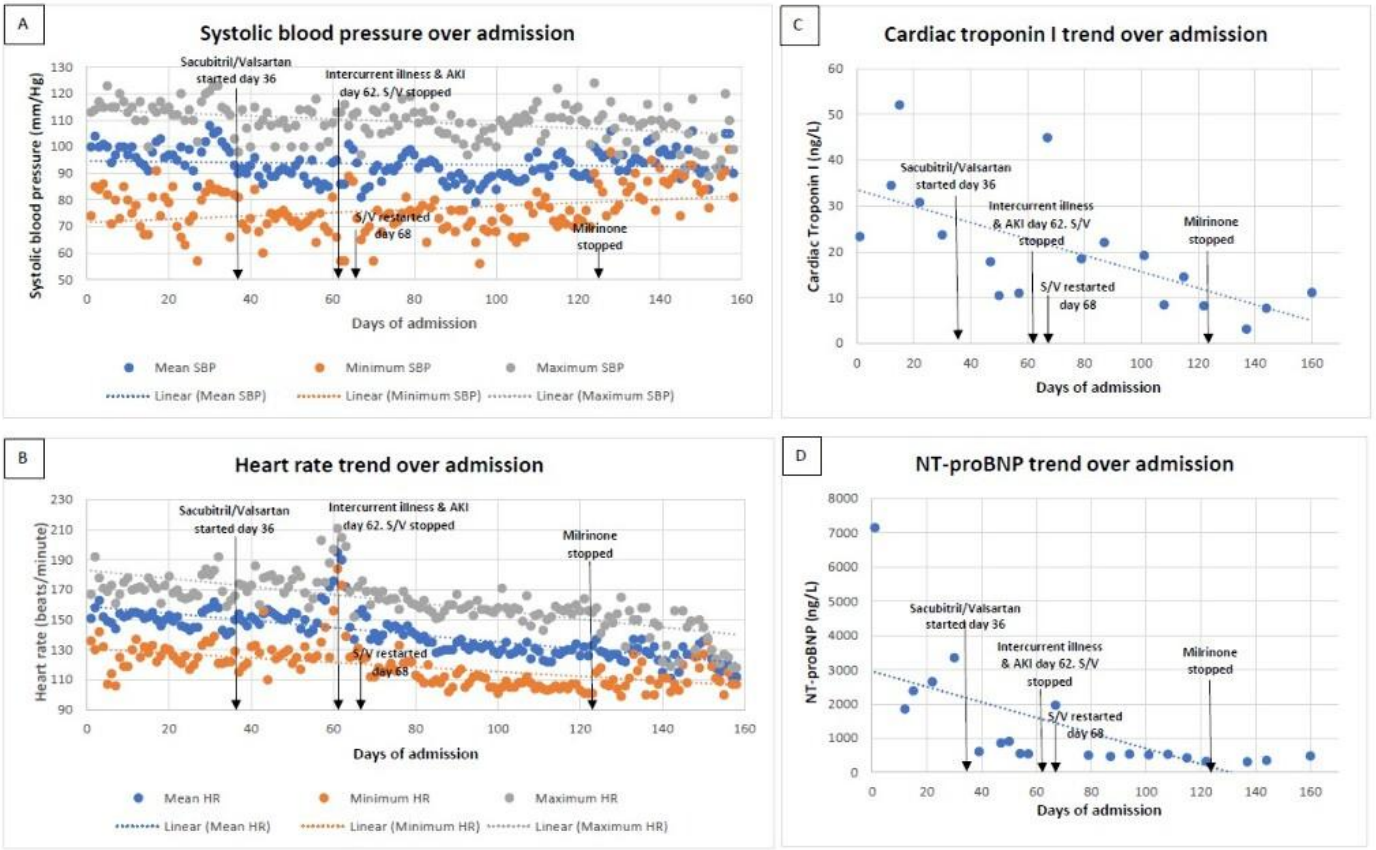


Figure 1: Timeline of observations and blood results during admission. A: Mean, minimum and maximum systolic blood pressure, demonstrated to have less variability over admission with upward trend in minimum SBP, B: Mean, minimum and maximum heart rate, demonstrated to trend downward over admission, with less variability, C: Cardiac troponin I demonstrated to trend downward over admission, D: NT-proBNP demonstrated to trend downward over admission.

Conclusions: Sacubitril/valsartan treatment can successfully aid the de-escalation of IV milrinone in DCM in the under-1s, with normalisation of vital signs and reduction in NT-proBNP and cardiac troponin I, thereby allowing discharge from hospital. Close physical assessment and biochemical monitoring is required for under-1s and flexibility for rapid adaptations in the medication plan will be necessary, due to the decreased renal clearance in this age group.



FT-047 / #76

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

INCREASED PRENATAL DIAGNOSIS OF VASCULAR RING BY FETAL ECHOCARDIOGRAM: HAS IT IMPROVED POSTOPERATIVE OUTCOMES?

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Background and Aim: Vascular ring (VR) mainly consists of right aortic arch with aberrant left subclavian artery (RAoA/ALSCA) and double aortic arch (DAoA), causing breathing and swallowing problems with variable onset and severity. Whether recent increased prenatal diagnosis changed clinical outcomes of VR is poorly understood.
Methods: All patients diagnosed with isolated VR were retrospectively reviewed. Demographic data, anatomical classification of VR, initial clinical presentations, ages at surgery, and postoperative course were analyzed. Data are shown as median, [interquartile range (IQR)].
Results: 176 patients with isolated VR from 1998 to 2024 at our Cardiac Center were studied, including 121 RAoA/ALSCA, 46 DAoA, and 9 others. Prenatal diagnosis was made in 72 RAoA/ALSCA (60.0%) and 14 DAoA (30.4%), where 28 (38.9%) and 6 (42.9%) were symptomatic and 27 (36.9%) and 13 (92.9%) underwent surgery in RAoA/ALSCA and DAoA, respectively. Lower incidence of symptomatic patients and lower rate of surgery were noted in prenatal than in postnatal groups (35.9% vs. 88.6% and 46.5% vs. 86.4%, respectively). Age at surgery (months) was significantly younger in prenatal than in postnatal diagnosis (9 [4, 19.5] vs. 13.5 [6, 47.8], $p = 0.012$). There was no significant difference between prenatal and postnatal diagnosis in post-surgical hospitalization days (3 [3,4] vs. 3 [2,6]) or incidence of complications (both 20%). The incidence of unrelieved symptoms was higher in postnatal than in prenatal groups (8.1% vs. 0%). In prenatally diagnosed cases, age at surgery (months) was 13.5 [7, 29] and 4 [3, 6] in RAoA and DAoA, respectively. When RAoA/ALSCA and DAoA were separately analyzed (including prenatal and postnatal), respiratory symptoms were less frequent in RAoA/ALSCA than DAoA (37.2% vs. 67.4%). CT or MRI finding of airway compression was noted in 54.5% and 69.5% in RAoA/ALSCA and DAoA, respectively. Majority of asymptomatic RAoA/ALSCA did not undergo surgery whereas almost all DAoA underwent surgery (95.7%).
Conclusions: The clinical encounter of VR has become more common during infancy with increased prenatal diagnosis. Regardless of vascular ring anatomy or prenatal diagnosis,



surgical complications and length of post operative hospital stay were comparable. Prenatal diagnosis was associated with earlier surgery with better resolution of symptoms.



FT-048 / #192

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

ORAL CYCLOSPORINE A MONOTHERAPY FOR KAWASAKI DISEASE WITH SMOLDERING INFLAMMATION: A RETROSPECTIVE STUDY ON EFFICACY AND CORONARY OUTCOMES

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Background and Aim: Background: In Kawasaki Disease (KD), standardised management for patients who seemingly respond to initial treatment yet exhibit persistent or re-flaring low-grade smoldering inflammation remains undefined. These patients are at risk for coronary artery lesions (CALs) despite the absence of overt fever. Since 2020, our department has defined Kawasaki Disease with Smoldering Inflammation (KD-SI) as post-initial treatment patients meeting any of the following: (1) sub-febrile state (<38ºC) persisting for >12 hours, (2) inadequate CRP improvement, or (3) persistence of at least one major KD symptom with CALs. We introduced oral cyclosporine A (CsA) monotherapy for these cases as an intravenous immunoglobulin (IVIG)-sparing option. **Aims:** To retrospectively evaluate the efficacy and coronary outcomes of CsA monotherapy versus additional IVIG therapy in patients with KD-SI.
Methods: We reviewed 280 KD patients hospitalised from January 2014 to November 2025. Patients meeting KD-SI criteria were categorized into two groups: the CsA group (n=13), treated with oral CsA monotherapy, and the IVIG group (n=12), treated with additional IVIG. Clinical courses and coronary outcomes were compared.
Results: Before treatment for KD-SI, CALs had developed in 5 patients (38.5%) in the CsA group and 5 (41.7%) in the IVIG group. Crucially, no new onset or worsening of CALs occurred after initiating treatment in either group, and no CsA-induced renal dysfunction was observed. Although additional rescue treatment was required more frequently in the CsA group (30.8% vs. 8.3%), the rate of residual CALs beyond the acute phase was comparable (CsA: 7.7% vs. IVIG: 16.7%; Risk Difference: -9.0% [95% CI: -29.6 to 17.5%]).
Conclusions: Oral CsA monotherapy for KD-SI is a viable strategy that prevents CAL progression as effectively as additional IVIG, with a favourable safety profile. While clinicians should remain vigilant for non-responders requiring rescue therapy, this approach offers a significant benefit in preserving IVIG resources.



FT-049 / #787

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

LONGITUDINAL ECHOCARDIOGRAPHIC SEVERITY SCORING FOR THE PREDICTION OF CHRONIC LUNG DISEASE OR DEATH IN NEONATES WITH PATENT DUCTUS ARTERIOSUS (PDA)

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Background and Aim: Existing severity scores which predict hemodynamically significant PDA using the composite outcome of chronic lung disease (CLD) or death rely on single-timepoint data. With the increasing tendency toward expectant management, necessitating prolonged longitudinal appraisal via serial echocardiography, a score incorporating temporal trajectory may improve clinical utility. This study aimed to identify routinely measured echocardiographic predictors of CLD/death and develop and evaluate a longitudinal scoring approach.
Methods: A preliminary retrospective dataset from Hannover Medical School comprising neonates with PDA and ≥1 left-to-right–shunt echocardiogram ≤14 days after birth was analyzed. 72 echocardiographic variables reflecting ductal size/flow, pulmonary and LV overcirculation, systemic steal, and myocardial function were recorded or retrospectively measured. For each, 14-day-minimum, -maximum, -mean, and -slope were calculated. Variables significant on univariate testing ($P<0.05$), clinically relevant, and non-collinear (VIF <2.5) for the combined outcome CLD/death were entered into LASSO-Regression for further selection. Multivariable logistic models were constructed, weighted and scaled to ascending 0–100 severity scores. Thresholds were optimized using sensitivity, specificity, PPV, NPV, and accuracy. Day-by-day AUC and accuracy analyses evaluated longitudinal performance.
Results: Using 220 echocardiograms from 123 infants (nCLD=68; nDeath=5), eight predictors were identified: LA/Ao ratio; weight-normalized mitral valve A-wave velocity; PDA diameter/Ao ratio; PDA LR-shunt Velocity Time Integral (VTI); PDA peak velocity (PDA-Vmax); PDA-Vmax to velocity at ECG-R-wave ratio; celiac trunk antegrade VTI, and gestational age. Mean and extreme values produced the strongest longitudinal predictive performance, leading to the construction of two models: PDA-mean and PDA-extremes. Complete predictor data existed for 108 exams in 54 patients. Optimal thresholds were 60



(sensitivity:0.92, specificity:0.8125, PPV:0.9211, NPV:0.8125, accuracy:89%) and 52 (sensitivity:0.95, specificity:0.69, PPV:0.88, NPV:0.85, accuracy:87%) for PDA-mean-score and PDA-extremes-score respectively. Day-7 AUCs (68 exams, 43 patients) were 0.97 (PDA-mean-score) and 0.95 (PDA-extremes-score); day-14 AUCs (108 exams, 54 patients) were 0.94 and 0.90. AUC remained >0.88 for both models on all days, with the PDA-mean-score generally outperforming the extremes-score.

Conclusions: Analysis of 72 echocardiographic variables identified 8 candidates for two longitudinal PDA severity scores, both of which demonstrated predictive value for CLD/death. Given the small retrospective sample, future work will include refinement with larger datasets and subsequent prospective validation.



FT-050 / #412

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

ARE HEMATOLOGIC MARKERS INDEPENDENT PREDICTORS OF RHEUMATIC HEART DISEASE STAGE IN CHILDREN?

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Background and Aim: Rheumatic heart disease (RHD) remains a major cause of morbidity in children following acute rheumatic fever (ARF). Easily accessible hematologic indices such as red cell distribution width (RDW), mean platelet volume (MPV) and platelet distribution width (PDW) may reflect chronic inflammation and valvular damage, but data in pediatric RHD are limited. This study aimed to evaluate the relationship between baseline whole-blood parameters and both valvular involvement and persistent RHD stage.
Methods: In this single-center retrospective study, 45 children with echocardiographically confirmed RHD were included and classified as Stage A (n=23), Stage B (n=14), or Stage C (n=8). Aortic and mitral regurgitation were graded (mild–moderate–severe) and converted into severity scores (0–3). Baseline laboratory data included ASO, CRP, ESR, full blood counts and derived indices (NLR, PLR, MLR, SII, SIRI). Group comparisons were performed using Kruskal–Wallis and Mann–Whitney U tests; correlations were assessed with Spearman analysis. A multivariable logistic regression model was constructed to identify independent predictors of higher-stage disease (Stage B/C vs A).
Results: RDW, MPV and PDW showed significant stepwise increases from Stage A to C ($p<0.05$ for all), with RDW and MPV demonstrating the strongest differences between all stage pairs. Aortic regurgitation severity correlated with RDW ($\rho=0.35$, $p=0.018$) and PDW ($\rho=0.31$, $p=0.036$), whereas no significant associations were found for mitral regurgitation. In multivariable analysis, RDW (OR 2.11, $p=0.018$) and MPV (OR 2.86, $p=0.027$) independently predicted higher-stage (B/C) RHD, while PDW and aortic score were not independent predictors. NLR, PLR, SII and SIRI were not significantly associated with RHD stage or valve scores.
Conclusions: This study shows that RDW and MPV are simple, independent markers that correlate strongly with persistent RHD stage and valvular involvement in children. Their progressive increase across disease stages and predictive value in multivariable analysis suggest that these indices reflect chronic, low-grade inflammatory and fibro-proliferative processes underlying valvular remodeling. Unlike traditional inflammatory markers and



leukocyte-derived ratios, RDW and MPV provided meaningful stratification of disease severity, indicating potential utility as accessible adjuncts to echocardiographic follow-up, especially in resource-limited settings. Prospective studies are needed to confirm these findings and assess whether these markers detect children at risk for faster valvular progression.



FT-051 / #904

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

MACHINE LEARNING–DRIVEN FUNCTIONAL PHENOTYPING OF HFPEF BASED ON RESTING AND STRESS ECHOCARDIOGRAPHY

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Background and Aim: Heart failure with preserved ejection fraction (HFpEF) is a highly heterogeneous syndrome characterized by complex pathophysiological mechanisms, including left ventricular diastolic dysfunction, impaired left atrial function, and diminished ventriculo–arterial reserve. Existing phenotyping studies have largely relied on clinical characteristics or resting echocardiography, which insufficiently capture the dynamic physiological heterogeneity of HFpEF. This study aimed to integrate resting and exercise stress echocardiographic parameters to identify functional phenotypes of HFpEF and to investigate their pathophysiological features, exercise tolerance, and clinical outcomes.
Methods: A total of 153 patients meeting the diagnostic criteria for HFpEF underwent both resting and exercise stress echocardiography. After standardization, variables were reduced using principal component analysis (PCA). Based on variance contributions, 30 candidate features were selected (5 clinical variables, 12 resting echocardiographic parameters, and 13 stress echocardiographic parameters). Unsupervised clustering was performed using the K-prototype algorithm. Cardiac structural and functional characteristics, as well as long-term composite outcomes (HF rehospitalization or cardiovascular death), were compared across phenogroups. Survival differences were evaluated using Kaplan–Meier analysis.
Results: Ten principal components (PC1–PC10) were retained, explaining 61.2% of the total variance. Variables with absolute PCA loadings >0.20 were selected as key phenotypic contributors. Three phenogroups were identified:Phenogroup 1 (28.1%): characterized by lower BMI, elevated pulmonary pressures, and impaired exercise-induced RV–pulmonary arterial (RV–PA) coupling, representing a phenotype dominated by decreased pulmonary vascular compliance.Phenogroup 2 (36.7%): older patients with a high prevalence of hypertension, marked reduction in left atrial reservoir strain, and pronounced exercise-induced rise in E/e', indicating limited diastolic reserve.Phenogroup 3 (35.2%): preserved biventricular contractile reserve and enhanced cardiac output response during exercise, demonstrating better exercise tolerance.Kaplan–Meier curves showed significantly higher



cumulative incidence of composite outcomes in Phenogroups 1 and 2 (log-rank p=0.001). Over a median follow-up of 433 days (IQR 395–503), 56 composite events occurred (36.7%), including 7 cardiovascular deaths and 49 HF events. In multivariable Cox models adjusted for age, sex, heart rate, blood pressure, resting E/e', and structural parameters (LAVI, LVMI, EF, ESV/SV), phenogroup classification remained independently associated with outcomes (all $p<0.05$).

Conclusions: The study identified three distinct phenotypes of HFpEF, this phenotyping approach more accurately captures physiological heterogeneity and prognostic differences among HFpEF patients.



FT-052 / #830

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

OUTCOME OF ANTI-IL1 THERAPY FOR THE TREATMENT OF ACUTE MYOCARDITIS IN YOUNG CHILDREN COMPLICATED WITH LV DYSFUNCTION

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Background and Aim: Acute myocarditis in children presenting with severely impaired left ventricular (LV) function has poor outcome. In the recent experience in Multisystem Inflammatory Syndrome in Children (MIS-C), anti-IL-1 therapies have shown efficacy in case of myocarditis and LV dysfunction. We report outcomes using anakinra in conjunction with high dose steroids and IVIG in the tratment of acute myocarditis and LV systolic dysfunction.
Methods: This is a single-center retrospective study of children <6 years diagnosed with acute myocarditis and LV systolic dysfunction from January 2018-April 2025. Diagnostic criteria for myocarditis included positive CMR imaging meeting Lake Louise criteria, or strictly defined clinical diagnosis based on LV Dysfunction (EF < 45%) and dilation associated with elevated troponin, pathologic EKG, signs and symptoms of acute HF including cardiogenic shock or rapid progression upon admission, positive respiratory virus PCR/antigen test from respiratory tract swab. Patients with MIS-C or who received cardiotoxic medications were excluded. Our standard myocarditis treatment protocol included 2 g/kg IVIG and methylprednisolone 10 mg/kg/die. From December 2023, patients were treated accoding to MIS-C protocol including anakinra (4 mg/kg/die iv), high dose iv steroid (methylprednisolone 30 mg/kg/die) and IVIG.
Results: Eighteen patients met inclusion criteria. Median age at diagnosis was 4.2 years (range 0.7–6). Median ejection fraction at diagnosis was 28% (IQR 20–40). Overall, mortality or need for heart transplantation occurred in 6 patients (20%). Median age at death was 2.1 years (IQR 0.6 – 3). Six patients were treated with MIS-C protocol. All six patients had a viral etiology (positive plasma PCR DNA for parvovirus B19 in 5, CMV in one). No significant difference was found in baseline clinical and demographic characteristics between standard and anakinra group. No adverse reaction was described in the anakinra group. None of them died or required mechanical support. At 3-months follow-up all six patients regained normal or nearly normal LV function (LV-EF >48%). There was a tendency to a shorter ICU lenght-of-stay in the anakinra group (p=0.08).
Conclusions: Anakinra associated with high dose steroids and IVIG to treat acute



myocarditis can be safe without significant infections or long-term side effects. Our cohort had excellent recovery of ventricular function and survival without transplant.



FT-053 / #910

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

EARLY CLINICAL OUTCOMES OF STEPWISE SACUBITRIL/VALSARTAN AND DAPAGLIFLOZIN THERAPY IN POSTOPERATIVE CONGENITAL HEART DISEASE

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University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Department Of Pediatric Cardiology, Istanbul, Turkey

Background and Aim: Children and young adults with congenital or acquired heart disease may continue to experience symptomatic heart failure despite guideline-directed medical therapy. Real-world data on stepwise add-on therapy with sacubitril/valsartan and dapagliflozin in heterogeneous postoperative congenital heart disease populations remain limited. This study aimed to evaluate cardiac function, biomarker response, clinical course, and short-term tolerability of stepwise sacubitril/valsartan and dapagliflozin therapy in postoperative pediatric heart failure patients with inadequate response to monotherapy.
Methods: This single-center retrospective study included 14 pediatric and young adult patients with postoperative congenital heart disease who remained symptomatic (NYHA/Ross class ≥ II) despite optimized conventional therapy. Sacubitril/valsartan was initiated at 0.8–1.6 mg/kg/dose twice daily and uptitrated every two weeks according to tolerability, reaching a maximum of 3.1 mg/kg/dose twice daily. Dapagliflozin was started at 0.1 mg/kg/day and increased to 0.2 mg/kg/day; patients weighing ≥30 kg received 5–10 mg/day. Dapagliflozin was added 1–2 weeks after sacubitril/valsartan initiation as part of a stepwise escalation protocol. Serial assessments included ventricular function parameters (LVEF, FAC, TAPSE, ventricular dimension z-scores), NT-proBNP levels, renal function, electrolytes, blood pressure, and NYHA/Ross functional class.
Results: All patients were receiving optimized heart failure monotherapy and remained clinically symptomatic prior to stepwise dual therapy initiation; 85.7% were classified as NYHA/Ross class III–IV. The median age was 18.5 years (IQR 8.5–22.0). Single-ventricle physiology (Glenn/Fontan circulation) was present in 42.9% of patients, cardiomyopathy in 35.7%, and systemic right ventricle in 21.4%. NT-proBNP levels decreased significantly during follow-up (mean 7,777 pg/mL to 3,973 pg/mL, p = 0.002). Left ventricular ejection fraction increased to >45% in 4 patients (30%). Renal function and serum potassium levels remained within acceptable limits. Two patients experienced dapagliflozin-related adverse effects, which resolved after drug discontinuation. During a median follow-up of 3 months (range 1–6 months), 3 patients (21%) required hospitalization for clinical deterioration. No



mortality or permanent discontinuation of sacubitril/valsartan occurred.

Table 1. Baseline demographic and clinical characteristics

Variables	**n (%)**	**Median (IQR)**
Male	8 (57.1%)	
Female	6 (42.9%)	
Age (years)		18.5 (8.5–22.0)
Weight (kg)		53 (19.8–62.0)
Single-ventricle physiology	6 (42.9%)	
Cardiomyopathy	5 (35.7%)	
Complex systemic RV	3 (21.4%)	
NYHA/Ross ≥ III	12 (85.7%)	
Inotrope-dependent	2 (14.3%)	
Prior cardiac surgery/cath	14 (100%)	
Baseline Simpson LVEF (%)		36
Baseline NT-proBNP		7,777 (1,620–10,937)

Abbreviations: RV, right ventricle; NYHA, New York Heart Association; LVEF, left ventricular ejection fraction; NT-proBNP, N-terminal pro–B-type natriuretic peptide; IQR, interquartile range.

Notes: Single-ventricle physiology includes patients with Glenn and Fontan circulation. Values are presented as *n (%)* or *median (IQR)*, as appropriate.



Variable	Baseline (Mean ± SD)	Final (Mean ± SD)	p-value	Effect Size (η^2)	Df
LVEF (%)	36.0 ± 7.2	38.8 ± 8.1	**0.041**	0.18	1
TAPSE (mm)	11.0 ± 3.2	13.0 ± 3.5	0.062	0.12	1
FAC (%)	25.0 ± 7.1	26.0 ± 6.9	0.289	0.05	1
NT-proBNP (pg/mL)	7,777 ± 4,120	3,973 ± 2,980	**0.002**	0.42	1
NYHA/Ross class	3.2 ± 0.4	2.5 ± 0.5	**0.008**	0.31	1
Rehospitalization (%)*	-	21%	-	-	-

Table 2. Changes in ventricular function and biomarkers

* Rehospitalization refers to hospital admission due to clinical deterioration during follow-up.

Abbreviations: LVEF, left ventricular ejection fraction; TAPSE, tricuspid annular plane systolic excursion; FAC, fractional area change; NT-proBNP, N-terminal pro–B-type natriuretic peptide; NYHA, New York Heart Association; SD, standard deviation; η^2, partial eta squared; Df, degrees of freedom.

Conclusions: In this heterogeneous postoperative congenital heart disease cohort, stepwise add-on therapy with sacubitril/valsartan and dapagliflozin was feasible and generally well tolerated, with early biomarker improvement and modest short-term ventricular functional recovery. Larger prospective studies are required to define long-term efficacy and safety.



FT-054 / #328

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

PROFILE OF PEDIATRIC INFECTIVE ENDOCARDITIS FROM A TERTIARY CARE CENTRE IN INDIA

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Background and Aim: Background Infective endocarditis (IE) in children is rare but associated with high morbidity and mortality. Early diagnosis and targeted therapy is vital for optimal outcome. This study aims to describe the profile and outcomes of IE cases treated in a tertiary care center in India
Methods: This retrospective observational study included 46 children under the age of 18yrs diagnosed with IE over a 7-year period (2017-2025). Data collected included clinical history echocardiographic parameters, laboratory markers, treatment given and short term outcome.
Results: 46 children were included (72% male) with an average age of 7.8yrs (0.1-16). 50% were native valve endocarditis with 15% (n=7) occurring in structurally normal hearts and 35%(n=16) having structural heart disease . Rest 50% (n=23) were post op cases with TOF pulmonary atresia being the most common diagnosis with 30% (n=15) having an RV- PA conduit with a mean duration of 3.8yrs (0.3-7.5) from surgical insertion. Dental caries was seen in only with 36% (n=17) with almost all patients presenting with fever (98%). There was an average delay of 21 days (4-60) from onset of fever till diagnosis. 70% (n=32) had blood culture positivity with MSSA (n=10) followed by Streptococcus (n=7) being the commonest organisms. There were 7 (15%) GNB sepsis and 4 (8%) fungal sepsis. Blood investigations showed an average WBC count of 14,400 cells/Ml mean CRP of 46mg/l and ESR of 52mm/hr. Systemic embolization occurred in 30% (n=14) with surgical intervention required in 56% cases (n=26) and 3 children expired(6%).
Conclusions: IE still continues to be a significant cause of morbidity in children. Although native valve endocarditis is still common, congenital heart disease and post op status with conduits pose a significant risk. Delay in diagnosis and suboptimal treatment can prove detrimental in children with IE.



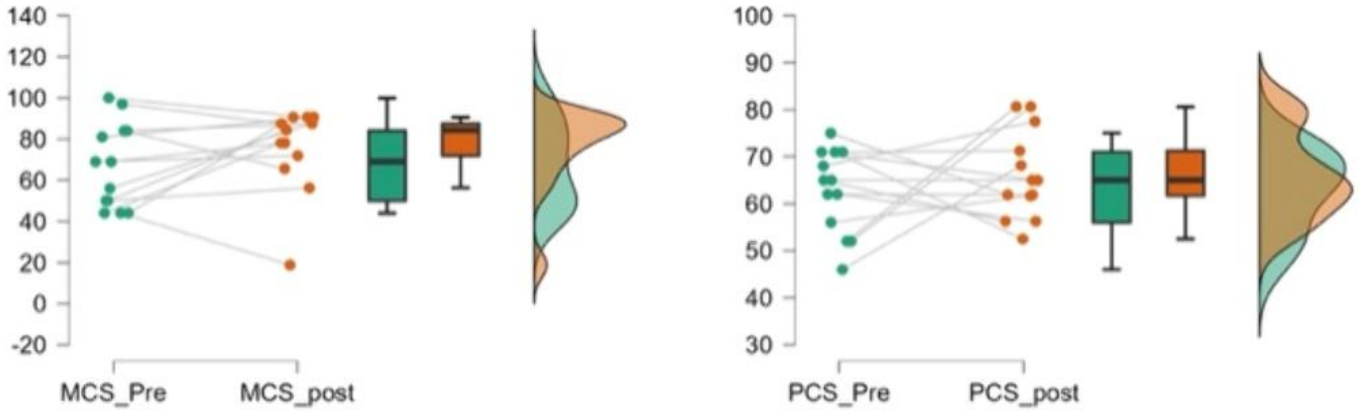
FT-055 / #521

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

HOME EXERCISE PROGRAM FOR ADULT CONGENITAL HEART DISEASE PATIENTS: FEASIBILITY, OUTCOMES AND PERSISTENT BARRIERS FROM A PILOT STUDY.

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Background and Aim: ACHD (Adult Congenital Heart Disease) patients in India have poor physical functioning related QoL (Quality of Life), compared to counterparts from other countries. To address this gap, we designed a prospective pilot interventional study to determine the feasibility and impact of a graded, personalized, home-based, monitored exercise training program.
Methods: Eligible patients were randomly selected. Baseline evaluation included Demographics, and medical details, step counts, IPAQ (International Physical Activity Questionnaire), Barriers to Being Active Questionnaire, and QoL instruments using SF-12 (Short-Form-12), LAS-QoL (Linear Analog Scale), and EQ-VAS(EuroQoL Visual Analog Scale). Orientation session was in person, one to one, followed by a 16-week step-wise, personalized training comprising of weekly supervised Zoom-based sessions (Levels 1–5 of the British Cardiac Rehabilitation Home Program). Paired t-test or Wilcoxon signed-rank test was applied for pre–post comparisons. A feedback survey was administered to identify factors contributing to non compliance.
Results:



Thirty-nine patients were recruited (age 25.8±6.4 years;56% male). Majority had defects of moderate(17/39) or great (19/39)complexity. 84.6% had previous cardiac surgery, 74.4% physiologic stage A. Baseline median IPAQ total activity was 2394 MET min/week (IQR: 561-5499) and mean daily step count was 5141±2252. Despite continued efforts at mitigating barriers identified at baseline (Reminders, flexibility, make-up sessions, counseling, celebrity appearances), 26 subjects dropped out. Baseline data was similar between compliant and noncompliant groups. In the former, IPAQ walking MET minutes showed a modest, non significant increase, IPAQ total MET minutes remained unchanged. Similarly physical (62.8→66.0, p=0.666) and mental (67.1→76.0, p=0.244) component summaries of SF 12 improved, neither reached statistical significance. LAS-QoL (67.1→76.0, p=0.244) remained stable and EQVAS (77.3→70.0; p=0.309) showed a nonsignificant decline. Feedback responses highlighted poor will power, constraints with space and time, and fatigue as major reasons for noncompliance.

Conclusions: A personalized, home-based exercise program for ACHD patients is feasible and safe, and offered encouraging improvements, especially in mental domain of SF-12. However, despite extensive motivational strategies, deep rooted behavioral, environmental and logistical barriers resulted in substantial attrition. These pilot findings underscore the need of a broader societal change to promote physical activity as an essential part of daily routine, more so for those with chronic cardiovascular conditions.



FT-056 / #288

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

PREDICTIVE VALUE OF INFLAMMATORY BIOMARKERS FOR CORONARY ARTERY INVOLVEMENT AND IVIG RESISTANCE IN KAWASAKI DISEASE

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Background and Aim: Kawasaki disease (KD) is an acute vasculitis of childhood and a major cause of acquired heart disease. Diagnosis relies on clinical, laboratory, and echocardiographic evaluation because no specific test exists. Recent work has examined hematologic and inflammatory markers that may reflect disease severity. Indices such as the systemic immune-inflammation index (SII), systemic inflammatory response index (SIRI), neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), monocyte-to-lymphocyte ratio (MLR), and C-reactive protein/albumin ratio (CRP/ALB) have been proposed as predictors of coronary artery abnormalities (CAA) and intravenous immunoglobulin (IVIG) resistance.
Methods: This retrospective cross-sectional study included 150 KD patients (28 days–18 years) treated with IVIG between January 2012 and December 2024 at the University of Health Sciences, Dr. Behçet Uz Children's Hospital. Only patients with complete clinical, laboratory, and echocardiographic data were analyzed. Demographic characteristics, KD subtype (typical/atypical), fever duration, IVIG response, and presence of CAA were recorded. Pre-IVIG laboratory values were used to calculate SII, SIRI, NLR, PLR, MLR, and CRP/ALB.
Results: Among the 150 patients, 48% had typical and 52% atypical KD. The typical group had a higher mean age and shorter diagnostic delay ($p<0.05$). IVIG resistance occurred in 10.7% and was associated with longer follow-up duration ($p<0.001$). Resistant cases showed significantly higher NLR and SII values and lower lymphocyte percentages ($p<0.05$). ROC analysis identified optimal thresholds for predicting IVIG resistance as NLR >4.02 and SII >1850.9. CAA developed in 25.3% of patients. Surprisingly, NLR, SII, and PLR were significantly lower in patients with CAA ($p<0.05$), with predictive cut-offs of NLR <2.95, SII <838.7, and PLR <112.5. SIRI, MLR, and CRP/ALB were not significantly associated with IVIG resistance or coronary involvement.
Conclusions: Among readily available hematologic biomarkers, NLR and SII were strong predictors of IVIG resistance, showing significantly elevated values in resistant cases. In



contrast, lower NLR, SII, and PLR levels were associated with coronary artery abnormalities, indicating an inverse relationship with coronary involvement. These opposite trends highlight the potential of these indices to distinguish different risk profiles within Kawasaki disease. Their accessibility and low cost support their incorporation into clinical evaluation and follow-up strategies. Prospective multicenter studies are needed to validate these findings.



FT-057 / #614

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

THE HEARTMATE 3 ASSIST DEVICE IN PAEDIATRIC CARDIOMYOPATHY: A REPORT FROM SINGLE CARDIAC CENTRE

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Background and Aim: The utilization of the HeartMate 3 ventricular assist device is demonstrating a notable increase among paediatric patients with end-stage heart disease, who are candidates for cardiac transplantation. The primary aim of this study is to report our institutional experience utilizing the HeartMate 3 device in this specific patient population.
Methods: We performed a retrospective review of clinical records covering all paediatric patients (n=5, aged 10–16 years), who received a HeartMate 3 at our facility spanning the period from January 2022 through November 2025. Clinical status information, procedural specifics, details from the perioperative period and follow-up data were gathered and subsequently reviewed.
Results: Throughout the time frame of the study, five patients diagnosed with end-stage dilated cardiomyopathy met criteria for HeartMate 3 implantation. Their median age was 13 years (with a range of 10–16) and their median weight was 41.5 kg (range 24-75kg). The PediMACS profiles for these patients were in range between 1 and 2. Two patients, who presented with a PediMACS profile 1, underwent temporary left ventricular assist device placement prior to surgery (1 percutaneous catheter-based axial flow pump, 1 centrifugal magnetically levitated rotary pump with central surgical cannulation). The median length of time spent in the intensive care unit after HeartMate 3 implantation was 35 days (range 21-54 days). Impaired function of the right ventricle was observed in four patients; three of these were managed medically, while one necessitated the placement of a temporary RVAD. Over a mean follow up of 231 days (range 43-781), three patients received heart transplant, whereas two patients are still on device support. There was no mortality recorded, and none of the patients suffered any complications related to the pump itself.
Conclusions: Using of the HeartMate 3 constitutes a secure and highly effective therapeutic path, enabling paediatric patients to be effectively bridged to heart transplantation.



FT-058 / #1364

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

EARLY IL-1 BLOCKADE WITH ANAKINRA IN PAEDIATRIC ACUTE MYOCARDITIS: A SINGLE-CENTRE RETROSPECTIVE STUDY

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Background and Aim: Acute myocarditis in children is a heterogeneous condition, ranging from mild disease to fulminant heart failure with cardiogenic shock and malignant arrhythmias. Although viral infection is the most common trigger, disease severity largely depends on the magnitude of the host inflammatory response. Growing evidence supports a key pathogenic role of interleukin-1 (IL-1)–mediated inflammation. We report our single-centre experience with the IL-1 receptor antagonist anakinra in paediatric acute myocarditis.
Methods: We retrospectively analysed 11 consecutive paediatric patients (mean age 2.3±1.1 years) treated with anakinra for acute myocarditis between 2023 and 2025. Anakinra was initiated within 72 hours in fulminant presentations or used as rescue therapy for persistent inflammatory activity despite conventional treatment. Serial measurements of left ventricular ejection fraction (LVEF), troponin-I, and NT-proBNP were collected from admission through follow-up. Timing, route, dosage, and duration of anakinra therapy were recorded. Follow-up included serial echocardiography and cardiac magnetic resonance (CMR) when available.
Results: All patients showed significant myocardial injury with severe LV dysfunction at baseline (LVEF 27.8±9.4%) and markedly elevated biomarkers (median Troponin-I peak 987 ng/L, range 145–9327; NT-proBNP 35827±23959 ng/L). Treatment involved high-dose intravenous anakinra (8 mg/kg/day), followed by gradual tapering and transition to subcutaneous administration (2 mg/kg/day) until withdrawal, based on clinical, laboratory, and echocardiographic recovery.
Clinical improvement occurred within the first week. LVEF increased to 45±12.3% at 2 weeks ($p=0.001$ vs baseline) and to 53±11.3% after 1 month ($p<0.0001$). NT-proBNP levels declined significantly during follow-up (median 1647 ng/L, range 67–14072; $p=0.001$). No deaths, major infections, serious drug-related adverse events, or clinically relevant recurrences occurred. CMR follow-up documented edema resolution in all evaluable patients, complete in 83%, occurring within 1.5–15 months (median 7).



Conclusions: In this single-centre experience, early IL-1 blockade with anakinra was safe and associated with rapid improvement in cardiac function and biomarkers in paediatric acute myocarditis. High-dose intravenous initiation followed by tapering and subcutaneous maintenance may be considered in severe presentations. Randomized studies are needed to compare early anakinra use with conventional therapy.



FT-059 / #1206

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

REFRAMING EXERCISE IN REPAIRED CONGENITAL HEART DISEASE: CARDIOPULMONARY EXERCISE TEST DATA SUPPORTING SAFE, PERSONALIZED SPORT PARTICIPATION

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Background and Aim: Exercise capacity is a major determinant of long-term outcome in patients with congenital heart disease (CHD), yet the mechanisms of exercise limitation after surgical repair remain incompletely characterized, and the potential benefits of regular physical activity have been underappreciated. This study aimed to assess functional capacity in patients with repaired CHD, accurately identify the physiological mechanisms underlying exercise intolerance, and provide a basis for individualized exercise prescription, while exploring clinical outcomes.
Methods: We retrospectively analyzed 79 consecutive patients with operated congenital heart disease who underwent symptom-limited cardiopulmonary exercise testing (CPET) on cycle ergometry with ramp protocols between 2014 and 2023. Demographic and clinical data, resting and post-exercise echocardiography, and comprehensive CPET parameters were collected. CPET findings were used to inform individualized exercise prescription.
Results: The mean age was 16.9 ± 6.4 years, and 60% were male. Most patients were in NYHA class I (85%), with preserved biventricular systolic function. Diagnoses were heterogeneous, with conotruncal anomalies accounting for nearly half of the cohort. Peak aerobic capacity was mildly reduced (VO_2peak 30.7 ± 7.6 mL/kg/min, 69.8 ± 14.6% predicted) despite maximal effort (RER (1.10 ± 0.15). The anaerobic threshold occurred early (45.3 ± 10.2% predicted VO_2). Ventilatory efficiency was preserved (VE/VCO_2 slope 26.5 ± 5.2; $EqVE/VCO_2$ 27.0 ± 4.1; $PetCO_2$ 40.6 ± 5.7 mmHg; breathing reserve 47 ± 15%). Oxygen uptake efficiency (OUES 94.5 ± 15.1% predicted) and mean oxygen pulse (85 ± 15% predicted) were normal, although a subset of patients fell below 80%. Chronotropic index averaged 0.73 ± 0.11, but values were normal in non-beta-blocked patients. Exercise was safe, with desaturation in 5% and minor arrhythmias in 8%.
Conclusions: In operated CHD patients, exercise capacity is significantly reduced despite preserved ventricular function and normal ventilatory efficiency. The pattern suggests a



mixed mechanism, with variable cardiac contribution in a subset of patients and frequent deconditioning as a modifiable factor. At the latest clinical follow-up, no major adverse clinical events were reported. These findings support the development of a structured, CPET-based program of personalized exercise prescription for patients with congenital heart disease, challenging the traditional restriction from physical activity, while ensuring safe participation in sport, and promoting long-term health.



FT-060 / #1314

FLASH TALK SESSION 3
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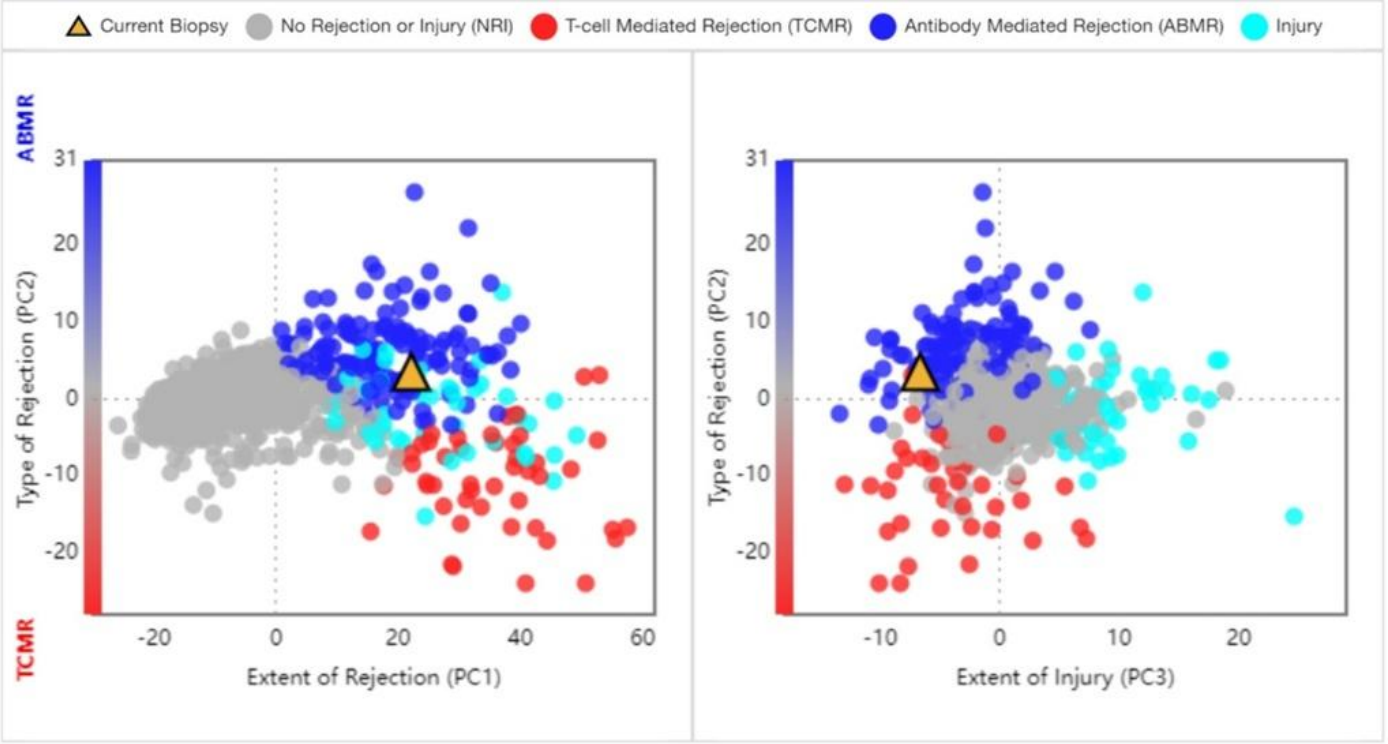
THE MOLECULAR MICROSCOPE DIAGNOSTIC SYSTEM (MMDX-HEART) IN PAEDIATRIC HEART TRANSPLANT RECIPIENTS: COMPARISON WITH HISTOLOGY AND IMPACT ON CLINICAL MANAGEMENT

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Background and Aim: The Molecular Microscope Diagnostic System for heart transplantation (MMDx-Heart) utilises microarrays to quantify biopsy-based gene expression and employs machine learning to interpret the results. MMDx assesses T cell–mediated rejection, antibody-mediated rejection, parenchymal injury, and atrophy-fibrosis (Halloran et al, Transplantation, 2023). The objective of this study was to compare MMDx to histology and evaluate its impact on patients' management.
Methods: A single-centre retrospective analysis of MMDx results (November 2022 - November 2025). The MMDx® was licensed and established in the routine clinical practice at the Institute for Clinical and Experimental Medicine in Prague and the results were obtained within a 72-hour period. MMDx was indicated only in patients exhibiting discrepancies between clinical and histological findings, or in patients deemed to be at elevated risk of rejection.
Results: MMDx tests were conducted on 38 endomyocardial biopsies (EMB) from 17 patients, with a median time of 519 days (IQR 87 – 1315) after transplantation. Mild systolic dysfunction was observed in 2 cases, diastolic dysfunction in 14, and donor specific antibodies in 12. The most prevalent EMB finding was no rejection in histology (cellular rejection grade up to 1R) in concordance with MMDx (N=25). A considerable degree of disagreement was observed in cases of rejection (Table 1 – concordant results shown in green, discordant in red). MMDx results influenced further management in the majority of cases (92%), resulting in decreased (53%) or increased (18%) rejection surveillance, acute anti-rejection treatment initiation (8%) or omission (5%), chronic immunosuppression intensification (13%), or verification of anti-rejection treatment effect (21%).

Table 1

	MMDx				
Histology	No rejection	T-cell mediated rejection	Antibody mediated rejection	Mixed rejection	Injury
No rejection	25	1	2	1	0
Acute cellular rejection (> 1R)	2	0	1	0	1
Antibody mediated rejection (> pAMR0)	2	0	2	0	1



Conclusions: In the majority of EMBs, MMDx results influenced the clinical management in a subpopulation of heart transplant recipients who were at higher risk of rejection. MMDx has the potential to enhance the diagnosis of rejection and might have higher sensitivity than histology. However, the current clinical relevance in paediatric heart transplant recipients remains unclear, especially in cases of discordant results from histology.



FT-061 / #765

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

DROPLET DIGITAL PCR FOR DONOR-DERIVED CELL-FREE DNA MEASUREMENT IN A NATIONAL PEDIATRIC HEART TRANSPLANT COHORT

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Background and Aim: Donor-derived cell-free DNA (dd-cfDNA) has emerged as a promising noninvasive biomarker for allograft injury after heart transplantation, with growing evidence in both adult and pediatric practice. Several centers already use dd-cfDNA in clinical care; however, most assays rely on next-generation sequencing (NGS), which is costly, slow, and reports only donor fraction (DF). We developed a droplet digital PCR (ddPCR)–based assay enabling absolute quantification of dd-cfDNA, which may improve diagnostic precision and feasibility. This study evaluated the ability of ddPCR-derived dd-cfDNA levels to distinguish rejection from quiescence in a national pediatric heart transplant cohort during the first post-transplant year.
Methods: We conducted a prospective, national, multicenter study including 24 pediatric heart transplant recipients. All endomyocardial biopsies performed during the first post-



transplant year were paired with plasma sampling for dd-cfDNA analysis. In total, **193 paired biopsy–plasma samples** were analyzed using our ddPCR assay targeting informative single-nucleotide polymorphisms to quantify both absolute dd-cfDNA levels and DF. Rejection was adjudicated according to contemporary histopathologic criteria.

Results: Across 193 assessments, absolute dd-cfDNA levels were significantly higher during biopsy-proven rejection compared with quiescence, whereas DF showed greater overlap between states. Receiver-operating characteristics demonstrated superior discriminatory performance of absolute dd-cfDNA levels relative to DF. The ddPCR workflow provided short turn-around times and reliable detection across the pediatric age and size spectrum. These results align with prior work in kidney transplantation and extend emerging heart transplant data from other groups, supporting ddPCR-derived absolute dd-cfDNA as a robust surveillance tool.

Conclusions: Absolute dd-cfDNA quantification using ddPCR outperformed donor fraction for detecting allograft rejection in this national pediatric cohort. ddPCR offers a rapid and cost-efficient alternative to sequencing-based assays and supports safer surveillance with fewer routine biopsies—particularly important in pediatrics, where biopsies require anesthesia and entail added risk. A current limitation is the relatively large blood volume needed per analysis, underscoring the need for pediatric-appropriate blood collection tubes and further assay miniaturization. Pediatric-specific thresholds for absolute dd-cfDNA also require refinement, but these data highlight ddPCR-based dd-cfDNA testing as a major step toward individualized, minimally invasive follow-up in childhood heart transplantation.



FT-062 / #495

FLASH TALK SESSION 3
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COMPREHENSİVE RETROSPECTİVE ANALYSİS OF 104 SCİMİTAR SYNDROME PATİENTS OVER 33 YEARS

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Background and Aim: Scimitar syndrome presents wide anatomical and clinical heterogeneity. This study reports a retrospective, comprehensive 33-year single-center cohort, detailing morphology, interventions and outcome.
Methods: A retrospective review of 104 patients (1992–2025) to include clinical presentation, imaging, morphology, catheter-based interventions, surgery and outcomes is deccribed.
Results: There were 63 females (60.6%) and 41 males (39.4%). Mean age at presentation was 10.7 years (range: 1 day–68 years), 59 patients (56,7%) presenting before 1 year. Mean age at last review was 22.2 years (60 days–70 years), mean follow-up was 11.5(range 58 days to 38,3 years). Common associated anomalies included atrial septal defect (ASD, 35.6%), left superior vena cava (19.2%), and patent ductus arteriosus (PDA, 17.3%). Dextrocardia occurred in 73.1%. Pulmonary arterial abnormalities, mainly involved the right (RPA) (~70%). Symptoms varied at presentation; at last review, 42.3% were asymptomatic. Among asymptomatic patients (n=44), 27,3% underwent combined surgical and transcatheter therapy, 22,7% surgery alone, 15,9 % transcatheter intervention only, and 34.1% required no intervention. Single systemic collateral artery was present in 70 , and multiple in 31, categorized by anatomical origin and size. Pulmonary venous return patterns included total right-lung drainage in 17 patients (16.3%), total left-lung drainage in 1 (1%), and partial right-lung drainage in 86 (82.7%) mostly to inferior vena cava (IVC, 51.9%) or the IVC–right atrial junction (29.8%). Pulmonary vein (PV) or scimitar vein stenosis ranged from mild to severe and was classified in 17 patients as pre- or postoperative. Cardiac catheterisation in 122 included 63 (51,6%) interventional procedures with embolisation of collaterals in 46. Surgery was required in 47 (45,2 %), most commonly for partial anomalous pulmonary venous drainage (PAPVD) repair. Cardiovascular magnetic resonance (CMR) was performed 95 times: 64 patients had one scan and 22 had two or more, primarily for follow-up. Pre-operative CMR in seven patients showed varying degrees of right-sided volume overload, with a mean right ventricular (RV) end-diastolic indexed volume of 107.71 mL/m^2 (range: 25–228) and a mean Qp/Qs of 1.86



(range: 1.1–2.9).

Conclusions: The study emphasises the anatomical variability and demonstrates multimodality imaging is crucial for accurate diagnosis, risk stratification, and timely intervention.



FT-063 / #523

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

DOUBLE-ORIFICE TRICUSPID VALVE: AN UNUSUAL DIAGNOSIS IN A YOUNG PATIENT

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Background and Aim: Double orifice tricuspid regurgitation (DOTV) is a rare congenital heart defect characterized by the presence of two separate orifices in the tricuspid valve, leading to abnormal blood flow from the right ventricle to the right atrium. It can occur in isolation or in association with other cardiac and noncardiac anomalies. The majority of cases are diagnosed incidentally during open-heart surgery or echocardiographic examination. This condition can cause various symptoms and complications, and its management depends on the severity of the defect. We present a rare case of an incidental finding of a DOTV in a young patient.
Methods: A 24-year-old man with no prior medical history presented to the cardiology department complaining of palpitations. Physical examination revealed no abnormalities, but an electrocardiogram showed evidence of preexcitation, suggesting an accessory electrical pathway.
Results: To further investigate, transthoracic echocardiography was performed, which made the surprising discovery of a rare congenital heart defect, a DOTV. The echocardiography showed the presence of two separate right atria, each with their own tricuspid valve, both draining into a single right ventricle. Importantly, there was no stenosis or regurgitation noted at either valve orifice. No other intracardiac anomalies were detected. Cardiac magnetic resonance imaging was used to confirm the echographic findings and solidify the diagnosis of isolated DOTV. Given the patient's normal functional status, lack of major symptoms, and absence of other cardiac defects, the decision was made to monitor him regularly with clinical visits and periodic echocardiography. The preexcitation was likely an incidental finding unrelated to the DOTV. With close follow-up, the patient should be able to maintain a good quality of life without need for intervention, barring any future changes in his condition.
Conclusions: The absence of significant symptoms and associated intracardiac anomalies underscores the importance of careful evaluation and monitoring in asymptomatic cases. Regular follow-up will ensure that any changes in the patient's



condition are promptly addressed, allowing for the maintenance of a good quality of life. This case emphasizes the need for heightened awareness of DOTV among clinicians, as early identification and appropriate management can lead to favorable outcomes in affected individuals.



FT-064 / #920

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

USE OF CHRONIC TOTAL OCCLUSION TECHNIQUES FOR SUCCESSFUL STENTING OF THORACIC AORTIC ATRESIA

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Background and Aim: Thoracic aortic atresia represents a rare and severe form of aortic coarctation in adults, often presenting with longstanding or refractory hypertension. We report the successful stenting of an atretic thoracic aortic segment in a 22-year-old patient, highlighting technical aspects that are relevant to complex congenital interventions.
Methods: The patient was admitted with severe hypertension and absent lower limb pulses. CT angiography revealed a 2.5 cm atretic segment of the thoracic aorta distal to the left subclavian artery, with extensive collateral vessels. Initial attempts to cross the atretic segment using standard guidewires were unsuccessful. A coronary chronic total occlusion strategy was therefore employed, using a Confianza Pro 12 guidewire and a FineCross microcatheter. After successful wire passage, repeated predilatations were performed. A 45-mm Cheatham-Platinum covered stent was subsequently delivered and deployed. A snare introduced through femoral access was used to externalise a BMW guidewire to ensure better support during stent advancement.
Results: Complete revascularisation of the atretic segment was therefore achieved, with complete elimination of the translesional pressure gradient and equalisation of proximal and distal blood pressure measurements. Post-procedural angiography confirmed optimal stent expansion without visible signs of dissection or distal embolisation. The patient was discharged 36 hours later, on a reduced antihypertensive treatment. At one-month follow-up, the patient remained asymptomatic, with optimal blood pressure control and palpable lower-limb pulses.
Conclusions: Percutaneous stenting represents a safe and effective therapeutic option for selected cases of thoracic aortic atresia, even when the atretic segment is long or technically challenging. Adopting techniques derived from coronary chronic total



occlusion interventions can be crucial in successfully crossing and treating these lesions. This case highlights the increasing applicability of endovascular approaches in complex congenital aortic pathology.



FT-065 / #1538

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

CLINICAL UTILITY OF NEUTROPHIL-TO-LYMPHOCYTE RATIO AND SYSTEMIC INFLAMMATION RESPONSE INDEX IN PEDIATRIC KAWASAKI DISEASE

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Background and Aim: Kawasaki disease is an acute systemic vasculitis of childhood and a leading cause of acquired heart disease in developed countries. Despite intravenous immunoglobulin (IVIG) therapy, some patients develop IVIG resistance and coronary artery involvement, highlighting the need for simple inflammatory biomarkers. The neutrophil-to-lymphocyte ratio (NLR) and systemic inflammation response index (SIRI) reflect systemic inflammation, but their utility in Kawasaki disease remains unclear. This study evaluated the association of admission NLR and SIRI with disease type, IVIG response, and coronary artery involvement in children with Kawasaki disease.
Methods: This retrospective observational study included children with Kawasaki disease followed at a tertiary pediatric cardiology center between 2011 and 2025. Demographic, clinical, laboratory, echocardiographic, and treatment data were retrospectively collected. Kawasaki disease was classified according to American Heart Association criteria. Admission neutrophil, lymphocyte, and monocyte counts were used to calculate the neutrophil-to-lymphocyte ratio (NLR) and systemic inflammation response index (SIRI). IVIG resistance was defined as persistent or recurrent fever ≥36 hours after IVIG infusion. Coronary artery involvement was evaluated using Z-score–based echocardiography, and comparisons were performed using non-parametric tests.
Results: Eighty-five children with Kawasaki disease were included. Echocardiographic coronary artery involvement was detected in 21 patients (24.7%), while intravenous immunoglobulin (IVIG) resistance was observed in 8 patients (9.4%). Admission neutrophil-to-lymphocyte ratio (NLR) and systemic inflammation response index (SIRI) values showed non-normal distributions. While median NLR and SIRI values did not difer significantly according to disease type or IVIG response (all $p > 0.05$), both indices were significantly different in patients with echocardiographic coronary artery involvement compared to those without ($p = 0.003$ for NLR and $p = 0.002$ for SIRI).
Conclusions: In this cohort of children with Kawasaki disease, admission NLR and SIRI were not associated with disease type or IVIG resistance but were significantly higher in patients with coronary artery involvement. These findings suggest that both indices may



reflect vascular inflammation and could serve as accessible adjunctive markers for identifying patients at increased risk of coronary involvement, although they should not be used as standalone predictors and require validation in larger, prospective studies.



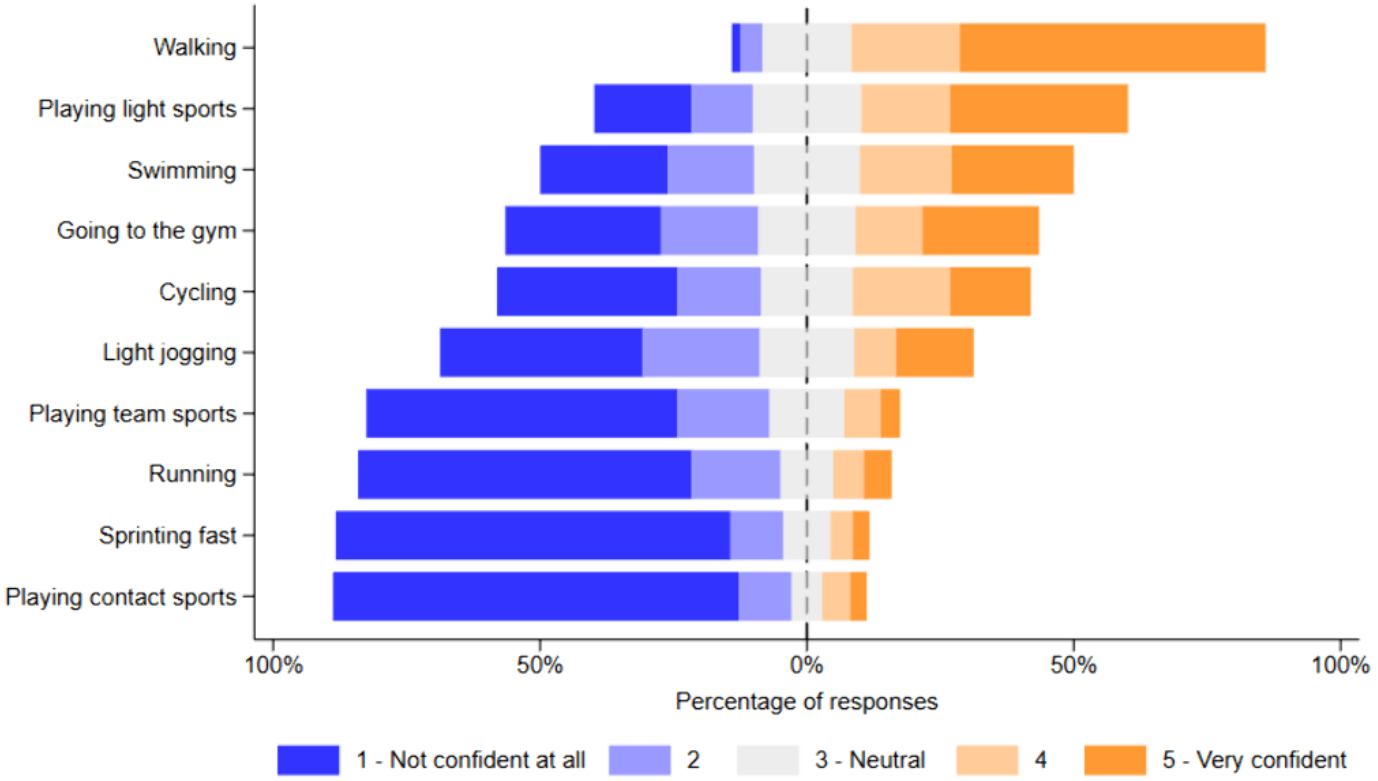
FT-066 / #223

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

ATTITUDES TOWARDS AND BARRIERS AGAINST EXERCISE IN ADULTS LIVING WITH CONGENITAL HEART DISEASE.

Conor Gibb[1], Dan-Mihai Dorobantu[1], Radwa Bedair[2], Craig Williams[1]
[1]University of Exeter, Exeter, United Kingdom, [2]Bristol Heart Institute, Bristol, United Kingdom

Background and Aim: Surveys of UK parents of children with congenital heart disease (CHD) identified inconsistent guidance and symptom-related barriers to exercise. How these barriers and attitudes evolve in adults with CHD remains unclear.
Methods: We conducted an anonymous online survey of adults with CHD. A 5-point Likert scale assessed exercise confidence, perceived barriers, and clinician advice. CHD severity was classified according to European Society of Cardiology guidelines. Associations between demographic and clinical factors, confidence, barriers, and advice needs were analysed using multivariable regression.
Results: 192 responses met our criteria, 163 (85.3%) female and median age 45 y (IQR 32-52). CHD severity was mild in 26 (13.5%), moderate in 86 (44.8%) and severe in 80 (42.7%). 59 (30.7%) exercised daily, 74 (38.6%) weekly/monthly and 59 (30.7%) rarely/never. Respondents tended to be more confident in lighter or mixed sports, but there are still barriers towards team sports and contact activities (Figure 1.).



The most common barriers to exercise were related to getting out of breath (n=128, 66.7%) and feeling that they do less than others (n=108, 56.3%). Ten (5.2%) respondents had advice not to exercise. Common themes around medical professional advice were safety (n= 134, 69.7%), exercise intensity (n=118, 61.5%) and when to stop (n=107, 55.7%). These were inconsistently associated with barriers and exercise confidence, not with CHD severity. CHD severity was not significantly associated with confidence in light or moderate sports ($p=0.3$), but was significantly associated with lower confidence in team or contact sports ($p=0.004$). Factors associated with lower overall confidence in exercising were: older age ($p<0.05$), female gender ($p=0.02$), perceiving shortness of breath as barrier ($p<0.05$) and perceiving safety as a barrier ($p<0.05$). Exercise frequency was independently associated with higher confidence in exercising ($p<0.05$).

Conclusions: In adults with CHD, anatomical severity correlates poorly with exercise confidence, barriers, and advice sought. Exercise confidence is most influenced by exercise frequency, breathlessness, and safety concerns. To improve physical activity levels, a detailed discussion with each patient should be added to clinical risk stratification. This should include exploring their individual situation, fears and barriers, exercise preferences, and to provide useful advice on exercise.



FT-067 / #399

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

DIAGNOSTIC YIELD OF THE JUST PROJECT FOR EARLY IDENTIFICATION OF YOUTH AT RISK FOR SUDDEN CARDIAC DEATH

Francesca Bonanni[1], Francesco Gentile[1], Francesca Moschetti[1], Francesca Pennucci[1], Angela Durante[1], Sabrina Nuti[1], Marco Di Paolo[2], Claudio Passino[1], Michele Emdin[1], Alberto Giannoni[1]
[1]Scuola Superiore Sant'Anna, pisa, Italy, [2]Department of Surgical Pathology, University of Pisa, pisa, Italy

Background and Aim: Juvenile sudden cardiac death (SCD) remains a major cause of mortality in otherwise healthy young individuals. While screening has proven effective in athletes, most adolescents (70–80%) are non-athletes and do not undergo routine evaluation. We hypothesized that a low-cost, school-based cardiovascular screening could enable early detection of SCD-related conditions. The JUST (JUvenile Sudden deaTh) project is the first regional programme in Tuscany implementing cardiovascular screening in high schools.
Methods: We conducted a prospective, multicentre study involving students in the 2nd and 5th year of six high schools across Tuscany. First-line screening included a standardized questionnaire (family history of SCD, inherited cardiac diseases, symptoms) and a 12-lead ECG. In case of abnormal findings, second-line investigations locally (echocardiography, Holter ECG monitoring, and/or exercise testing), or third-line investigations (cardiac MRI, genetics, or electrophysiological testing) were planned.
Results: From 2022 to 2025, 1782 students were screened (mean age 17.1 ± 1.8 years; 53% male). Smoking was reported by 629 individuals (35%), and 481 (27%) engaged in competitive sports. Abnormal findings at first-line screening were detected in 5.6% of participants, who were consequently referred for second-line investigations. Six previously unrecognized cardiac conditions associated with SCD risk were diagnosed: arrhythmogenic cardiomyopathy (n=1), Wolff–Parkinson–White syndrome (n=2), left ventricular non-compaction (n=1), inherited aortopathy (n=1), and anomalous pulmonary venous return requiring surgical repair (n=1). A detection rate of 0.3% is consistent with the expected yield of other established preventive screening initiatives.
Conclusions: School-based cardiovascular screening showed meaningful clinical yield by enabling early detection of conditions predisposing to juvenile SCD. The progressive adoption of simplified, algorithm-supported pathways, together with structured operator training and integration with BLSD education, may provide a scalable model for regional



and national prevention strategies. Long-term follow-up will be essential to assess the overall population impact of this programme.



FT-068 / #168

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

PRE-PROCEDURAL 3D MODELLING AND GUIDED PERCUTANEOUS PULMONARY ARTERY BANDING IN A 1-MONTH-OLD INFANT WITH TRICUSPID ATRESIA

Stasa Krasic, Vladislav Vukomanovic, Vesna Topic
Mother And Child Health Institute Of Serbia, Belgrade, Serbia

Background and Aim: Tricuspid atresia (TA) is a complex congenital heart defect (CHD) requiring staged surgical interventions. Percutaneous pulmonary artery banding (PAB) using modified Microvascular plugs (MVP) is a novel type of standard, initial palliative procedure that reduces pulmonary blood flow and prepares the patient for subsequent surgical palliation. This case report highlights the application of 3D printing technology for pre-procedural planning and guided percutaneous PAB in a 2-month-old infant with TA.
Methods: Case Presentation: A 1-month-old male infant (body weight 5 kg) diagnosed with TA and transposition of great vessels (TGA) presented with signs of pulmonary overcirculation. Pulmonary artery (AP) branching was not at the same level, and angulation of the right AP was observed. Due to unusual pulmonary artery branching, pre-operative computed tomography (CT) imaging of the chest was obtained. Using CT data, a patient-specific 3D model of the pulmonary artery (PA) and its branching anatomy was generated via 3D printing. This model allowed for detailed visualization of the PA, identification of anatomical variations, and simulation of optimal band placement. Furthermore, a custom-designed, 3D-printed guide was created to facilitate accurate band delivery during the percutaneous procedure, accounting for the infant's specific PA anatomy.
Results: Under fluoroscopic guidance, percutaneous PAB using modified MVP with concomitant balloon atrioseptostomy was performed. The 3D-printed model was used to determine the ideal device size and location preoperatively. According to the PA branches' sizes (branches diameters were 5mm), MVP7Q were placed in both branches. The place was selected to avoid the jailing of lobar branches. The procedure was transthoracic echocardiography-guided, and LPA was banded first. Post-procedural echocardiography and angiography demonstrated optimal MVPs placement and a significant reduction in pulmonary blood flow. Percutaneous oxygen saturation (SpO2) decreased from 98 to 82%. No complications were observed. The procedure was completed successfully with excellent clinical and echocardiographic outcomes. The patient was symptom-free and underwent an uneventful Glenn procedure at 6 months of age.
Conclusions: 3D printing provides an innovative and effective tool for pre-procedural planning and guided percutaneous PAB intervention, as demonstrated in this case of a 1-



month-old infant with TA. This technology can contribute to improved procedural accuracy, reduced complications, and optimized patient outcomes.



FT-069 / #228

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

INCIDENCE AND TREATMENT OF POSTOPERATIVE ACUTE KIDNEY INJURY FOLLOWING CONGENITAL HEART SURGERY

Helene Wendt[1], Muneaki Matsubara[1], Thibault Schaeffer[1], Jonas Palm[2], Andrea Amici[2], Paul Philipp Heinisch[1], Alfred Hager[2], Jürgen Hörer[1], Masamichi Ono[1]
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Background and Aim: Acute kidney injury (AKI) complicates congenital heart surgery, leading to increased morbidity and mortality. This study aimed to assess the incidence, treatment, and risk factors for postoperative AKI and its impact on outcomes.
Methods: In patients undergoing congenital heart surgery with cardiopulmonary bypass from January 2001 to January 2024, the incidence of AKI during their hospital stay was evaluated. Treatment, outcomes after AKI, and risk factors for mortality were analyzed.
Results: Among 9892 congenital heart surgeries during the study period, AKI developed in 465 patients (4.7%). Age at operation was younger (0.1 (IQR: 0.02-0.7) vs. 1.3 (IQR: 0.3-10.0) years, p<0.001) and CPB time was longer (130 (IQR: 88-177) vs. 85 (IQR: 55-124) minutes, p<0.001) in patients with AKI than in those without. Aortic cross-clamp was needed more frequently (82.2 vs. 73.2%, p<0.001), and cross-clamp time was longer (median 65 (IQR: 42-98) vs. 57 (IQR: 36-84) minutes, p<0.001) in patients with AKI than those without. The highest risk procedure for AKI was TAPVC repair (21.8%), followed by arterial switch operation concomitant with aortic arch reconstruction and VSD closure (20.0%), Ross-Konno procedure (18.5%), the Norwood procedure (18.4%), and truncus arteriosus repair (13.8%). Peritoneal dialysis (PD) was performed in 301 patients (3.0%) with a median duration of 3 (IQR: 1-7) days. Continuous veno-venous hemodialysis (CVVHD) was performed in 213 patients (2.2%) with a median duration of 5 (IQR: 2-10) days. Hospital mortality was higher in patients with AKI than those without (42.6 vs. 2.5%, p<0.001), and AKI was an independent risk factor for in-hospital death (OR: 29.105, p<0.001). Risk factors for hospital death in patients with AKI were CVVHD support (OR: 3.543, p<0.001), the Norwood procedure (OR: 1.790, p=0.022), Heterotaxy (OR: 3.505, p=0.006), neonatal operation (OR: 1.455, p=0.047), longer CPB time (OR: 1.004, p=0.003),



and high STAT scores (4 or 5, OR: 1.727, p=0.004).

Conclusions: AKI occurred in approximately 5% after congenital heart surgery. AKI was an independent risk factor for in-hospital death. CVVHD support, Norwood procedure, Heterotaxy, neonatal operation, longer CPB time, and high STAT scores were identified as risk factors for hospital mortality after the development of AKI.

Major cardiac procedures and the incidence of AKI

Variables	ALL	AKI (+)	p-value
Intracardiac repair			
VSD closure	1044	19 (1.8)	<0.001
ASD	760	6 (0.8)	<0.001
CAVSD	392	13 (3.3)	0.186
ASO for TGA	352	7 (2.0)	0.014
ASO, VSD	105	8 (7.6)	0.155
ASO, VSD, arch repair	20	**4 (20.0)**	0.001
PAPVC, ASD	254	2 (0.8)	0.003
TOF TAP	240	11 (4.6)	0.931
TOF non TAP	215	8 (3.7)	0.493
Aortic arch reconstruction	229	20 (8.7)	0.004
Rastelli	155	1 (0.6)	0.016
Partial AVSD	145	3 (2.1)	0.131
Aortic arch + VSD	122	14 (11.5)	<0.001
TAPVC repair	110	**24 (21.8)**	<0.001
TAC repair	58	**8 (13.8)**	0.001
SV palliation			
Norwood	408	**75 (18.4)**	<0.001
Aortopulmonary shunt	415	33 (8.0)	0.001
BCPS	586	11 (1.9)	<0.001
Fontan	584	18 (3.1)	0.057

Variables	ALL	AKI (+)	p-value
Valve procedure			
RVOT Conduit exchange	630	15 (2.4)	0.004
AVR	318	7 (2.2)	0.032
MV repair	216	5 (2.3)	0.094
MVR	215	11 (5.1)	0.771
TV repair	191	11 (5.8)	0.485
AV repair	125	6 (4.8)	0.958
Ebstein repair	116	3 (2.6)	0.279
TVR	109	7 (6.4)	0.393
Ross	104	0 (0.0)	0.023
Bentall	100	1 (1.0)	0.079
David	77	2 (2.6)	0.381
CAVV repair	44	5 (11.4)	0.036
DVR	39	2 (5.1)	0.899
Ross-Konno	27	**5 (18.5)**	<0.001
PVR	27	0 (0.0)	0.248
PV repair	16	0 (0.0)	0.374
CAVV replacement	7	2 (28.6)	0.003



FT-070 / #232

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

CLINICAL OUTCOME FOLLOWING REPAIR OF TOTAL ANOMALOUS PULMONARY VENOUS CONNECTION: COMPARISON OF BIVENTRICULAR AND SINGLE-VENTRICULAR PATIENTS

Viola Kellerer[1], Muneaki Matsubara[1], Thibault Schaeffer[1], Jonas Palm[2], Andrea Amici[2], Paul Philipp Heinisch[1], Alfred Hager[2], Jürgen Hörer[1], Masamichi Ono[1]
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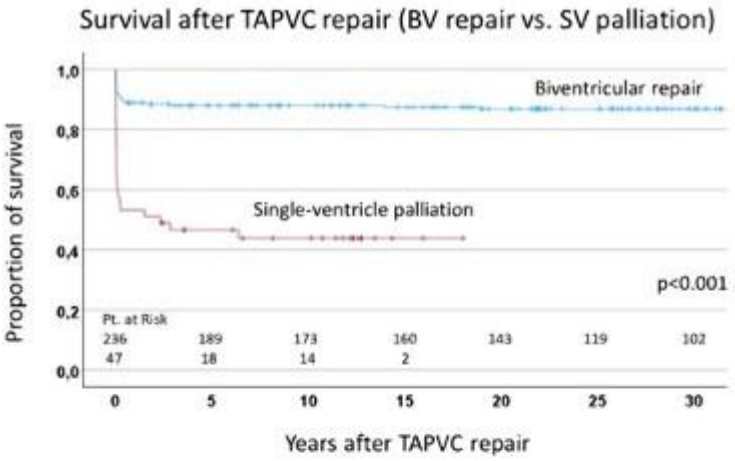
Background and Aim: Total anomalous pulmonary venous connection (TAPVC) can occur in combination with single-ventricle or biventricular physiology. We sought to evaluate the clinical outcomes following TAPVC repair and to identify risk factors for mortality and reoperation.
Methods: All patients who underwent repair of TAPVC between June 1974 and April 2025 were reviewed. Clinical outcomes were evaluated using the Kaplan-Meier method and risk factors were analyzed using Cox regression models.
Results: A total of 283 consecutive patients were included. Types of TAPVC included supra-cardiac (n=128), cardiac (n=60), infra-cardiac (n=79), and mixed (n=16). Association of functional single ventricle was observed in 47 patients, heterotaxy in 25, and pulmonary venous obstruction in 151. Median age at TAPVC repair was 17 (IQR: 7-78) days. The median CPB time and AXC time were 65 (IQR: 45-109) and 50 (IQR: 38-62) minutes, respectively. DHCA was used in 168 patients with a median duration of 42 (IQR: 28-52) minutes. There were 41 in-hospital deaths and 18 late deaths with a median follow-up time of 26 (IQR: 11-40, max: 52) years. Survival was higher in biventricular patients than in single-ventricular patients (88.0 vs. 46.6% at 5 years, $p<0.001$). Single ventricle physiology (HR: 3.327, $p<0.001$) and longer CPB time (HR: 1.009, $p<0.001$) were identified as independent risk factors for mortality. Survival in patients with single ventricle physiology improved in the later era (≥2000) compared to the early era (<2000) (50% vs. 20% at 5 years, $p=0.026$). Reoperation was performed in 55 patients (22.7%), including for pulmonary veins (n=21, 7.8%). Freedom from reoperation was higher in biventricular patients than in single-ventricle patients (87.1 vs. 11.5% at 5 years, $p<0.001$). However, freedom from reoperation

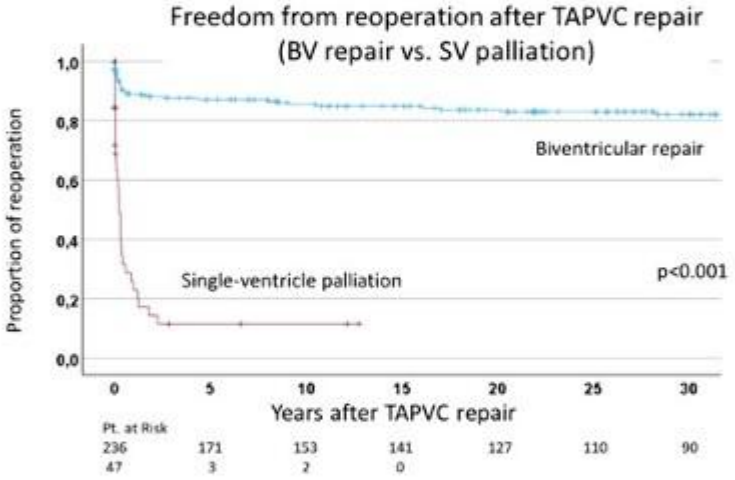


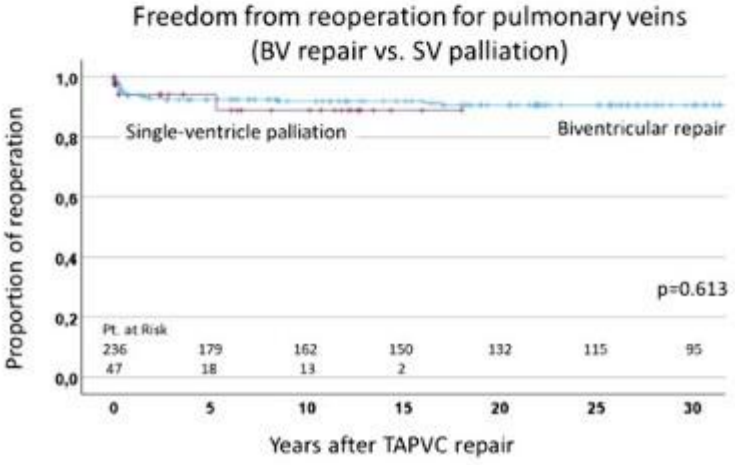
for pulmonary veins was similar between the groups (92.5 vs. 88.9% at 5 years, p=0.613). A longer CPB time (HR: 1.009, p=0.017) was identified as a sole risk factor for reoperation for pulmonary veins.

Conclusions: Survival after TAPVC repair was excellent in biventricular patients. In contrast, survival of patients with single ventricle physiology remains poor, but has improved in the last decades. Reoperations for pulmonary veins are rare, and occur at

similar rates in biventricular and single-ventricle







patients.



FT-071 / #349

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

EARLY OUTCOMES OF PERVENTRICULAR DEVICE CLOSURE OF VENTRICULAR SEPTAL DEFECT THROUGH PARTIAL LOWER STERNOTOMY: A SINGLE-CENTRE RETROSPECTIVE STUDY

Varsha Walavalkar[1], Shreesha Maiya[1], Sweta Mohanty[1], Prakash Ramachandra[1], Satheesh Siddaiah[1], Atul Prabhu[1], Suresh Pujar[1], Roshni Vinosha E[2], Ward Vanagt[3], Sudesh Prabhu[4], Tammo Delhaas[5]
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Background and Aim: Perventricular VSD device closure on the beating heart avoids cardiopulmonary bypass and, when performed via partial lower sternotomy, allows minimally invasive access with faster recovery. The aim of the study is to evaluate outcomes and causes of failure in perventricular VSD device closure via partial lower sternotomy.
Methods: Retrospective review of all perventricular VSD device closures performed between February 2022 and August 2025. Patient characteristics, procedural details, and outcomes were compared among successful and failed perventricular device closure cases and between device types.
Results: Among 38 attempted closures, device implantation was successful in 26 (68.4%) and failed in 12 (31.5%) patients. Perimembranous VSDs constituted 92.1% of cases. Failure did not correlate with age, VSD type, or device type. Children receiving Konar-Multifunctional Occluder (Konar-MFO) were significantly younger ($P < 0.001$). The total hospital stay was also found significantly longer in failed cases ($P=0.007$). No new valve regurgitation or rhythm abnormality occurred. PR intervals did not significantly change between pre and post-procedure for successful ($P=0.66$) and failed ($P=0.14$) cases. Failure was due to residual shunt, valve interference, or embolization.
Conclusions: Perventricular VSD device closure through partial lower sternotomy is safe and effective in selected patients. Konar-Multifunctional Occluder (Konar- MFO) and Amplatzer Duct Occluder (ADO) devices were equally suitable. Precise pre-procedural



anatomical assessment and larger studies are required to refine device selection and standardize technique.



FT-072 / #377

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

IMPACT OF SURGICAL EXPOSURE AND ANASTOMOTIC TECHNIQUES ON OUTCOMES IN INFRACARDIAC TOTAL ANOMALOUS PULMONARY VENOUS CONNECTION: INSIGHTS INTO THE MECHANISMS OF POSTOPERATIVE PULMONARY VEIN OBSTRUCTION

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Background and Aim: This study aims to compare the outcomes of different surgical approaches for patients with infracardiac total anomalous pulmonary venous connection (TAPVC).
Methods: A retrospective study was conducted on patients with infracardiac TAPVC who underwent the sutureless technique (ST) (n=18), atrial septal approach(ASP) (n=41) or oblique sinus approach (OSP) (n=89) at 5 Chinese centers between 2009 and 2022. Endpoints were death, pulmonary vein obstruction (PVO), low cardiac output syndrome (LOCS). A univariate and multivariate risk analysis was performed. Time-to-event analysis was conducted using Kaplan-Meier estimates.
Results: This study ultimately included 148 patients with an median age of 24 days (interquartile range [IQR]:13-40days). At a median postoperative follow-up period of 28 months (IQR: 2.6-52 months), 24 deaths occurred. Compared to the other two groups, the ST group had a higher incidence of LOCS (72.2%) (p=0.008). There was a trend of lower mortality in the ST group although it did not reach a statistical difference (p=0.183). In terms of reducing the occurrence of PVO, the ST group was significantly superior to the OSP group (p=0.035) and showed a trend towards superiority over the ASP group, but did not reach statistical significance (p=0.084). Multivariate Cox regression analysis revealed that a larger standardized difference in left atrial diameter (HR: 1.019, 95% CI: 0.961-0.995, p=0.011) was a protective factor against postoperative mortality, whereas prolonged cardiopulmonary bypass (CPB) time (HR: 1.022, 95% CI: 1.002-1.042, p=0.035) was identified as an independent risk factor for postoperative mortality. Residual obstruction (HR: 3.172; 95% CI: 1.674-6.021, p<0.001) was an independent risk factor for postoperative PVO.
Conclusions: ST was associated with lower risks of PVO and mortality in infracardiac



TAPVC patients, though a higher incidence of LOCS was observed perioperatively. The ASP showed superiority over the OSP and was comparable to ST in reducing PVO and mortality.



FT-073 / #395

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

TETRALOGY OF FALLOT REPAIR WITH CREATION OF A NEOPULMONARY VALVE FROM AUTOLOGOUS RIGHT ATRIAL APPENDAGE

Fabrizio Gandolfo[1], Giuseppe Ferro[1], Maria Derchi[2], Gianluca Trocchio[2], Giulia Tuo[2], Carmelo Arcidiacono[2], Roberto Formigari[2], Guido Michielon[1]
[1]GASLINI HOSPITAL GENOA, Pediatric Cardiovascular Surgery, Genoa, Italy, [2]GASLINI HOSPITAL, Pediatric Cardiac Unit, Genoa, Italy

Background and Aim: Children with tetralogy of Fallot (TOF) benefit from a competent and non-stenotic pulmonary valve (PV) as part of surgical reconstruction of the right ventricular outflow tract (RVOT). Native PV preservation may not be always possible if the PV annulus is <3 Z-score. Transannular repair results in free pulmonary regurgitation with well-known consequences. The aim of this study is to evaluate the efficacy of a neopulmonary valve (neoPV) construction from autologous right atrial appendage (RAA) during transannular repair of TOF.
Methods: Between November 2024 and November 2025 a bicuspid neoPV from autologous RAA was created in 7 patients undergoing primary TOF repair. The neoPV was implanted during the transannular recostruction of the RVOT.
Results: The seven patients had a median weight of 13.5 kg (ranging from 8 to 45 kg) and median age of 3.6 years (from 7 months to 17 years of age). One patient was previously palliated by construction of a right modified BT-shunt. The PV annulus was ≤ 3 Z score in all patients. The nominal neoPV diameter was measured intraoperatively by Hegar dilatators ranging from 13 to 19 mm (≥ 1.0 Z score). There was no mortality or postoperative morbidity and all patients were discharged home in excellent clinical condition with no residual lesions. At 6 months mean follow-up, a 2D echocardiogram with Doppler interrogation showed no or trivial neoPV regurgitation in 6 patients while mild to moderate neoPV insufficiency was detected in 1. RVOT peak gradients remained stable between 10 mmHg and 35 mmHg at 6 mo follow-up.
Conclusions: Creation of a neoPV from autologous RAA as part of transannular TOF repair seems to be a promising novel technique that prevents free pulmonary regurgitation or stenosis, thereby averting post operative right ventricle failure. Autologous RAA is a living tissue that may retain growth potential, hence this novel technique might avoid future PV replacement to treat right ventricular dilatation/dysfunction. Longer follow up is needed to confirm the efficacy and durability of the autologous RAA neoPV in RVOT reconstruction.



FT-074 / #455

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

GROWTH POTENTIAL OF THE PULMONARY VALVE ANNULUS FOLLOWING VALVE-SPARING REPAIR IN TETRALOGY OF FALLOT

Aws Al-Farsi[1], Mohammed Sobh[2], Saif Awlad Thani[3], Salim Al Maskari[2], Hamood Al Kindi[4]
[1]Department of Cardiothoracic Surgery, National Heart Center, Royal Hospital, Muscat, Oman, [2]Departement of Pediatric Cardiology, National Heart Center, Royal Hospital, Muscat, Oman, [3]Royal Hospital, Muscat, Oman, [4]Department of Cardiothoracic Surgery, National Heart Center, Royal Hospital and Department of Cardiothoracic Surgery, Department of Surgery, Sultan Qaboos University Hospital, Muscat, Oman

Background and Aim: Tetralogy of Fallot (TOF) repair has evolved toward a more aggressive valve-sparing approach. The decision between valve-sparing repair (VSR) and transannular patch repair (TAP) depends on patient anatomy and surgeon preference, resulting in variations in surgical practices across centers. The aim of this study is to evaluate the growth potential of the pulmonary valve (PV) annulus following standardized VSR in TOF patients and to compare clinical outcomes and postoperative right ventricular (RV) function between VSR and TAP.
Methods: This single-center study included TOF patients who underwent VSR by a single surgeon between 2020 and 2023. Repair was performed using a standardized technique, provided the peak PV gradient was <40 mmHg and RV pressure was <⅔ of systemic pressure following the procedure. Data collected at one-year follow-up included survival, surgical reinterventions, and echocardiographic parameters. Outcomes were compared with a historical cohort (2016–2023) of TOF patients who underwent TAP.
Results: The study included 34 patients in the valve-sparing group and 39 in the transannular patch group. Preoperative PV annulus size and z-scores were similar in both groups. However, significant improvements in annulus size (from 7.10 ± 1.73 mm to 10.28 ± 2.25 mm, $P < 0.001$) and z-score were observed in the valve-sparing group during follow-up. Postoperative RV FAC was significantly higher in the valve-sparing group (40% vs 34%, $P = 0.0089$). There was no mortality in either group. Multivariate logistic regression analysis showed that gender, age, weight at surgery, and the presence of collaterals had no significant impact on pulmonary annulus z-score improvement. Lower preoperative PV annulus z-score was the only independent predictor of postoperative annulus growth, with smaller baseline annulus size associated with significantly increased odds of growth (OR 0.32, $P = 0.037$).
Conclusions: The valve-sparing approach in TOF repair promotes significant PV annulus



growth and improves short-term RV function compared with the transannular patch technique. Importantly, a small preoperative pulmonary annulus should not discourage surgeons from pursuing a valve-sparing operation, as there is a potential for postoperative annular growth. Further studies are needed to identify the modifiers and biological determinants that influence pulmonary annulus growth in TOF.



FT-075 / #514

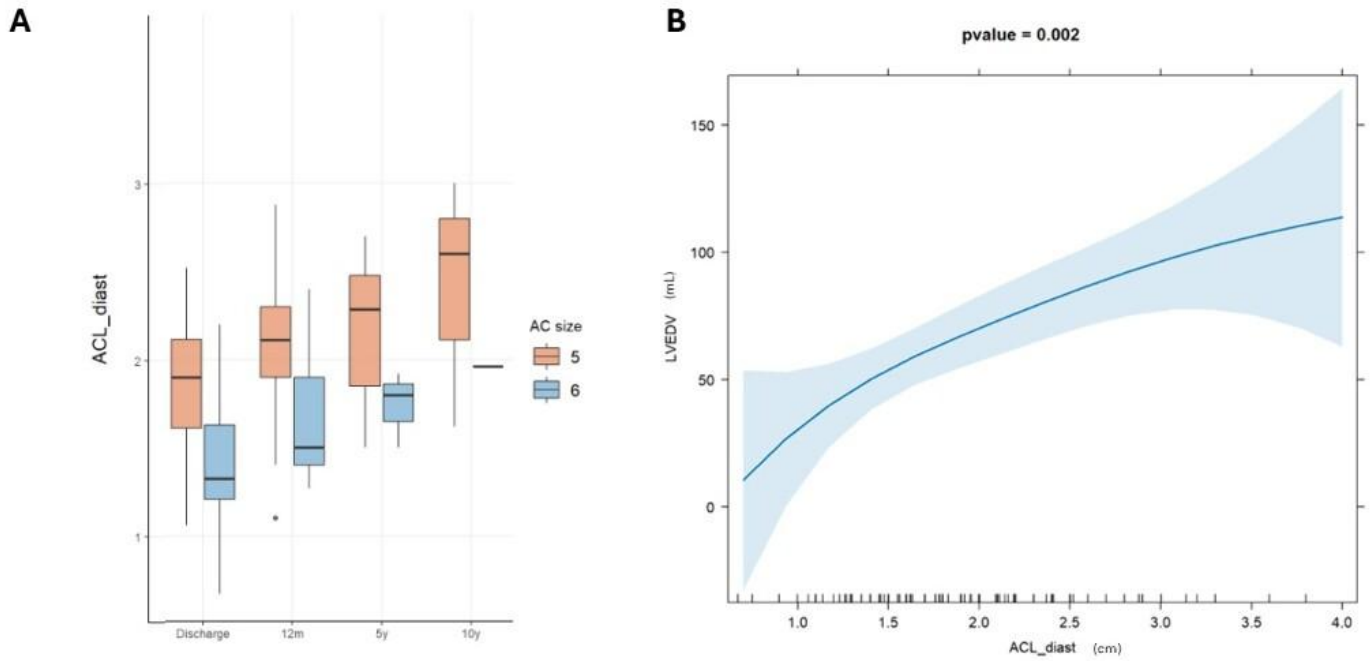
FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

DURABILITY AND ELONGATION OF ARTIFICIAL CHORDS IN PEDIATRIC MITRAL VALVE REPAIR: A COMPREHENSIVE ECHOCARDIOGRAPHIC ANALYSIS

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Background and Aim: Artificial chords (AC) are widely used in adult mitral valve (MV) repair, but their pediatric application remains debated due to leaflet fragility and durability concerns. Since leaflet motion restriction has not been reported, we aimed to evaluate the evolution, mechanics and outcomes of expanded polytetrafluoroethylene (ePTFE) AC in congenital MV repair through comprehensive echocardiographic analysis.
Methods: We retrospectively reviewed all patients <18 years who underwent MV repair with ePTFE AC between 2005-2024. Indications included congenital MV dysplasia, rheumatic disease, endocarditis, and atrioventricular canal. Patients without ≥ 1-month postoperative echocardiographic follow-up were excluded. AC were fashioned from 6-0 or 5-0 ePTFE sutures, anchored to papillary muscles and adjusted for optimal coaptation. Serial echocardiograms assessed residual mitral regurgitation (MR), transmitral gradients, and AC length evolution.
Results: Forty-two patients (median age 5 years, IQR 2–13) underwent MV repair with AC, with a median follow-up of 3.97 years (95% CI 2.51–7.03). Median number of AC was 4 (IQR 2–6). Progressive AC elongation was observed: median diastolic AC increased from 1.78 cm (1.38-2.04) at discharge to 2.28 cm (1.88-2.70) at 10 years, and systolic from 1.40 cm (1.14-1.67) to 2.10 cm (1.6-2.5). No difference was observed between 5-0 and 6-0 ePTFE. AC elongation correlated with left ventricle remodeling (end-diastolic and end-systolic volumes, p=0.002 and p=0.018) but not with coaptation length or tenting height (p=0.34, p=0.78). No AC rupture or calcification occurred. At 5 and 10 years, cumulative incidence of moderate-or-more mitral regurgitation (MR) was 39.0% (95% CI 26.5– 57.3) and 45.7% (95% CI 30.7–68.3). Reprolapse incidence at 10 years was 36.5% (95% CI 24.3-54.7). Mean transmitral gradient remained stable (median 4.4 mmHg [IQR 3.0–6.0] at discharge and 4.4 [IQR 3.0–7] at last follow-up). Ten-year reoperation incidence, accounting for death and transplant, was 20.1% (95% CI 10.8–37.4). Among the 7 reoperations, 3 (42.8%) were due

to prolapse and 2 (28.6%) to restriction.



Conclusions: In pediatric MV repair, ePTFE AC demonstrated excellent durability and adaptative elongation with somatic growth, preserving leaflet mobility. These findings support their long-term reliability congenital MV reconstruction. Further longitudinal and multimodal imaging studies are warranted.



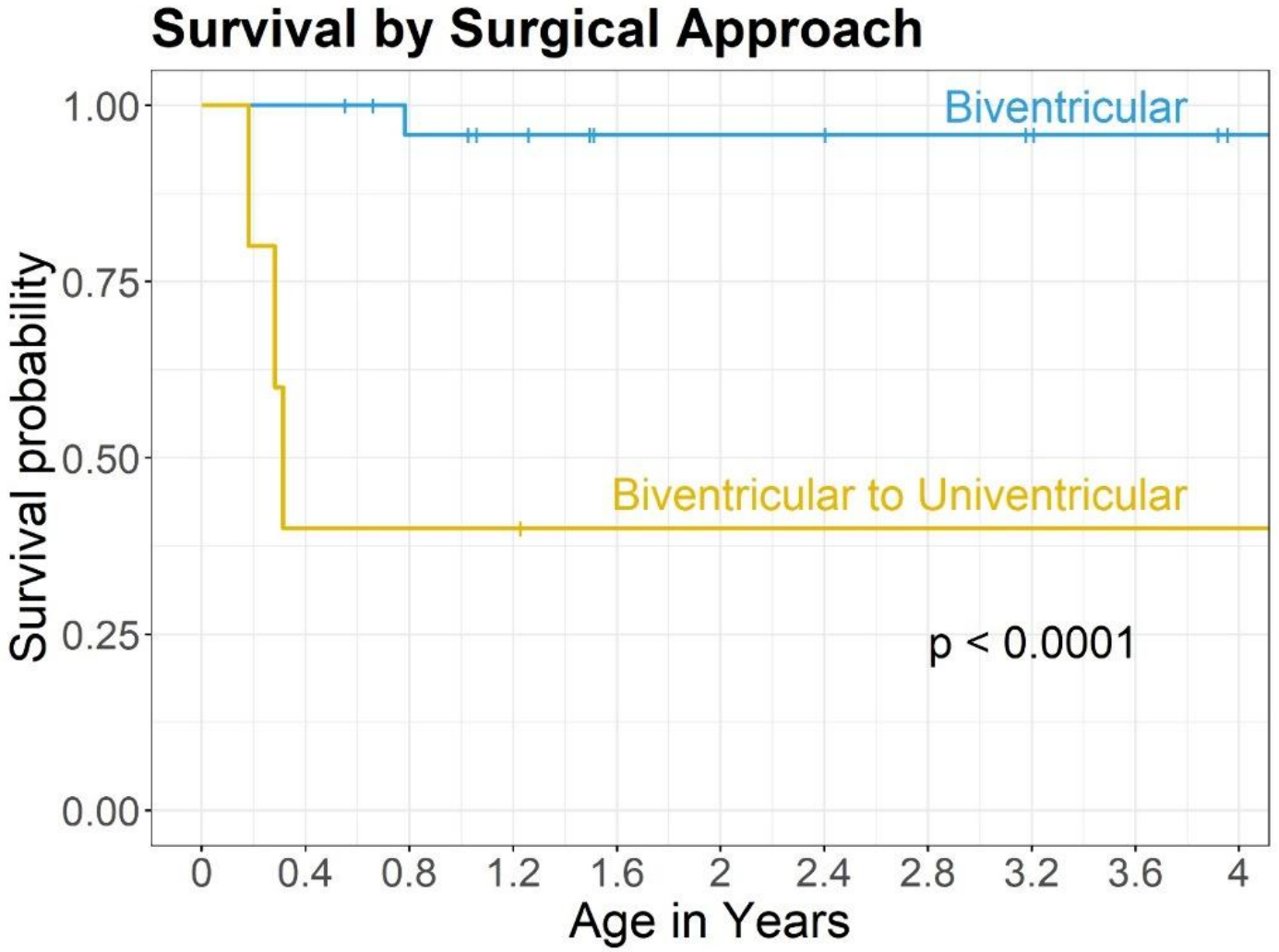
FT-076 / #559

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

SURGICAL OUTCOME AND MID-TERM FOLLOW UP OF PATIENTS WITH SHONE'S COMPLEX

Anine Mueller[1,2], Nina Odgaard[1,2], Fatima Mansoori[1,2], Agnesa Kyqyku[1,2,3], Adeleida Woenckhaus Alvarez[1,2,3], Hitendu Dave[2,3], Robert Cesnjevar[2,3], Oliver Kretschmar[1,2], Walter Knirsch[1,2]
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Background and Aim: Shone's complex (SC) summarizes heterogenous types of multilevel left heart obstructive congenital heart disease. Therapeutic decision-making after birth in SC remains challenging.
Methods: Using the consecutive patient dataset (Data Warehouse) enabled us to perform a detailed analysis of patients undergoing biventricular cardiac surgery for SC with focus on diagnostic, therapeutic and clinical mid-term outcome.
Results: Between 01/2014 and 12/2024 (follow-up (FU) until 09/2025), 31 patients (45.2% female) were born with SC with a median birth weight of 3320g (IQR 2910-3630). The first invasive procedure was performed at 5.5 days of age (4-12.5). In our cohort 26 patients underwent biventricular repair and in five patients we changed from a primary biventricular approach to a univentricular approach during the early period of treatment. Multilevel LV obstruction was observed at the aortic arch (CoA) (90.3%), mitral valve (32.3%), and aortic valve (25.8%). Patients received one (41.9%), two (38.7%) or more than two surgical procedures (19.4%). More than a third (38.7%) of the patients were treated by further catheter-based procedures, such as treatment of residual CoA (11.3%). In 31 patients, a total number of 63 hospital stays resulted in median cumulative length of hospital stay of 16 days (5.5-32), major complications included cardiopulmonary resuscitation (4.7%) and/or ECMO (5.7%). Postoperative renal failure required peritoneal dialysis (9.4%) for a median duration 3 days (2-7). Chronic heart failure treatment was necessary in 25.8 % of patients at last FU. At median FU age 3.9 years (1.2- 6.7), the overall survival rate was 87 %. The survival rate was decreased in patients where primary BV repair was attempted but was ultimately changed to univentricular palliation ($p<0.0001$) (Figure 1).



Conclusions: Shone's complex still includes relevant perioperative and mid-term cardiac morbidity and mortality. Changing from primary biventricular repair of SC to univentricular palliation during early period of treatment is a potential risk factor and needs more further investigation to determine the cause and possible treatment improvements for this cohort at risk.



FT-077 / #599

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

REINTERVENTION IN NEONATES WITH SYMPTOMATIC TETRALOGY OF FALLOT – A SWEDISH NATIONWIDE STUDY COMPARING DIFFERENT MANAGEMENT STRATEGIES

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Background and Aim: Neonates with symptomatic tetralogy of Fallot (sTOF) require early intervention. This nationwide study aimed to compare staged repair (SR), defined as initial palliation (IP) and subsequent complete repair (CR), with primary repair (PR) in sTOF, with respect to reintervention rates and time to first reintervention.
Methods: All neonates with sTOF who underwent IP or PR in Sweden at ≤30 days of age between 2000 and 2023 were retrospectively reviewed. Patients with concomitant pulmonary atresia, atrioventricular septal defect or absent pulmonary valve were excluded. Data were collected from surgical/catheter registries and medical records. The primary outcome was cumulative reintervention incidence; secondary outcome included mortality, time to first reintervention and type of repair at CR or PR. To adjust for confounders outcomes were compared using inverse propensity score weighting with robust standard errors and sensitivity analysis with overlap weights. Descriptive statistics, Kaplan-Meier curves and weighted Poisson regression models were used.
Results: Of 85 neonates included, 68 (80%) underwent SR and 17 (20%) underwent PR. The SR group had lower gestational age, lower weight, earlier intervention and longer follow-up, table 1. Reintervention incidence rates per patient year were 0.054 (95% CI 0.036-0.081) for SR and 0.095 (95% CI 0.037-0.245) for PR. Incidence rate ratio was 0.57 (95% CI 0.20-1.60), p=0.29, table 2. Seven patients died, two due to shunt occlusion. The mortality incidence rates were 0.0074 events per patient year in both groups. Time to first reintervention was similar between SR and PR (hazard ratio 0.99 (95% CI 0.39-2.51;



p=0.99). At least one reintervention occurred in 25/68 (37%) patients after SR and 6/17 (35%) patients after PR. Valve-sparing repair was performed in 17% of SR patients and 24% of PR patients, table

Table 1 Differences in baseline characteristics between treatment strategies

Variable	Overall (n=85)	Staged repair (n=68)	Primary repair (n=17)	p-value	SMD
Center					
1	31 (36.5%)	26 (38.2%)	5 (29.4%)		
2	54 (63.5%)	42 (61.8%)	12 (70.6%)	0.70	0.16
Type of initial palliation					
BT-shunt	61 (75.0%)	61 (75.0%)			
RVOT stent	2 (2.5%)	2 (2.5%)			
Balloon pulmonary valvuloplasty	18 (22.1%)	18 (22.1%)		NA	
Gestational age, weeks	38.4 (2.3) 39.6 (28; 42.1) n=84	38.2 (2.3) 39.3 (28; 41.6) n=68	38.9 (1.9) 39.7 (37.0; 42.1) n=16	0.332	0.33
Prematur	13 (15.3%)	13 (19.4%)	0 (0.0%)	0.351	0.66
Prenatal Diagnos	31 (36.5%)	25 (36.8%)	6 (35.3%)	1.00	0.03
Birth weight, kg	2.99 (0.74) 3 (1.16; 4.34) n=84	2.93 (0.79) 2.95 (1.16; 4.34) n=68	3.28 (0.36) 3.23 (2.76; 4.10) n=16	0.084	0.48
Associated cardiac defects	46 (54.1%)	38 (55.9%)	8 (47.1%)	0.70	0.18
Genetic Syndrome	24 (28.2%)	18 (26.5%)	6 (35.3%)	0.56	0.19
T21	4	3	1		
22q11	8	5	3		
Extra cardiac defects	33 (38.8%)	26 (38.2%)	7 (41.2%)	1.00	0.06
Sex					
Male	51 (60.0%)	41 (60.3%)	10 (58.8%)		
Female	34 (40.0%)	27 (39.7%)	7 (41.2%)	1.00	0.03
Average PDX pre intervention	80.4 (7.0) 80 (63; 96) n=65	80.7 (7.5) 80 (63; 97) n=48	79.2 (5.2) 80 (69; 88) n=17	0.48	0.20
Spells	37 (43.5%)	28 (41.2%)	9 (52.9%)	0.55	0.24
Prostaglandins	39 (42.4%)	32 (47.1%)	4 (23.5%)	0.13	0.51
Left pulmonary artery, mm	3.57 (1.06) 3.6 (1.7; 6) n=81	3.64 (1.14) 3.6 (1.7; 6) n=64	3.36 (0.70) 3.4 (2.5; 5) n=17	0.58	0.16
Right pulmonary artery, mm	3.70 (1.24) 3.75 (2; 6) n=82	3.69 (1.30) 3.5 (2; 6) n=65	3.77 (0.73) 4 (2.5; 5) n=17	0.80	0.26
McGoon index	1.30 (0.30) 1.3 (1; 2.06) n=82	1.28 (0.25) 1.13 (1; 2.05) n=65	1.39 (0.40) 1.19 (1; 2) n=16	0.51	0.19
Pulmonary valve, mm	4.74 (1.18) 4.6 (2.5; 9) n=82	4.61 (1.18) 4.6 (2.5; 9) n=65	5.21 (1.20) 5 (3.5; 7.5) n=17	0.071	0.52
Pulmonary valve / BSA	22.6 (4.7) 22.2 (14; 41.6) n=72	22.6 (4.7) 22.1 (14; 41.6) n=56	22.5 (5.1) 23.1 (15.3; 37.1) n=16	0.49	0.20
Age at initial palliation or primary repair, days	14.9 (9.1) 12 (1; 30) n=85	13.7 (7.7) 11.5 (1; 30) n=68	18.5 (9.2) 18 (8; 30) n=17	0.0084	0.75
Weight at first intervention, kg	3.20 (0.80) 3.20 (1.3; 7.5) n=84	3.10 (0.81) 3.1 (1.3; 7.5) n=67	3.56 (0.40) 3.5 (2.8; 4.6) n=17	0.046	0.55
Follow-up time, years	11.1 (8.6) 11.1 (0; 23) n=85	11.8 (8.7) 13.4 (0; 23) n=68	7.85 (6.43) 7.83 (0.16; 14.60) n=17	0.022	0.61

For categorical variables n (%) is presented.
For continuous variables Mean (SD) / Median (Min; Max) / n° is presented.
For comparison between groups Fisher's Exact test (lowest 1-sided p-value multiplied by 2) was used for dichotomous variables and Chi-Squared test was used for unordered categorical variables and the Fisher's Non Parametric Permutation Test was used for continuous variables.
Effect size (Cohen's d when N>=50, Hedges g when N<50) is absolute difference in mean / pooled SD

3.



Table 2 Cumulative Incidence Rate of Reintervention, by Group

	Total number of reinterventions mean (SD) median (min max) Total number	Person-Years of Follow-up mean (SD) median (min max) Sum of Person-Years	Rate of Reintervention per patient year (95% CI)	Rate of Reintervention Adjusted inverse propensity score weighting[a] (95% CI) (primary analysis)	Rate of Reintervention Adjusted overlap weighting[a] (95% CI) (sensitivity analysis)
Staged repair n = 55	0.65 (1.12) 0 (0-4) 47	11.9 (6.72) 13.4 (0.03-22.9) 811	0.058 (0.039-0.086)	0.054 (0.036-0.081)	0.045 (0.028-0.073)
Primary repair n = 17	0.53 (0.87) 0 (0-3) 9	7.95 (5.43) 7.83 (0.15-18.93) 135	0.067 (0.028-0.154)	0.095 (0.037-0.246)	0.074 (0.030-0.181)
Rate ratio[b]			0.870 (0.344-2.198) p =0.77	0.571 (0.204-1.597) p = 0.29	0.616 (0.223-1.708) p = 0.35

[a]Adjusted for centre, gestational age, prematurity, birth weight, extracardiac defect associated, cardiac defect, genetic syndrom, pulmonary valve size
[b]Primary repair is the reference group



Table 3 Number of Reinterventions and type of PR/CR

Variable	Total (n=85)	Staged repair (n=68)	Primary repair (n=17)	p-value	Difference between groups Mean (95% CI)	Effect Size
Any Reintervention	31 (36.5%)	25 (36.8%)	6 (35.3%)	1.00	1.5 (-26.5; 25.3)	0.03
Number of Reinterventions						
0	54 (63.5%)	43 (63.2%)	11 (64.7%)			
1	17 (20.0%)	13 (19.1%)	4 (23.5%)			
2	6 (7.1%)	5 (7.4%)	1 (5.9%)			
3	5 (5.9%)	4 (5.9%)	1 (5.9%)			
4	3 (3.5%)	3 (4.4%)	0 (0.0%)	0.58		
Number of Reinterventions	0.659 (1.075) 0 (0; 4) n=85	0.691 (1.123) 0 (0; 4) n=68	0.529 (0.874) 0 (0; 3) n=17	0.70	0.162 (-0.364; 0.769)	0.150
Type of PR/CR		CR	PR			
Valve sparing approach	15 (18.5%)	11 (17.2%)	4 (23.5%)			
Transannular patch (TAP)	32 (39.5%)	29 (45.3%)	3 (17.6%)			
TAP monocusp	29 (35.8%)	21 (32.8%)	8 (47.1%)			
Conduit	5 (6.2%)	3 (4.7%)	2 (11.8%)	0.19		

For categorical variables n (%) is presented.
For continuous variables Mean (SD) / Median (Min; Max) / n= is presented.
For comparison between groups Fisher´s Exact test (lowest 1-sided p-value multiplied by 2) was used for dichotomous variables, the Mantel-Haenszel Chi Square test was used for ordered categorical variables and Chi Square test was used for non-ordered categorical variables and the Fisher´s Non Parametric Permutation Test was used for continuous variables. The confidence interval for dichotomous variables is the unconditional exact confidence limits. The confidence interval for then mean difference between groups is based on Fishers non-parametric permutation test.
Effect size is absolute difference in mean / pooled SD.

Conclusions: In our nationwide multicenter retrospective study of neonates with sTOF we could not find any difference between SR and PR in reintervention and mortality incidence rates, time to first reintervention or the frequency of valve-sparing TOF repair. Comparisons across initial palliation strategies were limited by the low number of right ventricular outflow tract stents, shorter follow-up in these patients, and the absence of ductal stents.



FT-078 / #697

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

CARDIAC INTERVENTIONS PERFORMED IN INDIVIDUALS UP TO 35 YEARS OF AGE WITH DOWN SYNDROME AND CONGENITAL HEART DISEASE

Orla Megraw[1], Courtney Potts[1], Brian Mccrossan[2], Frank Casey[1]
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Background and Aim: Down Syndrome (DS) is a genetic condition often associated with congenital heart disease (CHD). Many of those with DS and CHD require surgery in their first year. This study aims to review CHD interventions performed in a group of patients with DS in Northern Ireland (NI) over three decades.
Methods: The department of paediatric cardiology in Royal Belfast Hospital for Sick Children has established a database of all those born with DS in NI from 1990-2023. This was updated using both electronic and paper medical records to include CHD diagnosis, cardiac surgeries/interventions performed and survival status/cause of death. Survival from birth was analysed using Kaplan-Meier curves and multivariable Cox regression, assessing the impact of CHD, cardiac surgery and gender on mortality. Individuals with missing or inconsistent data were excluded.
Results: The database includes 1384 individuals ranging from 2-35 years of age. CHD is prevalent, occurring in 49% of individuals. The most common diagnoses included ventricular septal defect (VSD) (47%), complete atrioventricular septal defect (AVSD) (29%) and atrial septal defect (ASD) (6%). Overall, 66% with CHD required an intervention and of these, AVSD repair was the most common (42%) followed by VSD repair (25%). The majority of individuals only required one intervention (88%), but some required two (9%), three (2%) or four (<1%) cardiac surgeries. In this cohort, 89 people (6%) have died, and a higher proportion of those that died had CHD (68%), most commonly AVSD (n=33, 54%). The primary reason for death was cardiac related (42%), including post cardiac surgery complications, heart failure and pulmonary hypertension. In multivariable Cox regression, absence of congenital heart disease was strongly associated with improved survival (HR 0.34, 95% CI 0.19–0.60, p<0.001). Cardiac surgery was not independently associated with mortality (HR 0.81, 95% CI 0.48–1.36, p=0.43) and gender had no significant effect.
Conclusions: Individuals with CHD had nearly three times the hazard of death compared with those without, indicating that the presence of CHD is a strong predictor of reduced survival in those with DS . A large proportion with CHD require



surgery, highlighting the continued need for early cardiac surveillance, timely intervention and continued long-term follow-up.



FT-079 / #722

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

FIRST EUROPEAN REPORT OF PARTIAL HEART TRANSPLANTATION AS AN ALTERNATIVE TO VALVE REPLACEMENT IN COMPLEX CONGENITAL HEART DISEASE

Julie Wacker[1], Maurice Beghetti[1], Jean Villard[2], Sylvie Ferrari-Lacraz[2], Alexandre Pelouze[3], Joel Obama[1], Anaïs Buffat[4], Tomasz Nalecz[3], Tornike Sologashvili[1]
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Background and Aim: Valve replacement in children is not a lifelong solution, as prosthetic valves do not grow and biological valves tend to deteriorate, requiring replacement after 5–10 years. Partial heart transplantation (PHT) is emerging as a promising alternative but has so far been performed only in a limited number of patients in the United States.
Methods: A candidate for PHT was selected after extensive discussion and approval of the ethics committee and the family, as well as national regulatory authorities. The patient, a 12-year-old child born with truncus arteriosus, had previously undergone three surgeries for truncal valve and pulmonary conduit replacement. Due to immune thrombocytopenic purpura, mechanical valve anticoagulation was relatively contraindicated.
Results: The child underwent partial heart transplantation of the aortic and pulmonary valves from the same ABO-and HLA-compatible donor. Ischemic time was 261min. Immunosuppression consisted of methylprednisolone for 3 days, mycophenolate mofetil for 2 months, and currently a single tacrolimus therapy, maintaining trough levels of 7–9 ng/mL. Valve function is excellent at 3 months, without stenosis and only trivial aortic regurgitation. No donor-specific antibodies are detected.
Conclusions: This case constitutes the first European report of PHT with excellent short-term results. Long-term follow-up is needed to confirm the durability of this technique and the ability of the transplanted valves to grow with the child, potentially reducing the need for repeated surgeries. PHT could redefine the management of complex valvar disease, offering a physiological solution that preserves native ventricular function and avoids



anticoagulation. Broader adoption will require multicenter experience, standardized protocols, and careful patient selection.



FT-080 / #752

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

DUCTAL STENTING VERSUS AORTO-PULMONARY SHUNT FOR LESIONS WITH DUCT-DEPENDENT PULMONARY BLOOD FLOW: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Huzeifa Elhedai, Suhair Shebani, Frances Bu'Lock, Marinos Kantzis
University Hospitals Of Leicester NHS Trust, East Midlands Congenital Heart Centre, Leicester, United Kingdom

Background and Aim: To evaluate outcomes of initial palliation of neonates born with lesions with duct-dependent pulmonary blood flow (PBF) whether it is done by aorto-pulmonary shunts (shunt) or percutaneous ductal stenting (stent).
Methods: This systematic review and meta-analysis was designed and carried out in accordance with the Cochrane Handbook for Systematic Reviews of Interventions and followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines for reporting. The trial strategy was registered in PROSPERO, (CRD420251034196).
Results: Eleven studies had a total of 1348 patients, divided between 533 in the stent group and 815 in the shunt group. The stent group showed a significantly lower early and overall mortality rate compared to the shunt group [[5.3% in the stent group versus 8.9% in the shunt group, OR 0.51 (0.28, 0.93) 95% CI, P= 0.03] and [7.6% in stent group versus 14.4% in shunt group, OR 0.50 (0.33, 0.76) 95% CI, P= 0.001], respectively. . The stent group also had significantly lower post-procedure complications rate [16.1% in the stent group versus 21.3% in the shunt group, OR 0.50 (0.35, 0.69) 95% CI, P= 0.0001]]. Additionally, the stent group was superior in terms of post-procedure oxygen saturation [MD 1.89 (1.52, 2.27) 95% CI, P= 0.00001] and length of hospital stay [MD -6.69 (-9.09, -4.28) 95% CI, P= 0.00001]. There was no significant difference between the two groups regarding early and late interventions, the need for extra-corporeal membrane oxygenation (ECMO) and post-procedure pulmonary artery (PA) growth.
Conclusions: Ductal stenting is associated with significant reduction in both early and late mortalities compared to aorto-pulmonary shunt. There was also considerably higher post-procedural oxygen saturation in the stent group, as well as shorter hospital length of stay (LOS) and fewer procedural complications.



FT-081 / #913

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

PERCUTANEOUS EDGE-TO-EDGE REPAIR FOR SYSTEMIC ATRIOVENTRICULAR VALVE REGURGITATION IN PATIENTS WITH CONGENITAL HEART DISEASE: THE FIRST DESCRIPTIVE COHORT.

Patrice Guerin[1], Zakaria Jalal[2], Hélène Bouvaist[3], Lionel Le Roux[2], Laurence Iserin[4], Laurianne Le Gloan[1], Jean Benoit Thambo[2], Xavier Iriart[5]
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Background and Aim: Introduction: Tricuspid regurgitation plays a central role in systemic right ventricular dysfunction in patients with D-transposition of the great arteries palliated by atrial switch procedures and in those with L-transposition of the great arteries. The development of percutaneous edge-to-edge repair of atrioventricular valves raises questions regarding its role in this specific population.
Methods: Objectives: To evaluate the multimodal outcomes of high surgical risk patients with a systemic right ventricle following percutaneous tricuspid valve repair. **Materials and Methods:** We established a French multicenter cohort, including both retrospective and prospective data, of high surgical risk patients with a systemic right ventricle who underwent percutaneous tricuspid valve repair. Follow-up was performed at 6 months, 1 year, and 2 years to assess feasibility, safety, and efficacy.
Results: Results: Sixteen patients were included across seven specialized centers between 2019 and July 2024: eight patients with D-transposition of the great arteries and eight with L-transposition of the great arteries. No procedure-related deaths or major complications were observed. A significant reduction in tricuspid regurgitation severity on echocardiography was demonstrated at 6 months and 1 year ($p < 0.01$). Patients showed a significant improvement in NYHA functional class and a significant reduction in furosemide dosage at 6 months. No sustained significant decrease in NT-proBNP levels was observed. Cardiac magnetic resonance imaging data demonstrated significant positive remodeling of systemic right ventricular volumes.
Conclusions: Conclusion: Percutaneous edge-to-edge repair of the tricuspid valve in the systemic position appears feasible and demonstrates an acceptable safety profile in selected high-risk patients. This intervention is associated with clinical improvement and a



reduction in tricuspid regurgitation severity. These preliminary results are promising but require confirmation in larger studies with longer follow-up.



FT-082 / #1317

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

ESTABLISHING A REGIONAL MULTIDISCIPLINARY SINGLE-VENTRICLE CARE SYSTEM: RATIONALE, STRUCTURE, AND INITIAL RESULTS

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Background and Aim: Long-term morbidity in patients with single-ventricle physiology remains a significant challenge. To address this, we aimed to improve quality of life and survival by creating the country's first official, dedicated multidisciplinary team to ensure consistent, lifelong care for this complex population.
Methods: We developed a structured follow-up protocol for patients after Stage-II (bidirectional Glenn) palliation, based on literature review and adaptation to local resources. The protocol specifies timing and location for each investigation. Care is delivered through a collaborative hub model: a dedicated team at a Free-standing Cardiac Hospital (cardiac surgeon, pediatric cardiologist, echocardiography specialist, interventionalist, electrophysiologist, radiologist) and specialists at a Multidisciplinary Children's Hospital (pediatrician, pulmonologist, gastroenterologist, neurologist). Each specialist follows standardized diagnostic protocols (echocardiography, catheterization, CT). A dedicated outpatient clinic operates twice weekly, with a pediatric cardiologist coordinating care and determining the need for additional evaluations.
Results: Between 2005-2025, our regional center (serving 3.2 million people) managed 213 single-ventricle patients. Of these, 168 underwent neonatal palliative surgery (shunt/Norwood/Starnes/DKS), with 45 deaths at this stage. A total of 165 patients entered the first interstage period (15 deaths). Subsequently, 126 underwent a bidirectional Glenn procedure (4 deaths). Following Stage-II, complications requiring unplanned reintervention included occlusion of veno-venous/atrial fistulas (n=11), pulmonary artery repair (n=12), aortic arch repair (n=3), occlusion of aortopulmonary collaterals (n=9), pacemaker implantation (n= 4), AV-valve repair/replacement (n=2), deaths (n=7). Ultimately, 84 patients completed Fontan palliation (2 procedural deaths). Post-Fontan complications included protein-losing enteropathy (n=3), plastic bronchitis (n=2), gastric ulcer (n=2), PA stenosis (n=12), ecstracardiac conduit stenosis (n=3), arrhythmias requiring pacemaker (n=11), occlusion of late-appearing collaterals or fistulas (n=22), ventricle dysfunction (n= 3), pulmonary hemorrhage (n=3). There were 4 late deaths after Fontan completion. Seven patients from the initial cohort were never surgical candidates.
Conclusions: The single-ventricle pathway is associated with a wide array of potential



complications at all stages of life. Our experience confirms the critical need for and feasibility of a structured, life-long, multidisciplinary follow-up system to promptly address these issues and optimize long-term outcomes.



FT-083 / #1345

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

WHEN THE SEPTUM RESTRICTS: PREDICTORS AND OUTCOMES OF ATRIAL SEPTECTOMY IN FONTAN PATIENTS.

Saad Ahmad Malik, Abdulla Tarmahomed, Tim Jones, Tristan Ramcharan
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Background and Aim: Optimal Fontan haemodynamics require unobstructed interatrial flow to prevent elevated atrial pressures, pulmonary venous hypertension, cyanosis and pleural effusions. Some patients require atrial septectomy at Fontan completion or postoperatively. Despite its clinical significance, the incidence, risk factors, and anatomical substrates necessitating septectomy in this population remain poorly defined. This study aimed to determine the incidence, identify risk factors and anatomical substrates predisposing to atrial septectomy at or after Fontan completion.
Methods: We retrospectively reviewed 575 patients who underwent Fontan completion between 2010 and 2025 using a prospectively maintained database. Surgical records identified those requiring atrial septectomy at or after Fontan completion.
Results: Of 575 patients undergoing extra cardiac fenestrated Fontan completion, 46(8%) required additional atrial septectomy. The most common anatomical substrates were variants of HLHS (15/46, 33%) and DILV with TGA and PS (15/46, 33%). 42 patients had a restrictive interatrial septum preoperatively, confirmed by echocardiography or cardiac catheterization, necessitating elective septectomy during Fontan completion. Twenty-eight patients (61%) had previously undergone atrial septal intervention (either atrial septectomy or balloon atrial septostomy) at initial palliative procedure, while eighteen (39%) underwent atrial septectomy for the first time at Fontan completion. Four patients (8.6%) required post-Fontan atrial septectomy, three of whom (75%) had HLHS. All had undergone prior atrial septectomy at stage one palliative procedure. The mean interval to septectomy from Fontan completion for these four patients was 675 days, with one requiring immediate septal enlargement on postoperative day one. Restrictive interatrial septum was confirmed on post-Fontan echocardiography, and all patients were symptomatic with cyanosis and/or pleural effusion.
Conclusions: Atrial septectomy was required in a notable 8% of patients undergoing Fontan completion, underscoring its clinical relevance, particularly as this changes the operative technique. HLHS variants and DILV with TGA and PS were the predominant anatomical substrates. Despite prior atrial septal interventions in most patients, a subset developed recurrent or progressive interatrial restriction necessitating septectomy either at



Fontan completion or during follow-up, predominantly in those with HLHS. These findings highlight the importance of meticulous pre-Fontan assessment of interatrial septal patency and the need for vigilant post-Fontan surveillance, as late atrial septal restriction may contribute to significant morbidity.



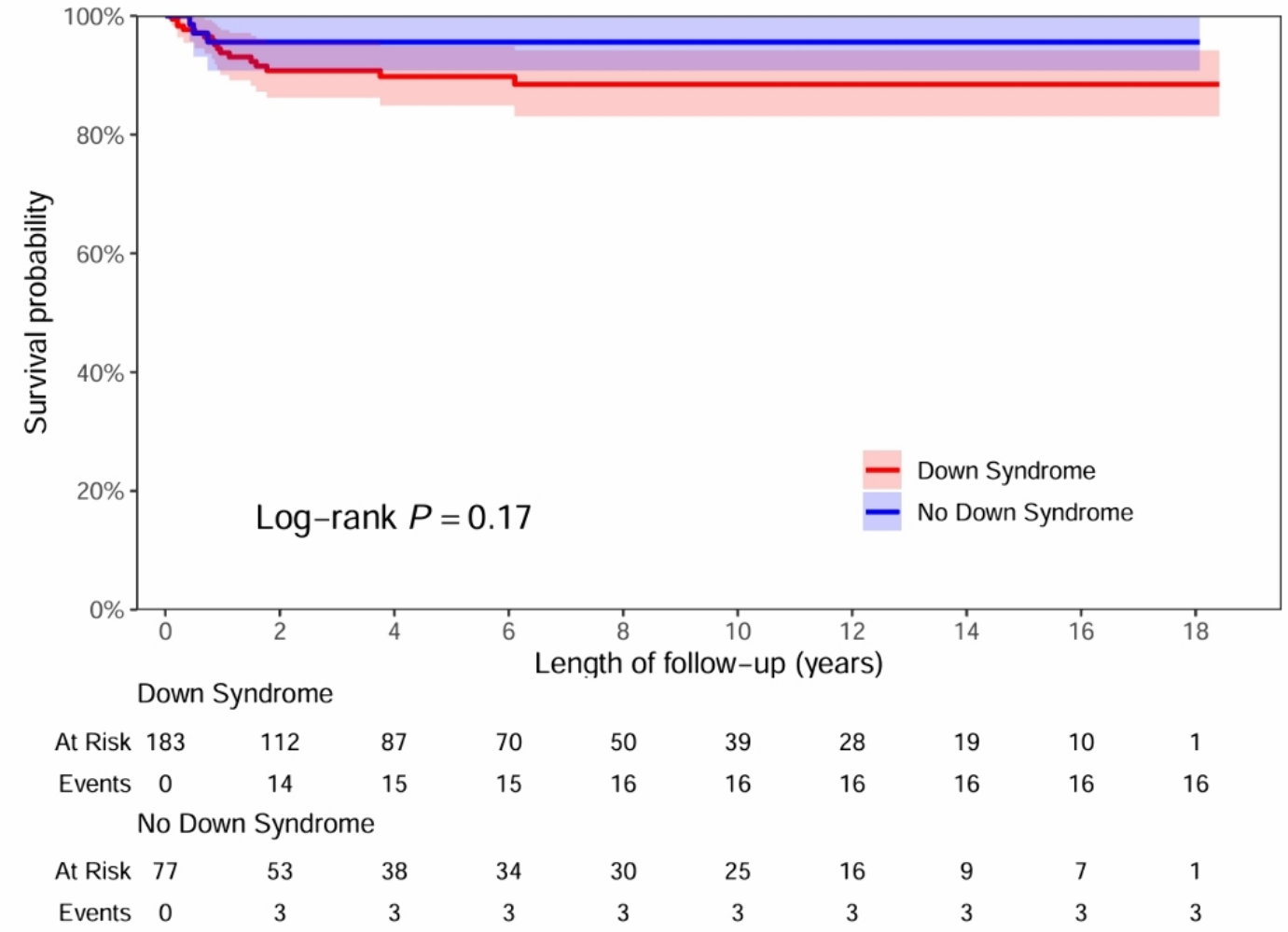
FT-084 / #1346

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

ATRIOVENTRICULAR SEPTAL DEFECT REPAIR: DOES TRISOMY 21 ALTER THE LONG-TERM COURSE?

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Background and Aim: Atrioventricular Septal Defect (AVSD) is the most common congenital heart defect (CHD) in individuals born with Trisomy 21, with about one in four Trisomy 21 patients having an AVSD. This study aimed to evaluate and compare the long-term outcomes of patients with and without Trisomy 21 who underwent AVSD repair over an 18-year period.
Methods: We conducted a single-centre retrospective cohort study. The primary outcome was long-term functional status assessed using the New York Heart Association (NYHA) classification for patients aged seven years and older, and the Ross classification for patients younger than seven years, at the time of the most recent cardiology follow-up after surgical repair. The clinical predictors of outcome for end points were analysed with univariate Cox regression analysis. Kaplan-Meier analysis was used for time dependent end points.
Results: A total of 260 consecutive patients underwent AVSD repair between 2007 and 2025. 183 (70.4%) were diagnosed with Trisomy 21, while 77 patients (29.6%) did not have the chromosomal abnormality. The median follow up time was 2.4 years. Patients with Trisomy 21 were more often younger than three month at the time of surgery [91 (49.7%) vs. 24 (31.2%); p=0.011], had a lower body weight [4.8 kg (4.1-5-5) vs 5.6 kg (4.2-7.5); p<0.001] and predominantly presented with complete AVSD [165 (90.2%) vs. 38 (49.4%); p<0.001]. Long-term postoperative functional status according to NYHA (p=0.410) and Ross (p=0.915) did not differ significantly between both groups and there was no significant difference in postoperative mortality (p=0.165). Additional cardiac malformations [4.36 (95% CI: 1.66, 11.47); p=0.003], non- cardiac comorbidities [3.47 (95% CI: 1.13, 10.64); p=0.029] as well as the need for postoperative interventions such as ECMO [7.25% (95% CI: 1.91, 27.55); p=0.004], tracheostomy [5.29 (95% CI: 1.37, 20.5); p=0.016] or the need for reoperation where independent predictors of mortality in the overall cohort [4.71 (95% CI: 1.13, 10.64); p=0.029].



Conclusions: Trisomy 21 patients were younger and presented more frequently with complete AVSD. Postoperative long-term functional or survival outcomes achieved comparable results in both groups . Additional comorbidities and postoperative complications were independent predictors for mortality.



FT-085 / #1406

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

TRANSCATHETER AND HYBRID CLOSURE OF MUSCULAR VENTRICULAR SEPTAL DEFECTS USING THE KONAR-MF™ OCCLUDER: A MULTICENTER PEDIATRIC EXPERIENCE IN INDIA

Usha Sastry[1], Nageswara Rao Koneti[2], Bhargavi Dhulipudi[2], Jayranganath Mahimarangaiah[1], Navaneetha Sasikumar[3], Shwetha Bakhru[2], Raman Krishna Kumar[4]
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Background and Aim: The KONAR-MF™ occluder, with its flexible medium-profile design, has broadened the feasibility of transcatheter closure of muscular ventricular septal defects particularly in infants. To assess feasibility, safety, techniques, and outcomes of muscular ventricular septal defect closure using the KONAR-MF™ occluder in a multicenter pediatric cohort.
Methods: A retrospective review was conducted at three tertiary pediatric cardiac centers (2018–2024). Patient demographics, ventricular septal defect characteristics, procedural approaches, and follow-up outcomes were analyzed. Device implantation was performed via retrograde, antegrade, trans-septal, or hybrid approaches under fluoroscopic and echocardiographic guidance.
Results: Fifty patients (54 devices) were included (median age: 48 months ,weight: 12 kg) including 14 infants (9 <7 kg). The smallest patient was 2.4 kg at 1month age. Indications for closure were failure to thrive (46%), heart failure (28%), recurrent infections (12%), and postoperative residual ventricular septal defect (14%). Mean defect size was 5.8 ± 2 mm. Mean pulmonary artery (PA) pressure decreased from 37 ± 13.4 mmHg to 19 ± 3.8 mmHg ($p < 0.001$).Median fluoroscopy time was 18 minutes (range: 3–71). The anatomical location of defects were mid-muscular (32), apical (12), posterior (7), and anterior (3). Retrograde device deployment was used in 26 defects (48%), arterio-venous (AV) loop with venous deployment in 14 (26%), direct antegrade right ventricle–left ventricle approach in 9 (16%), hybrid per-ventricular approach in 3 (6%), and PFO-guided approach in 2 (4%). Procedure was succesful in all but one patient (98%). Immediate mild residual shunt was observed in 18% of patients which reduced to 9% at 1 week and resolved completely by 3 months. Mild new tricuspid regurgitation was noted in 14%, which resolved spontaneously on follow-up. One embolization required surgical retrieval. No patient developed aortic regurgitation,



hemolysis, or atrioventricular block. At a median follow-up of 9 months (range 1–60), no conduction disturbances, valvular dysfunction, late embolization, or recurrent shunt were observed.

Conclusions: Muscular ventricular septal defect closure using the KONAR-MF™ occluder is safe, feasible, across a wide pediatric age and weight spectrum. The device's low-profile configuration, dual-sided deployment, and compatibility with smaller delivery systems provide important procedural flexibility, particularly in anatomically challenging locations.



FT-086 / #1465

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

USE OF IMPELLA DEVICE IN A PAEDIATRIC HOSPITAL OVER 9 YEARS

Lisa Bianco[1], Enrico Piccinelli[2], Micol Rebonato[3], Mara Pilati[1,2], Rachele Adorisio[4], Lorenzo Galletti[5], Gianfranco Butera[1,6]
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Background and Aim: The Impella is a continuous-flow microaxial ventricular assist device (VAD) designed for temporary mechanical circulatory support (MCS). Its use in paediatrics has progressively expanded, particularly in the management of refractory cardiogenic shock or advanced heart failure, alone or combined with ECMO for ventricular unloading. However, evidence in children remains limited. This study describes our institutional experience with Impella in a paediatric hospital over 9 years.
Methods: This is a retrospective review of all cases receiving Impella support between 2016 and 2025 at our tertiary paediatric cardiac centre.
Results: Sixteen Impella devices were implanted in 15 patients between 2016 and 2025. Median age and weight at implantation were 14 years [IQR 13–17] and 46.25 kg [40–54], respectively. The smallest patient was 7 years old (24.7 kg), supported with Impella CP through a carotid graft. Twelve patients (80%) received a CP Impella (3.5), and three (20%) received Impella 2.5. Impella was used in combination with ECMO in 13 cases (87%) to optimise cardiac unloading; in the remaining two patients, it was used alone for MCS. The device was mainly used in acquired heart disease, with congenital heart disease accounting for only 20% (N=3) of cases. In two of those (one unrepaired ccTGA and one failing Fontan), an Impella CP was successfully positioned in a systemic right ventricle. Femoral arterial access was used in 13 cases (80%); carotid access, achieved via surgical cut-down or graft conduit, in 3 (20%). There were no intraprocedural immediate



complications or procedural mortality. The median duration of support was 6 [3–17] days. Explant indication included cardiac recovery in 7 patients (47%), LVAD conversion in 5 (33%) and non–device–related death in 2. Major adverse events occurred in 33% (N=5) of cases: haemolysis in two, retroperitoneal hematoma, aortic valve flail managed conservatively, and femoral pseudoaneurysm requiring surgical repair in one case, respectively. At a median follow-up of 14 [5–31] months, 73% (N=11) of patients were alive, and no device-related deaths occurred.

Conclusions: Our results are aligned with current literature and confirm that Impella implantation is feasible and safe in paediatric patients requiring temporary MCS, supporting its expanding role in specialised paediatric cardiac centres.



FT-087 / #1534

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

INTERSTAGE OUTCOMES IN SINGLE VENTRICLE NEONATES: DUCTAL STENTING VERSUS MODIFIED BLALOCK-TAUSSIG SHUNT

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Background and Aim: To compare outcomes of ductal stenting (DS) versus modified Blalock-Taussig shunt (mBTS) as initial palliation in neonates with functionally univentricular heart (FUH) and duct-dependent pulmonary blood flow (DDPBF), up to bidirectional cavo-pulmonary connection (BCPC).
Methods: We retrospectively analyzed 192 FUH patients with DDPBF who underwent initial palliation with DS or mBTS at our institution between 2005 and 2025. Cox proportional hazards models were used, adjusted for baseline confounders.
Results: Median follow-up was 6.3 months. Low birth weight was more frequent in the DS group (28.2% vs 11.1%; p=0.01), while right-ventricular dominance was observed only in the mBTS group (12.4% vs 0%; p=0.02). Left PA stenosis was numerically more frequent in the mBTS group (11 cases, 7.9%) versus none in the DS group (p=0.07). Survival after palliation, through interstage, and after BCPC was 85.7% (95% CI 81.9–91.5), 83.3% (95% CI 76.9–88.1), and 79.7% (95% CI 71.9–85.5), respectively, with no significant between-group differences (log-rank p>0.8). NICU stay, duration of inotropes therapy, ventilation, and diuretic use at discharge were all greater after mBTS (all p<0.01). At pre-BCPC catheterization, DS patients were younger (p=0.09), had a lower weight (p=0.08), and branch pulmonary artery stenosis was more frequent after mBTS (RPA 16.3% vs 0%, LPA 13.1% vs 2.6%; p<0.01). Median age at BCPC was 7 months, with comparable operative and postoperative outcomes (all p>0.4). After adjustment, mBTS showed a non-significant trend toward higher overall mortality (HRa 1.74; 95% CI 0.70–4.60; p=0.30) and reintervention before BCPC (HRa 1.77; 95% CI 0.71–4.38; p=0.21).
Conclusions: DS provides safe and effective palliation for neonates with FUH and DDPBF, with advantages in early recovery and a signal toward reduced mortality and reintervention. Confirmation in larger multicenter cohorts is warranted.



FT-088 / #320

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

IMPACT OF EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) ON MORBIDITY, MORTALITY AND NEURODEVELOPMENTAL OUTCOME IN YOUNG (< 6 WEEKS) INFANTS AFTER CARDIOPULMONARY BYPASS (CPB) SURGERY

Walter Knirsch[1,2], Reto Engeli[1,2], Verena Rathke[1,2], Michael Von Rhein[2,3], Christelle L'ebraly[4], Sebastian Grunt[5], Janet Kelly-Geyer[2,6], Swiss Orchid[7]
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Background and Aim: Perioperative ECMO in patients undergoing CPB surgery may be associated with increased mortality and morbidity including impaired neurodevelopmental (ND) outcome. Therefore, we investigated the impact of ECMO on the 1-year ND outcome after CPB surgery.
Methods: Analyzing data of the nation-wide Outcome Registry for Children with severe CHD (Swiss ORCHID), we assessed the impact of perioperative ECMO on one-year mortality and ND outcome using the Bayley Scales of Infant Development, 3rd ed. (BSID III) and language (LCS), cognitive (CCS), and motor (MCS) composite scores.
Results: Between January 1st, 2020, and May 30th, 2024, 240 patients were included. The one-year perioperative mortality was 5.8%. Perioperative ECMO was used in 34 patients (14.2%). The mortality of the patients with perioperative ECMO (ECMO group) was higher (mortality ECMO group 29.4% vs. non ECMO group 1.9%, p<0.001), and more frequently associated with univentricular CHD (p = 0.005). ND outcome was affected in the patients of the ECMO group by significantly lower BSID III CCS (β=-13.942, SE=3.736, p=<0.001) and MCS (β= -15.913, SE=4.325, p =<0.001) compared to the patients of the non-ECMO group (simple linear regression). A negative impact of ECMO was shown on CCS (p<0.05), while MCS was influenced by longer hospital stay (p<0.01), and lower socioeconomic status (p<0.05) (multiple linear regression).
Conclusions: Perioperative ECMO is associated with higher perioperative mortality and impaired ND outcome after early CPB surgery for complex type of CHD.



FT-089 / #383

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

WHEN TIME MATTERS: EARLY CATHETERIZATION AS A DETERMINANT OF RECOVERY AFTER CONGENITAL HEART SURGERY

Nujin Uluğ Murt[1], Sinan Işik[1], Erman Çilsal[1], Selman Gökalp[1], Murat Şahin[1], Sezen Ugan Atik[1], Sertaç Haydin[2], Alper Güzeltaş[1]
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Background and Aim: Early cardiac catheterization serves as an important diagnostic and therapeutic strategy to identify residual anatomical or functional abnormalities. This study evaluated the outcomes of transcatheter evaluation and intervention performed within the first 60 postoperative days following congenital cardiac surgery, focusing on timing, indications, feasibility, safety, and associated risk factors.
Methods: This single-center study included pediatric patients who underwent congenital cardiac surgery over a 10-year period and subsequently required early postoperative cardiac catheterization due to clinical deterioration. Over the last decade, our center performed 6,242 congenital cardiac surgeries and 7,051 transcatheter angiographic procedures, reflecting a high-volume tertiary center. Patients were stratified according to the timing of catheterization into three groups: ≤7 days, 8–30 days, and 31–60 days after surgery. Demographic characteristics, clinical indications, catheterization findings, interventional procedures, and early postoperative recovery parameters, including markers of hemodynamic and clinical stabilization, were analyzed using SPSS.
Results: A total of 270 patients were included, 53% of whom were male. Catheterization was performed within ≤7 days in 42.2%, between 8–30 days in 43.0%, and between 31–60 days in 14.8% of patients. The most common indications were persistent hypoxemia, failure to wean from ventilatory or inotropic support, inability to wean from extracorporeal membrane oxygenation, and suspected residual anatomical lesions. Transcatheter interventions were frequently performed to address surgically related obstructions or residual lesions. Catheterizations performed within ≤7 days were associated with earlier hemodynamic and clinical stabilization and a shorter intensive care unit course compared with later time windows. Procedural success rates were high across all timing groups, and no increase in catheterization-related complications was observed in the very early period.



Rates of repeat catheterization or diagnostic-driven reoperation were similar.

Table.1. Demographic and clinical characteristics of the study population (n:270)

Patient demographics	**Variable**	**Value**
	Weight (kg, min-max)	2.45–83
	Age at surgery (months, min-max)	0.03–258
	Male, n(%)	127 (47.0%)
Surgical physiology	**Variable**	**n(%)**
	Univentricular circulation	116 (43.0%)
	Biventricular circulation	154 (57.0%)
STS–EACTS mortality score	**Variable**	**n(%)**
	STAT 1	84 (31.1%)
	STAT 2	70 (25.9%)
	STAT 3	32 (11.9%)
	STAT 4	63 (23.3%)
	STAT 5	21 (7.8%)
Indication	**Variable**	**n(%)**
	Persistent / severe cyanosis	112 (41.5%)
	Low cardiac output syndrome	78 (28.9%)
	Failure to wean inotropes and/or mechanical ventilation	145 (53.7%)
	Failure to wean ECMO	48 (17.8%)
	Severe or hemodynamically significant residual lesions	80 (29.6%)
	Severe pleural and/or peritoneal effusions	22 (8.1%)
Timing, type and outcome of catheterization	**Variable**	**n(%)**
	Very early (≤7 days)	114 (42.2%)
	Early (7–30 days)	116 (43.0%)
	Late (>30 days)	40 (14.8%)
	Interventional catheterization	128 (47.4%)
	Diagnostic-only catheterization	142 (52.6%)
	Acute procedural success*	117 (91.4%)
	Re-operation after diagnostic catheterization	46 (17.0%)
	Re-catheterization	10 (3.7%)
Type of intervention	**Variable**	**n(%)**
	Stent implantation	47 (36.7%)
	Occlusion (coil and/or device closure)	44 (34.4%)
	Balloon angioplasty	23 (18.0%)
	Balloon atrial septostomy	8 (6.3%)
	Other interventions	6 (4.7%)

*Acute procedural success is calculated **only among interventional procedures. (n:128)**
STS–EACTS Society of Thoracic Surgeons–European Association for Cardio-Thoracic Surgery, STAT Congenital Heart Surgery Mortality Score, ECMO Extracorporeal membrane oxygenation

Conclusions: Early postoperative cardiac catheterization, including transcatheter interventions, can be performed safely and effectively after congenital heart surgery, even in patients requiring extracorporeal support. When guided by clear clinical and



hemodynamic indications, very early catheterization (≤7 days) does not increase procedural risk and may facilitate earlier stabilization and recovery. These findings support catheter-based evaluation and intervention as an integral component of postoperative management in pediatric patients who deviate from the expected recovery course.



FT-090 / #67

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

EMERGENCY RADIOFREQUENCY ATRIAL SEPTOSTOMY IN A PRETERM AND SMALL FOR GESTATIONAL AGE NEONATE WITH HYPOPLASTIC LEFT HEART SYNDROME AND PRENATALLY CLOSED FORAMEN OVALE

Simon Schmid, Johannes Nordmeyer, Heiner Latus, Jörg Michel
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Background and Aim: Hypoplastic left heart complex (HLHC) with critical aortic stenosis and a prenatally closed or restrictive foramen ovale represents a neonatal emergency due to severe pulmonary venous congestion and impaired left atrial decompression. Therefore, immediate transcatheter creation of an unrestrictive interatrial communication is crucial to restore adequate circulation and oxygenation.
Methods: A preterm twin female infant (gestational age 33 weeks, birth weight 1,720 g) with prenatally diagnosed HLHC (borderline left ventricle with endocardial fibroelastosis, aortic stenosis, hypoplastic aortic arch) and a closed foramen ovale developed critical pulmonary venous hypertension shortly after birth. An emergency balloon valvuloplasty of the aortic valve with a 4 mm/20 mm balloon reduced the transvalvular gradient from >70 to 50 mmHg, but did not result in sufficient left atrial decompression. Under transesophageal echocardiography (TEE) guidance an interatrial communication was successfully created by radiofrequency perforation using a 0.024” radiofrequency wire in a microcatheter after achieving stable positioning at the interatrial septum with a 4F IM catheter. The perforation was subsequently dilated with a 2 mm/20 mm balloon, followed by implantation of a 6 mm/24 mm premounted stent reaching from the inferior vena cava to the left atrium.
Results: TEE confirmed immediate left-to-right shunting and effective left atrial decompression. The preterm infant recovered without procedural complications. On day 10, bilateral pulmonary artery banding was performed, followed by ductal stenting as part of a planned hybrid strategy due to high surgical risk for direct Norwood repair. At four months of age (weight 3.4 kg), a Norwood type I operation was successfully performed with removal of both interatrial and ductal stents.
Conclusions: Radiofrequency-guided atrial septostomy with stent implantation offers a rapid and effective method for emergency left atrial decompression in neonates with HLHC, critical aortic stenosis, and a prenatally closed foramen ovale, even in preterm, low-weight infants where septal access is technically demanding.



FT-091 / #98

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

PERCUTANEOUS PULMONARY VALVE IMPLANTATION WITH VENUS P-VALVE: A SINGLE CENTER EXPERIENCE

Alper Güzeltaş, Selman Gökalp, Erman Çilsal, Sezen Ugan Atik, Ensar Duras, Serdar Kertmen, Mehmet Akin Topkarci, Murat Şahin
University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Department Of Pediatric Cardiology, Istanbul, Turkey

Background and Aim: Free pulmonary valve insufficiency is a common late sequela after right ventricular outflow tract (RVOT) surgery. In appropriately selected patients, percutaneous pulmonary valve implantation (PPVI) provides a less invasive alternative to repeat surgery. While balloon-expandable valves have been widely used, self-expanding devices such as the Venus P-valve have expanded treatment options, particularly for dilated RVOT anatomies. The Venus P-valve can be implanted without a long delivery sheath, potentially simplifying the procedure and reducing costs.
Methods: This retrospective single-center study included 30 patients (median age 15.6 years) who underwent Venus P-valve implantation between February and November 2025 for free pulmonary insufficiency following prior RVOT surgery. Most had repaired tetralogy of Fallot (TOF). In all but one case, the valve was delivered over a guidewire without a long sheath. Demographic, imaging, and procedural data were reviewed.
Results: Of the cohort, 76% were male; the median interval since the last surgery was 14 years. Cardiac MRI showed a median RVEDVi of 156 mL/m^2 and pulmonary regurgitation fraction of 47%. CT classified RVOT morphology primarily as Type 2 (50%). Mean RVOT diameter was 33 mm; balloon sizing revealed a mean waist diameter of 29 mm. Valve sizes ranged from 28/25 mm to 36/25 mm. All 29 attempted sheathless implantations were successful; one case required a 24F DrySeal sheath. Complications developed in three patients: one ventricular fibrillation resolved with defibrillation, a groin hematoma, and a pulmonary artery injury managed with device closure. Median hospital stay was 4 days. Trivial regurgitation was noted in three patients; no significant arrhythmias occurred during 15-days to 7-months of follow-up.
Conclusions: Venus P-valve implantation without a long delivery sheath is technically feasible and appears safe in selected pediatric and young adult patients with RVOT dysfunction. This simplified approach may broaden PPVI applicability. Larger, long-term studies are warranted to confirm durability and long-term outcomes.



FT-092 / #194

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

EVALUATING THE ACCURACY OF A NOVEL 3D VISUALIZATION SOFTWARE FOR PREPROCEDURAL PLANNING OF AORTIC COARCTATION STENTING

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Background and Aim: Stent implantation for aortic coarctation relies on detailed preprocedural planning, typically performed using CT or MRI. A novel 3D simulation tool has been developed to allow precise morphometric analysis and virtually simulate endovascular device deployment. This study aimed to evaluate the accuracy and efficiency of this software in patients undergoing transcatheter stenting for aortic coarctation by comparing simulated findings with real catheterization and stent implantation data.
Methods: 43 consecutive patients who underwent cardiac catheterization and aortic stenting at Padova University Hospital between 2019 and 2024 were enrolled. Demographic, clinical, and procedural data were collected. An expert operator retrospectively and blindly analysed anonymized preprocedural imaging (CT or MRI) using the simulation software and performed virtual stent implantation. Key anatomical and procedural parameters from the 3D simulation were compared with real catheterization data.
Results: Three patients were excluded due to poor imaging quality, leaving 40 patients (18 female, 22 male, median age of 17.5 ± 10y, mean weight 49.9 ± 18.2kg). Native coarctation was present in 77.5% of cases and re-coarctation in 22.5%, while 55% had associated CHDs. All procedures were successful, with a significant reduction in peak-to-peak gradient (31.4±11.8mmHg vs. 2.3±4.0mmHg, $p < 0.001$). The mean time for 3D visualization and virtual stenting was 5.7 ± 1.9 minutes, with a progressive decrease as operator experience increased. No significant differences were observed between simulation and catheterization in key aortic measurements, including the transverse arch, isthmus, diaphragmatic aorta and distance from the left subclavian artery (LSCA) to the coarctation. Likewise, stent length ($p = 0.77$) and balloon size ($p = 0.16$) showed no significant discrepancies. Stent type selection (CP, Bentley, Andra) demonstrated strong concordance, with an accuracy of 88%. The simulation predicted the need for covered versus bare stents with 70% accuracy and correctly anticipated flare requirements and, in



thre cases, LSCA jailing.

Conclusions: This new 3D simulation software provides a rapid and accurate tool for anatomical assessment and preprocedural planning in aortic coarctation stenting. By generating reliable predictions without additional post-processing, it streamlines workflow and supports interventional cardiologists. Further prospective studies are warranted to confirm its clinical value, cost-effectiveness, and learning curve.



FT-093 / #239

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

MID-TERM OUTCOMES AFTER PULSTA VALVE IMPLANTATION: PROCEDURAL INSIGHTS AND MULTIMODALITY IMAGING FOLLOW-UP

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Background and Aim: Patients with Tetralogy of Fallot, pulmonary atresia, absent pulmonary valve, or those undergoing pulmonary valvuloplasty or Ross procedure risk developing significant pulmonary regurgitation or stenosis, often requiring pulmonary valve replacement. Recently, self-expandable transcatheter valves (Pulsta, Harmony, Venus P-valve, Alterra) have broadened minimally invasive options for complex anatomies. The Pulsta valve, with its short self-expanding frame and low-profile delivery, enables implantation in native RVOTs up to 32 mm while limiting myocardial and vascular complications. Despite growing experience, long-term durability data remain scarce. Here, we present acute outcomes and up to five-year follow-up after Pulsta implantation, using multimodality imaging to evaluate valve performance.
Methods: In this retrospective study, all patients who underwent percutaneous Pulsta valve implantation at our center, except one, were included. Pre-procedural cardiac magnetic resonance imaging (CMR) was performed in all patients. During the procedure, hemodynamic measurements, including RV pressure, pulmonary artery pressure, and RVOT pressure gradient, were recorded. Pigtail angiography was performed to evaluate RVOT anatomy, measure diameters at multiple levels, and determine the length of the intended implantation site. Simultaneous coronary angiography and balloon sizing using the stop-flow technique were performed to exclude coronary compression and select the optimal valve size. Post-procedure follow-up included clinical assessment, echocardiography, NT-proBNP and CMR to evaluate valve function and RV remodeling.
Results: Six patients underwent successful Pulsta valve implantation without major procedural complications. Post-procedural RVOT gradients decreased significantly in all patients, with immediate improvement from a median of 12 mmHg (range 0–19) to a median of 0 (range 0-2) mmHg. Echocardiography and CMR demonstrated reduced pulmonary regurgitation and favorable right ventricular remodeling, including decreased RV end-diastolic volumes and preserved RV ejection fraction at follow-up (Figure 1). Continuous ECG monitoring revealed only one transient, non-sustained ventricular

tachycardia related to reversible hypokalemia, with no arrhythmic events during follow-up. No patient required antiarrhythmic therapy, and overall clinical outcomes were

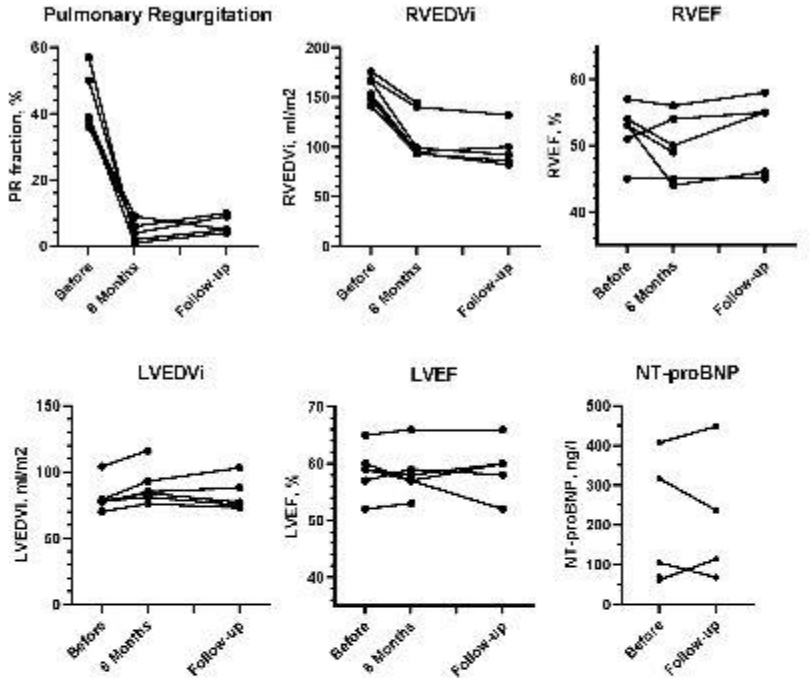


Fig. 1. Individual changes in PR, ventricular volumes, function, and NT-proBNP before, 6 months after, and at follow-up. *Abbreviations:* PR – pulmonary regurgitation; RVEDVi – right ventricular end-diastolic volume index, RVEF – right ventricular ejection fraction; LVEDVi – left ventricular end-diastolic volume index; LVEF – left ventricular ejection fraction, NT-proBNP – N-terminal pro-B-type natriuretic peptide.

excellent.

Conclusions: The Pulsta valve has shown sustained durability and hemodynamic stability over mid-term observation up to 5 years of follow-up, without evidence of structural



compromise or valve dysfunction. However, a longer follow-up and a larger patient cohort is needed for evaluation of the valve performance in long term.



FT-094 / #327

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

RESTORING FLOW: MID TERM OUTCOMES OF TRANSCATHETER PALLIATION IN CHILDREN WITH DECREASED PULMONARY BLOOD FLOW, EXPERIENCE FROM INDIA

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Background and Aim: Backround:
BT shunt in neonates has high morbidity and mortality and transcatheter palliation can be a lifesaving alternative. With trans catheter palliation slowly becoming preferrd over surgical shunts, we wanted to analyse real world data from a tertiary care centre in India. This study evaluates such interventions focusing on immediate and short term outcomes of RVOT and PDA stenting.
Methods: Aim & Methods:
This retroprospective observational study analysed data from 2016 -2024 of patients who underwent transcatheter palliation. Indication for considering cath based intervention was either if they were less than 30days or weighed less than 3kg or had a branch PA zscore or <-2. Procedural details and post op course was analysed and patients were followed up till Intra cardiac repair
Results: Results:
Out of 84 children, 61(72%) intended for biventricular repair and 23(28%) for univentricular palliation, 50 underwent PDA stent and 34 RVOT stenting. With a mean weight was 2.97kg (1.6-4.8) and stent diameter of 4 (3.5-4.5), immediate procedural success was 97.6% with an average Hospital stay of 4.7(3-16) days. 35 (42%) kids have underwent final correction at a median age of 360days (149-978) with 7(20%) requiring PA plasty, 16(19%) are on follow up and 14(16%) have lost to follow up. Branch PA growth was facilitated well by stenting with mean RPA diameter Z score improving from -1.70(-0.08 5.6) to +0.23(+0.04 +1.59) and LPA from -1.52 (-0.4 -4) to 0.43 (+0.2 +2.26) and only 1 patient required additional BT shunt. 19(22%) kids expired, 7(8%) (1 dissection, 1 stent thrombosis,1 migration and 4 with sepsis) during the hospital stay and 12(14%) were interstage mortality who were lost to follow up.
Conclusions: Transcathter palliation provides a critical bridge to finnal surgery for high risk small kids enabling adequate growth of pulmonary arteries with minimal complications and leading to successful complete repair making this a very promising option for this subset of children.



FT-095 / #454

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

„SECOND CORONARY WIRE" ACROSS CONGENITAL LESION TYPES AND COMPLEX PULMONARY INTERVENTIONS: A MULTI-ANATOMY TECHNICAL SERIES AND LESSONS FROM THE CATHLAB BATTLEFIELD

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Background and Aim: Wire-based support maneuvers are integral but remain under-reported in congenital interventional cardiology. The "second coronary wire" ("buddy wire"), common in PCI for added stability and coaxiality, may also aid complex pediatric anatomies. We imed to characterize "buddy wire" impact on procedural control and identify lesions where it provides greatest benefit.
Methods: Among 275 single-center cardiac catheterisations in 2025, we identified 7 consecutive procedures in which a second wire was intentionally used to enhance stability or device deliverability when initial angiography indicated anticipated instability or risk of losing catheter position.
Results: Seven patients had diverse congenital anatomies: (1)Tetralogy of Fallot with left pulmonary artery (LPA) stent restenosis; (2) Congenitally corrected transposition of the great arteries with pulmonary atresia (PA), right ventricle–to–pulmonary artery (RV–PA) conduit folding and LPA stenosis; (3) Hypoplastic left heart syndrome (HLHS) after Fontan procedure with in-stent LPA stenosis; (4) HLHS after Norwood stage I with RV–PA conduit and proximal LPA stenosis; (5) Ex-preterm infant with ventricular septal defect after pulmonary artery banding and severe right pulmonary artery narrowing; (6) PA, Blalock–Taussig shunt and narrow LPA; (7) Total anomalous pulmonary venous return with severe multiple pulmonary vein stenosis. Age ranged from 1 month to 12 years; weight 3.0–30 kg. Four of seven patients (57%) required urgent or hybrid-emergent intervention. Technical success was 100%, with no wire-related complications. The second wire improved: back-up support for catheter or balloon advancement(7/7); coaxial alignment in sharp take-offs or tortuous conduits (3/7); re-entry after wire loss or repositioning in unstable access situations (4/7);access stability in high-risk infants, preventing repeated re-navigation(all 4 urgent cases). The technique proved effective in short or angulated main pulmonary artery segments, long-segment or in-stent LPA stenosis, tortuous or folding RV–PA conduits, narrow Blalock–Taussig shunts, and severely stenotic pulmonary veins. In neonatal and



hybrid-emergent procedures, it reduced loss of access, and enabled smooth completion despite marked anatomic and hemodynamic instability.

Conclusions: The second coronary wire is a simple, safe, and highly versatile maneuver that enhances procedural control in complex congenital and post-surgical anatomies, including neonatal cases. Its use can reduce procedural instability, shorten procedure time, and should be considered for incorporation into congenital interventional training.



FT-096 / #500

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

COVERED STENT EXCLUSION OF SVC STENTING- INSTITUTIONAL EXPERIENCE AND AN UNIQUE APPROACH WITH ANCHORING STENT.

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Background and Aim: Sinus venosus atrial septal defect (SVASD) of superior vena cava (SVC) type is a complex congenital anomaly traditionally corrected by surgical repair under cardiopulmonary bypass. Although effective, surgery entails thoracotomy, longer intensive care and hospital stay, and procedure-related morbidity. Transcatheter SVC exclusion using covered stents has recently emerged as a minimally invasive alternative that can exclude the defect and redirect anomalous pulmonary venous return while avoiding open-heart surgery. Optimising stent stability in this anatomically challenging region, including the selective use or non-use of adjunctive anchoring devices such as Capsure fasteners, is an important technical consideration.
Methods: This study aimed to evaluate the feasibility, safety and early outcomes of transcatheter SVC exclusion by covered stent in patients with SVC-type SVASD. Specific objectives were to describe baseline clinical and imaging characteristics, detail procedural techniques (including stent-in-stent stabilisation and the strategy regarding use or non-use of Capsure fasteners), and assess early post-procedural clinical and haemodynamic outcomes. We analysed 50 consecutive patients with SVC-type SVASD who underwent transcatheter SVC exclusion by covered stent at a single tertiary centre. Demographic, clinical, echocardiographic, CT/TEE/cardiac MRI and haemodynamic data were collected. Procedural details included vascular access, stent and balloon types, stent-in-stent techniques, thoracoscopic assistance, and whether Capsure fasteners were deployed for additional fixation or whether the stent was left unsupported relying on optimal sizing and landing.
Results: Patients were predominantly young adults with near-equal sex distribution. Procedural success was high, with successful stent deployment and position in almost all cases, both in those with Capsure fastener use and those without, where careful sizing and stent-in-stent anchoring into the innominate vein provided adequate stability. There was no procedure-related mortality, and the incidence of major complications was low; most adverse events were minor and medically manageable. Intensive care and total hospital stay were short. Early imaging demonstrated a well-expanded SVC stent with no or only tiny residual interatrial shunt, preserved pulmonary venous drainage and no significant



obstruction in either strategy.

Conclusions: Transcatheter SVC exclusion using covered stents, with selective use or omission of Capsure fasteners, appears to be a feasible and safe alternative to surgery in appropriately selected patients with SVC-type SVASD.



FT-097 / #512

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

INTERVENTIONAL EXTRACARDIAC FONTAN (IECF): EIGHT-YEAR SINGLE-CENTRE EXPERIENCE WITH A STAGED, CATHETER-BASED FONTAN COMPLETION STRATEGY

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Background and Aim: Fontan circulation fundamentally alters venous flow dynamics, with sluggish, non-pulsatile pulmonary blood flow predisposing to morbidity and late failure. Conventional extracardiac Fontan completion requires redo sternotomy and cardiopulmonary bypass (CPB), carrying risks of sternal re-entry, bleeding, and ventricular dysfunction due to abrupt unloading. Interventional Extracardiac Fontan (iECF) is an evolving strategy that separates the preparatory surgical stage from a later percutaneous completion, aiming to preserve Fontan kinetics, minimize reoperative risk, and reduce perioperative morbidity.
Methods: From 2017 to 2024, children with functionally single-ventricle physiology underwent **Stage 1 iECF**: bidirectional Glenn shunt with placement of an expandable PTFE extracardiac conduit from the inferior vena cava (IVC) to the pulmonary arteries, separated from the superior caval pathway by a pericardial dam. From 2019 onwards, eligible patients underwent **Stage 2 iECF**: percutaneous Fontan completion via transcatheter puncture and balloon dilation of the pericardial dam, followed by stenting of the preparatory conduit (typically with 59 Zephyr or 57 Andra XXL stents). Concomitant interventions (e.g., LPA stenting, antegrade flow interruption, fenestration creation) were performed as required. Haemodynamic data, procedural success, complications, and early post-procedure course were analysed.
Results: Interventional completion was technically successful in the vast majority of cases, with stable Fontan pressures and preserved Glenn-to-RPA and Fontan-to-LPA flow offsetting. Most patients required **no post-procedure intubation or inotrope support**, and demonstrated **short ICU and hospital stay**, indicating reduced Fontan-related morbidity. Use of a single, appropriately sized stent maintained impedance comparable to a surgical graft, without distortion of branch pulmonary arteries. Periprocedural complications, including access-related and device-related events, were infrequent and manageable, with no procedure-related mortality in this series. The technique proved applicable across a broad spectrum of complex cardiac anatomies, including dextrocardia, interrupted IVC, and juxtaposed atrial appendages



Conclusions: The staged iECF strategy with catheter-based Fontan completion is a **safe, feasible, and efficient** alternative to conventional redo surgical Fontan completion. It avoids sternal re-entry and CPB at completion, supports more physiological Fontan kinetics, reduces early morbidity, universally adaptable across diverse anatomies. Longer-term follow-up will clarify durability and late Fontan outcomes, but eight-year experience indicates this approach "works so far" and may represent a preferred pathway to Fontan completion



FT-098 / #695

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

THE IMPACT OF CIRCULAR SHUNTING AS A COMPLICATION OF A CHALLENGING THERAPEUTIC STRATEGY IN A NEWBORN WITH CRITICAL PULMONARY STENOSIS AND UNFAVORABLE ANATOMY

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Background and Aim: Critical pulmonary stenosis (PS) in neonates may present with complex right ventricular (RV) physiology, severe tricuspid regurgitation, and ductal dependence. Although balloon pulmonary valvuloplasty (BPV) is the standard initial therapy, technical failure or early restenosis can lead to rapid clinical deterioration. We report a challenging case where conventional antegrade access was impossible, requiring a retrograde ductal approach, followed by an unexpected postoperative course with circular shunting and staged surgical PDA management.
Methods: A term neonate, 4 days old and weighing 3000 g, was admitted with cyanosis and tachypnea. Echocardiography showed a severe pulmonary stenosis (very dysplastic valve), severe RV hypertrophy with moderate dysfunction, tricuspid valve dysplasia with severe regurgitation and a large ductus arteriosus. BPV was performed for critical PS.
Results: Multiple antegrade attempts from the femoral and jugular veins failed due to severe tricuspid regurgitation and inability to enter into the hypertrophic, high-pressure RV. A retrograde approach was therefore performed via the ductus arteriosus into the pulmonary artery and across the pulmonary valve. BPV was performed with a Tyshak balloon, reducing the peak gradient semnificatively. The immediate post-procedural



outcome was favorable, allowing gradual weaning of prostaglandin E1. At 24 hours, the infant deteriorated with desaturation, metabolic acidosis, and oliguria. Echocardiography revealed severe restenosis, severely hypertrophic RV with a very small cavity, severe tricuspid regurgitation, and significant RV dysfunction, prompting surgical intervention. Surgical treatment included valvotomy with a transannular patch. Attempts to close the ductus resulted in desaturation, and the ductus was temporarily left patent, with the delay of definitive sternum closure for staged reassessment. Postoperative complications included renal, hepatic, and cardiac failure with generalized edema mostly due to circular shunting in the setting of PDA associated with severe tricuspid and pulmonary regurgitation and a large ASD. A subsequent partial ductal banding and then complete surgical closure led to a good outcome.

Conclusions: This case highlights the technical challenges of BPV in neonates with severe RV hypertrophy and tricuspid regurgitation, where retrograde ductal access may be the only feasible route. Early restenosis and complex postoperative physiology, with the development of a circular shunt, underscore the need for individualized strategy and close multidisciplinary care.



FT-099 / #902

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

BALLOON VERSUS SURGICAL AORTIC VALVULOPLASTY IN NEONATES AND INFANTS WITH CRITICAL AORTIC STENOSIS: LONG - TERM IMPACT ON SUBSEQUENT INTERVENTIONS

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Background and Aim: Treatments of aortic stenosis in neonates and infants pose challenges in terms of long-term outcomes. Balloon aortic valvuloplasty is an effective approach; however, surgeons have concern that tearing of the leaflets may result increasing rates of Ross procedure. In contrast, surgical aortic valvuloplasty, can provide a more physiological valve opening and may reduce the progression of aortic regurgitation. In this study, we aimed to compare the long-term outcomes of pediatric patients with critical aortic stenosis who underwent BAV in our center with SAV results in literature.
Methods: The data were collected from patients who had BAV at The SCHN between 1996 and 2015. The results were reviewed retrospectively, only patients with at least 10 years of follow-up were included. The obtained data were compared with the findings reported in the literature.
Results: In our 74-patient (28 neonates) cohort with at least 10 years of follow-up (median 14 years), the 10- and 15-year reintervention-free survival rates were 37.8% and 13.5%. Median reintervention-free survival was 0.38 years in neonates, 11 years in infants, and 7 years in children. Valve surgery was required in 71% of neonates, mostly Ross/ Ross-Konno procedures. Overall, 34% underwent Ross, 16% AVR, and 9.5% SAV. In the literature, unadjusted aortic valve replacement rate at 10 years in the neonatal and infant age groups was 78% after initial BAV and 80.3% after SAV. In our study, the corresponding rate in the same age group was lower (57%). However, in a 2013 series from the Melbourne group including 123 neonates, the rate of Ross procedure within 5 years after BAV was 35%, while 26% of those who underwent SAV later required a Ross procedure. Our Ross procedure rate among 28 neonates was 64%. This higher rate may shows that the proportion increases over extended follow-up.
Conclusions: The rate of early Ross procedures following BAV performed in the neonatal period is significantly higher than in other age groups. The choice between BAV and SAV should be guided by the patient's anatomy and institutional expertise; when an



experienced surgeon is available, SAV may be considered as the first-line option in neonates.



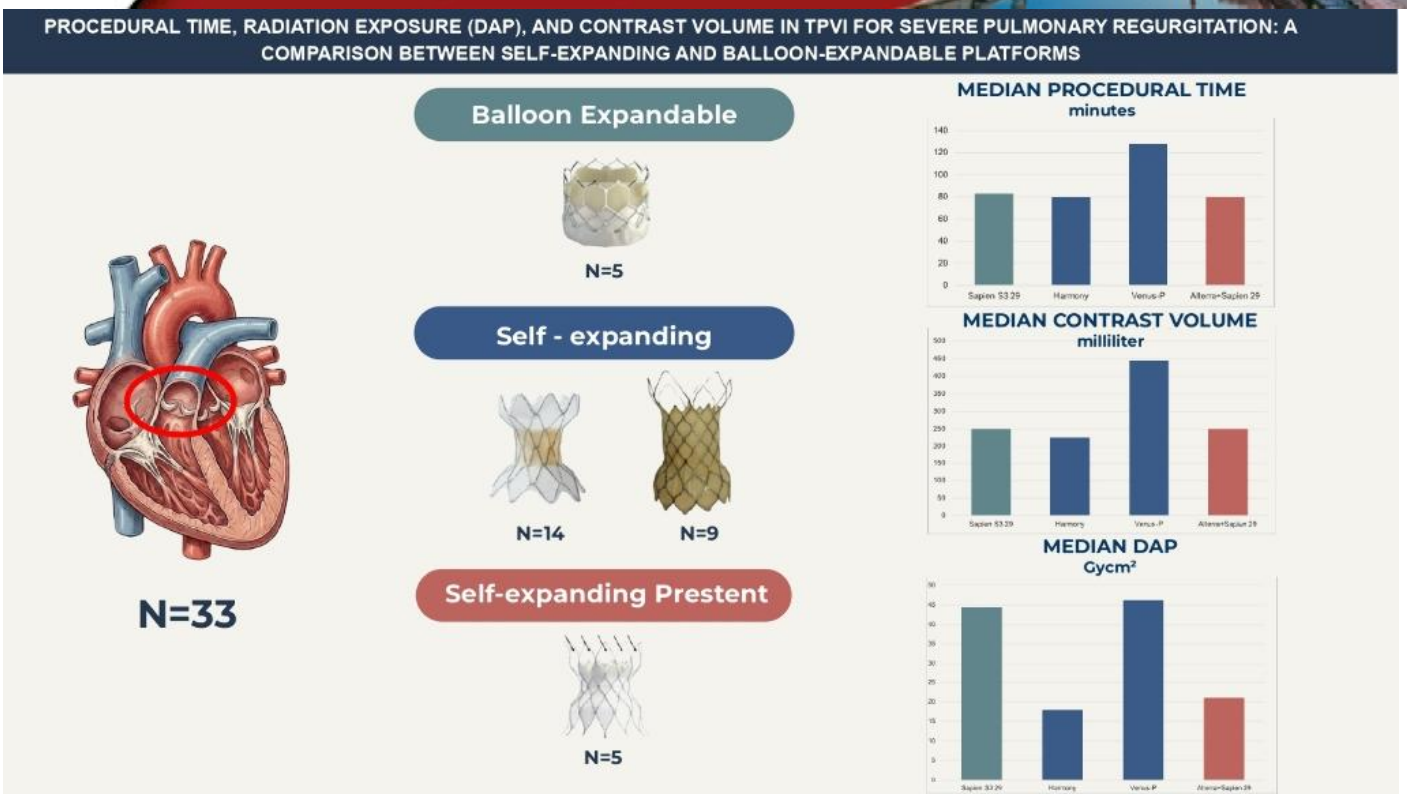
FT-100 / #1209

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

PROCEDURAL TIME, RADIATION EXPOSURE (DAP), AND CONTRAST VOLUME IN TRANSCATHETER PULMONARY VALVE IMPLANTATION FOR SEVERE PULMONARY REGURGITATION: A COMPARISON BETWEEN SELF-EXPANDING AND BALLOON-EXPANDABLE PLATFORMS

Giuliano Giusti[1], Francesco Prati[2], Giorgia Rocchetti[1], Cristina Cadonati[1], Alessandra Corato[1], Luigi De Luca[1], Valentina Giuli[1], Simona Marcora[1], Francesca Nespoli[1], Lucia Viola Camilla Mauri[1], Alessio Peretti[1], Stefano Marianeschi[1], Biagio Castaldi[2], Giovanni Di Salvo[2], Marco Papa[1]
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Background and Aim: Transcatheter pulmonary valve implantation (TPVI) in the native right ventricular outflow tract (RVOT) for severe pulmonary regurgitation has emerged as a safe and effective alternative to surgical pulmonary valve replacement. In recent years, several new TPVI platforms have been introduced into clinical practice. This study aimed to compare the procedural characteristics of TPVI in the native RVOT for severe pulmonary regurgitation using platforms currently available on the European market, focusing on procedural time, radiation exposure (dose–area product, DAP), and contrast volume, and descriptively assessing differences between self-expanding and balloon-expandable platforms.
Methods: This was a retrospective, dual-center observational study comparing consecutive patients who underwent TPVI between January 2023 and December 2025. All patients treated with TPVI were screened for eligibility. Patients were excluded if TPVI was performed in a non-native RVOT. For each TPVI procedure, the valve platform used, procedural duration, radiation exposure (DAP), and total contrast volume were recorded.
Results:



The study population consists of 32 patients who underwent TPVI. The cohort has a median age of 35 years, median Body Surface Area (BSA) is 1.43 m^2±0.3, median value of right ventricular end diastolic volume index derived from MRI was 151 ml/mq. The predominant native diagnosis is Tetralogy of Fallot (TOF), identified in 67% of the cases. The four TPVI platforms used were Sapien S3 (15%), TPV 25 (42%), Venus-P (27%), Alterra + Sapien (15%). Median procedural time in minutes was respectively 83 for Sapien S3, 80 for TPV25 and Alterra + Sapien, 128 for Venus-P. Median contrast volume used was 250 ml for Sapien S3 and Alttera + Sapien, 225 ml for TPV25, 445 ml for Venus-P. Median DAP was 44 $Gycm^2$ for Sapien S3, 18 $Gycm^2$ for TPV25, 46 $Gycm^2$ for Venus-P and 21 $Gycm^2$ for Alterra + Sapien.

Conclusions: Different procedural profiles were descriptively observed across TPVI platforms. Based on median values, TPV25 procedures showed shorter procedural times, lower radiation exposure and lower contrast volumes, whereas Venus-P procedures were associated with longer procedural times, higher contrast volumes and intermediate radiation exposure. Further studies are needed to better assess procedural differences among TPVI platforms.



FT-101 / #1217

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

TRANSCATHETER EMBOLIZATION OF A LARGE RIGHT CORONARY-CAMERAL FISTULA IN A LOW WEIGHT NEWBORN WITH HEART FAILURE

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Background and Aim: Management of large coronary fistulas (CAFs) causing neonatal heart failure is a complex scenario were surgical or percutaneous treatment could be high risk procedures, especially for low weight infants.
Methods: The patient was a full term baby girl born via a cesarean section because of facial presentation (weight at birth 2,7 kg). After birth neonatal adaptation was normal (APGAR 9-9) but within a few hours she developed moderate tachypnea. At NICU admission cardiologic consultation revealed a huge CAF between proximal right coronary artery (RCA) and right atrium (RA) and moderate biventricular systolic dysfunction. Surgical treatment was considered too risky because of the weight and the clinical conditions.
Results: Because of progressive signs of heart failure CAF embolization was performed under general anesthesia at a weight of 2,5 kg. A 3.3 Fr 7-cm short sheath (Pediavascular) was placed in the right femoral artery and a 5 Fr 7-cm short sheath (Terumo) was placed in the left femoral vein. RCA selective angiography confirmed a huge CAF between proximal RCA and RA with a maximum diameter of 6 mm and a narrowing of 2,5 mm just before a saccular aneurysm over the roof of the RA. First unsuccessful attempt of embolization was performed via a veno-arterial rail because the guidewire severely altered the anatomy of the fistula and there was concrete concern of device malposition/embolization or native coronary artery occlusion and the device was not implanted. Thus the guidewire was stabilized in the main pulmonary artery and successful deployment of an Amplatzer Vascular Plug II 6/6 mm (Abbott) was performed via antegrade route. Final angiography showed trivial residual shunt, native RCA widely patent and no signs of thrombosis. Dual antiplatelet therapy (DAPT) was started. At last follow-up 16 months after the procedure the baby is doing well, clinically asymptomatic with normal biventricular size and function, still on DAPT because of severe residual proximal RCA dilatation.
Conclusions: Transcatheter closure of huge CAF in low birthweight infants is a



valuable alternative to surgical ligation in selected patients. As often experienced during neonatal procedures, careful planning and attention to anatomical details is the clue to a successful procedure.



FT-102 / #1225

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

TOWARD A NATIONAL STANDARD: DEFINING ITALIAN DIAGNOSTIC REFERENCE LEVELS (DRL) IN PEDIATRIC INTERVENTIONAL CARDIOLOGY

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Background and Aim: Radiological imaging in pediatric Interventional Cardiology (IC) is vital for diagnosis and treatment of children with Congenital Heart Diseases (CHD),but carries radiation risks,particularly for this sensitive population. Diagnostic Reference Levels (DRLs) have been proven as a useful tool for optimizing patient exposure. Despite the significant radiation doses associated with pediatric IC, robust national benchmarks are still lacking in Europe.Given the absence of reference values in Italy, this multicenter study aims to provide the first National DRLs (NDRLs) for pediatric IC, in full accordance with the European RP185 guidelines.
Methods: A prospective multicenter study, funded by the Italian Ministry of Health (Grant GR-2018-12365477), was conducted between January 2020 and December 2024 across seven reference hospitals for CHD treatment. Patient demographics and dose-related quantities (P_{KA}, $K_{a,r}$) as well as Fluoroscopy Time (FT) were collected for all IC procedures performed on patients aged <18 years. Procedures were categorized into 8 diagnostic and 11 therapeutic types reflecting national practice. Patients were stratified into five body



weight (BW) classes according to guidelines: <5 kg(BW5), 5–<15 kg(BW15), 15–<30 kg(BW30), 30–<50 kg(BW50), and 50–<80 kg(BW80). For each procedure type and BW class, NDRLs were calculated as the 75th percentile of the distribution of median values observed in each center.

Results: A dataset of 3904 pediatric IC procedures were collected (1299 diagnostics,2605 interventions). Right heart catheterizations (n=613) and atrial septal defect (ASD) closures (n=723) were the most frequently performed. As example, NDRLs for P_{KA}(Gy cm^2) were: 1.7 (BW5) – 3.0 (BW15) – 5.8 (BW30) – 14.7 (BW50) – 40.9 (BW80) for diagnostic procedures; 4.0 (BW30) – 6.8 (BW50) – 12.1 (BW80) for ASD closures.Our results confirmed that patient dose (P_{KA},$K_{a,r}$) increases with BW, while FT relates to case complexity (patient,procedure,etc). Complex interventions like Angioplasty and Pulmonary Valve Replacement (PVR) demonstrated the highest exposures, with NDRL of P_{KA}(Gy cm^2) for the latter ranging from 25.1 (BW50) and 63.6 (BW80).

Conclusions: This study presents the most extensive dataset to date on pediatric IC in Italy, establishing robust,stratified NDRLs. The findings support weight-based stratification and offer a strong evidence base for regulatory bodies to define national standards and assist institutions in refining their optimization strategies.



FT-103 / #1360

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

CLINICAL IMPACT OF FONTAN CONDUIT STENTING ON FUNCTIONAL CAPACITY

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Background and Aim: Fontan conduit stenosis or caliber reduction may contribute to impaired hemodynamics, reduced functional capacity and progressive organ dysfunction. Transcatheter Fontan conduit stenting is a safe and effective strategy to restore conduit diameter and cross-sectional area. While procedural outcomes are well established, limited data are available regarding its clinical impact. The aim of this study was to evaluate the effects of Fontan conduit stenting on functional capacity.
Methods: This single-center retrospective study included pediatric and adult patients with Fontan circulation who had an indication for Fontan conduit stenting. Clinical data and cardiopulmonary exercise testing (CPET) parameters were collected before the procedure and during follow-up. Procedural data and changes in conduit geometry were analyzed to assess their association with functional outcomes.
Results: A total of 42 patients underwent Fontan conduit stenting between February 2022 and October 2025. Median age at the time of the procedure was 20.9±7.5 years, with a mean body weight of 58.2±17.5 kg. All procedures were performed electively and there were not complications. Covered stents were implanted in 20 patients (48%) and post-dilatation with high pressure balloon was performed in 37 (88%). Conduit cross-sectional area (CSA) increased from 156±35.7 mm^2 to 257±53 mm^2. 15 patients (36%) performed a CPET before and within one year from the procedure revealing non significant change in the peak VO_2 (22.9±5.2 to 23.0±5.4 ml/Kg/min; p=0.9) and VE/VCO_2 slope (40.9±8.5 to 42.3±6.12; p=0.6).
Conclusions: Fontan conduit stenting is a safe and effective procedure for improving Fontan circulation anatomy and flow. However, the main parameters of functional capacity do not show significant changes following the procedure. Longer follow-up studies are needed to confirm durability and long-term clinical benefit.



FT-104 / #1373

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

THE EURO-LYMPH REGISTRY: DESIGN, IMPLEMENTATION, AND EARLY CHARACTERISTICS OF A EUROPEAN MULTICENTER INITIATIVE FOR LYMPHATIC INTERVENTIONS

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Background and Aim: Lymphatic complications such as protein-losing enteropathy (PLE), chylothorax, and plastic bronchitis (PB) are severe causes of morbidity and mortality in patients with congenital heart disease or primary lymphatic diseases. Management strategies vary across Europe, and available evidence on lymphatic interventions is limited by small single-center cohorts and heterogeneous definitions, indications for intervention, and outcome assessment. The EURO-LYMPH registry was established to address these gaps through standardized multicenter data collection. The aim of this study is to describe the design, implementation, and early characteristics of the EURO-LYMPH registry.
Methods: EURO-LYMPH is a multicenter European registry including pediatric and adult patients with congenital heart disease or primary lymphatic diseases undergoing lymphatic interventions. Both retrospective and prospective data are collected using a centralized REDCap-based platform. Standardized definitions for PLE, chylothorax, PB, procedural outcomes, and clinical outcomes were developed through expert consensus. Ethical approval is obtained at national level in participating countries, with centralized approval frameworks applied in countries with multiple centers. De-identified clinical, imaging, and procedural data are contributed by participating institutions, with predefined longitudinal follow-up capturing clinical status, laboratory markers, reinterventions, hospitalizations, transplantation status, and survival.
Results: To date, the EURO-LYMPH registry involves 20 centers from 12 European countries. Ethical approval has been obtained or is in progress across participating sites, allowing retrospective and prospective data collection. A total of 22 patients (age range 7–34 years) have been included to date, all undergoing lymphatic interventions. Seventeen patients had Fontan circulation and five had primary lymphatic disorders. Presenting complications included PLE (n=14), PB (n=4), and chylothorax or chylopericardium (n=4). Recorded interventions included lymphatic embolization and thoracic duct interventions. In these early registry data, technical success was recorded in the majority of procedures.
Conclusions: The EURO-LYMPH registry represents the first European multicenter



initiative dedicated to lymphatic interventions in patients with congenital heart disease or primary lymphatic diseases. Early experience demonstrates the feasibility of standardized data collection across diverse healthcare systems and regulatory environments. This registry will provide a robust platform for comparative outcome analyses and the development of evidence-based management strategies in this complex patient population.



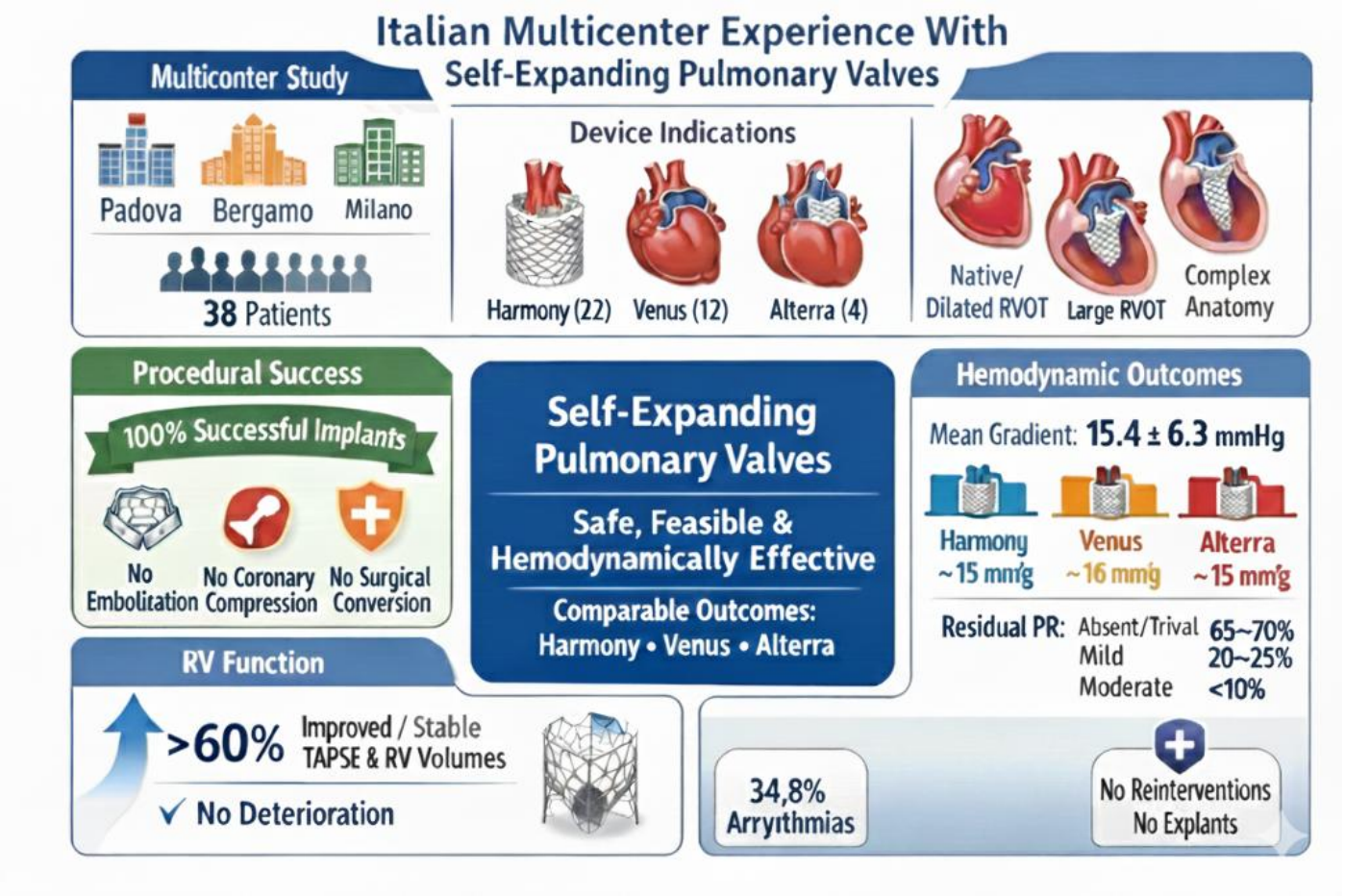
FT-105 / #1390

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

ITALIAN MULTICENTER EXPERIENCE WITH SELF-EXPANDING PULMONARY VALVES

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Background and Aim: Self-expanding transcatheter pulmonary valves (TPV) have emerged as a viable solution for large and dysfunctional right ventricular outflow tracts (RVOTs). We evaluated the feasibility, safety, and early hemodynamic performance of the three self-expandable valdevicesves available in Europe: Harmony, Venus P-Valve, and Alterra Adaptive Pre-stent systems.
Methods: This retrospective multicenter study (Padua, Bergamo, Milan) included 38 patients (mean age 38.4±16 years) undergoing TPV implantation between January 2025 and December 2025. Primary diagnoses were Tetralogy of Fallot (68%) and Pulmonary Stenosis/Atresia with Intact Ventricular Septum (32%). Indications for intervention included RV dilation/dysfunction (70%), symptoms (40%), and arrhythmias (20%). Preoperative MRI showed a mean indexed RV end-diastolic volume of 175.6±69 ml/m^2 and a mean regurgitant fraction of 49%.
Results:



Devices implanted included Harmony (n=22, 58%), Venus (n=12, 32%), and Alterra (n=4, 10%). Procedural Outcomes Device implantation was successful in 100% of cases. The mean procedural time was 96.5 minutes, with a mean contrast volume of 273 ml. The average dose-area product (DAP) was 52 Gyxcmq. Post-procedural mean trans-valvular gradient was 15.4±6.3 mmHg, with no significant differences between devices (Harmony: 15.1 mmHg; Venus: 16.0 mmHg; Alterra: 15 mmHg). Residual pulmonary regurgitation (PR) was absent or trivial in 70% and mild in 25%. Early RV remodeling was observed in >60% of patients. Post-procedural arrhythmias occurred in 34% of cases, while conduction abnormalities with no significant differences between valve types. However, a highly significant difference in arrhythmia incidence was observed when comparing annular versus supra-annular implantation sites ($p<0.001$), usually well controlled with short term oral B-blocckers therapy. No coronary or vascular complications were reported.

Conclusions: Self-expanding TPV implantation is safe and effective across different platforms, providing excellent hemodynamic results and RV remodeling. Post-operative arrhythmias are relatively common in case of sub-valvular implant, independently from the type of device used. Beta-blockers are usually effective to resolve sympoms.



FT-106 / #1422

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

INNOVATIVE INTERVENTIONAL APPROACH TO PEDIATRIC THROMBOSIS: DUBAI EXPERIENCE WITH MECHANICAL THROMBECTOMY

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Background and Aim: Thrombosis in children with complex comorbidities poses significant management challenges. Surgical removal of large intracardiac or pulmonary artery thrombi carries high risk, while conventional anticoagulation may be insufficient. Catheter-based mechanical thrombectomy using computer-assisted vacuum systems has emerged as a promising alternative. We present Dubai experience with the Lightning 7 system (Penumbra) in four pediatric patients with refractory thrombi, highlighting feasibility, safety, and outcomes.
Methods: Retrospective case series of four children undergoing catheter-based mechanical thrombectomy: **Case 1:** 7-month-old (4.2 kg) with severe immunodeficiency, recurrent infections, and infected thrombus extending from the superior vena cava to the atrial septum. Surgical removal was deemed high risk; thrombectomy was performed after multidisciplinary team consensus. **Case 2:** 10-year-old with nephrotic syndrome, multiple thrombi involving the right atrium and right pulmonary artery, complicated by severe RPA stenosis and pulmonary hypertension. **Case 3:** 16-month-old male with PA-VSD, prior ductal stent and Rastelli repair, admitted with infective endocarditis. Following surgical cleaning of vegetations, cardiac catheterization was performed to clear occlusive thrombus from the right middle and lower pulmonary lobes. **Case 4:** 16-year-old female with acute myeloid leukemia on chemotherapy, presenting with acute pulmonary embolism. CT showed bilateral pulmonary artery thrombi; echocardiography revealed a mobile right atrial thrombus attached to a Port-A-Cath. Thrombectomy was performed to reduce embolic risk while maintaining line integrity. Procedures were performed under fluoroscopic and echocardiographic guidance. Clinical outcomes, hemodynamics, and complications were documented.
Results: All patients underwent successful thrombus removal with significant reduction in clot burden. Case 1 stabilized with resolution of micro-embolic phenomena. Case 2



showed relief of RPA obstruction, reduced pulmonary pressures, and improved RV function. Case 3 achieved clearance of lobar pulmonary thrombi with improved perfusion. Case 4 demonstrated reduction of PA obstruction and stabilization of oxygenation without catheter dislodgement. Across the series, oxygenation improved, hemodynamics stabilized, and no major procedural complications were observed.

Conclusions: Computer-assisted vacuum thrombectomy is feasible and effective in critically ill pediatric patients with complex thrombi. This minimally invasive approach offers a valuable alternative when surgery is high risk or contraindicated. Our Dubai experience demonstrates encouraging outcomes and supports further evaluation of mechanical thrombectomy as part of comprehensive pediatric interventional programs.



FT-107 / #1453

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

A MULTICENTER ITALIAN EXPERIENCE ABOUT TRANS-CATHETER PATENT FORAMEN OVALE CLOSURE IN PAEDIATRIC AGE: EARLY OUTCOMES AND LONG-TERM FOLLOW-UP.

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Background and Aim: In adults, the trans-catheter closure of the patent foramen ovale (PFO) is a consolidate procedure in selected subsets. However, few and poor scientific evidences support this percutaneous procedure in paediatric age. The aim of this study is to highlight the early outcomes and the long-term follow-up of paediatric PFO closure in a multicentre Italian experience.
Methods: This is a retrospective multicenter study. From January 2004 to December 2025, the paediatric patients (≤18 years-old) undergone PFO or "small" atrial septal defect (ASD) closure in six high-volume Italian tertiary centres (Naples, Milan, Genova, Padua, Rome, Massa) were analysed. The patients with a concomitant congenital heart disease were excluded. The cohort's features (thrombophilia, comorbidities, and indication to closure), the early outcomes (exitus, procedural failure, adverse events) and the long-term follow-up (medical therapy, procedural redo, arrhythmias, procedure related adverse events and recurrent of the index event) were analysed.
Results: One-thirty-one patients were analysed. Mean age and weight were 14.1±3.5 years and 54.4±18.7 kilograms, respectively. A thrombophilic screening was positive in 28 pts



(21.4%) and negative in 70 pts (53.4 %). The major indications to PFO closure were: suspected paradoxical embolization (96 pts, 73.2%), primary prevention before a surgical operation (23 pts, 17.6%), disabling migraine (8 pts, 6.1%), arterial desaturation (4 pts, 3.1%). A device PFO closure was adopted in all patients, except in one case where a NobleStich EL system was used. No procedural failure and/or adverse events were detected. At discharge, 102 pts (77.9%) and 26 pts (19.8%) had a single and a double antiplatelet therapy, respectively. In 100 pts (76.3%), a follow-up (3.4±1.2 years) was available. The most of pts (69, 69%) were free from an antiplatelet therapy. Three pts (3%) had a residual shunt and required a redo-procedure. At last follow-up, no patient had procedure-related adverse events or significant arrhythmias. Only one patient (affected by brachyolmia) developed a relapsed paradoxical embolism.

Conclusions: The PFO closure is a safe and effective procedure in paediatric age. After PFO closure, the most of patients are free from antiplatelet/anticoagulation therapy and from “index event” (paradoxical embolization, migraine) during follow-up.



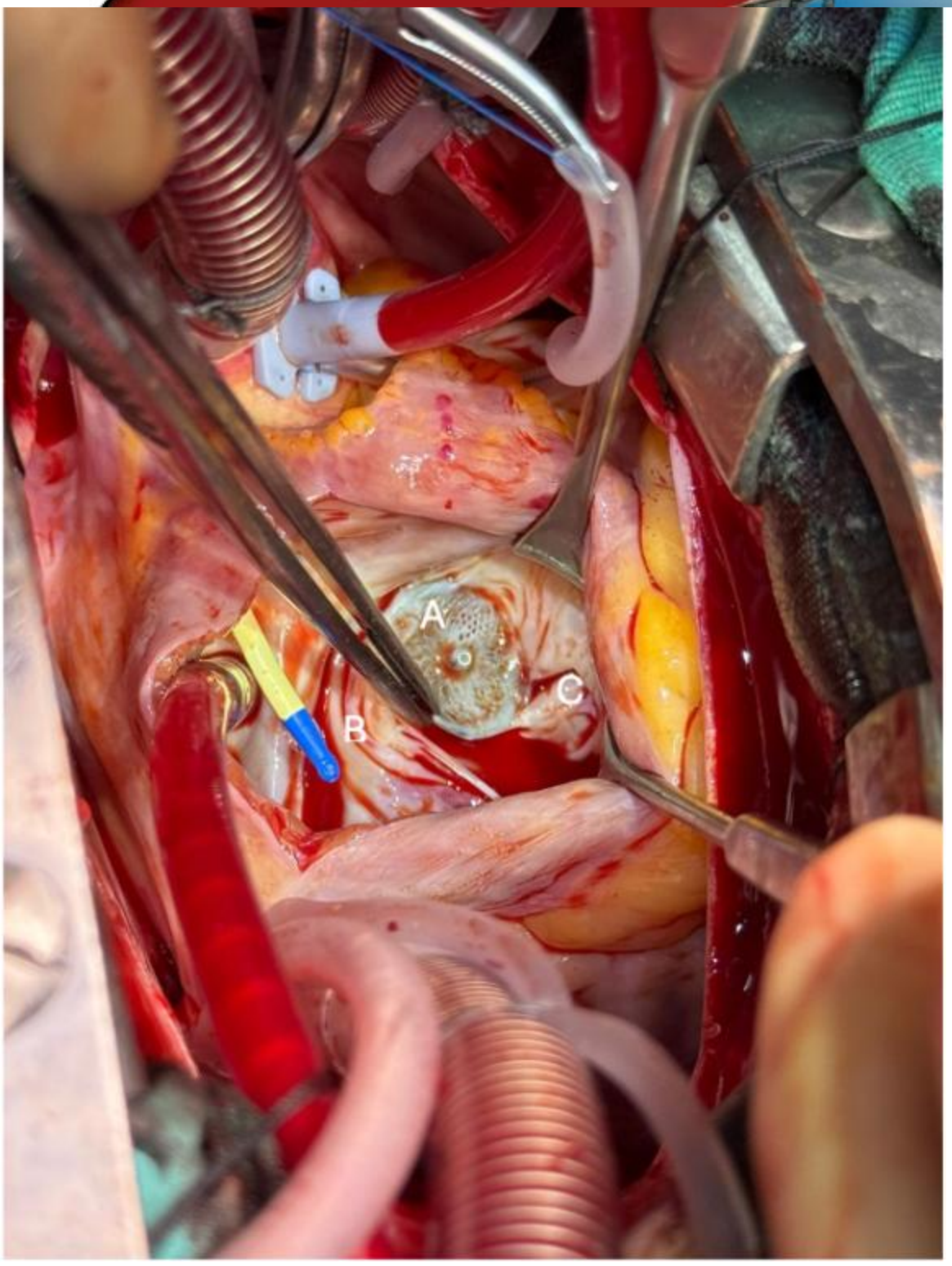
FT-108 / #1516

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

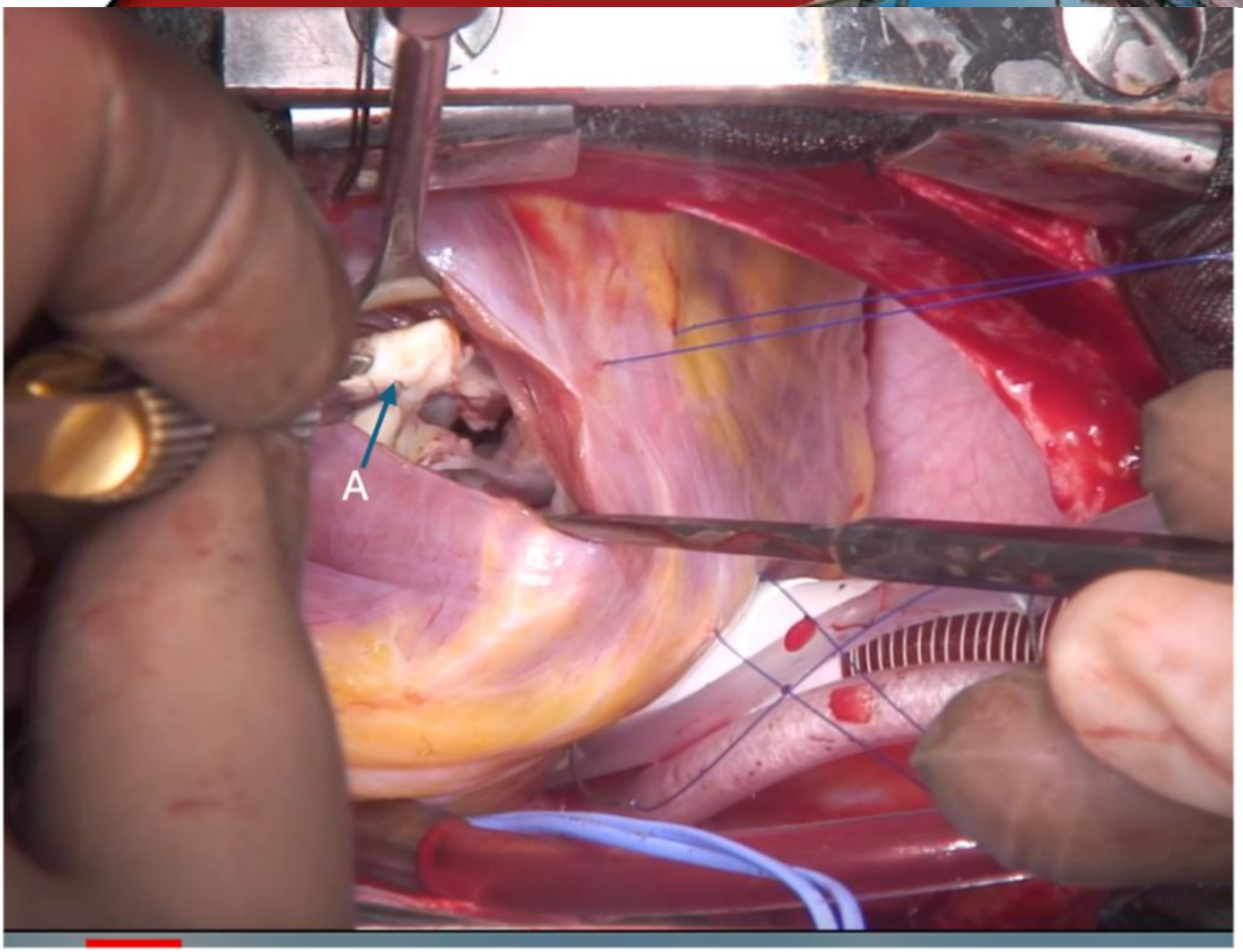
PROGRESSIVE RIGHT VENTRICULAR OUTFLOW TRACT OBSTRUCTION FOLLOWING PERIMEMBRANEOUS VSD CLOSURE WITH MFO: A RARE CASE OF VALVE–DEVICE INTERACTION

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Background and Aim: Transcatheter closure of perimembranous ventricular septal defects (pmVSDs) with Lifetech™ Konar-Multifunctional Occluder (MFO) has demonstrated high procedural success and safety. However, long-term complications due to valve–device interaction are rarely reported.
Methods: We describe a pediatric patient who developed progressive right ventricular outflow tract (RVOT) obstruction and severe tricuspid regurgitation 20 months after MFO closure, highlighting mechanisms, management, and outcomes.
Results: Case Description: A13-year-old girl underwent successful MFO closure of a 6-mm pmVSD. Early follow-up showed trivial tricuspid regurgitation and mild subpulmonic stenosis. Pre-procedural imaging revealed right ventricular hypertrophy caused by long-standing jet-related turbulence from the pmVSD, with no indications of a double-chambered right ventricle. Initial follow-up was uneventful, but serial echocardiography revealed rising RVOT gradients and mild tricuspid regurgitation. Sixteen months later, she developed exercise intolerance with a 60-mmHg gradient, although device position remained stable without migration. At 20 months, severe obstruction necessitated surgery. Intraoperatively, the device was found to entrap the anterior and septal tricuspid leaflets, displace papillary muscles, and induce fibrotic remodeling at the device-valve interference. Surgical management included excision of fibrotic tissue, pericardial patch augmentation of the tricuspid valve, and Kay annuloplasty. The patient recovered uneventfully, and follow-up confirmed resolution of obstruction with preserved valve function.



Interaction of MFO device **(A)** with anterior and septal leaflets. Entrapment of leaflets that are pushed to periphery by the device **(B)** and associated displacement of papillary muscles **(C)** are demonstrated.



RVOT view demonstrating fibrotic tissue that causes obstruction **(A)**.

Conclusions: This case demonstrates a rare long-term complication of MFO closure, in which chronic leaflet traction and increasing perimembranous fibrosis led to significant RVOT obstruction. Careful evaluation of anatomical risk factors, including VSD rim shape and leaflet proximity, can help identify patients at higher risk. Although MFO closure of pmVSDs is effective and typically safe, rare late complications involving the tricuspid valve and RVOT may occur. Pediatric cardiologists should carefully monitor valve–device interactions during implantation, and any leaflet restriction should prompt repositioning of the device. Follow-up must be thorough, with particular attention to Doppler gradients. If progressive obstruction develops, prompt surgical intervention can restore valve function and normal blood flow, leading to favorable outcomes.



FT-109 / #1530

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

PREDICTORS OF RESIDUAL SHUNT AFTER PATENT FORAMEN OVALE CLOSURE: A SINGLE CENTER STUDY

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Background and Aim: Residual shunt (RS) after percutaneous closure of patent foramen ovale (PFO) has been associated with an increased risk of recurrent stroke during long-term follow-up. However, the prevalence and predictors of RS are not well known. The aim of this study was to evaluate the prevalence and risk factors associated with the presence of RS in a cohort of consecutive patients undergoing percutaneous PFO closure.
Methods: All patients who underwent percutaneous PFO closure between January 2017 and August 2024 at the Pediatric and Adult Congenital Cardiology Unit in Massa were included. The presence and extent of RS were assessed using transcranial Doppler performed one year post-procedure. The anatomical characteristics of the PFO and the type of closure device used were analyzed retrospectively to identify possible risk factors associated with residual shunt.
Results: Among the 916 patients who underwent percutaneous PFO closure, only 657 completed follow-up and underwent transcranial Doppler 12 months post-procedure, and were therefore included in the analysis. The prevalence of RS was 23.9%, significantly higher after the use of the NobleStitch system compared to double-disc devices (56% vs. 22.6%, p<0.001). Among the latter, a lower rate of RS was observed with the Cardia device (13.3%, p<0.001, Table 1). In univariate analysis, the type of device (β=1.127, p=0.001), device diameter (>30 mm, β=1.718, p=0.008), and PFO diameter (>12 mm, β=1.526, p=0.036) were significantly associated with the presence of RS at 1 year. No significant association was found between RS and the presence of an atrial septal aneurysm, use of ASD devices, or the use of multiple devices. In multivariate analysis including device type (Cardia vs. others),device diameter, PFO diameter, and presence of septal aneurysm, the Cardia device was associated with a lower rate of RS independently of the other factors (β=0.295, p=0.001).
Conclusions: RS is a commonly observed condition after percutaneous PFO closure and is



significantly associated with PFO diameter and the type and size of the closure device. Cardia devices are associated with a lower risk of RS regardless of PFO or device size.



FT-110 / #1553

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

IN VITRO, IN SILICO AND EX VIVO CHARACTERIZATION OF MODIFIED MICROVASCULAR PLUGS AS PULMONARY FLOW RESTRICTORS: UNDERSTANDING CHALLENGES OF DEVICE PERSONALISATION.

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Background and Aim: Rapid pulmonary artery (PA) banding is an initial therapeutic approach to avoid bypass surgery in the neonatal period for neonates with pulmonary overcirculation. Surgically placed PA bandings can be associated with stenosis. Modified Micro Vascular Plug (MVP) devices have been used as transcatheter pulmonary flow restrictors (PFRs). However, they are associated with mixed results. The aim of the study is to characterize the behaviour of the MVP devices.
Methods: The hydraulic resistance of MVP devices was assessed using a Mock Circulatory Loop. Three different configurations (no-, one-, and two fenestrations with a diameter of 2 mm) with variations in pipe diameter were evaluated. Measurements were also performed in 3D-printed geometry. In addition, five modified MVP devices with a fenestration size of 4 mm were explanted during the comprehensive stage II procedure. H&E staining was performed. Complementary Computational Fluid Dynamics (CFD) simulations provided insights into haemodynamics, and a passive scalar washout was conducted as an assessment of thrombus risk.
Results: At low flow rates, fluid mainly flows through the fenestration and hydraulic resistance is mainly influenced by the size of the fenestration, while at high flow rates, the fluid mainly flows in the gap between the device and the vessel wall (para-device flow). Measurements performed in the 3D-printed patient geometry demonstrated good matching outcome compared to the *in vitro* results. CFD simulations demonstrate that one- and two-fenestration configurations exhibit less recirculation patterns. Wall shear



stresses was highest in the non-fenestrated configuration. Blood washout analysis revealed that 95% of the blood was cleared in 0.62 seconds, while the addition of fenestrations reduced this time by 21%. Comparison between histological observations and CFD-derived flow patterns indicate a correlation between areas of tissue proliferation and low velocity regions. Additionally, signs of para-device flow between the PA and the MVP were observed in all devices.

Conclusions: *In vitro* and *in silico* investigations revealed that the MVP is responsible for a biphasic flow pattern, suggesting that its hydraulic properties can be personalized by adjusting the number of fenestrations and the MVP-to-vessel diameter ratio related to device oversizing. Histological findings supported the presence of the two flow paths.



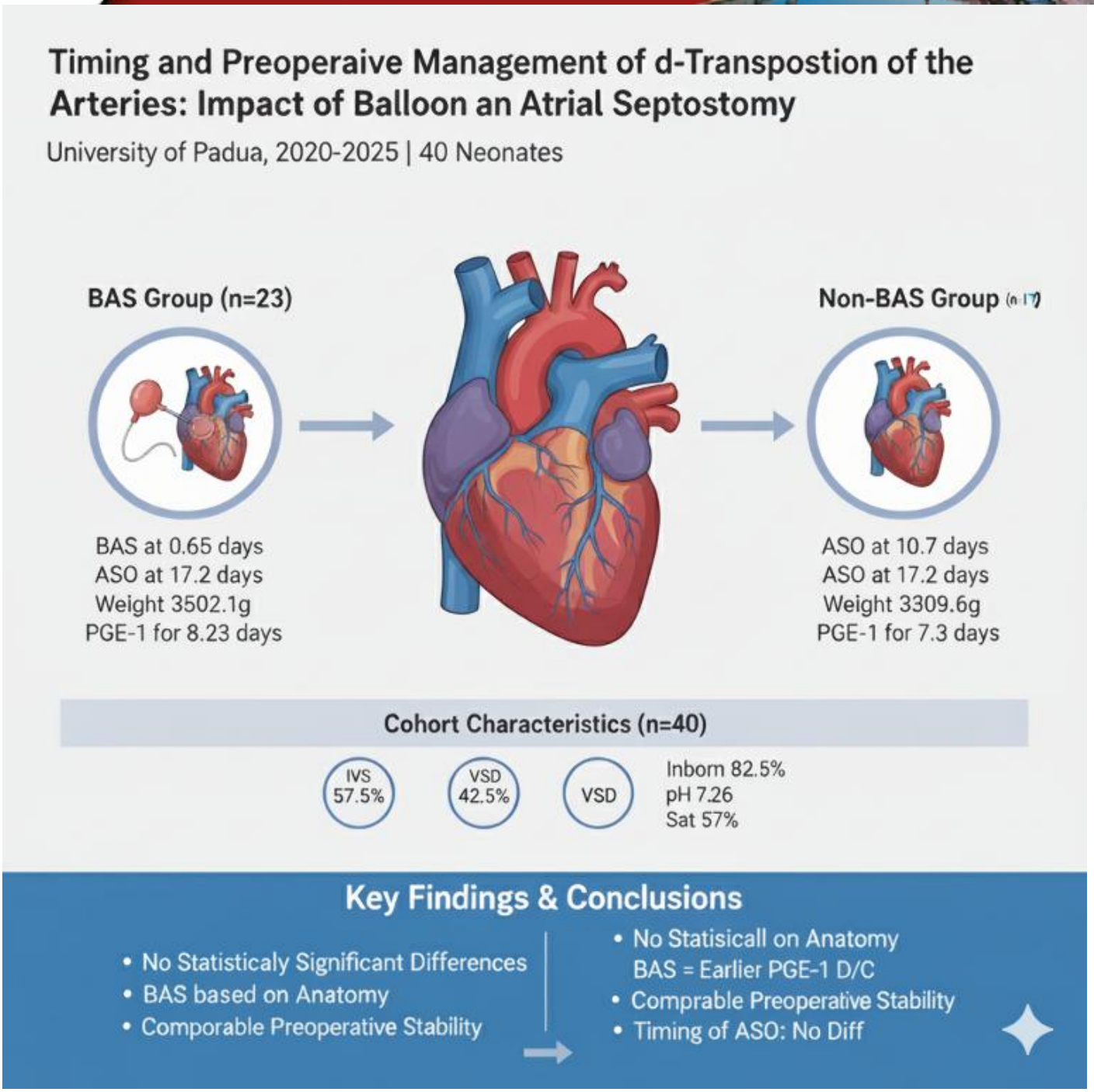
FT-111 / #1404

FLASH TALK SESSION 5
15-05-2026 11:30 - 13:00

TIMING AND PREOPERATIVE MANAGEMENT OF D-TRANSPOSITION OF THE GREAT ARTERIES: IMPACT OF BALLOON ATRIAL SEPTOSTOMY

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Background and Aim: The arterial switch operation (ASO) is the gold standard for d-transposition of the great arteries (d-TGA), but optimal preoperative stabilization remains debated. This study evaluates the impact of Rashkind balloon atrial septostomy (BAS) versus Prostaglandin-E1 (PGE-1) infusion alone on the timing of surgery, duration of medical therapy, and anthropometric data at the time of repair.
Methods: We conducted a retrospective single-center study at the University of Padua (2020–2025), including 40 neonates with d-TGA. Patients were divided into two groups: those undergoing BAS (n=23) and those managed with PGE-1 alone (n=17).
Results: Of the 40 patients, 57.5% had an intact ventricular septum (IVS) and 42.5% a ventricular septal defect (VSD). Most patients (82.5%) were inborn. At birth, the cohort showed a mean pH of 7.26 and oxygen saturation of 57%. In the BAS group, the procedure was performed at a mean age of 0.65 days. At the time of ASO, the mean age was 17.2 days with a mean weight of 3502.1g; the mean duration of PGE-1 infusion was 8.23 days. In the Non-BAS group, the mean age at ASO was 10.7 days, mean weight was 3309.6g, and mean PGE-1 duration was 7.3 days. Statistical analysis revealed no significant differences between the two groups regarding clinical or anthropometric parameters.



Conclusions: No statistically significant differences were observed between the groups regarding the clinical or anthropometric parameters analyzed. BAS was primarily performed based on the anatomical characteristics of the interatrial septum. Furthermore, BAS was not a determining factor for early PGE-1 discontinuation. Consequently, both management strategies appear to provide comparable preoperative stability for patients awaiting definitive surgical repair



FT-112 / #109

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

LONG-TERM IMPAIRED EXERCISE CAPACITY IN KAWASAKI DISEASE

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Background and Aim: Kawasaki disease (KD) is a pediatric systemic inflammatory condition, likely triggered by a respiratory infection, inducing myocardial inflammation, and complicated with coronary aneurysms. The objectives are to measure the late cardiopulmonary exercise response and associate the severity of the acute episode with the long-term aerobic capacity.
Methods: Data on the acute KD episode were collected retrospectively. Children and adolescents with past KD underwent a standardized ergometer cardiopulmonary exercise testing. Regression analysis was used to associate coronary Z-score and acute biomarkers, including maximum N-terminal pro-B-type natriuretic peptide (NT-proBNP), with the exercise parameters.
Results: Forty-three patients were diagnosed with KD (mean age 4.97 ± 2.88 years, 42% females). After a mean of 6.78 ± 3.00 years (range 1.5 – 16 years), 30 KD patients age-and-sex matched with 15 controls were included. Peak oxygen consumption (peakVO_2) and ventilatory threshold were significantly decreased in KD patients (34.1 ± 11.1 versus 39.4 ± 7.2 mL·kg^{-1}·min^{-1}, p = 0.025, and 50.7 ± 13.7 versus 56.3 ± 11.8 %, p = 0.036, respectively) Acute NT-proBNP and acute coronary Z-score were not associated with peakVO_2 (odds ratio OR [95% confidence interval] 0.974 [0.734 – 1.293] and 1.023 [0.719 – 1.455], respectively). Instead, peakVO_2 in KD patients with persistent coronary aneurysms was even lower (26.2 ± 6.4 mL·kg^{-1}·min^{-1}, p = 0.013).
Conclusions: Children with KD had reduced aerobic capacity 7 years after the diagnosis. Maximum acute NT-proBNP and onset coronary Z-score were not associated with the late impaired exercise capacity, but persistent coronary aneurysms were.



FT-113 / #145

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

MEDIUM- TO LONG-TERM OUTCOMES IN A PEDIATRIC COHORT OF L-AAOCA WITH INTERARTERIAL COURSE (L-AAOCA/IA): ARE WE CHANGING THE LANDSCAPE?

Jenna Diab[1], Dana Reaves-O'Neal[2], Monisha Akula[2], Shagun Sachdeva[2], Tam Doan[2], Stephen Dolgner[2], June Schellhaas[2], Prakash Masand[2], Lindsay Eilers[2], Athar Qureshi[2], Srinath Gowda[2], Yishay Orr[2], Silvana Molossi[1]
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Background and Aim: Anomalous aortic origin of the left coronary artery with interarterial course (L-AAOCA/IA) is a high-risk lesion for myocardial ischemia and a leading cause of sudden cardiac death (SCD) in the young.
Methods: Single institution cohort study of patients with L-AAOCA/IA following a standardized protocol. Coronary anatomy was delineated by CTA and functional assessment with EST and either stress nuclear perfusion imaging (sNPI) and/or dobutamine stress cardiac MRI (DSCMR) in patients ≥6-8 years. Follow up studies were performed at 3 months post-op. High-risk features were defined as IA course, slit-like ostium, exertional symptoms, aborted SCD, or myocardial ischemia on functional testing.
Results: A total of 52 patients (69% male), median age 17 y [IQR 9.6-23.7] presenting with L-AAOCA/IA between 12/2012 - 04/2025 were included; 14/52 (27%) had exertional symptoms: chest pain and/or syncope, 9/52 (17%) had aborted SCD. CTA was obtained in 48/52 patients (92%), 40/48 (83%) with median intramural length of 6.5 mm [IQR 4-9]. EST was obtained in 33/52 (63%) with 3/33 (9%) positive for ischemia. sPI was obtained in 35/52 (67%): 27 DSCMR (77%), 10 sNPI (29%); of which 6/35 (17%) were positive for ischemia. Cardiac cath was obtained in 3 (6%), all with abnormal dobutamine FFR/iFR. Surgery was indicated in 39/52 (75%) and performed in 34/39 (87%), median age 13 y [IQR 9.5-15.5]: unroofing (16, 47%), osteoplasty (1, 3%), combined unroofing and osteoplasty (3, 9%), reimplantation (13, 38%) and heart transplantation (1, 3%); 5 (13%) patients declined and 1 pending surgery. Post-op functional studies demonstrated resolution of previously seen inducible ischemia. At a median follow-up of 3.1 years [IQR 1.3-5.8], 51/52 are alive (98%). All are physically active regardless of surgical status (except those who declined surgery): 43 (83%) recreational, 9 (17%) organized/competitive sport.
Conclusions: In our cohort of L-AAOCA/IA, only 1 in 4 patients present with exertional symptoms, 17% with aborted SCD. Medium to long-term outcomes are encouraging



following surgical intervention with return to physical activity, possibly influencing the natural history of this high-risk population.



FT-114 / #158

FLASH TALK SESSION 3
14-05-2026 16:30 - 18:00

TOWARDS IMPROVED PEDIATRIC FITNESS ASSESSMENT: VALIDATION OF A VO_2MAX Z-SCORE MODEL IN HEALTHY SPANISH CHILDREN

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Background and Aim: Maximal oxygen uptake (VO_2max) is the gold standard for assessing aerobic capacity in children. Its interpretation requires robust reference models. A pediatric Z-score model has recently been developed, but external validation in independent cohorts is essential to confirm its applicability.
Methods: We conducted a multicenter validation study using a prospective cohort of 1,046 healthy participants (mean age 11.4 ± 2.6 years): 175 from three Spanish pediatric CPET laboratories and 871 from the original reference cohort. The Z-score model was compared with traditional Cooper weight- and height-based linear equations in terms of correlation, prediction error, and classification of impaired aerobic fitness. Subgroup analyses were performed by sex and body mass index (BMI).
Results: The Z-score model showed the strongest correlation between predicted and observed VO_2max (R^2 = 0.70), outperforming Cooper's weight-based (R^2 = 0.64) and height-based (R^2 = 0.66) equations. It yielded smaller prediction errors across BMI groups and identified 14% of participants as having impaired aerobic fitness, compared to 20% and 23% using Cooper's weight- and height-based models, respectively. Differences between cohorts in age and anthropometrics did not significantly impact model performance. The Z-score model showed improved consistency and reduced bias, particularly in overweight participants.
Conclusions: The pediatric Z-score model demonstrated superior accuracy, consistency, and classification reliability compared to linear equations in a large, independent Spanish cohort. Its adoption may enhance the interpretation of pediatric CPET, support early identification of reduced aerobic fitness, and guide prevention strategies and tailored interventions.



FT-115 / #159

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

IMPROVING PREVENTIVE CARDIOLOGY IN CONGENITAL HEART DISEASE: LESSONS FROM THE QUALIREHAB TRIAL

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Background and Aim: Medical advances have reduced morbidity and mortality in congenital heart disease (CHD); however, maximum oxygen uptake (VO_2max) and ventilatory anaerobic threshold (VAT), decline more rapidly in CHD patients compared to the general population, impairing cardiopulmonary fitness and health-related quality of life (HRQoL). The QUALIREHAB randomized controlled trial showed positive effects of a hybrid cardiac rehabilitation program on physical health, mental health and HRQoL in youth with CHD (Amedro et al., Eur Heart J, 2024). We analyzed parameters associated with the intervention's magnitude.
Methods: A post-hoc analysis was conducted using data from e-Case Report Forms, medical records, and interviews with pediatric cardiologists, specialist nurses, adapted physical activity educators, and psychologists. Efficacy was defined as a 3.5 mL/kg/min increase in VO_2max at 3 or 12 months or a 4.3-point increase in HRQoL questionnaire. The parameters associated with poorer outcomes were evaluated using multivariate analysis.
Results: Data from 70 participants (intervention group) and 10 professionals were analyzed. Analyses found that the moderate intensity of exercise training (VAT interval training) could have been exceeded in most patients and a one-hour cycloergometer was too long. Many patients and professionals expressed a need for more playful sessions and less center-based reinforcement sessions (adherence: 88% for home-based and 77% for center-based). The intervention had a positive effect on mental health (-2.4 points in depression and -2.3 points in anxiety outcomes), but patients expressed the importance to involve their relatives. Parameters associated with lower efficacy included: cardiac surgery or catheterization for VO_2max change at 3 months (AUC = 0.79), low VAT and female gender for VO_2max change at 12 months (AUC = 0.83), and low VAT for HRQoL change at 12



months (AUC = 0.69).

Conclusions: QUALIREHAB showed positive results but could benefit from a more tailored rehabilitation approach to maximize intervention magnitude, particularly for female patients, with higher-intensity, playful activities, home-based sessions, and stronger mental health support.



FT-116 / #209

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

EXERCISE ECHOCARDIOGRAPHY IN PEDIATRIC AND CONGENITAL HEART DISEASE: ASSESSING CARDIAC RESERVE TO INFORM CLINICAL DECISIONS

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Background and Aim: Improved survival in pediatric and congenital heart disease (HD) has created a growing population requiring refined functional assessment. Many abnormalities in this group emerge only under stress. Exercise echocardiography offers a non-invasive, radiation-free method to evaluate cardiac reserve and dynamic physiology. Our aim was to assess feasibility, diagnostic yield, and physiological responses during exercise. echocardiography in pediatric/young adult patients with HD in a tertiary cardiology center in Lisbon, Portugal.
Methods: A retrospective single-center study included patients undergoing exercise echocardiography between January 2022-June 2025. Studies were performed using a semi-supine cycle ergometer. Standard echocardiographic parameters, including left ventricular ejection fraction (LVEF), global longitudinal strain (GLS) and tricuspid annular plane systolic excursion (TAPSE), were measured at rest and peak exercise.
Results: Sixty patients (median age 16 years, range 11–33) were included: 42 with HD (arterial switch operation, n=6; repaired tetralogy of Fallot, n=5; Fontan, n=5; left heart obstructive lesion, n=10; other repaired HD, n=9; and hypertrophic cardiomyopathy, n=7) and 18 controls with normal anatomy. Diagnostic image quality was >95% and interobserver reproducibility was excellent for LVEF, GLS and TAPSE (ICC >0.79). HD patients exhibited significantly lower LVEF at rest (55.2±10.4% vs. 61.4±5.5%, p=0.029) and peak stress (61.6±13.5% vs. 69.4±4.7%, p=0.039), as well as reduced GLS both at rest (–15.9±4.4% vs. –19.8±2.1%, p=0.015) and at peak stress (–17.3±4.8% vs. –22.2±2.6%, p=0.008). Fontan patients demonstrated the most impaired chronotropic and workload response. A subgroup of 6 patients was identified as having an adverse response to exercise. Of these, 2 were listed for heart transplant, 1 was proposed, and 1 was referred for ressynchronization therapy. This adverse-outcome subgroup demonstrated significantly reduced LVEF and GLS values both at rest and at peak exercise (p >0.001).
Conclusions: We demonstrated that echocardiography can characterize systolic function during exercise in pediatric and congenital heart disease patients. The latter often begin



with a baseline disadvantage and show reduced cardiac reserve. Exercise echocardiography is a powerful tool and can be used to help guide clinical decision-making in the most severe patients. Future work should focus on multimodality integration and outcome-driven studies.



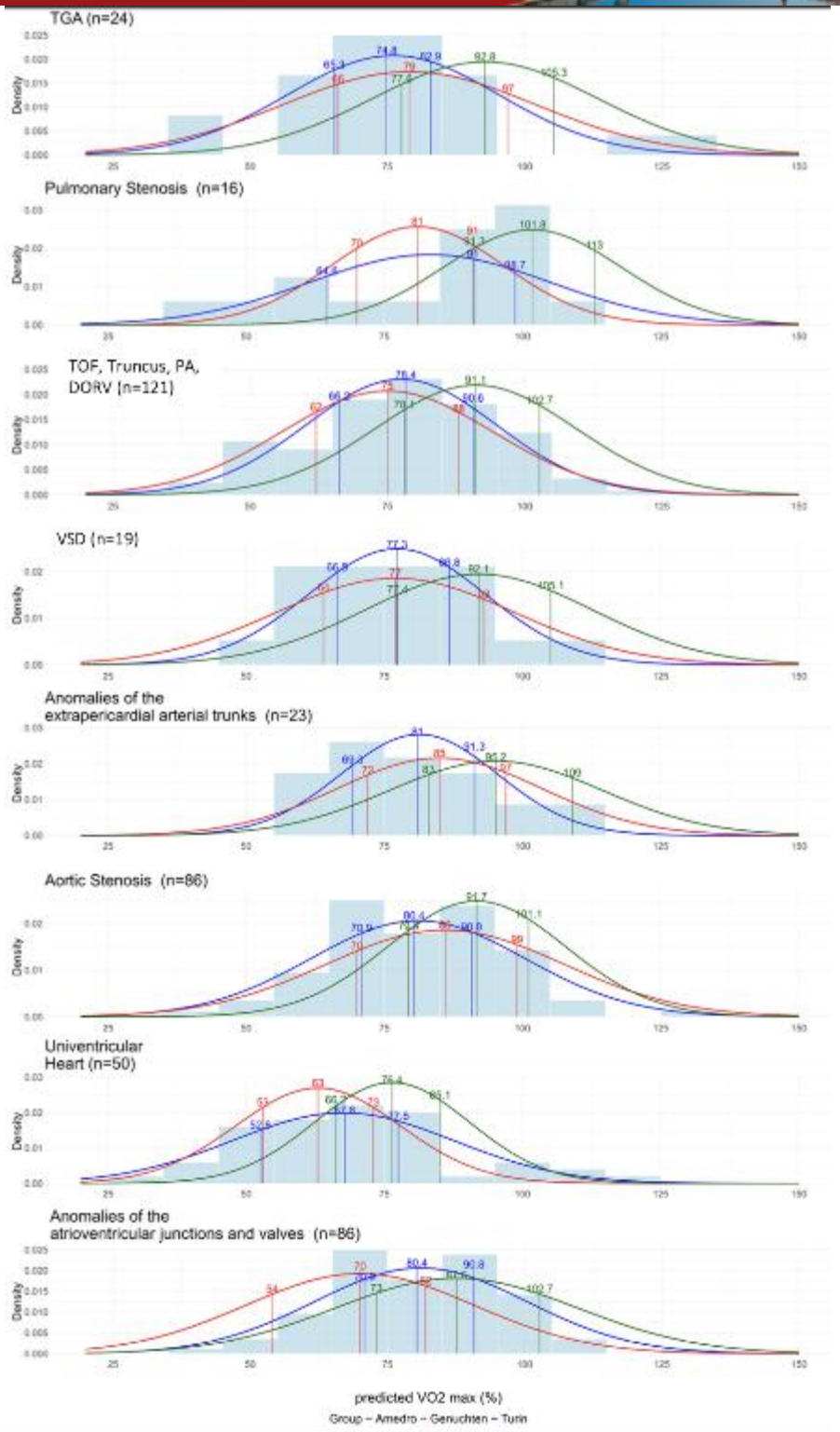
FT-117 / #250

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

DISEASE-SPECIFIC REFERENCE VALUES FOR EXERCISE CAPACITY IN CHILDREN WITH CONGENITAL HEART DISEASE

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Background and Aim: In pediatric patients with congenital heart disease (CHD), cardiopulmonary exercise testing (CPET) has become the gold standard for assessing functional capacity, and it also correlates with prognosis. The aim of this study is to investigate the distribution of exercise capacity across the entire spectrum of children with CHD, utilizing both internal institutional data and published studies, in order to establish disease-specific reference values.
Methods: We retrospectively included all CHD paediatric patients, aged 6 to 18 years old, who performed a CPET at Regina Margherita Hospital, Turin, between January 2005 and July 2025. We also searched PubMed for publications investigating cardiopulmonary exercise test with cycle ergometer in CHD paediatric patients published from January 1990, until October 2025.
Results: A total of 393 CPETs performed by 289 patients at our institution were included. Table 1 provides information regarding VO_{2max}, percentage of predicted VO_{2max}, (%pVO_{2max}) ventilatory anaerobic threshold (VAT), percentage of predicted VAT, and oxygen pulse, analyzed according to the specific CHD. The histograms shown in Figure 1 illustrate the distribution of the %pVO_{2max} values for each CHD group. Small cohorts (ccTGA, ASD, anomalies of the venous return and congenital anomalies of the coronary arteries) were not represented. Two publications describing exercise capacity were identified: Amedro P et al. Heart 2017;0:1–11 and J. van Genuchten et al European Journal of Pediatrics 2023,182:295–306. Figure 1 presents the CHD specific centile distribution of the %pVO_{2max} for the most common lesions, based on data from our cohort, data of Amedro et al and that of van Genuchten et al. The median VO_{2max} and %pVO_{2max} values were comparable between our data and the data reported by van Genuchten et al. for most diagnostic subgroups (with the exception of Anomalies of the atrioventricular junctions and valves), (Table 2). In contrast, a significant difference was observed between our data and the data



reported by Amedro et al.



	n	VO_2 max (mL/kg/min) mean ± SD	% of predicted VO_2 max mean ± SD	VAT (mL/kg/min) mean ± SD	% of predicted VAT mean ± SD	O_2 pulse(mL) mean ± SD	% of predicted O_2 pulse mean ± SD
Anomalies of the venous return	2	28.8 ± 7.1	72.0 ± 3.1	17,5 ± 0,3	45,0 ± 8,5	7,7 ± 0,6	72,2 ± 11,8
ASD	2	37.7 ± 3.1	79.7 ± 7.9	24,0 ± 1,2	47,0 ± 2,8	9,9 ± 0,7	100,2 ± 36,5
Anomalies of the atrioventricular junctions and valves	86	33.6 ± 8.7	81.1 ± 19.4	21,9 ± 6,4	51,5 ± 14,7	9,1 ± 3,0	89,7 ± 19,1
Functionally univentricular hearts	50	28.3 ± 7.7	67.5 ± 20.0	19,5 ± 4,8	46,3 ± 14,9	7,7 ± 2,2	88,1 ± 29,8
VSD	19	31.4 ± 7.3	77.3 ± 16.0	19,7 ± 5,1	48,7 ± 13,2	6,7 ± 2,1	79,9 ± 16,1
TGA	24	30.9 ± 9.0	76.1 ± 19.2	19,8 ± 4,2	48,1 ± 9,7	9,1 ± 2,7	80,1 ± 13,7
TOF, Truncus arteriosus, pulmonary atresia, DORV	121	31.3 ± 7.8	77.5 ± 17.3	19,9 ± 4,9	48,9 ± 12,0	8,7 ± 2,8	91,0 ± 17,3
Aortic valve stenosis, Shone complex	23	31.7 ± 6.0	73.8 ± 17.2	20,1 ± 3,3	46,7 ± 8,64	8,5 ± 2,9	93,0 ± 29,1
Pulmonary valve stenosis	16	36.2 ± 9.2	83.2 ± 21.7	20,6 ± 6,1	46,9 ± 14,9	10,1 ± 3,7	95,5 ± 18,0
Anomalies of the extrapericardial arterial trunks	23	35.4 ± 5.6	81.3 ± 14.2	22,3 ± 6,8	51,8 ± 15,6	10,8 ± 3,9	94,3 ± 10,8
Congenital anomalies of the coronary arteries	2	38.3 ± 2.8	90.9 ± 10.0	25,3 ± 7,5	62,0 ± 28,3	10,4 ±5,4	96,5 ± 3,5
ccTGA	4	31.8 ± 8.1	60.4 ± 14.5	15,8 ± 2,7	38,7 ± 9,5	7,28 ±3,64	71,5 ± 17,8



		25th	50th	75th	N	Bootstrap t.test	Bootstrap wilcoxon	Cohen's d	IQR Overlap	AGREEMENT BETWEEN TEST
TGA	Genucthen	66	79	97	182	0.64	0.84	0.19	53.3%	4/4
	Torino	65.3	74.8	82.9	24					
TOF, Truncus arteriosus, pulmonary atresia, DORV	Genucthen	62	75	88	252	0.75	0.73	0.18	76.2%	4/4
	Torino	66.2	78.4	90.6	121					
Univentricular heart	Genucthen	53	63	73	213	0.88	0.81	0.31	80%	4/4
	Torino	52.6	67.8	77.5	50					
Anomalies of the extrapericardial arterial trunks	Genucthen	72	85	97	141	0.87	0.87	0.22	70%	4/4
	Torino	69.3	81	91.3	23					
Anomalies of the atrioventricular junctions and valves	Genucthen	54	70	82	78	0.08	0.09	0.58	30.2%	NA
	Torino	70.9	80.4	90.8	86					
VSD	Genucthen	64	77	93	180	1	1	0	70%	4/4
	Torino	66.5	77	86.8	19					
Aortic valve stenosis, Shone complex	Genucthen	70	86	99	187	0.48	0.47	0.38	34%	3/4
	Torino	56.3	77.8	84.5	23					
Pulmonary Stenosis	Genucthen	70	81	91	80	0.92	0.84	0.57	62%	4/4
	Torino	64.6	91	98.7	16					

Conclusions: We present CHD specific data detailing the percentage of predicted $VO_{2\,max}$ levels in the pediatric CHD population. This information allows for the direct assessment and comparison of an individual patient's exercise capacity against that of their specific peer group.



FT-118 / #253

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

APP-BASED EXERCISE INTERVENTION FOR CHILDREN AND ADOLESCENTS WITH CONGENITAL HEART DISEASE

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Background and Aim: A physically active lifestyle is crucial for long-term cardiovascular health, yet existing supervised exercise programs for children and adolescents with congenital heart disease (CHD) are available only with limited accessibility. Although prior digital interventions for this population have proven safe and feasible, overall compliance was low. Mobile-health approaches, particularly those integrating gamification (digital children's room and digital shop, Figure 1), offer a promising way to increase motivation, engagement, and adherence among young “digital natives.” Therefore, the Footloose App, a modernized, app-based home exercise program (Figure 2) designed specifically for children and adolescents with CHD was developed. This study aims to evaluate the app using a multi-method
approach.

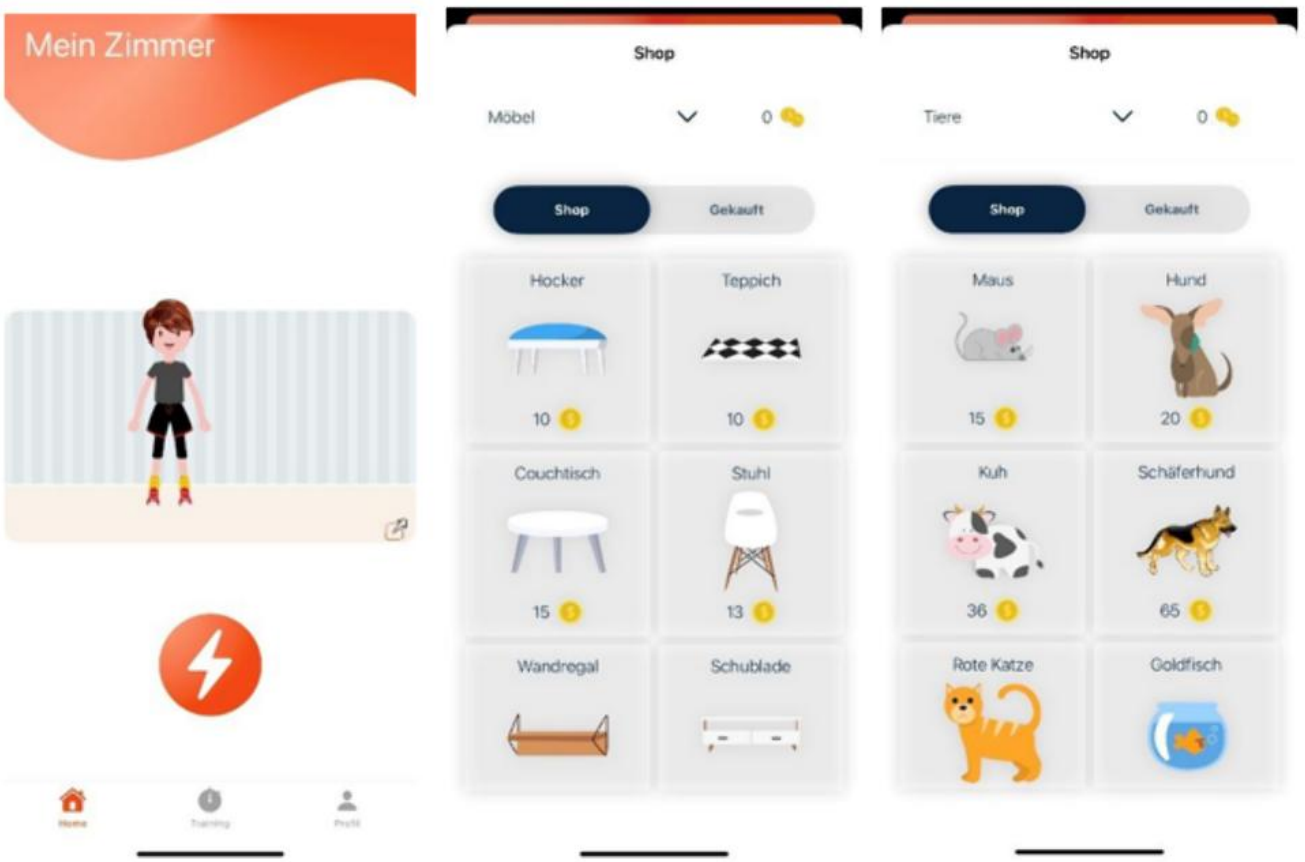


Figure 1: *Digital room (left); Digital shop – furniture (center), animals (left)*

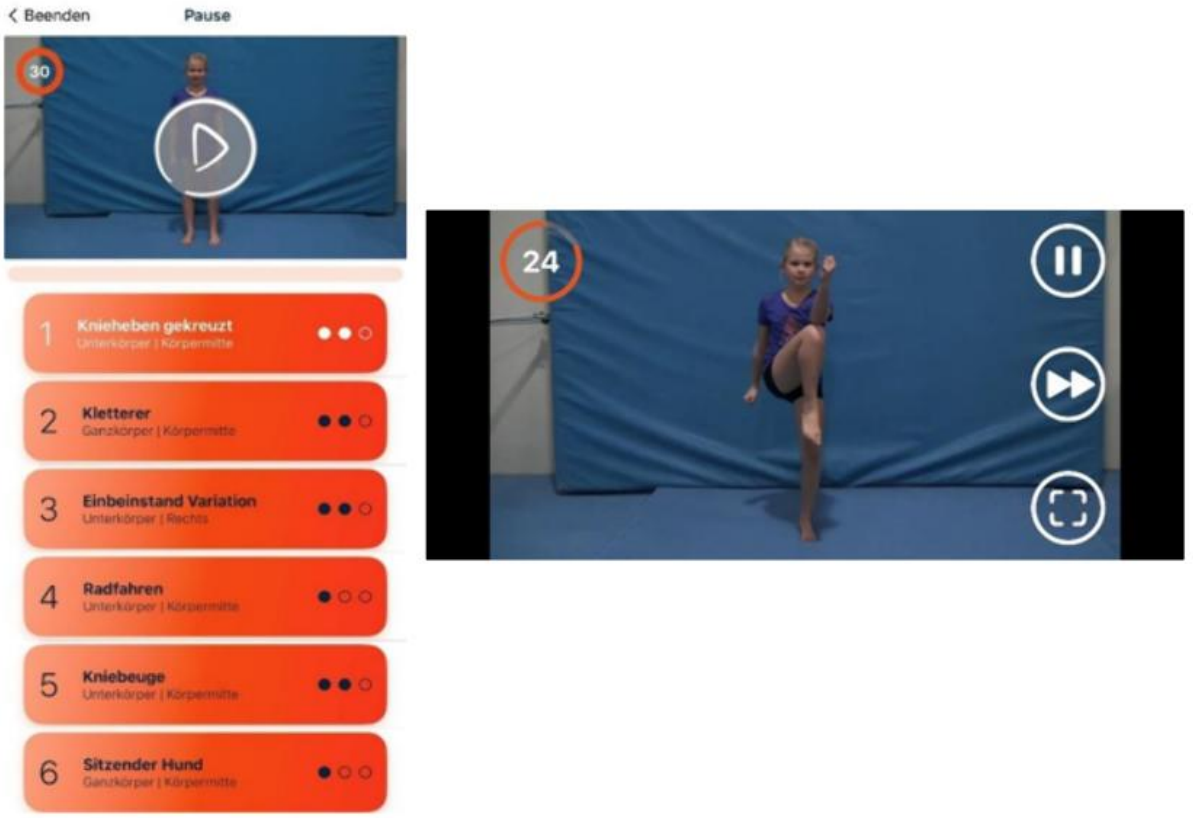


Figure 2: *Illustration of the exercise intervention (Footloose App)*

Methods: During routine outpatient visits at the TUM Klinikum Deutsches Herzzentrum patients aged 10-18 years will be recruited from July to December 2025 with moderate or complex CHD. Participants will use the Footloose App over a two-week period in their daily lives. App evaluation will follow a multi-method design: (1) semi-structured interviews to assess subjective experiences, and (2) standardized questionnaires to assess user experience (UEQ), physical activity self-efficacy, enjoyment of physical activity (PACES-S), and health-related quality of life (KINDL®). Interviews will be conducted digitally, audio-recorded, transcribed verbatim, and analyzed until thematic saturation is reached.
Results: Yet, 14 participants (12.8±2.3 years, 57.1% girls) have been included in the study. Thematic saturation is expected at approximately n=20-30 participants.
Conclusions: This study will generate user-centered insights into how children and adolescents with CHD experience the Footloose App. The results will guide targeted improvements to enhance usability and engagement.



FT-119 / #273

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

WHAT LIMITS CARDIORESPIRATORY FITNESS IN ADOLESCENTS WITH FONTAN CIRCULATION: AN INTEGRATED HAEMODYNAMIC AND PULMONARY PERSPECTIVE

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Background and Aim: Cardiorespiratory fitness (CRF) is strongly associated with morbidity and mortality in patients with Fontan circulation. However, the factors influencing CRF during adolescence remain incompletely understood. The primary aim of this study was to investigate the associations between CRF and somatic growth (height), ventricular function represented by end-diastolic pressure (VEDP), the transpulmonary pressure gradient (TPG), and pulmonary diffusion capacity (DL_{CO}/VA). The secondary aim was to assess the prevalence of exercise oscillatory ventilation (EOV) and its physiological correlates.
Methods: In this national, cross-sectional study, 44 adolescents (median age 16.6 years) with Fontan circulation underwent cardiopulmonary exercise testing, pulmonary function assessment, and heart catheterization. Peak oxygen uptake ($\dot{V}O_2$peak) was modelled as the dependent variable in a multiple linear regression with VEDP, TPG, DL_{CO}/VA (% predicted), and height as predictors. Logistic regression was used to identify physiological correlates of EOV.
Results: The multiple regression model for absolute $\dot{V}O_2$peak explained 61% of the overall variance. Lower VEDP and greater height were independently associated with higher $\dot{V}O_2$peak. When $\dot{V}O_2$peak was adjusted for body weight, also TPG became associated with higher $\dot{V}O_2$peak, while greater height and lower VEDP remained positively associated. This model explained 30% of the variance. DL_{CO}/VA was not independently associated with $\dot{V}O_2$peak. EOV was observed in 50% of patients but showed no association with $\dot{V}O_2$peak, haemodynamic, or pulmonary variables.
Conclusions: In adolescents with Fontan circulation, lower resting VEDP and somatic growth were associated with higher CRF, reflecting more efficient haemodynamics. Pulmonary diffusion impairment and EOV were common but not significantly associated with lower CRF.



FT-120 / #275

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

PATIENT PERSPECTIVES OF A PEDIATRIC CARDIAC REHABILITATION (FITNESS) PROGRAM

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Sickkids, Toronto, Canada

Background and Aim: Specialized fitness programs for children with heart disease are scarce, but evidence shows that exercise interventions are crucial for health optimization. The factors impacting success of these programs in supporting lifelong behavior change are multifactorial but participants' perceptions and experiences during the program play a key role. The aim of this study was to review patient and caregiver satisfaction following engagement in a guided, 6-month, home-based fitness program.
Methods: We performed a retrospective review of a standardized survey responses collected from October 2021 to October 2024. Surveys were sent electronically at program completion. Quantitative data was analyzed descriptively, and qualitative data was obtained through open-ended questions in the survey.
Results: 100 patients with cardiac diagnoses (CHD: 59, Hyperlipidemia: 19, Arrhythmia: 5, Pulmonary Hypertension: 5, Cardiomyopathy/Transplant: 5, Other: 7) participated. Surveys were sent to 94 patient participants and 85 caregivers. Twenty-five patient and 20 caregiver responses were received (Response rate of 26.6% and 23.5% respectively). The average age of patient respondents was 15.1 ± 2.3 years. Patients (21, 84%) and caregivers (19, 95%) expressed satisfaction with the program. Twenty patients (80%) reported improved knowledge about exercise and all reported feeling able to continue being physically active without guidance. Patients and caregivers reported having better knowledge about nutrition and about creating good sleep habits (Fig 1). Positive qualitative feedback highlighted the individualized approach and the use of group settings as key elements of satisfaction. Patients reported that they liked having the ability to work at their own pace and the exercise programs being personalized and "fun". Both patients and caregivers appreciated educational topics related to lifestyle and highlighted the importance of support from the medical team as well as social support from family/friends for successful engagement in the
program.



Table 1: Patient and Caregiver Responses

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	Patient Participants				
I learned a lot about exercise and physical activity	12	8	1	0	0
I feel able to make good nutritional choices	12	8	5	0	0
I have the knowledge to create good sleep habits	9	10	5	0	0
I enjoy exercise	5	13	1	1	0
I would recommend the program to other patients	13	5	2	0	0
	Caregivers				
I learned a lot about exercise and physical activity	7	11	2	0	0
I feel able to help my child continue to exercise	11	7	2	0	0
I feel I have learned principles of healthy nutrition	6	11	2	1	0
I feel able to support my child in having healthy nutritional habits	9	10	1	0	0
I understand the importance of a good sleep routine	16	3	1	0	0
I feel able to help my child maintain good sleep habits	13	6	1	0	0
I would recommend the program to other families	17	3	0	0	0

Conclusions: Participants in the program reported high levels of satisfaction and felt empowered to live a healthier lifestyle with participation in the fitness program. The need for individualization of such programs, gamification of the delivered plans, proper education and clinical and social support were identified as enablers to success.



FT-121 / #296

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

ACTIVITY LIMITATIONS IN PEDIATRIC FONTAN CIRCULATION

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Background and Aim: Children with Fontan circulation are known to have lower levels of physical activity compared with healthy peers; however, the clinical, functional and psychosocial determinants contributing to this limitation remain insufficiently defined. This study aimed to characterize patterns of physical activity and everyday mobility in pediatric Fontan patients and to identify predictors of reduced participation in exercise and sports.
Methods: Between May 2023 and June 2025, 31 children with Fontan circulation (mean age 10.77 ± 4.70 years) and 31 healthy controls (mean age 9.90 ± 4.35 years) completed a standardized questionnaire assessing the number of days per week with ≥60 minutes of physical activity, sports participation, everyday mobility and subjective fitness perception. Clinical parameters collected in the Fontan cohort included resting oxygen saturation (SpO2), atrioventricular (AV) valve regurgitation, ventricular morphology, and cardiac medication.
Results: Fontan patients were active on a mean of 3.95 days per week, compared with 4.39 days in controls. Although this difference was not statistically significant, multiple clinically relevant associations emerged within the Fontan cohort. Lower SpO2 (<95%), AV valve regurgitation (≥grade 2), and treatment with betablockers or diuretics were consistently linked to fewer active days. Everyday functional limitations were also more common: 53.6% walked <1 km/day (vs. 10% of controls), and 41.4% reported difficulties climbing stairs (vs. 3.6% of controls). The ability to swim was reduced (42.9% vs. 76.7%), limiting participation in common childhood sports. Participation in organized sports differed substantially between groups. Only 13.8% of Fontan patients were members of a sports club, compared with 76.6% of controls. However, most Fontan children reported enjoyment of physical activity, and 72% expressed a desire to be more active. Notably, 86.2% perceived themselves as physically fit despite lower measured endurance and activity levels, suggesting a discrepancy between subjective and objective fitness.



Conclusions: Reduced physical activity in pediatric Fontan patients appears to result from a combination of clinical constraints, reduced functional capacity, and limited access to organized sports. Despite this, intrinsic motivation remains strong. These findings highlight the need for structured, individualized, and medically supervised exercise programs to support safe and enjoyable participation in physical activity.



FT-122 / #302

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

AI-ENABLED DIGITAL STETHOSCOPE FOR EARLY DETECTION OF CONGENITAL HEART DISEASE IN CHILDREN: A PROSPECTIVE STUDY

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Background and Aim: Background: Early detection of congenital heart disease (CHD) is critical, particularly in low- and middle-income countries where access to pediatric cardiology services is limited. While auscultation remains a first-line screening tool, its accuracy is operator dependent. Advances in digital stethoscopes and artificial intelligence (AI) may enhance diagnostic performance. Aim: To evaluate the accuracy of an AI-based algorithm integrated with a digital stethoscope for detecting CHD in children, using echocardiography as the reference standard.
Methods: In this prospective study, heart sounds were recorded from 721 subjects (382 with CHD, 339 controls) using the Ayusynk 2 Pro+ digital stethoscope at four standard auscultatory sites. Of these, 301 recordings were used for algorithm training and 420 for blinded forward testing. Recordings were denoised, transformed into mel-spectrograms, and analyzed using a convolutional neural network (CNN) to classify CHD probability. A threshold probability of >0.5 across > 2 sites was used to predict CHD. Performance was compared against echocardiography.
Results: In forward testing, the AI algorithm correctly identified 222 of 233 CHD cases and 171 of 187 controls, yielding a sensitivity of 95.2% and specificity of 91.4%. The algorithm remained effective in noisy environments and in uncooperative children, where conventional auscultation is challenging.
Conclusions: An AI algorithm integrated with a digital stethoscope demonstrated high sensitivity and specificity for CHD detection in children. By leveraging mel-spectrogram features, it overcomes key limitations of isolated time-domain or frequency domain analysis and shows promise as a scalable, non-invasive screening tool for early CHD detection, particularly in resource-limited settings.



FT-123 / #312

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

COMMOTIO CORDIS IN PEDIATRIC ATHLETE: SAFE TO RETURN TO PLAY WITH MYOCARDIAL SCARRING?

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Background and Aim: Commotio Cordis (CC) is a rare cause of sudden cardiac arrest/death (SCA/D), caused by blunt impact to the chest with myocardial injury. We aim to report a case of CC with coronary injury that led to myocardial scarring without occurrence of SCA.
Methods: Seven-year-old male presented with syncope following blunt chest trauma with a baseball traveling at 70 MPH as he walked in front of pitching machine. Return of consciousness was spontaneous after 15 seconds. In the EC, high sensitivity troponin I measured 17,681 ng/L. An ECG had no ST-T wave abnormalities. An echocardiogram (ECHO) showed normal ventricular function with no wall motion abnormalities. A cardiac MRI (CMR) had concern for LAD injury/dissection with area of late gadolinium enhancement (LGE) in the inferior apical region (distal LAD territory). He had an uneventful course at our institution with no development of arrhythmias. Troponin I downtrended to 1.391 ng/mL, he was discharged after 72 hs with exercise restrictions until reevaluation at 3-6 months. Upon returning, a CPET had no ischemia, an ECHO showed normal function, and a Regadenoson stress-CMR demonstrated no inducible perfusion abnormalities and LGE in the apical septum, similar to previous CMR. The patient was allowed to return to play. At follow up 3 years later, CPET, ECHO and CMR findings were unchanged. He remains active in competitive running and tennis.
Results: CC can lead to SCA/D. In this young patient, it led to myocardial injury without causing SCA. A period of recovery of 3-6 months was thought reasonable prior to reevaluation and return to play, if normal ventricular function and no arrhythmias. At 6 months post-event, functional studies were reassuring despite persistent of LGE. It is important to highlight how CC still led to myocardial injury in the absence of SCA and the role of advanced imaging to assess the degree of myocardial scarring. The patient has returned to play without symptoms.
Conclusions: Myocardial injury with scarring occurs in CC even in the absence of SCA.



Return to play can safely occur if patients are closely monitored, as long-term effects of myocardial scarring are unknown.



FT-124 / #437

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

DIGITAL DIAGNOSIS OF CARDIAC SOUND IN PEDIATRIC PATIENTS [DI-SOUND STUDY] – PRELIMINARY RESULTS

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Background and Aim: Automated diagnosis of cardiac sounds using dedicated algorithms is known but it has not been studied in the neonatal population. Aim of our study is to develop an algorithm dedicated to the identification of pathological murmurs in this population.
Methods: We performed cardiac auscultation using a digital stethoscope in 295 newborns (82% healthy, 18% pathological). 30-second tracks were recorded in a lossless format (*.wav) using a standardized recording protocol. All newborns underwent an echocardiogram, base on which they were classified as healthy or pathological. The track collection was analyzed using sound analysis algorithms (frequency domain, time domain, and time-frequency domain techniques) to identify the segments of the soundtrack containing information capable of differentiating pathological from healthy newborns. Then, various machine learning algorithms were used to create the classifier, whose effectiveness was tested with blinded listening by a group of 4 pediatric cardiologists.
Results: The algorithms able to extract the most significant information were a frequency technique (band power ratio) and a time-frequency technique (Mel-frequency cepstral coefficients). Three different machine-learning models were applied based on these algorithms (Logistic regressor, XGBoost, and Random Forest), whose ROC analysis showed AUCs of 0.63, 0.59, and 0.62, respectively. The Random Forest-based classifier was compared with the group of expert pediatric cardiologists, but it performed poorly (Sensitivity 0.42/0.47). We therefore decided to extract information from specific points in



the signal by creating an analysis algorithm that identified the first heart sound and segmenting the time between two sounds into six segments (I: T1 and protosystole, II: late systole, III: T2, IV-VI: diastole) to obatin information from areas with homogeneous acoustic characteristics and select only the relevant segments. The analysis demonstrated that segments II-IV contained the most important information, and specific frequency bands were selected for each. The same machine learning models were then applied, obtaining AUCs of 0.67/0.64/0.73. The optimized classifier outperformed the human control group (Sensitivity 0.56/0.47).

Conclusions: This preliminary experience allowed us to develop a raw classifier able of outperforming the human control group. Training with multiple audio tracks will refine the ability to classify newborns, providing a useful screening tool.



FT-125 / #664

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

CARDIOVASCULAR RISK SCREENING IN DEVELOPMENTAL AGE (RISCAPED STUDY)

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Background and Aim: The risk of developing cardiovascular disease (CVD) is a continuum that gradually increases, and the atherosclerotic process generally begins in childhood. Early intervention is crucial to modifying the disease trajectory, and personalized prevention is necessary. The objective of the RISCAPED Study is to describe the distribution and predictors of potential cardiovascular risk factors in the pediatric population (7-12 years old) residing in the province of Alessandria, Italy.
Methods: The RISCAPED Study is an observational and non-profit study. The study population consisted of 481 children and adolescents aged 7 to 12 years. Procedures included administering a questionnaire to parents and pediatricians, which featured the FNPA (Family Nutrition and Physical Activity) questionnaire for a detailed assessment of family lifestyle.
Results: Analysis of 481 patients (median age 9 years) showed a dose-response relationship between body weight and blood pressure percentile, most evident for systolic pressure. Elevated blood pressure values were observed even in the overweight group. Family history proved to be a determining factor: a positive family history of acute myocardial infarction was the only significant predictor of hypertension (OR 2.61; p=0.025). Similarly, a family history of impaired glucose tolerance or the presence of overweight/obese family members were the most robust predictors of overweight/obesity in the child, increasing the odds by up to 70%. Finally, the FNPA score, reflecting healthy family practices, showed a protective trend, reducing the odds of overweight/obesity by 3% for each additional point.
Conclusions: The RISCAPED Study confirms the crucial role of excess body weight and the



strong shared hereditary/environmental component in determining cardiovascular risk in developmental age. Evidence of an increased hemodynamic risk starting already in the overweight phase emphasizes the need for targeted and early preventive interventions in the pediatric setting. Future research should focus on creating personalized risk SCORES through genetic analysis (PRS) and the validation of biomarkers to calibrate effective prophylactic therapies.



FT-126 / #694

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

LONG-TERM OUTCOMES OF A PERSONALISED EXERCISE PROGRAMME IN ATHLETES WITH INHERITED ARRHYTHMOGENIC SYNDROMES: A SINGLE-CENTRE EXPERIENCE

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Background and Aim: Inherited arrhythmogenic syndromes associated with sports-related sudden death (SAMS-D) often lead to restrictive exercise advice for young athletes. Recent evidence supports individualised, supervised training to maintain fitness and well-being without increasing arrhythmic risk. We evaluated a personalised exercise programme (PAC-SAMS) for this population.
Methods: We performed a single-centre retrospective cohort followed by a prospective interventional pilot at a tertiary paediatric cardiology and sports unit. Athletes aged 9-34 years with confirmed SAMS-D and prior sports restriction underwent baseline ECG, echocardiography, 5-day ambulatory ECG, cardiopulmonary exercise testing (CPET) and nutritional and psychological assessment [including Satisfaction With Life Scale (SWLS)]. Participants completed a 6-month moderate-intensity aerobic and resistance training programme with ECG-guided supervision and remote rhythm review and were reassessed at 6 and 24 months.
Results: Of 20 screened athletes, 12 (75% male; median age 18 [9-34]) enrolled, completed the programme and attended both follow-ups. Underlying diagnoses were hypertrophic or arrhythmogenic cardiomyopathy in most, with idiopathic ventricular fibrillation, long QT syndrome and dilated cardiomyopathy in the remainder; 42% carried implantable cardioverter-defibrillators. No sustained ventricular tachycardia or fibrillation, syncope, ischaemia, emergency admissions or device therapies occurred. By 24 months, 80% reported ≥3 moderate sessions/week and 20% had resumed supervised or competitive sport. Echocardiography showed no clinically relevant structural or functional change; resting ECG intervals and repolarisation remained stable. On 5-day Holter, ectopy burden was negligible and maximum heart rate decreased, consistent with improved cardiovascular efficiency. CPET showed preserved peak oxygen uptake with lower peak heart rate, higher oxygen pulse, improved ventilatory equivalents and lower respiratory rate



at peak exercise. Body composition shifted towards higher lean mass with stable weight. SWLS scores increased by 27% without evidence of rising maladaptive cardiac anxiety.
Conclusions: PAC-SAMS enabled a safe, structured return to exercise over 24 months in young athletes with inherited cardiomyopathies and channelopathies, with no serious arrhythmic events and preserved cardiac function, improved exercise efficiency and sustained gains in life satisfaction. These findings support replacing categorical sports disqualification with individualised risk stratification, shared decision-making and telemetry-supported exercise pathways, and justify larger studies to refine safe intensity thresholds and identify candidates for higher-intensity or competitive participation.



FT-127 / #814

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

DEEP LEARNING–DERIVED MYOCARDIAL STRAIN IN CHILDREN: VALIDATION OF A FULLY AUTOMATED, OPEN-SOURCE MODEL FOR LEFT VENTRICULAR GLOBAL LONGITUDINAL STRAIN INFERENCE

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Background and Aim: Global longitudinal strain (GLS) aids subclinical left ventricular (LV) dysfunction detection in children, yet current measurement relies on semi-automated, vendor-specific software that requires manual adjustment and shows notable inter-rater and inter-vendor variability. Deep Learning-Derived Myocardial Strain (DLS), developed by Kwan et al., provides an open-source alternative that adapts EchoNet-Dynamic LV-segmentation to automatically estimate GLS from apical-four-chamber (A4C) cine loops. Although validated in adults, its performance in pediatric populations is unknown. This study assessed the performance of DLS in children using routinely acquired GLS from a widely used Proprietary Software Model (PSM) as the comparator.
Methods: Echocardiograms performed between 2014 and 2023 at Hanover Medical School that contained an A4C cine loop and a corresponding PSM-GLS measurement were included and supplemented with demographics, diagnoses, and intervention data. Videos were anonymized, preprocessed, and analyzed with the DLS model to obtain segmentation-based, frame-wise LV-lengths. The original strain-extraction code uses fixed constraints optimized for adult cardiac cycles. Pediatric-specific modifications were introduced to accommodate higher heart rates, smaller ventricular dimensions, and heterogeneous frame rates. GLS values derived using the original and modified DLS-pipelines were compared with PSM-measurements. Performance metrics included mean absolute error (MAE) and root mean squared error (RMSE), with subgroup analyses by age and diagnostic category.
Results: 582 examinations from 381 patients (0–17y; mean age 8.9y) met inclusion criteria. Over-arching diagnostic groups comprised aortic valve disease (AVD), heart transplant recipients (HTx), myocardial disease, congenital heart disease (CHD), cardiotoxicity screening, and other. 2/582 studies failed segmentation because of poor image quality. In subsequent strain-extraction, pediatric-specific adjustments reduced failures from 66/580 to 0/580 and improved agreement with PSM-derived GLS. MAE and RMSE decreased from

5.61 and 7.43, respectively, using the original strain-extraction to 5.38 and 7.35 with the pediatric-adapted code. Error was highest in HTx and CHD and lowest in cardiotoxicity screening and AVD. Younger age groups exhibited larger discrepancies than older children.
Conclusions: Fully automated GLS estimation using DLS is feasible in children. Performance improves with pediatric-oriented adaptations but remains limited in younger patients and those with complex cardiac anatomy. Further work will include pediatric fine-tuning of the segmentation model and incorporation of additional echocardiographic views.

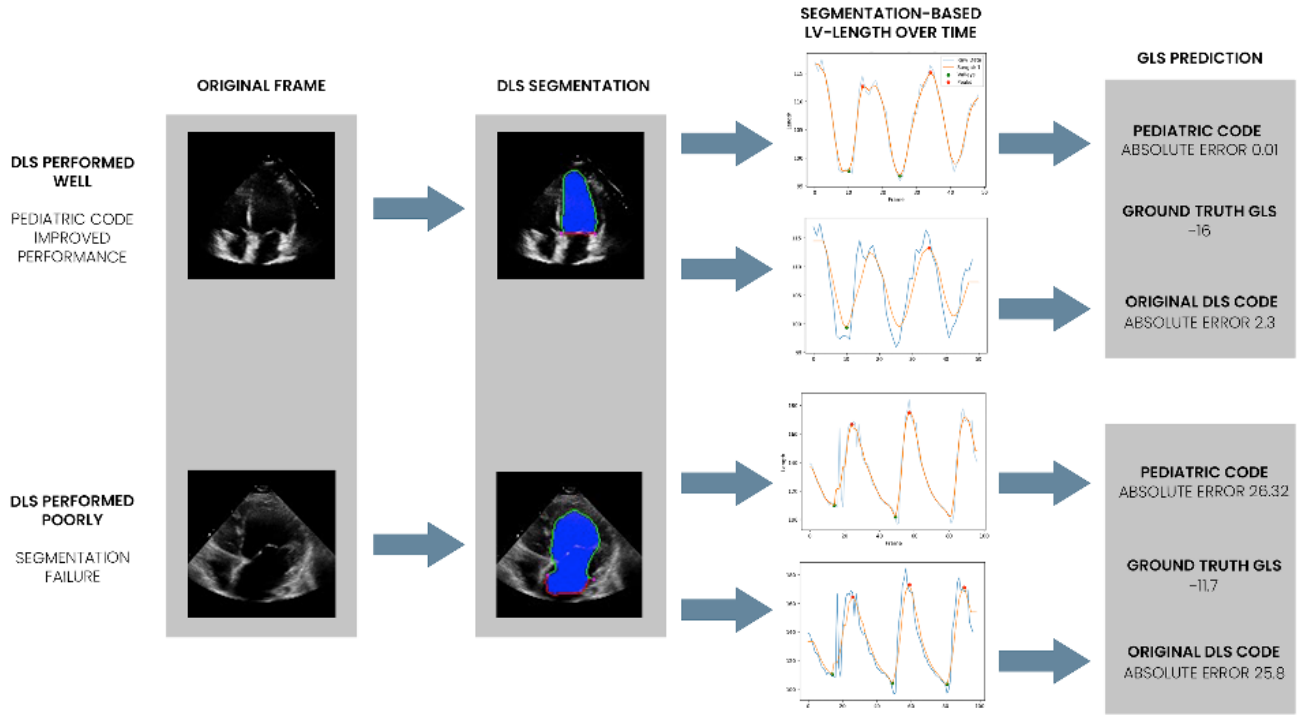


FIGURE 1.
EXAMPLES OF A4C CINES LOOPS ILLUSTRATING HIGH VS. LOW GLS PREDICTION ERROR



FT-128 / #855

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

FUNCTIONAL ARTERIO–VENTRICULAR COUPLING AND ITS ECHOCARDIOGRAPHIC DETERMINANTS IN HEALTHY, PHYSICALLY ACTIVE ADOLESCENTS

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Background and Aim: Adolescence is characterised by dynamic cardiovascular development, yet functional arterio–ventricular coupling (AVC) in healthy youths remains insufficiently understood. Structural echocardiographic parameters may relate more strongly to aerobic capacity than functional indices, but pediatric evidence is limited. Carotid circumferential strain is a promising marker for arterial elasticity, however its relationship with cardiac structure and function in adolescents is largely unknown. This study prospectively examined associations between echocardiographic parameters, VO_2peak, and carotid strain, and evaluated whether components of functional AVC persist after accounting for key developmental factors.
Methods: A sample of 251 youths (24.7% female; mean age = 13.52, SD = 1.69 years) underwent cardiopulmonary exercise testing, standardized echocardiography (EDV, EDV/BSA, IVSd, IVSd/BSA, EF, E/E'), and speckle-tracking carotid strain analysis were performed. Spearman correlations, partial correlations controlling for age and sex, and linear regression models were applied to test associations with VO_2peak and with carotid strain. Additional models adjusted for VO_2peak to determine whether aerobic capacity independently contributes to AVC.
Results: Unadjusted analyses showed strong associations between VO_2peak and cardiac structural indices such as EDV/BSA, and moderate association with carotid strain. Carotid strain correlated particularly with ventricular size and septal thickness. After adjustment for age and sex, almost all associations diminished. Only two independent relationships persisted: EF correlated positively with carotid strain (partial $r \approx 0.155$), whereas IVSd/BSA correlated negatively (partial $r \approx -0.156$). Regression analyses confirmed that age and sex were the strongest predictors of carotid strain, while VO_2peak showed no independent contribution once developmental factors were accounted for. Combined models explained approximately 13–18% of variance.
Conclusions: Cardiac–vascular interactions in healthy adolescents are driven



predominantly by age- and sex-related developmental influences. Nonetheless, small but consistent independent associations of EF and IVSd/BSA with carotid strain indicate early components of functional AVC beyond developmental effects. These findings highlight the importance of considering developmental factors when interpreting echocardiographic and vascular indices in youth.



FT-129 / #896

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

NEXT-GENERATION SUDDEN CARDIAC DEATH RISK ASSESSMENT IN HYPERTROPHIC CARDIOMYOPATHY: INTEGRATING CARDIAC MAGNETIC RESONANCE IMAGING WITH ARTIFICIAL INTELLIGENCE

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Background and Aim: Hypertrophic cardiomyopathy (HCM) is a major cause of sudden cardiac death (SCD), yet current stratification—based on HCM Risk-SCD scores combining echocardiographic, clinical, and familial data—has important limitations. Cardiac magnetic resonance (CMR) offers superior tissue characterization and may improve risk prediction. We evaluated whether an artificial intelligence (AI) regression model using CMR-derived features can enhance the accuracy and reproducibility of SCD-risk assessment.
Methods: Our retrospective cohort included 437 genetically confirmed sarcomere-positive patients, of whom 261/299 underwent 1.5T CMR (3T studies excluded). The 5-year ESC Risk of SCD was calculated using ESC recommended algorithms. CMR acquisition included cine short-axis and four-chamber views, LV T1 mapping, and late gadolinium enhancement. An automated pipeline standardized all images and performed data augmentation. Processed datasets were then used to train a DenseNet-based convolutional neural network (90% training split), with the ESC HCM Risk-SCD score as the regression target.
Results: The AI model predicted HCM Risk-SCD values with a mean absolute error below 2 in the validation dataset. All combinations of CMR sequence inputs were evaluated. Models including cine images consistently produced the most accurate and stable predictions. Adding other CMR modalities to cine data further reduced prediction error.
Conclusions: The CNN-based AI model accurately predicted the HCM Risk-SCD index from CMR images, demonstrating the potential of CMR as a robust tool for SCD-risk



assessment in HCM. As the dataset includes patients with documented cardiac SCD events, the next step is to train and evaluate the model directly against observed SCD outcomes to estimate absolute risk. Future work will also require external validation in independent cohorts to confirm model performance and generalizability.



FT-130 / #1241

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

ECHOCARDIOGRAPHIC ASSESSMENT OF VENTRICULAR REMODELLING IN JUNIOR ATHLETES BY SPECKLE TRACKING STRAIN AND MYOCARDIAL WORK INDICES

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Background and Aim: Echocardiographic assessment of ventricular dimensions and function in young athletes is challenging. This study aimed to characterize cardiac remodelling and function in junior athletes according to sport discipline and training exposure.
Methods: Healthy subjects aged ≥10 years (215 athletes, 169M/46F; 157 controls, 78M/79F) underwent comprehensive echocardiography. LV dimensions, wall thickness, volumes, mass, EF, speckle-tracking LV and RV strain, and myocardial work indices (GWI, GCW, GWW, GWE) were assessed. RV size and function included RVED/RVES area, basal/mid diameters (RV1, RV2), and TAPSE. Athletes were classified as endurance, mixed, power, or skill.
Results: Athletes had higher LV wall thickness, mass, and volumes than controls (LVEDV 113 ± 25 vs 98 ± 21 mL; LVESV 41±12 vs 36±9 mL; IVSd 8.5±1.1 vs 7.9±1.0 mm; LVPWd 8.5±1.0 vs 7.8±0.9 mm; LV mass 140±31 vs 121±28 g), while EF was similar (65.1±5.2 vs 64.3±6.9%, p=0.21). RVED (23.1±4.5 vs 15.6±3.3 cm^2), RVES (10.8±2.3 vs 7.9±2.0 cm^2), RV1 (40.6±5.6 vs 31.6±4.8 mm), RV2 (28.1±4.5 vs 23.6±5.6 mm), and TAPSE (25.6±4.2 vs 19.3±3.2 mm) were higher (all p< 0.001), while RV and LV strain and myocardial work were similar.
RV remodelling varied by discipline: RVED/RVES were larger in endurance/mixed than skill (p < 0.001) and highest in power (p< 0.001 vs skill, p>0.05 vs endurance/mixed); RV1, RV2, TAPSE, and RV strain did not differ. LVEDV and LVESV were higher in endurance/mixed than skill (p=0.006–0.016), comparable to power. Power athletes had greatest IVSd, LVPWd, and LV mass (p≤0.002), endurance/mixed were intermediate (p<0.01 vs skill, <0.05 vs power). Years of training increased LVEDV (p=0.03), IVSd (p=0.04), LVPWd (p=0.045), and LV mass (p=0.02). Males had higher LVEDV, IVSd, LVPWd, and LV mass than females (all p≤0.01); RV dimensions and function were unaffected by sex or training.
Conclusions: In children ≥10 years, sport-related ventricular remodelling is predominantly structural and influenced by discipline and training. Despite biventricular enlargement, RV



systolic function and myocardial efficiency remain preserved, supporting physiological adaptation in the young athlete's heart.



FT-131 / #1258

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

PULSE WAVE VELOCITY IN CHILDREN 6-18 YEARS AFTER SURGICAL OR INTERVENTIONAL REPAIR OF AORTIC COARCTATION - CAN WE MEASURE EARLY VASCULAR AGING ?

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Background and Aim: Although aortic coarctation is usually diagnosed early in infancy and successfully repaired, patients are affected by an increased risk of long-term cardiovascular complications, especially late, systemic arterial hypertension. For this reason, aortic coarctation has to be handled as a complex cardiovascular entity which needs lifelong surveillance. Increased arterial stiffness is a major factor contributing to morbidity. The gold standard for measurement of arterial stiffness is the carotid-femoral pulse wave velocity (cfPWV).The study aimed to address vascular aging in patients after surgical or interventional repair of aortic coarctation beyond blood pressure readings by measuring cfPWV oscillometrically with the Vicorder device which is standardized and independent of the examiner.
Methods: PWV and pulse wave analysis (PWA) were measured in 6- to 18-year-old CoA patients using the Vicorder device. Demographic and hemodynamic data, as well as information on the treatment method, were retrieved from clinical information systems. The statistical analysis relies on descriptive methods.
Results: Valid PWV measurements could be obtained in 75 CoA patients. There was an age-dependent increase in PWV in line with the healthy normal collective (4.4 m/s in male patients from 6-9 years to 5.4 m/s in female patients from 15-18 years. There was no recognizable gender-specific trend in PWV. Only a minority of patients had arterial hypertension which was treated by medication. Nevertheless a correlation of PWV with left ventricular hypertrophy and systolic blood pressure could be shown. Surprisingly age at the time of surgical or interventional repair did not impact on PWV. Patients who needed an aortic interposition graft for coarctation repair was clearly correlated to increased PWV.
Conclusions: In the studied cohort we found an age-dependent increase in PWV that was in line with the healthy normal population until the age of 18 years. Despite the known enhanced cardiovascular risk in CoA patients vascular ageing seems to occur later in life.



Therefore, PWV measurement in adult CoA patients could nevertheless serve as a useful tool for stratifying individual cardiovascular risk in long-term follow-up.



FT-132 / #1266

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

EFFECTIVENESS OF EHEALTH-SUPPORTED PHYSICAL ACTIVITY INTERVENTIONS IN CHILDREN WITH CONGENITAL HEART DISEASE: A SYSTEMATIC REVIEW

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Background and Aim: A growing number of eHealth interventions have been developed to monitor and promote physical activity (PA) in children with congenital heart disease (CHD). However, an overview of their efficacy is lacking. This systematic review aimed to evaluate the effect of eHealth interventions on PA outcomes in children with CHD.
Methods: Medline, Embase, Cochrane CENTRAL, Web of Science and Google Scholar were systematically searched from January 2015 to September 2025. Studies investigating the effectiveness or feasibility of eHealth in promoting PA of children with CHD, written in English, were eligible for inclusion. Primary outcome was PA level, defined by minutes of moderate to vigorous physical activity (MVPA) per day, daily step count and/or sedentary time. Physical fitness, measured as peakVO2 or VO2max, and quality of life (QoL) were included as secondary outcomes. Risk of bias was assessed using the Cochrane Risk of Bias 2 tool for randomized controlled trials (RCT) and the ROBINS-1 tool for non-comparative intervention studies.
Results: Thirteen studies were included, consisting of seven RCTs, five single-arm pre-post intervention studies and one non-randomized controlled intervention study. Sample sizes ranged from 2 to 158 participants, with mean/median ages between 8.6 and 16.3 years. eHealth modalities included digitally guided exercise training, wearable-based activity monitoring, remote coaching and digital nudging. Of the thirteen studies reporting effects of eHealth on PA outcomes, seven found positive effects, while the remainder found no effects. Improvements in MVPA and/or reductions in sedentary time were observed in two studies, of which one also reported an increase in daily steps. Improvements in physical fitness were reported in three studies, and two studies demonstrated enhanced patient- or parent-reported QoL. Notably, six of the seven effective interventions were online guided exercise programs. Considerable heterogeneity between interventions precluded meta-analysis. All interventions were feasible and well tolerated, with no adverse events reported.
Conclusions: Most positive effects of eHealth on PA measures were observed in eHealth-



supported exercise programs, suggesting that eHealth may be most effective when integrated within guided exercise interventions rather than as a stand-alone tool. eHealth-supported exercise programs appear feasible, safe and potentially beneficial for improving PA, fitness and QoL in children with CHD.



FT-133 / #1379

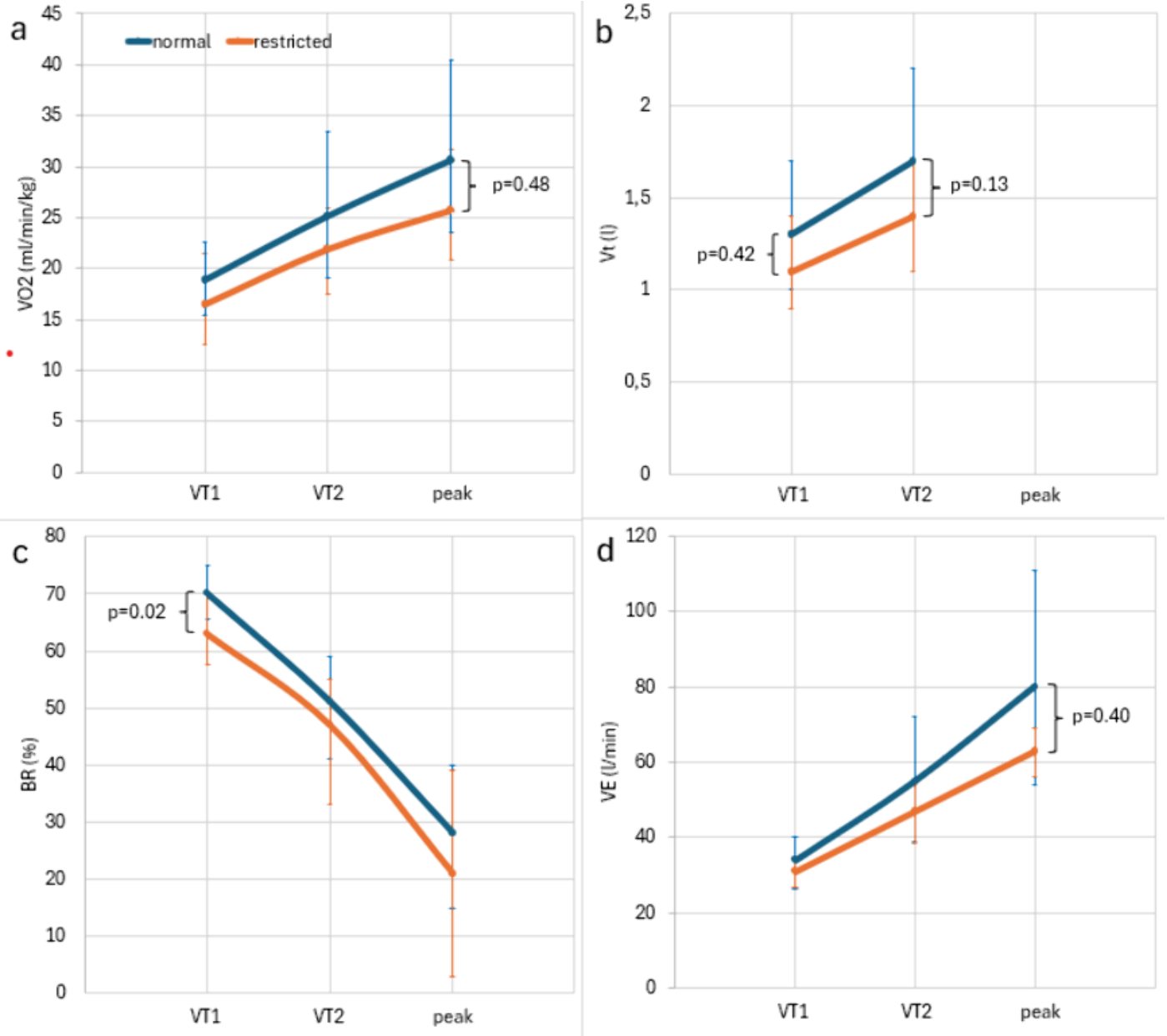
FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

VENTILATORY LIMITATION TO EXERCISE IN PATIENTS WITH FONTAN CIRCULATION

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Background and Aim: In patients with Fontan circulation, pulmonary blood flow is maintained by passive venous return; hence, ventilatory efficiency is essential for pulmonary perfusion during exercise. However, restrictive ventilatory pattern (RP) is frequent in this population. This study aims to compare ventilatory response during exercise in patients undergoing Fontan procedure with or without RP at rest.
Methods: This observational, single-centre study included patients with Fontan circulation referred for spirometry and maximal cardiopulmonary exercise testing.
Results: 66 patients (mean age 25.5±11.6 years, 63.6% males, BMI 20.9±3.8 kg/m2), 65.2% had left and 34.8% right systemic ventricle (mean ejection fraction 58.2±8.7%, mean fractional area change 40.4±6.9%). 37.9% of patients had normal spirometry (non-RP) and 62.1% had RP. No significant differences were observed between RP and non-RP in terms of age and BMI, as well as peripheral oxygen saturation (SpO_2) at rest (97% vs 96%, respectively) and at peak exercise (92% vs 90%), VE/VCO_2 slope (34.9 vs 35.4), peak heart rate as % of predicted (84.6% vs 81.0%), and O_2 pulse ad % of predicted (92% vs 76%). RP had lower overall exercise capacity (11.5 vs 13.6 METs, p=0.044), VO_2 peak (25.7 vs 30.7 ml/min/kg, p=0.048; 64% vs 75% of predicted, p=0.034), and peak ventilation (63 vs 80 l/min, p=0.040). Significant differences emerged for tidal volume (Vt) at both at first and second ventilatory thresholds (VT), in particular: 1.1 vs 1.3 l at VT1 (p=0.042), and 1.4 vs 1.7 l at VT2 (p=0.013), but not for VO_2 (ml/min/kg), ventilation and breathing frequency. Additionally, at VT1, RP had lower breathing reserve (63 vs 70%, p=0.002) and higher VO_2 as % of their VO_2peak (65% vs 61%,

p=0.043).



Conclusions: In this population almost 2 out of 3 patients had a restrictive spirometry, resulting in a ventilatory limitation due to an inability to adequately increase Vt during exercise, with a significant impact on aerobic and overall exercise capacity. These findings underline the importance of comprehensive cardiopulmonary assessment in order to identify the specific source of functional limitation and targeted rehabilitation and physical exercise strategies to optimize functional outcomes in this population.



FT-134 / #1389

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

ROBUSTNESS OF THE OXYGEN UPTAKE EFFICIENCY SLOPE UNDER SUBMAXIMAL EXERCISE CONDITIONS IN PEDIATRIC CARDIOPULMONARY EXERCISE TESTING

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Background and Aim: In pediatric cardiopulmonary exercise testing, maximal cardiopulmonary exertion is frequently not achieved, limiting the interpretability of peak oxygen uptake (VO_2peak). The oxygen uptake efficiency slope (OUES) is considered a submaximal parameter of cardiorespiratory performance. This study aimed to evaluate the reliability of OUES under submaximal exercise conditions.
Methods: CPET was performed on a cycle ergometer using a ramp protocol. Participants were recruited from a pediatric sports medicine outpatient clinic and included predominantely physically active children and adolescents across a wide range of performance levels. For each participant, OUES was calculated over different portions of the exercise test, excluding the initial minute of exercise. Calculations covered submaximal phases (75% of test duration), later phases (90%), the complete exercise test, and up to VT2 as an exploratory approach. Comparability between OUES values derived from different exercise durations was assessed using correlation analysis and relative differences. Associations between each OUES variant and VO_2peak were examined, with sensitivity analyses restricted to participants achieving a respiratory exchange ratio (RER) ≥ 1.10.
Results: A total of 1,053 participants were included (28.2% female; mean age = 14.1, SD 2.1); 833 achieved an RER ≥ 1.10 (28.0% female). OUES values derived from different portions of the exercise test were strongly associated with each other ($r = 0.97–0.99$; all $p < 0.001$), with only minor variations in absolute values across exercise portions (<3%). All OUES variants demonstrated strong correlations with VO_2peak ($r = 0.93–0.94$; all $p < 0.001$). Similar associations between OUES and VO_2peak were observed when analyses were restricted to participants achieving RER ≥ 1.10.
Conclusions: OUES demonstrates robust associations with VO_2peak across different portions of the exercise test. These findings support the validity and robustness of OUES as a functional index of cardiorespiratory performance even when maximal exercise is not achieved, which is particularly relevant in pediatric CPET.



FT-135 / #26

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

FORMULA OR FORTIFICATION INITIATION IS ASSOCIATED WITH NECROTIZING ENTEROCOLITIS IN INFANTS WITH CRITICAL CONGENITAL HEART DISEASE: A MULTISITE STUDY FROM COLLABORATIVE RESEARCH FROM THE PEDIATRIC CARDIAC INTENSIVE CARE SOCIETY

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Background and Aim: Infants with critical congenital heart disease (CCHD) are vulnerable to necrotizing enterocolitis (NEC). Human milk may confer protection, yet investigations into human milk and NEC in this population are limited. We aimed to evaluate the relationship between (1) proportion of human milk intake, and (2) timing of formula or fortification initiation and NEC in infants with CCHD.
Methods: We conducted a propensity score-matched case-control study across 24 US sites. Neonates who underwent cardiac surgery with cardiopulmonary bypass during 2021–2022 were included. Patients born prematurely or with less than 7 days of neonatal enteral feeding were excluded. Exposures were (1) percentage of enteral intake as human milk and (2) timing of formula or fortification initiation. The primary outcome was NEC, defined as modified Bell's Stages II–III. Propensity scores for matching were generated using 20



preselected demographic and clinical variables. Each NEC case with documented enteral feeding prior to diagnosis was matched to up to 10 control patients without NEC. Analysis included data visualization and logistic regression, with sensitivity analyses to account for enteral volume, exposure and outcome timing, and formula or fortification type.

Results: Of 822 neonates in the full sample, 22 patients who developed NEC after enteral feeding were matched to 198 patients without NEC (Table 1). The percentage of pre-NEC human milk feeding was not associated with a reduced NEC rate (OR 1.35, p=0.656). As shown in Figure 1, while patients received primarily human milk before NEC, there was an observable relationship between bovine-derived formula or fortification initiation and subsequent NEC. In propensity score matched models (Table 2), formula or fortification initiation within 5 days of diagnosis age was associated with nearly 5-fold higher odds of NEC ($p<0.001$), consistent across sensitivity
analyses.



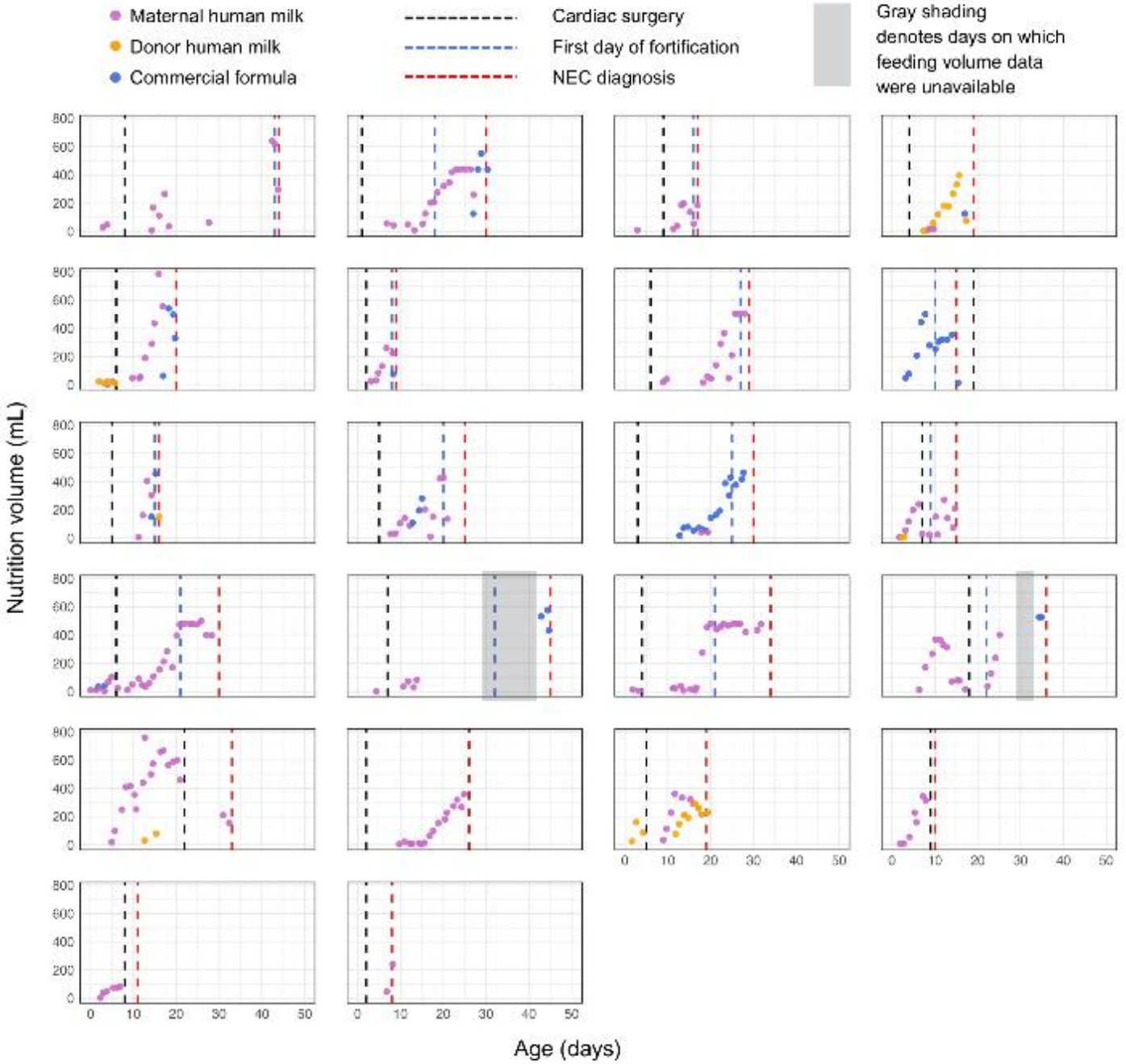
Table 1. Characteristics of the propensity score matched cohorts, by NEC diagnosis

	Overall	NEC	No NEC	p value
	(N = 220)	(N = 22)	(N = 198)	
Sex at birth				0.889
Male	138 (62.7)	13 (59.1)	125 (63.1)	
Female	82 (37.3)	9 (40.9)	73 (36.9)	
Race				0.991
White	113 (51.4)	11 (50.0)	102 (51.5)	
Black/African American	49 (22.3)	5 (22.7)	44 (22.2)	
Another race or multirace	58 (26.4)	6 (27.3)	52 (26.3)	
Ethnicity				0.995
Hispanic/Latino	41 (18.6)	4 (18.2)	37 (18.7)	
Not Hispanic/Latino	158 (71.8)	16 (72.7)	142 (71.7)	
Not documented	21 (9.5)	2 (9.1)	19 (9.6)	
Insurance status				>0.999
Public	149 (67.7)	15 (68.2)	134 (67.7)	
Non-public or other	71 (32.3)	7 (31.8)	64 (32.3)	
Child Opportunity Index	44 (23, 68)	44.50 (33.5, 62)	44 (22, 70.5)	0.990
Prenatal CHD diagnosis	201 (91.4)	20 (90.9)	181 (91.4)	>0.999
Birth WAZ	-0.38 (1.06)	-0.44 (1.04)	-0.37 (1.06)	0.792
Single ventricle physiology	136 (61.8)	14 (63.6)	122 (61.6)	>0.999
Genetic syndrome	45 (20.5)	4 (18.2)	41 (20.7)	>0.999
Extracardiac abnormality	38 (17.3)	3 (13.6)	35 (17.7)	0.858
Any preoperative feeding	135 (61.4)	13 (59.1)	122 (61.6)	>0.999
Surgery age (days)	6 (4, 9)	6 (4, 8)	6 (4, 9)	0.963
Weight (kg) at surgery	3.27 (0.53)	3.26 (0.55)	3.27 (0.52)	0.909
STAT score 4 or 5	191 (86.8)	20 (90.9)	171 (86.4)	0.790
Sternum left open	144 (65.5)	15 (68.2)	129 (65.2)	0.962
Postoperative ECMO	23 (10.5)	3 (13.6)	20 (10.1)	0.883
Sepsis	16 (7.3)	3 (13.6)	13 (6.6)	0.436
Other infection	37 (16.8)	6 (27.3)	31 (15.7)	0.279
NEC diagnosis age (days)	20 (15, 30)	–	–	–
% of volume as HM (base diet) before NEC diagnosis age	75.93 (35.76)	79.33 (32.84)	75.55 (36.14)	0.640
Exclusive HM (base diet) before NEC diagnosis age	101 (46.5)	11 (50.0)	90 (46.2)	0.907
Any breastfeeding before NEC diagnosis age	33 (15.0)	1 (4.5)	32 (16.2)	0.257
First bovine-derived formula or fortification exposure within 5 days before the NEC diagnosis age	57 (25.9)	13 (59.1)	44 (22.2)	**<0.001**
Length of stay (days)	37 (26, 57)	58.5 (38.75, 90.75)	34.5 (25, 51.75)	**0.001**

Notes:
NEC is defined as modified Bell's criteria stage II–III.
Descriptive statistics are n (%) for categorical variables, mean (SD) for continuous variables except median (25%, 75%) for Child Opportunity Index, age at surgery, NEC diagnosis age, and hospital length of stay.
Abbreviations: CHD = congenital heart disease, ECMO = extracorporeal membrane oxygenation, HM = human milk, NEC = necrotizing enterocolitis, STAT = Society of Thoracic Surgeons-European Association for Cardio-Thoracic Surgery, WAZ = weight-for-age z-score



Figure 1. Nutrition patterns suggest a relationship between **formula or fortification initiation** and subsequent **NEC diagnosis** for infants with CCHD (n=22, age 7–45 days at diagnosis)



Notes: Each panel represents one infant with NEC; NEC = necrotizing enterocolitis.
Detailed feeding volume was available for the neonatal period (days 0–28), plus the last 2 days before NEC diagnosis. Days on which detailed feeding data were unavailabe are noted by gray shading.



Table 2. Propensity score matched models of initial bovine-derived formula or fortification exposure within 5 days of NEC diagnosis

Outcome: NEC	OR	95% CI	p value
First formula or fortification exposure within 5 days before NEC age	4.85	(1.97-12.47)	**<0.001**
Sensitivity analyses			
Further adjusted for maximum enteral volume (mL/kg/day) before NEC diagnosis age[a]	4.60	(1.84-12.07)	**0.001**
First bovine-derived formula or fortification exposure within 5 days before or after NEC age	4.32	(1.76-11.06)	**0.002**
First formula/fortification exposure within 5 days, limited to NEC cases < age 30	3.63	(1.31-10.58)	**0.014**
Further adjusted for fortification type: Standard or Specialized[b,c]	6.82	(1.99-31.55)	**0.005**

Notes:
NEC is defined as modified Bell's criteria stage II–III.
a. Estimate for maximum volume (mL/kg/day) in the model is 1.00 (0.99–1.01), p=0.924.
b. Specialized formula is defined as hydrolyzed, partially hydrolyzed, amino acid-based, or fat-modified. No infants received human milk-based fortifier (e.g., Prolacta).
c. Estimate for standard fortification, compared to specialized, as a covariate in the model is 1.74 (0.54–6.21), p=0.362.
Abbreviations: CI = confidence interval, NEC = necrotizing enterocolitis, OR = odds ratio

Conclusions: In this multisite cohort, the proportion of human milk during the neonatal period was not associated with a reduced NEC rate. We did, however, identify a relationship between formula or fortification initiation and an increased likelihood of NEC, even in predominantly human milk-fed patients. Further research is needed to identify optimal fortification strategies for high-risk infants with CCHD.



FT-136 / #55

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

SIX-HOUR RENAL RESISTIVE INDEX FOR EARLY PREDICTION OF ACUTE KIDNEY INJURY AFTER INFANT CARDIAC SURGERY: A PROSPECTIVE COHORT STUDY

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Background and Aim: Background Acute kidney injury (AKI) is a frequent complication after congenital cardiac surgery in neonates and infants and is associated with prolonged intensive care and worse outcomes. The renal resistive index (RRI), a non-invasive Doppler ultrasound parameter, may enable early bedside detection of patients at risk for postoperative AKI. **Objective** To determine whether a single six-hour postoperative RRI measurement can predict AKI—defined by Kidney Disease: Improving Global Outcomes (KDIGO) criteria—and to evaluate its relationship with postoperative hemodynamic support.
Methods: Prospective single-center cohort (n = 41) classified as AKI (n = 19) or non-AKI (n = 22). Ultrasound examinations were performed by a pediatric cardiac ICU intensivist and verified by a qualified radiologist. RRI was measured at six hours (primary), forty-eight hours, and at discharge. Inotropic scores were recorded, and discrimination was assessed using receiver operating characteristic (ROC) analysis.
Results: At six hours, RRI was higher in AKI than non-AKI (0.84 ± 0.07 vs. 0.74 ± 0.08; p = 0.0002) with good discrimination (area under the curve [AUC] 0.83; 95% confidence interval [CI] 0.68–0.97). At forty-eight hours, RRI remained higher (0.79 ± 0.07 vs. 0.73 ± 0.08; p = 0.017) with moderate discrimination (AUC 0.70; 95% CI 0.53–0.87). Discharge values were not significantly different (p = 0.18; AUC 0.62; 95% CI 0.44–0.80). In-sample, pragmatic six-hour thresholds suggested RRI < 0.80 identified no moderate–severe AKI, whereas RRI ≥ 0.86 enriched for higher risk. At forty-eight hours, the inotropic score was greater in AKI (7.2 ± 8.1) than in non-AKI (1.9 ± 3.4; p = 0.009), and the six-hour RRI correlated with inotropic burden (r = 0.56; p < 0.001). Three infants of the AKI group required peritoneal dialysis, all with six-hour RRI ≥ 0.90.

Conclusions: A single six-hour RRI supports early bedside risk stratification after infant cardiac surgery; values < 0.80 are reassuring, whereas values ≥ 0.86—and particularly ≥ 0.90—may indicate increased risk of severe AKI and dialysis. External validation of these thresholds is warranted.



FT-137 / #57

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

ULTRASOUND FOR DIAPHRAGMATIC DYSFUNCTION IN POSTOPERATIVE CARDIAC CHILDREN: A PROSPECTIVE COHORT STUDY

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Background and Aim: The use of ultrasound for assessing diaphragmatic dysfunction after paediatric cardiac surgery remains under-utilised. This study aimed to evaluate the role of bedside ultrasound performed by an intensivist to diagnose diaphragmatic dysfunction and to determine the need for plication in postoperative paediatric cardiac patients.
Methods: We carried out a prospective cohort study of children admitted to the Paediatric Cardiac Intensive Care Unit (PCICU) during 2024. Diaphragmatic dysfunction was suspected in patients with difficulty weaning from positive-pressure ventilation or abnormal chest-radiograph findings. Ultrasound examinations were performed by a trained PCICU intensivist and independently confirmed by a qualified radiologist.
Results: Among 344 postoperative patients, 32 underwent diaphragm ultrasound for suspected dysfunction. Ultrasound confirmed diaphragmatic dysfunction in 17 of 32 (53%) patients, with a mean age of 10.8 ± 3.8 months and mean weight 6 ± 1 kg. The overall incidence of diaphragmatic dysfunction was 4.9% of the total cohort. Diaphragmatic plication was required in 9 of 17 (53%) cases, corresponding to 2.6% of all postoperative cardiac children. The mean time to plication was 15.1 ± 1.3 days after surgery. All patients who required plication were **younger than four months**. After plication, the mean PCICU and hospital stays were 19 ± 3.5 and 42 ± 8 days, respectively.
Conclusions: Bedside ultrasound performed by the intensivist is a reliable, practical, and reproducible tool for early detection of diaphragmatic dysfunction after paediatric cardiac surgery.
Infants younger than four months represent the highest-risk subgroup and should be prioritised for ultrasound screening and considered for early plication if conservative measures fail beyond two weeks post-surgery.
Integrating critical-care ultrasound into routine postoperative evaluation may enhance timely decision-making and reduce morbidity in paediatric cardiac patients.



FT-138 / #213

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

HUMAN MILK AND BREASTFEEDING ARE ASSOCIATED WITH SHORTER HOSPITAL LENGTH OF STAY FOR NEONATES UNDERGOING CARDIAC SURGERY: A MULTISITE STUDY FROM COLLABORATIVE RESEARCH FROM THE PEDIATRIC CARDIAC INTENSIVE CARE SOCIETY

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Background and Aim: Human milk and breastfeeding (BF) have been associated with shorter hospitalization for critically ill newborns, but data for infants with critical congenital heart disease (CCHD) are limited. We examined relationships between neonatal human milk intake or direct BF and hospital length of stay (LOS) for neonates undergoing cardiac surgery.
Methods: This retrospective cohort study across 24 US sites included infants who underwent neonatal cardiac surgery during 2021–2022, discharged alive by 6 months. Premature patients and those with less than 7 days enteral feeding were excluded. Exposures were (1) percentage of enteral intake as human milk during the neonatal period and (2) neonatal direct BF. Analyses included inverse probability weighted regression, using energy balancing to account for 20 relevant covariates. Sensitivity analyses further



adjusted the models for fixed effects of clinical complications, physiologic instability, and weight trajectory.

Results: The sample included 758 infants (Table 1) with a median hospital LOS of 26 days (18, 40). Daily neonatal nutrition type and route are shown in Figure 1. Human milk (maternal or donor) comprised 70% of enteral nutrition during the hospitalization, although donor milk use was limited (3%). Only 25% of infants breastfed during the neonatal period. Inverse probability weighted models are presented in Table 2. Infants receiving 100% human milk in the neonatal period, compared with 0%, had an estimated 9.3 days shorter LOS ($p<0.001$), or roughly 1 day shorter per 10% human milk increase. Any BF was associated with 8.7 days shorter LOS ($p<0.001$) and each additional BF session with 0.48 days shorter LOS ($p<0.001$). Results were consistent in sensitivity analyses.



Table 1. Sample characteristics (n=758)

Sex at birth	
Male	473 (62.4)
Female	284 (37.5)
Race	
Black/African American	108 (14.2)
White	508 (67.0)
Another race or multirace	142 (18.7)
Ethnicity	
Hispanic/Latino	141 (18.6)
Not Hispanic/Latino	572 (75.5)
Not documented	45 (5.9)
Insurance type	
Public	404 (53.3)
Private or other	354 (46.7)
Prenatal CHD diagnosis	531 (70.1)
Birth WAZ	-0.19 (1.04)
Single ventricle physiology	208 (27.4)
Genetic syndrome	123 (16.2)
Any preoperative enteral feeding	558 (73.6)
Surgery age (days)	6 (4, 9)
Weight (kg) at surgery	3.32 (0.51)
STAT score 4 or 5	387 (51.1)
Sternum left open	349 (46.0)
Postoperative ECMO	24 (3.2)
% of enteral volume as Maternal HM over the hospitalization	66.71 (38.21)
% of volume as Donor HM over the hospitalization	3.16 (11.05)
Any breastfeeding before discharge	191 (25.2)
Length of stay (days)	25.50 (18, 40)

Notes:
Descriptive statistics are n (%) for categorical variables, mean (SD) for continuous variables except median (25%, 75%) for sugery age and hospital length of stay.
Abbreviations: CHD = congenital heart disease, ECMO = extracorporeal membrane oxygenation, HM = human milk, STAT = Society of Thoracic Surgeons-European Association for Cardio-Thoracic Surgery, WAZ = weight-for-age z-score

Figure 1. Nutrition volume, type, and route for infants with critical congenital heart disease during the neonatal period (n=758)

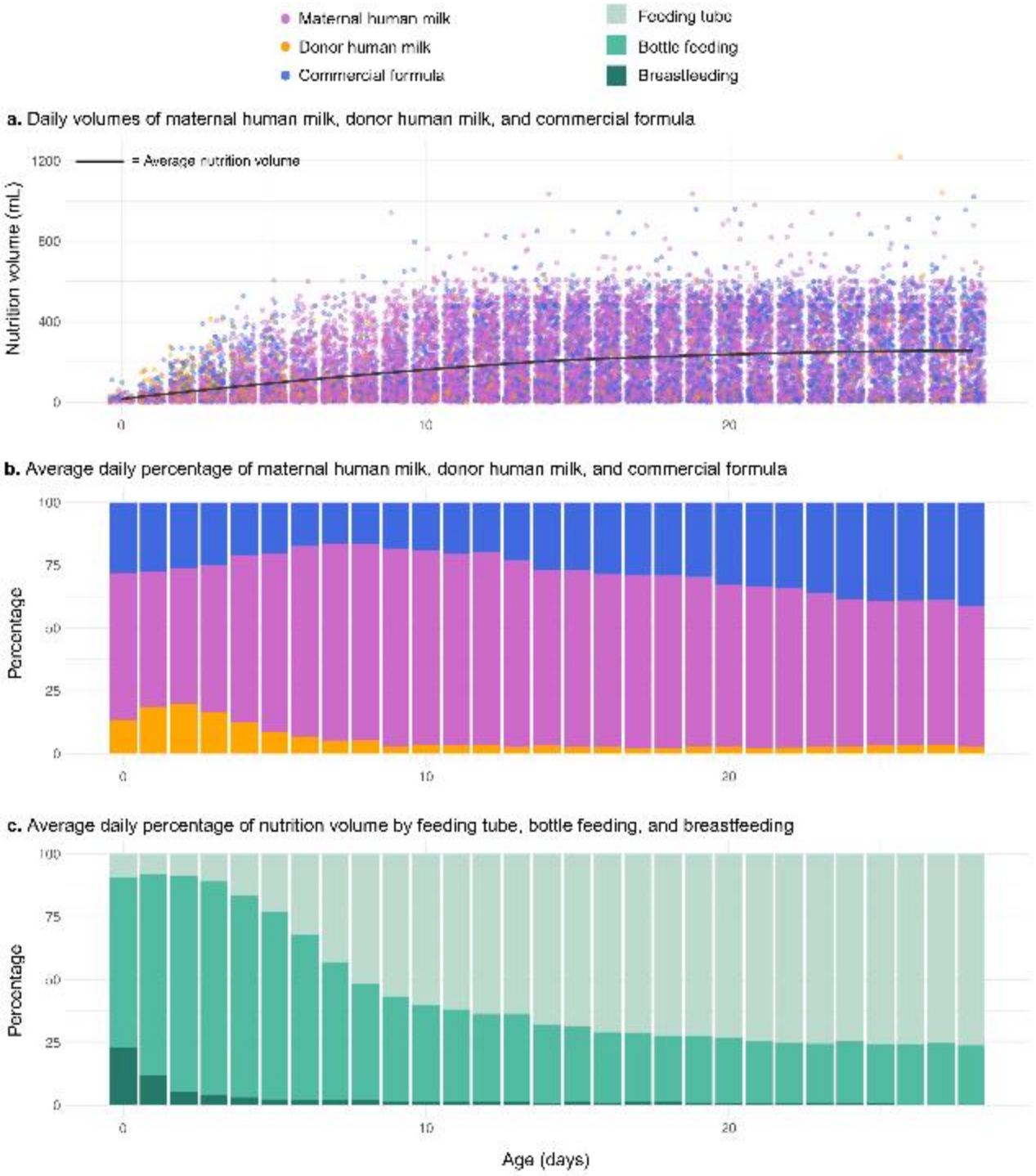




Table 2. Inverse probability weighted models of associations between human milk or direct breastfeeding during the neonatal period and hospital length of stay (n=758)

Outcome: Length of stay (days)	Estimate β or OR[a]	SE	95% CI	p value
Exposure: human milk volume				
% of volume as human milk	-9.33	2.48	(-14.19, -4.47)	**<0.001**
High human milk (≥90%)	-6.80	–	(-10.43, -3.16)	**<0.001**
Sensitivity analysis: further adjusted for clinical complications[b]				
% of volume as human milk	-6.01	2.20	(-10.31, -1.70)	**0.006**
High human milk (≥90%)	-5.62	–	(-8.63, -2.62)	**<0.001**
Exposure: direct breastfeeding				
# of breastfeeding sessions	-0.48	0.09	(-0.65, -0.31)	**<0.001**
Any breastfeeding	-8.65	–	(-13.46, -3.85)	**<0.001**
Any preop breastfeeding[c]	-6.92	–	(-11.21, -2.63)	**0.002**
Sensitivity analysis: further adjusted for clinical complications[b]				
# of breastfeeding sessions	-0.32	0.08	(-0.47, -0.17)	**<0.001**
Any breastfeeding	-5.45	–	(-9.27, -1.64)	**0.005**
Any preop breastfeeding[c]	-6.80	–	(-10.22, -3.38)	**<0.001**

Notes: Infants who died before discharge were excluded.
a. Estimates are β for continuous exposures and odds ratio (OR) for categorical exposures.
b. Sensitivity analyses adjusted for fixed effects of cardiac arrest, diaphragm dysfunction, chylothorax, duration of postop mechanical ventilation, low cardiac output syndrome, and weight trajectory (weight-for-age z-score change, birth to discharge).
c. Infants with no preop feeding were excluded from these models.

Conclusions: In this multisite cohort, greater human milk and BF during the neonatal period were associated with substantially shorter LOS. Given that nutrition exposures were limited to the neonatal period, reverse causality (i.e., prolonged hospitalization impeding milk supply) is unlikely. Low BF and donor milk prevalence highlight the need for enhanced lactation support and future studies testing the effect of lactation-focused interventions on clinical outcomes, including LOS.



FT-139 / #226

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

POSTOPERATIVE AEEG MONITORING IS AN ESSENTIAL TOOL FOR EVERY VENTILATED CHILD AFTER CARDIAC SURGERY UNTIL EXTUBATION

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Background and Aim: Postoperative seizures remain a common complication in children after cardiac surgery, with a prevalence ranging from 15-20% in clinical research settings. The majority are nonconvulsive seizures (NCS) or nonconvulsive status epilepticus (NCSE), which can only be detected using amplitude-integrated electroencephalography (aEEG). Up-to-date aEEG-Monitoring for at least 72 postoperative hours is recommended. Yet, perioperative aEEG neuromonitoring is not commonly used in daily clinical practice, according to a recent ESPNIC survey. In addition to seizures, aEEG pattern analysis enables detection of oversedation and prediction of long-term neurodevelopmental outcomes. During the establishment of a comprehensive neuromonitoring program, we evaluated our findings on postoperative seizure prevalence.
Methods: After comprehensive team training, all children who remained ventilated for at least 10 hours after cardiac surgery (35% of all patients) were monitored with a 2-channel aEEG setup using needle electrodes. aEEG patterns were assessed multiple times during each shift by the pCICU team. In case of abnormalities, a second analysis was performed by a paediatric neurologist at the bedside.
Results: aEEG-Monitoring compliance was 97,8% for all ventilated children, resulting in 92 patients being included during the period from October 2024 to October 2025. Seizures were detected in 17% of all ventilated children, 62% had non-convulsive episodes, while 38% experienced clinical (convulsive) seizures. Univentricular physiology (31%), aortic arch repair (25%), and ECLS (18%) were predominant patient-associated factors. 56% of all patients with seizures had experienced an episode of either pre- or postoperative resuscitation (mean time to ROSC 14,7min). The mean time interval from surgery to the occurrence of NCS/NCSE in sedated and ventilated children was 7,9 days and 8,0 days



after resuscitation, respectively.

Conclusions: With a prevalence of 17% in ventilated children after cardiac surgery, seizures are a frequent complication. aEEG monitoring is mandatory to detect all seizures; the majority suffer from nonconvulsive seizures. Patients with a perioperative history of resuscitation, aortic arch repair, univentricular physiology or ECLS are at higher risk. The recommended 72 h length of aEEG monitoring may need to be reconsidered, since NCS/NCSE can occur later, and aEEG monitoring until extubating seems reasonable.



FT-140 / #306

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

OXIDATIVE STRESS BIOMARKERS AND POSTOPERATIVE MRI BRAIN INJURY IN NEONATES WITH CONGENITAL HEART DISEASE

Ruth Ibáñez Llorente[1], Ana Remón Pérez[2], Marta Gómez Chiari[3], Monica Rebollo Polo[3], Débora Cañizo Vázquez[1], Alba Rivas Piorno[1], Joan Sánchez De Toledo[4], Marta Camprubí Camprubí[1]
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Background and Aim: Over recent decades, survival rates for patients with congenital heart disease (CHD) have improved substantially; however, this progress has been accompanied by an increasing incidence of adverse neurological outcomes. Early identification of patients at higher neurological risk is essential, and brain injury biomarkers have proven to be useful tools. Postoperative magnetic resonance imaging (MRI) plays a key role, as cerebral lesions detected after surgery are common and provide important insight into the neurological impact of the perioperative period. Among emerging biomarkers, isoprostanes have gained particular attention as robust indicators of oxidative stress, a key mechanism implicated in brain injury associated with cardiac surgery. The aim of this study is to determine the relationship between postoperative MRI abnormalities and urinary isoprostane levels with the goal of improving early risk stratification in this vulnerable population.
Methods: Prospective observational study involving newborns who underwent cardiac surgery within the first month of life. Post-operative brain MRI was performed according to the clinical protocol. The scans were reviewed to identify multifocal lesions (watershed injury, white matter injury (WMI)) and focal lesions (stroke, single white-matter lesion). Urinary isoprostanes were measured at three time points: preoperatively, immediately after surgery and 24 hours postoperatively.
Results: Ninety-one newborns were included. Postoperative MRI revealed brain injury in was 37,4% of the cohort, being WMI the most frequent finding (25,3%). Isoprostane levels were significantly higher in newborns with watershed injury both immediately after surgery (6490,8 ng/mg Cr vs 3809,3 ng/mg Cr; p=0,015) and at 24 hours (2726,2 ng/mg Cr vs 1804,3 ng/mg Cr; p=0,015). The pre-to-postoperative increase in isoprostane levels was also associated with watershed injury (3802,1 ng/mg Cr vs 188,4 ng/mg Cr; p=0,002) and with



WMI (1661,9 ng/mg Cr vs −88,6 ng/mg Cr; p=0,038). This association was not maintained in the pre-to-24-hour post-surgery interval. No significant differences in isoprostane levels were observed for the other patterns of brain injury.

Conclusions: This study provides evidence that perioperative changes in urinary isoprostanes correspond to specific patterns of postoperative MRI injury, underscoring their promise as emerging biomarkers of oxidative stress–related brain injury in neonates undergoing cardiac surgery.



FT-141 / #373

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

ARTIFICIAL INTELLIGENCE IN MEDICAL EDUCATION: PERCEPTIONS AND USE AMONG PEDIATRIC CARDIOLOGY FELLOWS — A PILOT SURVEY STUDY

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Background and Aim: Generative artificial intelligence (AI) is rapidly transforming both healthcare and medical education. The aim of this pilot study was to explore the perceptions and use of AI tools among pediatric cardiology (PC) fellows and PC subspecialty fellows in three private and public centers in Argentina.
Methods: A cross-sectional pilot survey was conducted using an anonymous online questionnaire administered to fellows of PC and its subspecialties in three private and public centers in Argentina. Collected data included sociodemographic characteristics, and uses and perceptions regarding the role of AI in medical education and clinical practice. Measures of frequency were calculated using descriptive statistics.
Results: The survey response rate was 55% (11/20). The age distribution was <30 years in 18%, 30-39 years in 9% and ≥40 years in 73%; 54% of respondents were female. There were 7/11 PC fellows and 4/11 subspecialties fellows (fetal cardiology, echocardiography, cardiac imaging, and electrophysiology). Only one fellow had received formal training in AI. Four participants (36%) reported frequent use of AI, 4/11 (36%) occasionally, and 3/11 (27%) reported rare or no use. Most fellows (73%) used AI for searching or synthesizing scientific information, 36% for research and statistical analysis, 36% for text writing and correction, 18% for interpretation of cardiac images. Self-perceived knowledge of AI applications in medicine was low or very low in 73% and moderate in 27%. Nearly half of the participants (46%) agreed that AI will improve clinical practice in PC over the next 5 years, while 73% expressed concern about inappropriate or unethical use of AI in medicine. Interest in formal AI training was expressed in 64%, mainly focused on clinical practice (46%), imaging diagnosis (36%), and research (18%).
Conclusions: Most PC and subspecialty fellows perceive their training in medical AI as suboptimal, report significant ethical concerns, and express interest in improving their education in this field. These findings underscore the need to incorporate structured AI education into PC and subspecialty training curricula to better prepare fellows for AI-enabled healthcare systems.



FT-142 / #594

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

HIGH-SENSITIVITY CARDIAC TROPONIN T AND INTRAVENOUS IMMUNOGLOBULIN IN CHILDREN WITH CMR- CONFIRMED OR PROBABLE MYOCARDITIS: A RETROSPECTIVE COHORT STUDY

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Background and Aim: Background
Pediatric myocarditis is most often viral, yet diagnosis remains challenging because endomyocardial biopsy is rarely feasible. Cardiac MRI (CMR) based on Lake Louise criteria provides an important non-invasive diagnostic tool, while high-sensitivity cardiac troponin T (hs-cTnT) is widely used to detect myocardial injury. Intravenous immunoglobulin (IVIG) is frequently administered, although its clinical benefit in children is uncertain. **Aims**
This study evaluated the diagnostic and clinical utility of hs-cTnT in children with CMR-confirmed or probable myocarditis and examined whether IVIG therapy influences troponin kinetics or clinical outcomes.
Methods: Study Design and Methods
In this single-center retrospective cohort (2013–2025), 105 hospitalized children with suspected myocarditis (mean age 13.4 ± 3.1 years; 81% male) were reviewed. Patients were classified as CMR-confirmed (CM) or probable myocarditis (PM). Data included ECG, echocardiography, CMR, baseline and follow-up hs-cTnT (Roche assay; 99th percentile 0.014 ng/dL), time to troponin normalization, and IVIG treatment (400 mg/kg/day up to 5 days). Statistical significance was set at $p < 0.05$.
Results: Results
CMR abnormalities were identified in 44 patients (41.9%). Median baseline hs-cTnT was 0.135 ng/dL, and median normalization time was 5 days. IVIG was administered to 38 patients (36.2%), more commonly in CM (50%) than PM (24.5%). Pathologic ECG findings occurred in 32% and were more frequent in IVIG-treated children. Troponin levels normalized more slowly with IVIG (median 10 vs. 6 days), particularly in the CM subgroup. However, echocardiographic parameters and left-ventricular systolic recovery showed no significant differences between IVIG-treated and untreated groups.
Conclusions: Conclusions
Hs-cTnT is a useful adjunct for diagnosing and monitoring pediatric myocarditis. Although IVIG was used more often in clinically severe cases, it did not improve ventricular recovery



or troponin dynamics. Larger prospective studies are needed to better determine its therapeutic role.



FT-143 / #661

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

"READY FOR HOME?" MULTIDISCIPLINARY AND CAREGIVER PERSPECTIVES ON CHILDREN SUPPORTED WITH BERLIN HEART - EXCOR®ACTIVE (BH-EA): A QUALITATIVE STUDY

Katharina Schmitt[1,2,3], Marie Thöle[1,2,3], Marilena Menz[1,2,3], Christoph Hoermandinger[1,4], Kira Kuschnerus[1,5], Matthias Mader[1,2,3], Hannah Ferentzi[1,2,3], Felix Berger[1,3], Oliver Miera[1,3], Friedrich Köhler[1,6], Laura Glasmeyer[1,2,3], Franziska Markel[1,2,3]
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Background and Aim: Paediatric patients with advanced heart failure need mechanical support while awaiting a heart transplant or recovery. The *Berlin Heart EXCOR® Paediatric* is the most widely used ventricular assist device (VAD) for children up to 30 kg bodyweight. Thanks to the small mobile drive unit *Active*, children with this VAD System move and play as freely as possible. Due to the shortage of donor organs, particularly in the paediatric sector, waiting times for children are becoming increasingly longer – time they spent largely separated from their home and families, as well as their educational and developmental environment. Therefore, there is an urgent need for innovation and further development to improve the quality of life and outlook for children with VAD and their families.
Methods: Through semi-structured interviews with 22 professionals (nurses, psychologists, perfusionists, physicians, physiotherapists, social workers, child education specialists, chaplains) and three caregivers of hospitalized children on the BH - EA, we explored: (1) safety of the device and caregiving; (2) environmental factors in the hospital (3) requirements for the transition home with EXCOR® Active.
Results: In this qualitative analysis we explored two of the central themes that could be identified through the interviews: alarm management and requirements for home



discharge of paediatric patients on BH-EA. Professionals and caregivers described frequent low-priority alarms, which contributed to a state of alarm fatigue. Clearer procedures, shared responsibilities, and improved training of the alarm management for caregivers are needed. For the safe discharge of children with BH-EA a 24/7 emergency hotline, a remote monitoring tool, a comprehensive system-wide support and training, and a strong emotional and structural support network are required prerequisites.
Conclusions: The interviews highlight that the alarm management of the BH-EA is conceptualized for in-hospital care, which leads to reservations concerning reliable home monitoring. Multidisciplinary efforts are essential to enhance device safety, empower caregivers, and develop safe discharge programmes for children on BH - EA in their family homes.



FT-144 / #733

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

OUTCOME DETERMINANTS AFTER IHCA AND CPR IN PEDIATRIC CARDIAC SURGERY PATIENTS

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Background and Aim: Congenital heart diseases (CHD) affect approximately 1% of all newborns, and the majority of affected children (52-66%) require at least one cardiac surgical intervention during childhood. Postoperative in-hospital cardiac arrest (IHCA) occurs in about 2-6% of these patients and remains associated with substantial mortality. This study aimed to identify risk factors for unfavourable outcomes following postoperative IHCA and cardiopulmonary resuscitation (CPR) in children with CHD.
Methods: This retrospective single-centre study included 249 patients treated at the Deutsches Herzzentrum Berlin (DHZB) between June 2010 and June 2020, who experienced an IHCA requiring CPR for >1min after CHD surgery. Perioperative, pre-arrest, resuscitation-related and early follow-up parameters were evaluated. The primary endpoint was survival to hospital discharge; the secondary endpoint was neurocognitive status at discharge.
Results: Return of spontaneous circulation was achieved in 189 patients (75.9%), and 186 (74.7%) survived to discharge. Factors significantly associated with mortality included younger age, univentricular physiology, cardiac arrhythmias, higher surgical complexity, Norwood procedure, prolonged resuscitation times, and the need for primary or secondary ECMO support ($p<0.001$). Post-arrest, sepsis, higher catecholamine requirements, and prolonged mechanical ventilation were strongly associated with mortality ($p<0.001$). Elevated lactate levels and delayed lactate clearance were also predictive of unfavourable outcomes ($p<0.001$). Survival was significantly associated with fewer neurologic events ($p=0.003$), shorter time to first extubation ($p=0.042$), less kidney injury ($p<0.001$), fewer renal replacement therapies ($p<0.001$) and less hepatic dysfunction ($p<0.001$). Among the 186 survivors, 167 (85%) demonstrated a favourable neurological outcome at discharge (PCPC Score ≤ 2).
Conclusions: The included children with IHCA and CPR showed high survival rates with



predominantly good neurological outcome. Mortality is primarily associated with indicators of prolonged multiorgan dysfunction and persistent hemodynamic instability. Early identification of high-risk patients and targeted postoperative management may further improve outcomes in this vulnerable population.



FT-145 / #745

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

OBSERVATIONAL STUDY OF IMPACT OF CARDIAC CYCLE EFFICIENCY IN INFANTS UNDERGOING TETRALOGY REPAIR IN TERMS OF PERI-OPERATIVE OUTCOME

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Background and Aim: We observed trends of Cardiac cycle efficiency (CCE) in infants undergoing tetralogy repair and their correlation with z-score of pulmonary valve annulus and right ventricular strain, lactates along with outcomes in terms of ventilation time and ICU stay. CCE is a unique modality, that is obtained by pressure recording analytical method which is a newer technique of continuous cardiac monitoring. Value of CCE ranges from -0.3 to +0.3. After intracardiac repair in tetralogy of fallot low cardiac output state(LCOS)in post-op period delays the recovery and may mandates interventions. CCE reflects hemodynamic equilibrium and can be used to predict LCOS earlier
Methods: Our observational study includes 15 infants weighing 4 to 6 kg with intracardial repair along with transannular patch for tetralogy of fallot repair . CCE monitoring was started in ICU in immediate post-op. Lower values of CCE were rectified with escalation of inotropes, ino-dilator and volume replacement as per status of dp/dt, Ea and hemoglobin and targeting normal cardiac index (CI) and indexed systemic vasular resisitance (SVRi).
Results: Out of 15 patients,9 had normal values of CI and SVRi but with stiff requirements of inotropes with CCE trending towards negatives indicating poor hemodynamic equilibrium. They responded with titration of inotropes, raised dose of milrinone and keeping adequate hematocrit, leading to CCE reverting to positive value. Remaining six patients had low CI with raised SVRi and CCE in lowest value with features of low cardiac output syndrome (LCOS) and have prolonged ventilation time, required interventions as peritoneal dialysis and have longer ICU stay We observed that it is possible to detect impending LCOS early despite having normal CI and SVRI, based on down going CCE as rising lactates, Oligouria and rise in core temperature with cold extremities occur late hence earlier optimization with escalation of inotrope, volume replacement is prudent. Patients with low Z-scores and reduced right ventricular strain have lower CCE baseline and worsens in post-op as compare to those with less negative z-scores.
Conclusions: CCE provides a global assessment of more energy efficient cardiovascular state and to evaluate whether cardiovascular system is at Hemostatic equilibrium with early warning of impending LCOS.



FT-146 / #799

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

NINE YEARS MULTIPLATE® TESTING IN INFANTS WITH SHUNT DEPENDENT LUNG PERFUSION: LESSONS LEARNED.

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Background and Aim: Antiplatelet therapy in infants with shunt dependent lung perfusion after systemico-pulmonal shunt operation is well established to prevent shunt thombosis. Regular testing of effectiveness of antiplatelet therapy is rare. Otherwise operations on heart lung machine influence platelet count and function in the postoperative period. We analysed our consequences of postoperative testing of antiplatelet therapy with acetylsalicyl acid (ASA).
Methods: We retrospectively analysed our patient reports of infants with shunt dependent lung perfusion and Multiplate® testing results.
Results: From 2/2014 to 2/2023 we analysed n = 158 infants with shunt operation and n = 680 Multiplate® tests. 134/158 (84%) infants received ASA treatment. After in median 17 days postoperative antiplatelet therapy n = 66 were responder (median ASPI 225 U/min; 15 – 299) and n = 68 nonresponder (median 569 U/min; 306 – 1493) according to the recommandation (responder = ASPI < 300 U/min). Despite slightly higher ASS dosis 51 % of infants remained nonresponding (nonresponder median dose 4,6 mg/kg; 1,6-7,1 vs. 4,1 mg/kg; 1,9 – 8,3 responder; p = 0,01). In the nonresponder group the antiplatelet therapy independent TRAP test was significant higher as in the responder group (median 1148 vs 977 U/min; p = 0,02). 30 % (40/134) of patients needed premature intervention (e.g. shunt stenting, ECMO, early PCPC) because of cyanosis in interstage monitoring in median 9 weeks after shunt operation. The median ASPI was 430 U/min (67 – 1490) preinterventionally, 85 % (34/40) were nonresponder around this timepoint. The last Multiplate® test was analysed in median 22 days (-2 - 385) before reintervention.
Conclusions: We found a high number of ASA nonresponder in the postoperative setting. Maybe do to the initially global decreased platelet function and count and secondary rebound after bypass operation. The platelet count and function normalized after 21 days postoperatively. So this might be the right timepoint for Multiplate® testing and the



definitive decision for responder or nonresponder status and in case of nonresponding to ASA to change the antiplatelet therapy.



FT-147 / #811

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

PRACTICE VARIATION IN CARDIAC CARE FOR DUCHENNE MUSCULAR DYSTROPHY: RESULTS OF A EUROPEAN MULTICENTRE SURVEY

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Background and Aim: Cardiac involvement is a major determinant of outcomes in Duchenne muscular dystrophy (DMD). We aimed to quantify current European practice variation in cardiac surveillance and cardioprotective pharmacotherapy for DMD.
Methods: We performed a cross-sectional, web-based survey of clinicians providing cardiac care for patients with DMD across Europe. Items covered timing and frequency of follow-up, use of cardiac imaging modalities, Holter monitoring practices, and triggers for initiating and escalating pharmacotherapy. Results are reported descriptively.
Results: We analysed 30 responses from 24 countries; 27/30 (90%) were from academic university-based hospitals. Routine cardiology follow-up started at diagnosis in 24/30 (80%). For patients aged <10 years, follow-up was most commonly annual (23/30, 77%), while for those aged ≥10 years follow-up was annual in 19/30 (63%) and every 6 months in 4/30 (13%). Routine CMR was reported by 16/30 (53%), 8/30 (27%) on case-by-case basis, 6/30 (20%) reported not using; among CMR routine users, first CMR was typically at 10–13 years (10/16, 62%), with 6/16 (38%) performing it before 10 years. LGE assessment was used by 23/24 (96%), one did not know. Routine Holter monitoring was reported by 19/30 (63%) with only 7/30 (23%) at fixed time intervals. For angiotensin-converting enzyme inhibitor/angiotensin receptor blocker initiation, an age-based approach was reported by 21/30 (70%), while left ventricular systolic dysfunction/LVEF triggers were reported by 17/30 (57%) and LGE-based triggers by 4/30 (13%); starting age clustered at 10–12 years (12/30, 40%) and 7–9 years (7/30, 23%). Beta blocker initiation was most commonly triggered by sinus tachycardia (18/30, 60%), LVEF/systolic dysfunction (17/30, 57%), and arrhythmia (12/30, 40%). Mineralocorticoid receptor antagonists were used (including



occasional/rare use) by 23/30 (77%). Multidisciplinary DMD clinics were reported by 15/30 (50%).

Conclusions: Even among academic centres across Europe contemporary DMD cardiac care shows substantial practice variation, particularly for CMR timing, Holter strategies, and pharmacotherapy triggers. These data identify priority targets for harmonised care pathways and implementation efforts. Acknowledgement: The study was endorsed by AEPC EC.



FT-148 / #886

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

INTRAOPERATIVE TEMPERATURE MANAGEMENT BUT NOT TIME ON CARDIOPULMONARY BYPASS PREDICTS POSTOPERATIVE DELIRIUM IN CHILDREN WITH CONGENITAL HEART DISEASE

Daniel Biermann[1], John Schittek[1], Ida Hüners[1], Sophia Schumann[2], Gerhard Schön[3], Urda Gottschalk[2], Palle Jürgensen[2], Lena Siebel[2], Friederike Jess[2], Jonas Denecke[4], Irwin Reiss[5], Dominique Singer[5], Rainer Kozlik-Feldmann[2], Michael Huebler[1], Sebastian Harms[2]
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Background and Aim: Postoperative delirium (PD) occurs in more than 40% of children undergoing cardiac surgery, with the highest risk seen in infants and in patients requiring prolonged ventilation, experiencing low cardiac output, or developing iatrogenic withdrawal syndrome. However, intraoperative predictors of PD remain poorly defined. This study aims to identify intraoperative management factors that predict postoperative delirium in children with congenital heart disease undergoing cardiopulmonary bypass surgery.
Methods: We conducted a retrospective, single-centre study in which postoperative delirium (PD) was assessed using the Cornell Assessment of Pediatric Delirium (CAPD). All children undergoing cardiac surgery were screened every eight hours postoperatively. A multivariate regression analysis was performed to evaluate potential intraoperative predictors, including Risk adjustment for congenital heart surgery (RACHS-1), cardiopulmonary bypass time (CPBT), aortic cross-clamp time (ACC), reperfusion time (RT), use of selective antegrade cerebral perfusion (SACP), intraoperative red blood cell (RBC) transfusion and RBC age, degree of hypothermia (mild: 28–34°C; moderate: 20–28°C; deep: <20°C), and rewarming rate (+0.1°C/min).
Results: Screening compliance was 95% among 311 patients, and the prevalence of postoperative delirium (PD) was 40.2%. Infants were at the most significant risk for PD (OR 2.9, p=0.008). Mild hypothermia was associated with a significantly reduced risk of PD (OR 0.3, p=0.023) compared with normothermia or surgery without cardiopulmonary bypass. Although rewarming speed was heterogeneous in our cohort and was comparably faster with lower levels of hypothermia, it did not predict PD (OR 0.95, p=0.73). While there was a



notable trend in predicting PD for RACHS-1 (OR 1.34, p=0.065), neither CPBT (OR 0.91, p=0.73), ACC (OR 1.1, p=0.50), nor RT (OR 1.1, p=0.21) had an impact on PD. Moreover, the use of SACP (OR 1.0, p=0.99) and RBC transfusion (OR 1.06, p=0.86) did not affect PD.
Conclusions: Intraoperative temperature management — but not cardiopulmonary bypass duration — was a significant predictor of postoperative delirium in children with congenital heart disease. Future interventional studies evaluating mild hypothermia are warranted to reduce the incidence of PD.



FT-149 / #749

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

IDIOPATHIC LEFT VENTRICULAR TACHYCARDIA: SUCCESSFUL RADIOFREQUENCY CATHETER ABLATION UNDER VENO-ARTERIAL EXTRACORPOREAL MEMBRANE OXYGENATION WITH ADDITIONAL MICROAXIAL LEFT VENTRICULAR ASSIST DEVICE IN A 16-YEAR-OLD PATIENT

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Background and Aim: Idiopathic left ventricular tachycardias (ILVT) typically occur in structurally normal hearts and often respond well to catheter ablation. In hemodynamically unstable forms, invasive electrophysiological (EP) evaluation is limited. Mechanical circulatory support (MCS) such as veno-arterial extracorporeal membrane oxygenation (VA-ECMO) and microaxial left ventricular assist devices (LVAD) may enhance procedural safety, but paediatric experience is scarce. We report an adolescent with ILVT successfully treated by catheter ablation dual MCS.
Methods: Case report of hemodynamically unstable ILVT treated with VA-ECMO and microaxial LVAD to enable EP study and ablation.
Results: A 16-year old patient presented with recurrent wide-complex tachycardia (~160bpm) and cardiogenic shock at a peripheral hospital. Echocardiography showed severely impaired biventricular function (EF ~20%). The patient deteriorated during sedation for electrical cardioversion, requiring intubation and catecholamine support for air transport to our ECMO center. On arrival, the tachycardia remained refractory to amiodarone, adenosine, verapamil, transvenous overdrive pacing and electrical cardioversion. Loss of perfusion pressure led to cardiopulmonary resuscitation and emergency VA-ECMO implantation. Under full ECMO-support the patient was transferred to the EP lab. EP study demonstrated incessant ILVT involving the left anterior and posterior fascicles. Irrigated radiofrequency ablation (iRFA) was performed via retrograde LV access. Periprocedural, severe mitral regurgitation with pulmonary edema occurred, prompting implantation of a transfemoral transaortic microaxial LVAD for active LV decompression allowing successful iRFA. Six hours later a different ILVT developed, hemodynamically non-tolerable without the existing MCS. A second EP study was performed showing upper



septal ILVT, which was also successfully ablated using iRFA. VA-ECMO was explanted after eight days and LVAD the following day. LV function recovered; the patient was discharged home and remained without VT recurrence at two months.

Conclusions: In pediatric patients with severely depressed LV function or refractory cardiogenic shock due to ILVT, combined VA-ECMO and microaxial LVAD support can provide procedural safety, enable EP studies, and allow definitive rhythm control, when pharmacological therapy or ECMO alone are insufficient. This case highlights the importance of close collaboration between electrophysiology, intensive care, anaesthesia, and cardiac surgery in the management of complex ventricular tachycardia in children.



FT-150 / #946

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

LEVOSIMENDAN: EFFICACY AS A RESCUE MEDICATION IN PAEDIATRIC HEART FAILURE AND POST-CARDIAC SURGERY

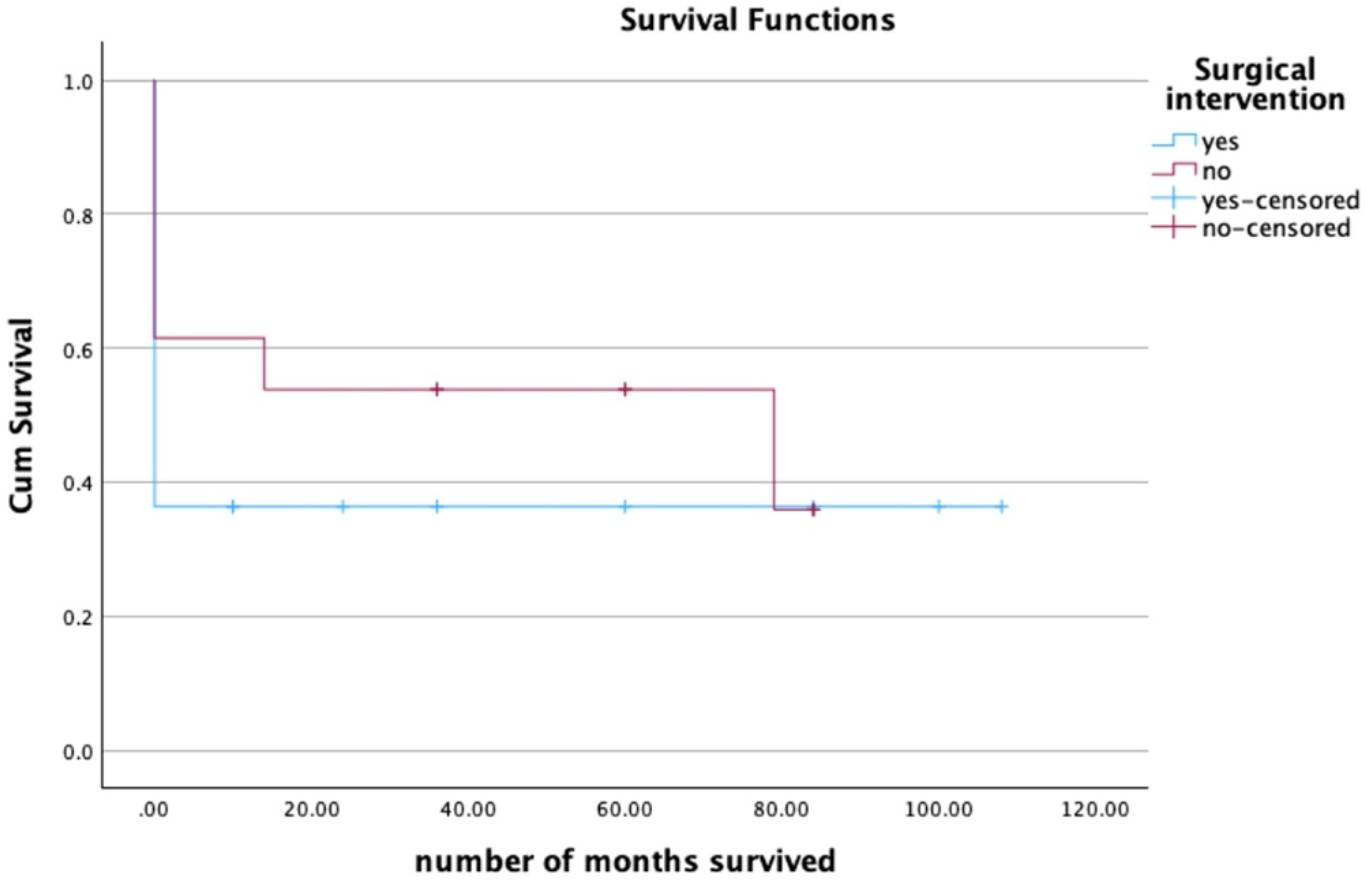
Cyprian Umeoguaju, Usoro Edidiongobong, Claire Westrope
East Midlands Congenital Heart Centre, University Hospitals of Leicester, Cardiac Paediatric Intensive Care Unit, Leicester, United Kingdom

Background and Aim: Paediatric heart failure and low cardiac output syndrome following cardiac surgery remain major contributors to morbidity and mortality in cardiac PICU, despite advances in surgical and postoperative management. A proportion of patients fail to respond to conventional catecholamine-based inotropic support, necessitating rescue therapies. Levosimendan is a calcium-sensitising inotrope that enhances myocardial contractility by increasing troponin C sensitivity to calcium without increasing intracellular calcium concentration or myocardial oxygen consumption. It also opens ATP-dependent potassium channels, producing vasodilation and potential cardioprotective effects. Paediatric evidence remains limited and largely observational. This study aimed to evaluate the experience of levosimendan as rescue therapy at the East Midlands Congenital Heart Centre. The primary outcome was survival to PICU discharge. Secondary outcomes included PICU length of stay, complications, changes in urine output, serum lactate and pH, and longer-term survival.
Methods: This was a retrospective observational study of paediatric patients (<18 years) who received levosimendan during Cardiac PICU admission between January 2016 and December 2024. Approval was obtained through the University Hospitals Leicester Audit and Quality Improvement Programme. Thirty-five patients met inclusion criteria. Patients transferred prior to levosimendan administration, with incomplete records, or treated outside the Cardiac PICU were excluded. Electronic records were reviewed for demographics, cardiac diagnosis, surgical interventions, inotropic therapy, physiological and laboratory parameters, and adverse events. Levosimendan was used as rescue therapy for refractory LCOS despite epinephrine, noradrenaline, and/or milrinone. It was administered at 0.05–0.1 µg/kg/min, with a 6 µg/kg loading dose in selected cases; milrinone was usually withheld to minimise vasodilatory effects. Continuous haemodynamic monitoring was performed. Data were analysed using SPSS v30.0. Appropriate parametric or non-parametric tests were applied. Kaplan–Meier analysis assessed post-discharge survival.
Results: The median weight of the patients was 6 kg (± 12.9 kg). The median length of stay

in PICU was 31.50 days (± 44.6 days). 18 (51%) of patients did not survive. Three patients had hypotension (8.6%).

	Before treatment	≥ 7 days post treatment	Z	r	p-value
lactate	1.30 (0.875-1.625)	1.30 (0.85-1.70)	0.434	0.0792	0.664
PH	7.40 (7.358-7.420)	7.38 (7.350-7.423)	0.535	0.0976	0.593
UO	3.20 (2.50-4.53)	3.20 (2.30-4.13)	0.350	0.0638	0.726
EF	23.00 (16.75-31.25)	26.75 (18.25-41.20)	3.456	0.631	**<0.001***

Data are presented as median (25th–75th percentile), Z and r indicates test statistics and effect size respectively. Statistically significant p-values are highlighted in bold.



Conclusions: Levosimendan was associated with a statistically significant but non-clinical improvement in ejection fraction, without improvement in PICU mortality. These findings highlight the need for larger prospective studies to better define the role of levosimendan in paediatric cardiac critical care.



FT-151 / #1322

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

CRITICALLY ILL NEONATES WITH TRICUSPID VALVE ANOMALIES

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Background and Aim: Neonatal tricuspid valve anomalies are usually part of complex congenital heart defects. Ebstein anomaly (EA) and tricuspid valve dysplasia (TVD) represent the most common isolated forms. Clinical presentation ranges from asymptomatic to hemodynamic instability. Reported risk factors for poor outcome include low birth weight, Apgar score ≤ 7, cardiomegaly, lung hypoplasia, ventricular dysfunction, cardiogenic shock, immediate postnatal respiratory failure, anatomic or functional pulmonary atresia, circular shunting, and dilated right atrium or tricuspid annulus. The incidence of EA and TVD, and risk factors associated with early clinical instability were evaluated.
Methods: A retrospective analysis of critical newborns with EA or TVD hospitalized at the Pediatric Cardiac Intensive Care Unit in Bratislava over a 10-year period (2014–2024) was performed. Both diagnostic groups were compared with respect to incidence, clinical course, and risk factors.
Results: In total, 2256 hospitalizations were analyzed. The incidence of critical newborn tricuspid valve anomalies was 17 (0.75%) with EA present in 8 (47%) and TVD in 9 (53%) patients.

Patient characteristics		
	EA (N=8)	TVD (N=9)
Prenatal diagnosis	4	8
Gender male:female	5:3	3:6
Birth weight	4	5



Prematurity	3	6
Apgar score < 7	1	3

Postnatal ICU course		
	EA (N=8)	TVD (N=9)
Hospitalisation length (median)	8.5	15.8
Intubation immediately after birth	3	6
Postextubation non-invasive ventilation	2	4
Cardiomegaly CTI > 0,55	7	9
Arrhythmias	3	4
Catecholamines	2	8
Prostaglandin infusion	7	8
Pulmonary hypertension therapy	7	7
ECMO	0	0

Management strategies included intensive care with respiratory and cardiovascular support. No further intervention was needed in 7 (41.2%) patients. Single ventricle palliation was performed in 4 (23.5%), pulmonary valvuloplasty in 2 (11.8%), and the cone procedure in 1 (5.9%) case. Comfort care was initiated in 3 (17.6%) patients. No other patient died.

Conclusions: Tricuspid valve anomalies are rare defects; often with severe clinical manifestation after birth, requiring intensive treatment options and even early surgical intervention. Our study had shown the need for longer hospitalization and more intensive therapy in TVD compared to EA. This may be due to more severe hemodynamic impairment in TVD. Despite critical clinical course, early mortality was low in both patients' groups.



FT-152 / #1354

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION FOR IN-HOSPITAL CARDIAC ARREST IN PEDIATRIC CARDIAC PATIENTS WITH SYSTEMIC-TO-PULMONARY ARTERY SHUNT

Kazuhiro Shoya[1], Yuya Komori[2], Naoki Wada[2], Yukihiro Takahashi[2]
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Background and Aim: In pediatric cardiac patients, adequate cardiopulmonary resuscitation (CPR) is often challenging due to anatomical characteristics and physiologies. Extracorporeal cardiopulmonary resuscitation (ECPR) potentially has more benefit when cardiac arrest occurs in those patients. In previous reports, the rate of return of spontaneous circulation (ROSC) without ECPR for in-hospital cardiac arrest (IHCA) is 60-71% in pediatric patients, and 36-48% in pediatric cardiac patients. Although shunt-dependent physiology seemed to be the high-risk population of cardiac arrest in previous reports and more likely to need ECPR according to resuscitation guidelines, there are not enough data. We aimed to investigate the reality of ECPR use in this physiology.
Methods: We retrospectively reviewed the records of all consecutive cases that underwent systemic-to-pulmonary artery shunt (S-P shunt) operation in our hospital from January 2004 to December 2024. Patients who had in-hospital cardiac arrests were included. We investigated the number of IHCA, ROSC rate (with/without ECPR), and survival to hospital discharge.
Results: A total of 250 patients underwent S-P shunt operation in this study period. Overall, 28 IHCAs occurred in 20 patients, and 6 patients had multiple IHCAs. Thirteen patients (65%) had single ventricular physiology. Seven IHCAs of 28 (25%) achieved ROSC without ECPR, 19 IHCAs (68%) achieved ROSC with ECPR, and 2 IHCAs (7%) were unable to be resuscitated. At hospital discharge, 10 patients (50%) survived with a favorable neurological outcome, and 3 patients (15%) had neurological sequelae.
Conclusions: In this study, the ROSC rate without ECPR of 25% in this physiology was lower than in pediatric cardiac patients, compared to previous reports. ECPR could be the only option to achieve ROSC when those patients are in refractory CPA. The hospital-based ECPR program should be established in high-volume heart centers treating complex congenital cardiac patients, such as shunt-dependent physiology. Multicenter studies are



highly needed to identify the real incidence and improve the outcome of IHCAs for this high-risk population.



FT-153 / #1490

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

DELIVERY ROOM AND EARLY POSTNATAL INTERVENTIONS WITH OXYGEN SATURATION PROFILES IN NEWBORNS WITH TRANSPOSITION OF THE GREAT ARTERIES.

Jesse Weeda[1], Arjan Te Pas[2], Matthijs Bosman[1], Justine De Jager[2], Monique Haak[3], Sally-Ann Clur[4], Nico Blom[1], Janneke Dekker[2], Roel Van Der Palen[1]
[1]Leiden University Medical Center, Pediatric Cardiology, Leiden, Netherlands, [2]Leiden University Medical Center, Neonatology, Leiden, Netherlands, [3]Leiden University Medical Center - Leiden, Obstetrics And Fetal Medicine, Leiden, Netherlands, [4]Emma Children's Hospital, Amsterdam University Medical Center, University of Amsterdam, Pediatric Cardiology, Amsterdam, Netherlands

Background and Aim: Newborn infants with transposition of the great arteries (TGA) typically exhibit distinct oxygen saturation (SpO_2) values during the transitional period after birth due to ineffectual parallel circulation. This study aimed to describe SpO_2 trends during neonatal transition and the first 24-hours after birth, and to assess the frequency of delivery room and early postnatal interventions in newborns with TGA.
Methods: All prenatally diagnosed patients with TGA eligible for arterial switch operation (excluding Taussig-Bing anomaly) born at the Leiden University Medical Center (LUMC) between 2011-2022 were included. Baseline characteristics, preductal and postductal SpO_2 data and clinical outcomes during first 24 hours post-birth were collected. Outcome measures included: need for respiratory support, balloon atrial septostomy, and the timing, location (delivery room or intensive care unit) and indication for these interventions, presence of persistent pulmonary hypertension of the newborn (PPHN), and survival.
Results: Of the 100 prenatally diagnosed patients (83% of the treated cohort), 67 were born at LUMC and were included (67%) (Table 1). Balloon atrial septostomy (<24h post-birth) was performed in 30 patients (45%). PPHN occurred in 16 patients (24%). Non-invasive and invasive respiratory interventions were frequent (Table1). Endotracheal intubation was required in 43 (64%) patients, including 14 who were intubated in the delivery room for various indications (Table 2). SpO_2 trends for the entire cohort and by diagnostic group are presented for the first 24-hour after birth (Figure1&2). Preductal SpO2 remained consistently lower than postductal SpO_2 throughout this period. Median preductal SpO_2 increased from 60% immediately after birth to 75% within the first 20 minutes; however, median time to reach sustained preductal SpO2≥75% (≥10 consecutive minutes) was 53 minutes (IQR 33-112). Early preductal SpO_2 trajectories did not differ between TGA infants with intact ventricular septum (IVS) and those with a ventricular



septal defect during the first 3 hours after birth, although infants with TGA-IVS required more time to achieve sustained preductal SpO2≥75%.

Table 1. Baseline characteristics and early interventions

Patient characteristics (N=67)	Median (IQR) / N (%)
Gestational age	39+0 (38+3 - 39+4)
Prematurity (34-37 weeks)	4 (6)
Birthweight (kg)	3.4 (2.9-3.6)
Gender (male)	44 (66)
Morphological diagnosis	
TGA-IVS	54 (81)
TGA-VSD	13 (19)
Associated anomalies	
Aortic coarctation	2 (3)
Mode of delivery (vaginal)	57 (85)
Daytime delivery (8am-8pm)	47 (70)
Early interventions and outcomes	
Prostaglandin E2 administration	67 (100)
Balloon atrial septostomy	**30 (45)**
Urgent (<4 hours)	*20 (30)*
Early (4-24 hours)	*10 (15)*
Maximum respiratory support <24 hours after birth	
Room air	7 (10)
High flow O_2	3 (5)
CPAP	13 (19)
Non-invasive PPV	1 (2)
Mechanical ventilation	43 (64)
Intubation	**43 (64)**
Delivery room	14 (21)
ICU <24 hours after birth	29 (43)
Time to intubation (min)	149 (56-420)
Preductal SpO_2 pre-intubation (60 min)	77 (57-83)
PPHN (iNO >12 hours)	16 (24)
ECMO	1 (1.5)
Mortality	0 (0)

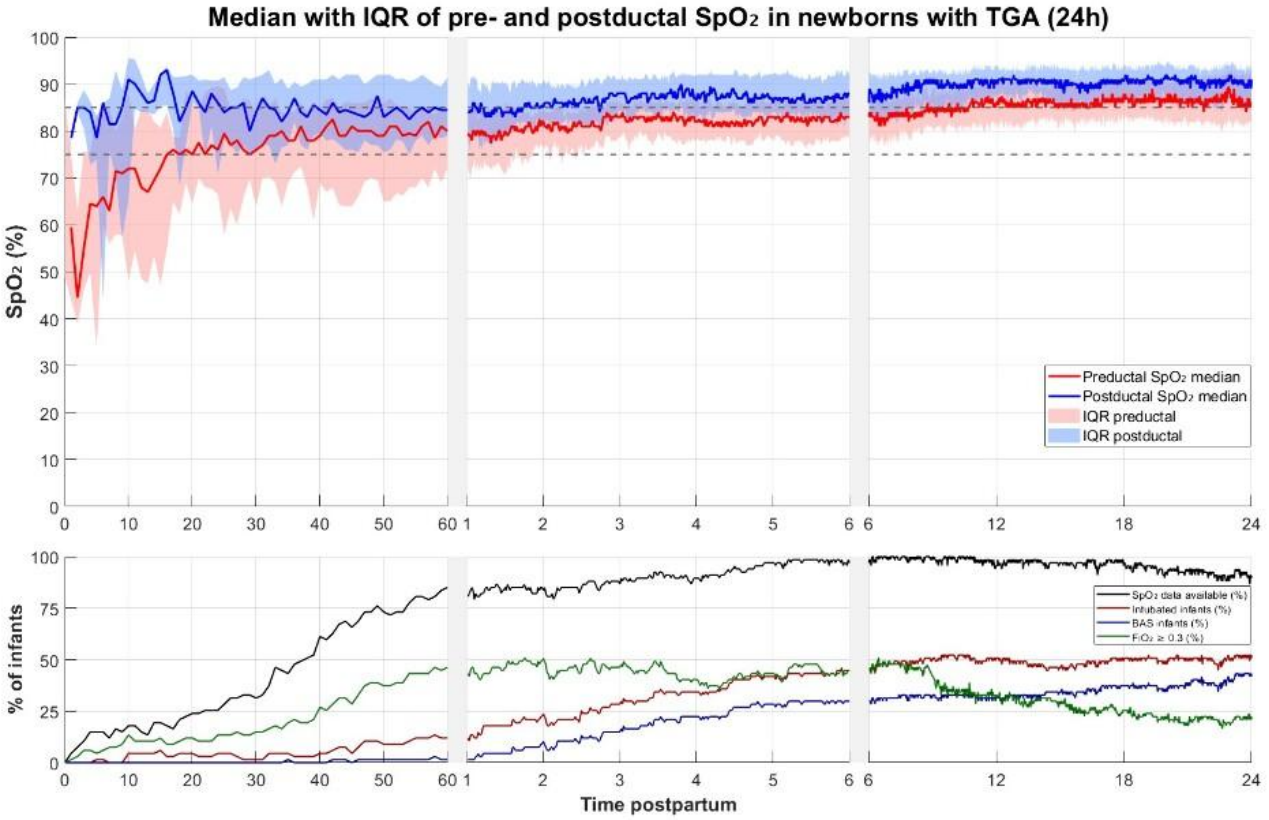
Data presented as median (IQR) or n (%). BAS: Balloon atrial septostomy; CPAP: Continuous positive airway pressure; ECMO: Extracorporeal membrane oxygenation; ICU: Intensive Care Unit; iNO: Inhaled nitric oxide; IVS: intact ventricular septum; O_2: Oxygen; PPHN: Persistent pulmonary hypertension of the newborn; PPV: Positive pressure ventilation; TGA: Transposition of the great arteries; VSD: ventricular septal defect.

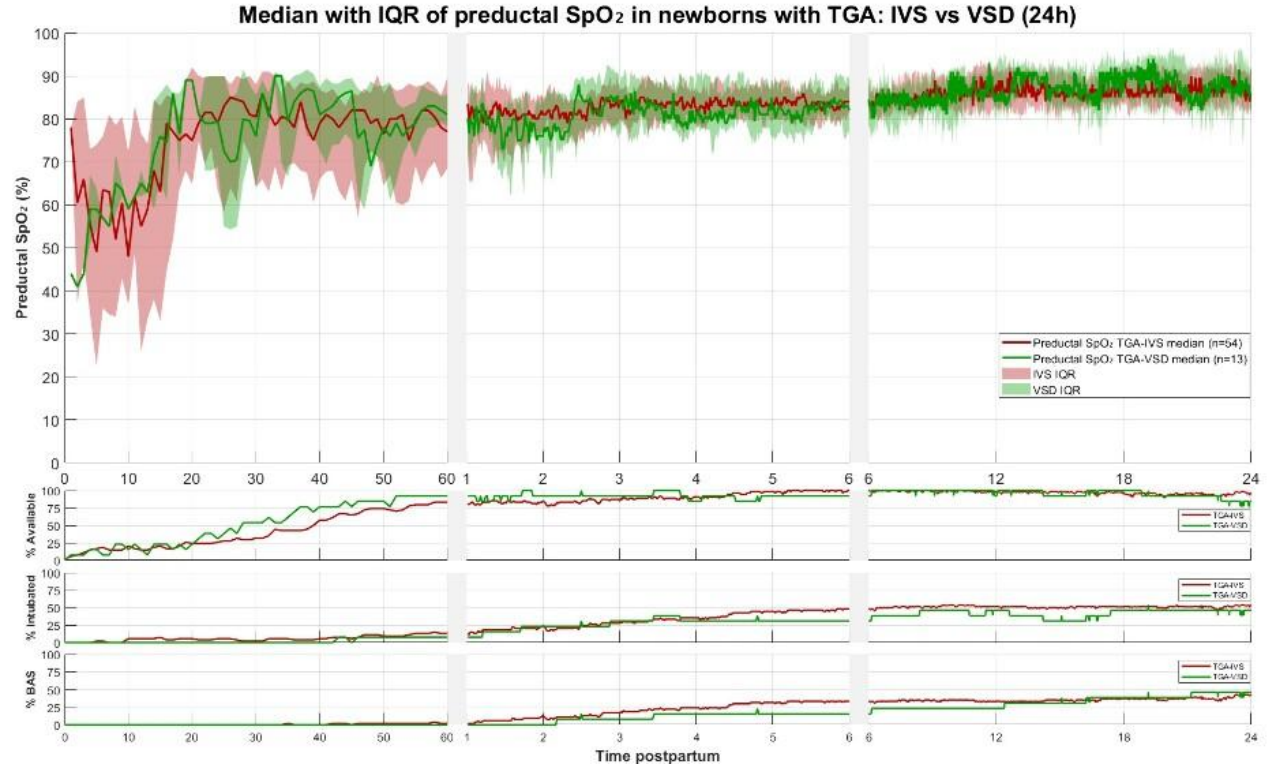


Table 2. Intubation indications in the delivery room and Intensive Care Unit

Delivery room	**N=14**
Hypoxemia primarily due to:	
Restrictive interatrial septum	**3 (21)**
Balloon atrial septostomy	3
Urgent (<4 hours post-birth)	3
Early (4-24 hours post-birth)	0
PPHN with or without restrictive interatrial septum	**10 (71)**
Oxygen + iNO + Balloon atrial septostomy	8
Urgent (<4 hours post-birth)	7
Early (4-24 hours post-birth)	1
Oxygen + iNO	2
Impaired respiratory drive	**0 (0)**
Prostaglandine E2 side effect	0
Prematurity	0
Respiratory failure secondary to IRDS	**1 (7)**
Prematurity	1
Oxygen + Surfactant + Balloon atrial septostomy + iNO	1
Intensive Care Unit	**N=29**
Hypoxemia primarily due to:	
Restrictive interatrial septum	**13 (45)**
Balloon atrial septostomy	13
Urgent (<4 hours post-birth)	5
Early (4-24 hours post-birth)	8
PPHN with or without restrictive interatrial septum	**5 (17)**
Oxygen + iNO + Balloon atrial septostomy	4
Urgent (<4 hours post-birth)	4
Early (4-24 hours post-birth)	0
Oxygen + iNO	1
Impaired respiratory drive	**9 (31)**
Prostaglandine E2 side effect	8
Prematurity	1
Respiratory failure secondary to IRDS	**2 (7)**
Prematurity	1
Oxygen + Surfactant + Balloon atrial septostomy	1
No prematurity	1
Oxygen + Surfactant	1

Data are presented as n (%). iNO: Inhaled nitric oxide; O_2: IRDS: Infant Respiratory Distress Syndrome; Oxygen; PPHN: Persistent pulmonary hypertension of the newborn.





Conclusions: Infants with TGA experience a high burden of delivery room and early



postnatal interventions. Continuous SpO_2 trend monitoring may guide individualized management during neonatal transition. Further optimization of delivery room strategies targeting pulmonary and systemic vascular may improve early stabilization.



FT-154 / #337

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

THE PREVENTION UTILITY OF CENTRAL VENOUS PRESSURE MANAGEMENT FOR POSTOPERATIVE DELIRIUM FOLLOWING PEDIATRIC TOTAL CAVOPULMONARY BYPASS

Itsumi Sato[1], Gaku Izumi[1], Yu Matsumura[2], Masahiro Shiraishi[1], Yoji Tamaki[3], Takayuki Toki[2], Yusuke Itosu[2], Hiroki Kato[4], Hitoshi Saito[2], Yuji Morimoto[2]
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Background and Aim: Postoperative delirium is a complication that is sometimes encountered following pediatric total cavopulmonary bypass (TCPC), yet its predictors remain unclear. We aimed to identify pre- and perioperative clinical factors that could help predict postoperative delirium.
Methods: We performed a retrospective, single-center observational study of patients undergoing TCPC from 2013 to 2024. Patients admitted to the intensive care unit (ICU) following TCPC surgery were included. Clinical variables, sedative use, catheterization data, and perioperative CVP were collected. Multivariate analyses were conducted to evaluate associations with postoperative delirium.
Results: Among 94 eligible patients, 17 (20%) developed postoperative delirium. Previously reported risk factors for delirium, including sedatives, were not significantly associated with its incidence. Multivariate analysis indicated that preoperative catheterization data could not predict delirium. In contrast, elevated perioperative CVP was independently and significantly associated with the occurrence of postoperative delirium. Although a precise cutoff could not be determined, a mean CVP around 10 mmHg appeared to be a reasonable target range. Each 1-mmHg increase in mean CVP was associated with a 2.7-fold increase in the odds of developing delirium.
Conclusions: Delirium after TCPC in children was not determined by preoperative catheter findings or sedative selection but was associated with mean CVP during ICU care. Because mean CVP was more informative than transient elevations in CVP, maintaining continuously low CVP may be important. While an exact threshold cannot be defined, a mean CVP near 10 mmHg may represent a practical target. Strategies aimed at minimizing sustained venous congestion may help reduce postoperative delirium.



FT-155 / #1332

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

ASSOCIATION BETWEEN NEOAORTIC ARCH GEOMETRY AND ADVERSE OUTCOMES FOLLOWING STAGE I NORWOOD PALLIATION

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Children´s Heart Centre, Skåne University Hospital and Lund University, Pediatric Cardiology, Lund, Sweden

Background and Aim: Optimal reconstruction of the neoaortic arch is a key determinant of outcome following stage I Norwood palliation. While overt arch obstruction can usually be identified, more subtle geometric abnormalities may persist and contribute to adverse outcomes. We sought to evaluate the impact of reconstructed aortic arch geometry, specifically the degree of aortic tapering, on major adverse events (MAEs).
Methods: We performed a retrospective analysis of all patients who underwent stage I Norwood palliation at our institution between January 2010 and December 2019. Aortic arch morphology was assessed from computed tomography or cardiac catheterization performed prior to Glenn procedure. Aortic diameters were measured perpendicular to the longitudinal axis of the vessel at predefined levels (Figure 1). Intersegmental diameter ratios were calculated, including ascending aorta to transverse arch (AA/TA), transverse arch to isthmus (TA/IA), and isthmus to descending aorta (IA/DA, coarctation index). MAEs, including mortality, were
recorded.

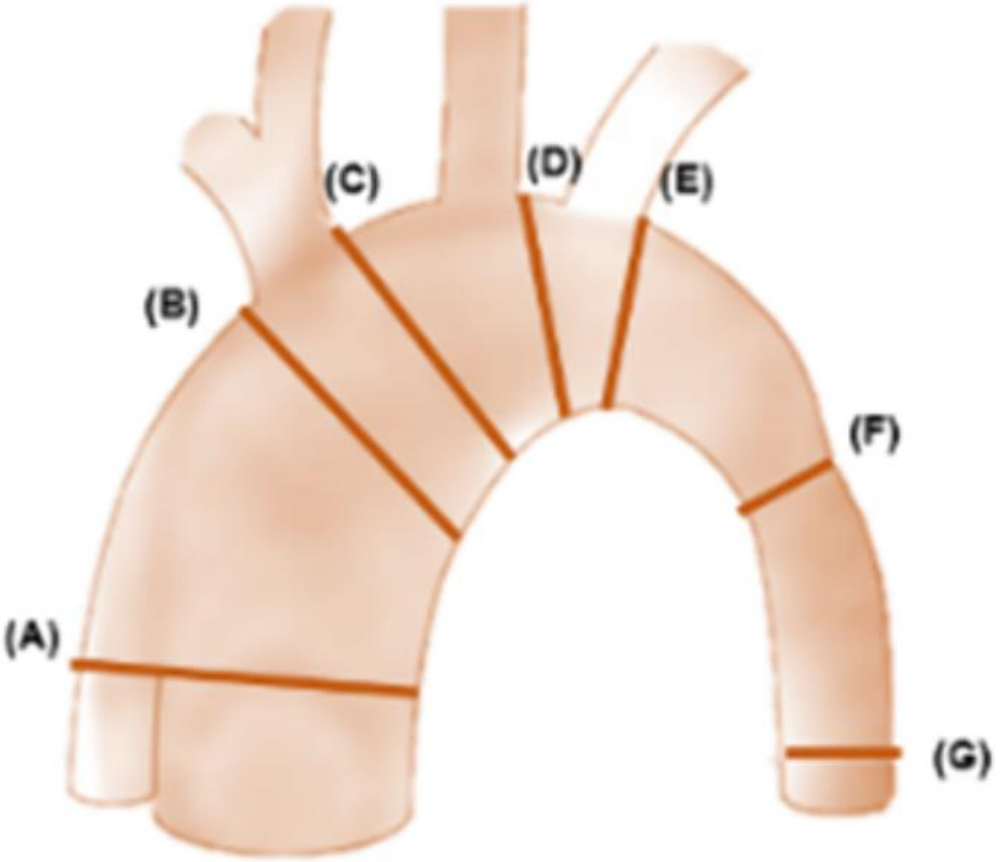


Figure 1: Geometric analysis of the reconstructed aorta.

Results: Fifty-five patients were included, of whom 74% had hypoplastic left heart syndrome (HLHS). The majority (89%) received a Blalock–Taussig shunt as part of initial palliation. MAEs occurred in 29 patients (53%). In the overall cohort, intersegmental indices of aortic tapering did not differ significantly between patients with and without MAEs (Table 1). However, within the HLHS subgroup, patients experiencing MAEs had a significantly lower coarctation index compared with those without MAEs (Table 2).

	Without MAEs	With MAEs	P-value
AA/TA	1.26±0.16	1.38 ± 0.35	0.11
TA/IA	1.89 ± 0.30	1.98 ± 0.84	0.60
IA/DA	0.97 ± 0.13	0.88 ± 0.20	0.06



AA/DA	2.19 ± 0.31	2.20 ± 0.46	0.91

Table 1. Intersegmental ratios in all patients (mean, ±SD)

	Without MAEs	With MAEs	P-value
AA/TA	1.28 ± 0.16	1.35 ± 0.37	0.50
TA/IA	1.77 ± 0.25	2.04 ± 0.94	0.25
IA/DA	0.99 ± 0.14	0.86 ± 0.22	0.04
AA/DA	2.15 ± 0.32	2.18 ± 0.47	0.81

Table 2. Intersegmental ratios in HLHS patients (mean±SD)

Conclusions: A more pronounced distal tapering of the reconstructed arch, reflected by a lower coarctation index, was associated with adverse outcomes in HLHS patients. Detailed assessment of reconstructed arch geometry may provide valuable additional information for postoperative risk stratification in this vulnerable population.



FT-156 / #284

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

BEYOND EJECTION FRACTION: VENTRICULAR MECHANICS AND THE FUNCTIONAL TURNING POINT IN REPAIRED TETRALOGY OF FALLOT ASSESSED BY CMR FEATURE TRACKING

Valeria Judith Hasbani[1], Esther Aurensanz Clemente[1], Alex Pérez Casares[1], Joan Sánchez De Toledo[1], Flavio Zuccarino[2,3]
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Background and Aim: Repaired Tetralogy of Fallot (TOF) is commonly associated with chronic right ventricular volume overload, progressive remodeling, and subclinical ventricular dysfunction. Cardiac magnetic resonance feature tracking (CMR-FT) allows detailed assessment of myocardial deformation beyond ejection fraction. This study aimed to characterize right and left ventricular myocardial deformation patterns in patients with repaired TOF without RVOT valvulation, compare them with healthy controls, and evaluate their relationship with right ventricular dilation and septal motion abnormalities.
Methods: This retrospective study included 58 patients with repaired TOF and 34 healthy controls. Ventricular volumes, ejection fraction, and global longitudinal and circumferential strain parameters were analyzed using CMR-FT (CVI42). TOF patients were stratified by RV end-diastolic volume index (RVEDVi) and presence of paradoxical septal motion.
Results: TOF patients showed marked RV dilation and reduced RV longitudinal strain (−19.1% vs. −23.4%; $p<0.001$), accompanied by compensatory augmentation of RV circumferential strain (−18.5% vs. −16.2%; $p<0.001$). RV circumferential strain demonstrated a biphasic pattern: increased values in mild–moderate dilation and a subsequent decline once RVEDVi exceeded 150 ml/m^2. LV longitudinal strain was significantly reduced despite preserved LVEF ($p=0.046$). Paradoxical septal motion was associated with larger RVEDVi, lower RV and LV ejection fractions, and more pronounced deterioration of strain parameters in both ventricles.
Conclusions: Myocardial mechanics in repaired TOF follow a progressive pattern in which RV circumferential strain behaves as a dynamic marker of early compensation and later decompensation. Paradoxical septal motion identifies a phenotype of advanced remodeling with significant biventricular interaction. Incorporating these parameters into clinical evaluation may improve risk stratification and help optimize timing for pulmonary valve replacement.



FT-157 / #843

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

ADVANCED CARDIAC MRI FOR EVALUATING MYOCARDIAL FIBROSIS AND HYPERTROPHY IN PATIENTS WITH AORTIC COARCTATION

Tobias Giertzsch[1], Michael Jerosch-Herold[2], Philipp Schneider[3], Inga Voges[4], Inka Ristow[1], Gunnar Lund[1], Carsten Rickers[3]
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Background and Aim: Aortic coarctation (CoA) necessitates long-term monitoring to identify late complications, including re-stenosis, aneurysms, and heart failure. Nonetheless, there remains a lack of understanding regarding the adverse remodeling of (LV) left ventricular tissue, which leads to these complications.
Methods: Extracellular volume fraction (ECV), native T1, and intracellular water lifetime were measured from pre- and post-gadolinium contrast T1 measurements in 46 patients with CoA and ten age-matched controls. Normalized LV volume, mass, and ejection fraction were obtained from cine CMR. Patients' CoA was classified as LG ("low grade" = Vmax≤3m/s and no re-stenosis nor arterial hypertension or medication), sCoA ("severe CoA" = Vmax >3m/s or one of LG's other variables applies), and BAV "CoA with bicuspid aortic valve (BAV)".
Results: ECV was significantly higher in SCoA group (0.31 ± 0.01) compared to LG group (0.26 ± 0.02, P=0.013) and healthy controls (0.26 ± 0.01, P=0.0045). Group with BAV (0.31 ± 0.05) showed a higher ECV than LG without statistical significance (P=0.059). Native T1 values were significantly elevated in sCoA group (T1=1,391 ± 162 ms) compared to LG group (T1=1,213 ± 47 ms, P=0.008) and in Group with BAV (T1=1,390 ± 127 ms) compared to LG group (P<0.001). Intracellular water lifetime was lower in LG group (0.24 ± 0.03 s) compared to sCoA group (0.28 ± 0.04 s) and Group with BAV (0.31 ± 0.05 s) but did not reach statistical significance (P=0.24). Patients on blood pressure medication showed a significantly lower native T1 (P = 0.016) and intracellular water lifetime (P = 0.034) compared to patients without BP medication.
Conclusions: Patients with higher disease severity of CoA demonstrated elevated ECV compared to low-grade CoAs and healthy controls, reflecting adverse tissue remodeling. Interestingly, patients with LG-CoA but concomitant BAV showed significantly greater



diffuse myocardial fibrosis than isolated LG-CoAs. These findings imply that CoA patients, especially those with concomitant BAV, could be at increased longterm risk for complications potentially related to diffuse myocardial fibrosis, such as diastolic dysfunction and arrhythmias. Antihypertensive medication shows positive effects and may decrease the degree of myocardial fibrosis and hypertrophy in CoA patients.



FT-158 / #1256

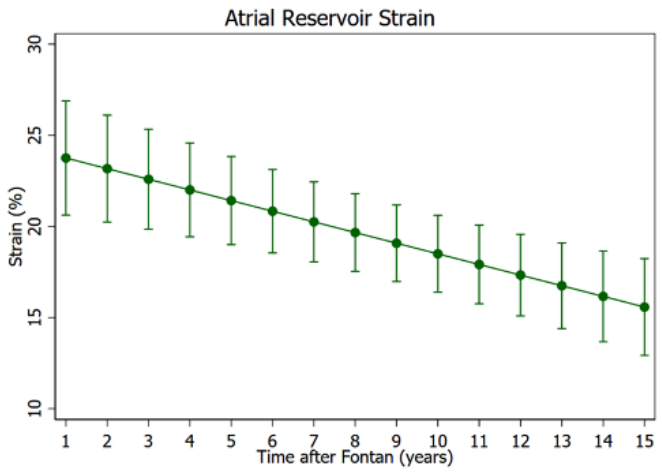
FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

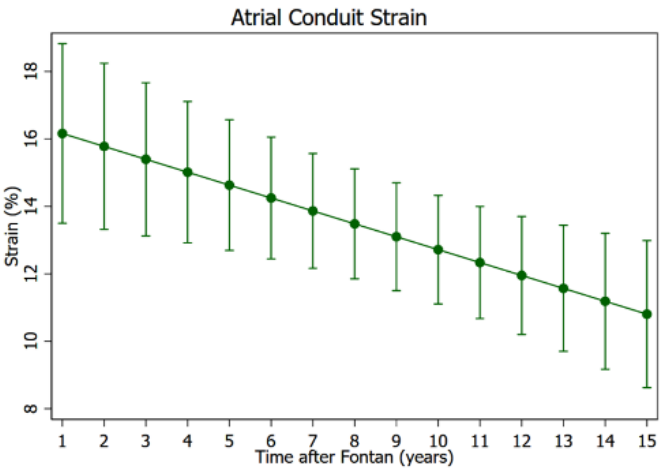
LONGITUDINAL DECLINE OF SERIAL ATRIAL STRAIN WITH CLINICAL ASSOCIATIONS IN PEDIATRIC FONTAN PATIENTS

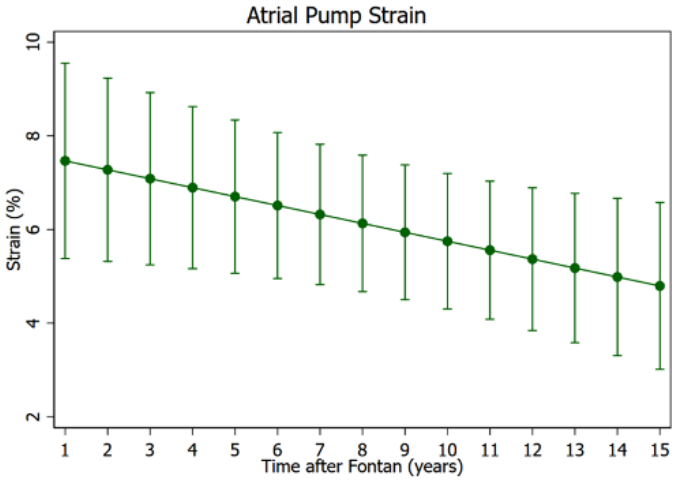
Thipsumon Tangsiwong[1], Sezen Ugan Atik[2], Mike Seed[2]
[1]The Hospital for Sick Children, Department Of Diagnostic Imaging, Toronto, Canada, [2]The Hospital of Sick Children, Cardiology, Paediatrics, Labatt Family Heart Centre, Toronto, Canada

Background and Aim: In Fontan circulation, atrial compliance and contractility are vital for ventricular filling due to the absence of a pulmonary ventricle. Although reduced atrial strain predicts adverse events, it is unclear if this dysfunction is static or progressive. This pilot study aimed to determine longitudinal changes in serial pulmonary venous atrial strain and their associations with clinical outcomes.
Methods: We retrospectively reviewed 30 pediatric Fontan patients who underwent serial cardiac MRI between 2010 and 2025; four (13%) were excluded due to quantification errors. Atrial strain was quantified from 4-chamber cine images using post-processing feature-tracking analysis. Longitudinal changes were analyzed using linear mixed-effects models. Individual rates of change were correlated with clinical data using Spearman's rank correlation and Mann-Whitney U tests.
Results: Of the 26 patients included, 18 (69%) were male. Median age at Fontan completion was 3.44 years [IQR 2.88, 3.83]. Median duration of serial MRI surveillance after Fontan was 5.71 years [IQR 5.35, 8.55], with a median of 3 studies per patient [range 2-5], yielding a total of 71 serial MRI examinations. Significant longitudinal decline in atrial strain was observed across all functional phases: reservoir (0.6%/year, $p<0.001$), conduit (0.4%/year, $p=0.010$), and pump strain (0.2%/year, $p=0.043$). A more pronounced deceleration of conduit strain decline correlated with higher predicted VO_2 anaerobic threshold ($\rho=0.519$, $p=0.033$), higher SVC pressure ($\rho= 0.586$, $p=0.013$) and larger extracardiac conduit cross-sectional area ($\rho=0.594$, $p=0.012$). Deceleration of pump strain decline positively correlated with liver stiffness ($\rho=0.637$, $p=0.006$). Furthermore, longitudinal changes in conduit ($p=0.009$) and pump strain ($p=0.037$) were significantly associated with liver fibrosis
status.









Conclusions: Atrial dysfunction in Fontan patients is a progressive longitudinal process. The rate of atrial strain decline is intricately linked to visceral organ integrity, specifically Fontan-associated liver disease. Paradoxical stabilization of pump contractility in liver stiffness suggests a compensatory effort to maintain ventricular filling against rising systemic resistance. Likewise, minimized decline of passive conduit function in SVC hypertension indicates a transition toward a non-compliant, rigid atrial wall. Therefore, serial atrial strain may be paramount for the early detection of high-risk patients with impending Fontan failure.



FT-159 / #409

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

ROLE OF OUTPATIENT TRANSESOPHAGEAL ECHOCARDIOGRAPHY IN CLINICAL DECISION-MAKING FOR PEDIATRIC HEART DISEASE: A SINGLE-CENTER EXPERIENCE

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Background and Aim: Transesophageal echocardiography (TEE) is an invaluable tool for structural and hemodynamic assessment in congenital heart disease, predominantly utilized intraoperatively. However, data on outpatient pediatric TEE remain limited. With newer technologies, including 3D TEE and smaller probes, the use of TEE in pediatric patients is expanding. This study evaluated the impact of outpatient or daycare TEE on clinical decision-making in pediatric patients.
Methods: This retrospective observational cohort study analyzed pediatric TEE procedures (age ≤18 years) performed in outpatient or daycare settings at a tertiary cardiac referral center over three years (April 2022–March 2025). Diagnostic yield, management impact, feasibility, and safety were assessed. Diagnostic outcomes were categorized as: A) critical diagnostic change altering management; B) new findings necessary for management; C) no diagnostic change.
Results: A total of 121 TEE studies were performed in 113 patients (59 males; age 4–18 years; mean weight 53 kg). Most studies (106, 87.6%) were performed outpatient with local anesthesia alone; 15 required daycare admission, with only 3 (2.5% of all studies) needing conscious sedation. Primary indications included atrial septal defect evaluation (n=61, 50.4%), valve/outflow tract assessment (n=20, 16.5%), stroke work-up (n=8, 6.6%), and suspected endocarditis (n=8, 6.6%). Category A outcomes occurred in 17 cases (14%) and Category B in 30 cases (24.7%), revealing new structural abnormalities, infectious sequelae, or differing lesion severity/morphology. Management was modified in 40 patients (33%), including surgical intervention for newly identified lesions, patent foramen ovale closure for cryptogenic stroke, and procedure deferral for hemodynamically insignificant defects. Additionally, TEE guided treatment modality selection (transcatheter versus surgical) in 65 patients (53.7%) with septal defects and influenced medical therapy (anticoagulation, antibiotics, cardiac medications) in 8 patients (6.6%). Suspected endocarditis and valve pathology demonstrated the highest rates of diagnostic change ($p=0.03$) and management modification ($p<0.001$). Two studies (1.7%) were incomplete due to poor patient cooperation, and one had suboptimal pulmonary vein visualization. No



procedure-related complications occurred.

Conclusions: Outpatient TEE is safe, feasible, and high-yield in pediatric congenital heart disease, significantly impacting clinical decision-making. With minimal sedation requirements and no complications, outpatient TEE should be considered more broadly in pediatric cardiac evaluation.



FT-160 / #570

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

MYOCARDIAL WORK RESPONSE TO A PRELOAD CHALLENGE IN THE FONTAN CIRCULATION

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Background and Aim: Systolic function of the single ventricle and its failure in the Fontan circulation is not fully understood. We have previously shown that an acute preload increase by rapid saline infusion does not recruit myocardial reserves measured by strain. We therefore aimed to explore 1) whether a response to preload could be detected with the myocardial work (MW) method and 2) whether MW correlated with well-functioning of the Fontan circulation and cardiorespiratory fitness measured by peak oxygen consumption (VO_{2peak}).
Methods: In 14 adolescents with a variety of morphological single ventricle situations and Fontan circulation (median age 16.6 years, range 16.0-17.7 years, 4 females), echocardiography was performed during heart catheterization with a rapid infusion of 0.9% saline infusion of 5 mL/kg body weight. Invasive global MW was calculated from simultaneously obtained longitudinal strain and intraventricular pressure at three time points: before saline infusion (baseline), at 1.00-2.00 minutes after infusion, and at 4.00-6.00 minutes after infusion (steady state). The results from each time point were compared with VO_{2peak} obtained during a cardiopulmonary treadmill exercise test within 48 hours.
Results: At baseline, mean global MW was 1153±437 mmHg·%. Mean global MW did not change significantly 1-2 minutes after volume infusion (1245±464 mmHg·%) or at steady state (1095±474 mmHg·%). Global MW did not differ significantly between morphologic right and left systemic ventricles at any stage. Mean VO_{2peak} was 32.2±5.9 $mL \cdot kg^{-1} \cdot min^{-1}$. There was no correlation between VO_{2peak} and global MW at any stage.
Conclusions: Invasively acquired global MW remains unchanged after sudden volume load illustrating incompetence of preload recruitable stroke work in the Fontan circulation and lack of influence on cardiorespiratory fitness.



FT-161 / #319

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

QUANTITATIVE MYOCARDIAL PERFUSION IMAGING IN COMPLEX CONGENITAL HEART DISEASE PATIENTS – INITIAL SINGLE-CENTER EXPERIENCES WITH 15O-WATER PET

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Background and Aim: PET-perfusion with ^{15}O-water is the noninvasive reference standard for myocardial blood flow (MBF) quantification, but is still not widely used in clinical practice. Its strengths are low radiation dose, MBF quantification and short imaging protocol. However, the use of ^{15}O-water or PET perfusion in patients with complex congenital heart disease has been rarely studied. We report the initial experiences of quantitative myocardial perfusion in complex congenital heart disease patients.
Methods: All complex congenital heart disease patients from our tertiary center were retrospectively assessed (11/2021 - 11/2025).
Results: Thirteen complex congenital heart disease patients who underwent adenosine-stress ^{15}O-water PET were identified (Table1). Most common diagnoses were transposition of the great arteries (5/13, 38%), Tetralogy of Fallot (3/13, 23%) and univentricular heart (3/13, 23%). Most typical indication for ^{15}O-water PET perfusion imaging was chest pain (6/13, 46%). PET perfusion study was diagnostic in all these cases with no adverse effects reported. The target radiotracer dose was 300 MBq (0,3 mSv) for pediatric patients and 600 MBq (0,6 mSv) for adults for a single ^{15}O-water dose (double for rest-stress protocol). The global stress myocardial blood flow was normal (>2.3 ml/g/min) in 11/13 patients. Myocardial flow reserve was normal (>2) in all patients. In one patient with a apical transmural scar on cardiac magnetic resonance imaging, stress and rest perfusion were decreased (Figure1), in the absence of obstructive coronary artery disease. Eleven patients (85%) had anatomical coronary imaging available, all without significant stenoses, indicating good agreement with anatomical
testing.

Baseline characteristics	Value
Age (years)	28 (7-59)
Gender (males)	4 (31%)
Systemic ventricle ejection fraction >50 %	7 (54%)
Diagnosis:	
Transposition of the great arteries	5 (38%)
Tetralogy of Fallot	3 (23%)
Univentricular heart	3 (23%)
ALCAPA	1 (7%)
Heart transplant due to congenitally corrected transposition of the great arteries	1 (7%)
Indication for ^{15}O-water PET perfusion imaging :	
Chest pain	6 (46%)
Decreased exercise tolerance	3 (23%)
ST-segment depression in exercise stress test	2 (15%)
Abnormal coronary artery course	2 (15%)
Results:	
Global stress myocardial blood flow (ml/g/min)	3,5 (1,5-5)
Coronary flow reserve	3,3 (2,5-5,4)

Table 1

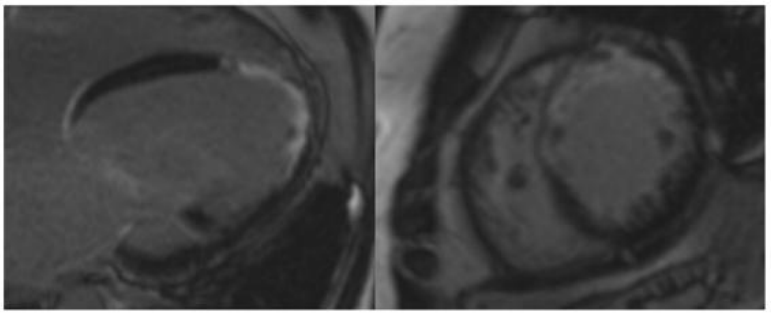
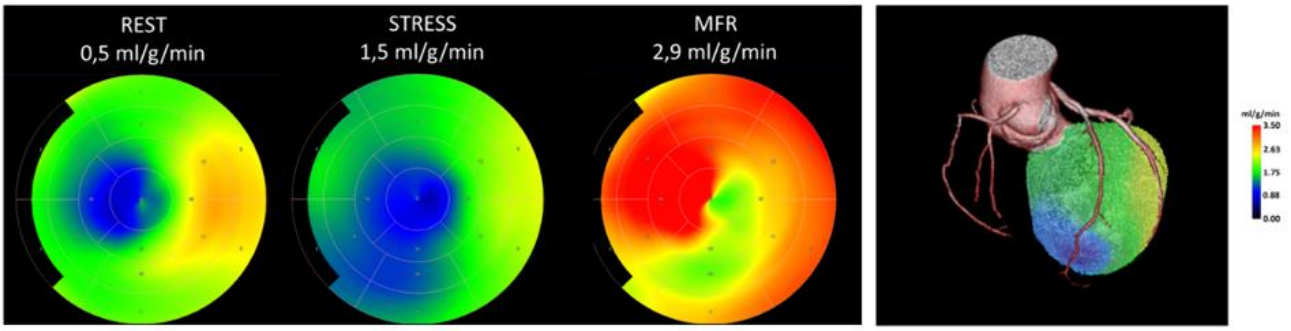


Figure1

50 years old man with Tetralogy of Fallot. Patient had an apical transmural scar on cardiac magnetic resonance imaging. LVEF 43%.



MFR= Myocardial flow reserve

Conclusions: ^{15}O-water PET perfusion imaging is feasible and safe for noninvasive



assessment of myocardial perfusion in complex congenital heart diseases. In these conditions, perfusion values correspond to the normal MBF reference values.



FT-162 / #218

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

RIGHT HEART REMODELING AND RHYTHM DYNAMICS AFTER ASD CLOSURE: A COMPARISON OF SURGICAL AND TRANSCATHETER APPROACHES

Nida Gülderen Kalay Şentürk, Ali Karakaş, Samed Çelik, Hazal Çulpan, İlker Yücel, Reyhan Dedeoğlu
İUC-Cerrahpasa Medical School, Istanbul, Turkey

Background and Aim: Atrial septal defect (ASD) is a common congenital heart disease that can cause chronic right-sided volume overload leading to RV dysfunction, atrial remodeling, arrhythmias, and autonomic imbalance. Although surgical and transcatheter closure effectively eliminate the shunt, the extent of mid-term recovery of RV function and autonomic regulation remains unclear. This study aimed to evaluate RV systolic–diastolic function, right heart remodeling, and heart rate variability (HRV) after ASD closure, and to compare outcomes between surgical and transcatheter techniques.
Methods: Forty-five patients who underwent ASD closure (14 surgical,31 transcatheter) were prospectively evaluated. RV systolic function was assessed using TAPSE, RV S', and FAC. Systolic dysfunction was defined as TAPSE <18 mm or FAC <35% (ASE/EACVI RV Guidelines). RV diastolic function was assessed by RV E' and E'/A'; diastolic dysfunction required ≥2 abnormal parameters. Remodeling was quantified by BSA-indexed RV end-diastolic dimension, RVDD (PLAX), and RA end-systolic diameters. Echocardiographic comparisons used 25 age-matched healthy controls; HRV analyses used 40 controls. Time and frequency-domain HRV parameters were obtained from 24-hour Holter recordings.
Results: Compared with controls, ASD patients had lower FAC, TAPSE, RV S', and RV E' ($p<0.001$). Among remodeling indices, only RVDD was significantly larger ($p<0.001$), while BSA-indexed RV and RA dimensions were similar. HRV was largely comparable; however, LF/HF ratio was higher in the ASD group ($p=0.032$), indicating increased sympathetic tone.In surgical versus transcatheter comparison, TAPSE and RV S' were lower in the surgical group, while FAC, diastolic parameters, and remodeling indices showed no difference. RV systolic dysfunction was more frequent after surgery (92.2% vs. 58.1%, $p=0.02$). HRV global indices were similar, though SDNN and SDANN were higher in the surgical group.RA end-systolic major diameter correlated with RMSSD ($r=-0.34$, $p=0.02$), pNN50 ($r=-0.36$, $p=0.016$), VHF ($r=-0.38$, $p=0.011$), and LF/HF ($r=0.34$, $p=0.021$).
Conclusions: Mid-term recovery of RV function after closure remains incomplete, particularly regarding TAPSE, RV S', FAC, and RV E'. Surgical patients exhibited lower longitudinal function but comparable diastolic and remodeling profiles. Although SDNN



and SDANN differed between groups, HRV values remained within pediatric normal limits. Correlations between RA size and HRV suggest that atrial remodeling may be linked to autonomic imbalance and potential arrhythmogenic risk.



FT-163 / #263

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

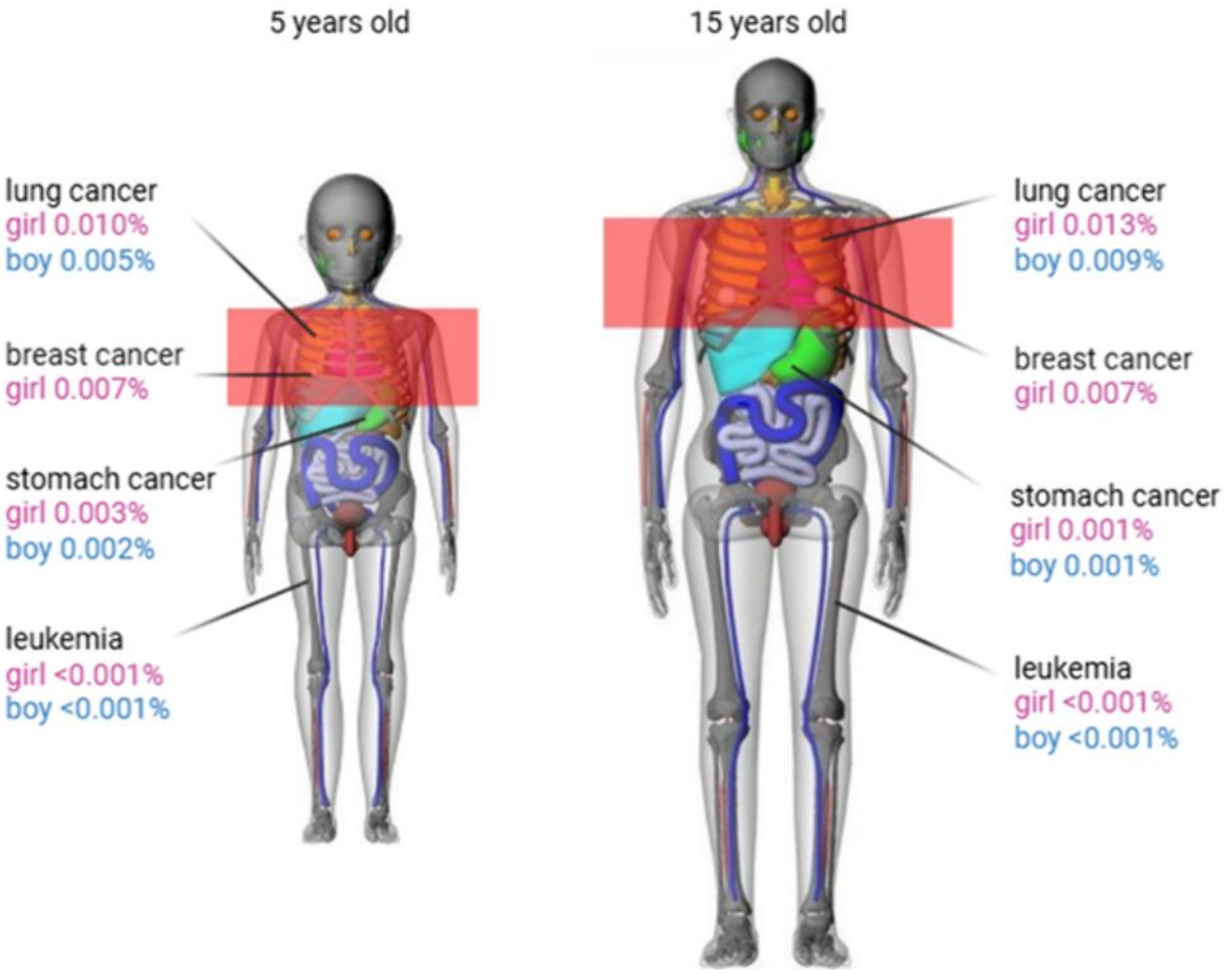
THE USE OF ECG-GATED COMPUTED TOMOGRAPHY IN PEDIATRIC POPULATION – COMPARISON WITH NON-GATED STUDIES AND CANCER RISK IN HEART TRANSPLANTATION SURVEILLANCE

Netta Ihanainen[1], Milla Vuorijärvi[1], Laura Martelius[1], Tiina Ojala[1], Juha Peltonen[1], Mika Kortesniemi[1], Riitta Paakkanen[2]
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Background and Aim: The use of computed tomography (CT) has become routine also in the pediatric population. The use of irradiation has been linked with increased cancer incidence, however the optimal method for estimating effective doses of ECG-gated CT is not clear. In this study, we assessed the radiation doses between ECG-gated and non-gated studies of the thorax and modelled the individual cancer risk in a subpopulation of HTX patients, subjected to repeated CT imaging for surveillance.
Methods: We retrospectively reviewed all CT studies in our tertiary pediatric center (08/2024- 08/2025 in Helsinki, Finland). All studies were performed with the same CT hardware (Revolution CT, GE). A subpopulation of patients with history of pediatric heart transplantation (n = 40) was separately studied for the estimation of risk of exposure induced cancer death (REID) by PCXMC (version 2.0, STUK).
Results: During one year, 248 CTs of the chest were performed. The majority, n = 226 (91%), were performed with ECG-gating (Table 1). CTDIvol was significantly higher in ECG-gated studies compared to non-gated studies ($p < 0.001$), whereas no statistically significant differences were observed in DLP or effective dose estimates between the two groups. Major variation was observed in effective doses, depending on the method of calculation. When modelling the risk of cancer death due to radiation from coronary CT imaging, the risk was highest for lung, breast and stomach cancer, the risk of leukemia being low (Figure 1). Importantly, girls showed increased susceptibility to REIDs, even outside the breast tissue. Yet, in all cases, the REID is very low, even when compared to the cancer risk from other
causes.



	ECG-gated (n = 226)	Non-gated (n = 22)
CTDI (mGy), *median* (range)	1.29 (0.08-15.33)	0.50 (0.33-5.98)
< 1 years (n = 85 / n = 7)	1.11 (0.08-2.08)	0.38 (0.33-0.64)
1-10 years (n = 64 / n = 6)	1.19 (0.14-2.65)	0.47 (0.44-0.49)
> 10 years (n = 77 / n = 9)	3.11 (0.42-15.33)	1.86 (0.93-5.98)
DLP (mGy·cm), *median* (range)	18.99 (0.04-461.59)	15.26 (4.87-558.05)
< 1 years (n = 85 / n = 7)	13.40 (0.04-25.25)	8.62 (4.87-11.46)
1-10 years (n = 64 / n = 6)	18.80 (0.07-42.38)	13.33 (7.79-16.00)
> 10 years (n = 77 / n = 9)	58.94 (6.65-461.59)	69.56 (29.42-558.05)
Effective dose (mSv), *median* (range), AAPM	0.53 (0.0016-6.00)	0.40 (0.189-7.25)
< 1 years (n = 85 / n = 7)	0.52 (0.0016-0.98)	0.34 (0.19-0.45)
1-10 years (n = 64 / n = 6)	0.40 (0.0018-0.79)	0.35 (0.20-0.42)
> 10 years (n = 77 / n = 9)	0.80 (0.086-6.00)	0.90 (0.38-7.25)
Effective dose (mSv), *median* (range), JACC	1.35 (0.0034-17.08)	1.14 (0.41-20.65)
< 1 years (n = 85 / n = 7)	1.14 (0.0034-2.15)	0.73 (0.41-0.97)
1-10 years (n = 64 / n = 6)	1.33 (0.0055-2.75)	1.06 (0.64-1.26)
> 10 years (n = 77 / n = 9)	2.18 (0.25-17.07)	2.57 (1.09-20.65)
Subpopulation of HTX patients (n = 40)		
Effective dose (mSv), *median* (range), AAPM	0.68 (0.37-2.89)	
1-10 years (n = 12)	0.50 (0.42-0.77)	
> 10 years (n = 28)	1.07 (0.37-2.89)	
Effective dose (mSv), *median* (range), ICRP103	1.72 (0.68-5.56)	
1-10 years (n = 12)	1.46 (1.06-1.88)	
> 10 years (n = 28)	2.27 (0.68-5.56)	
Effective dose (mSv), *median* (range), JACC	2.07 (1.04-7.63)	
1-10 years (n = 12)	1.76 (1.51-2.33)	
> 10 years (n = 28)	2.82 (1.04-7.63)	



Conclusions: ECG-gated CT studies were associated with higher CTDIvol compared to non-gated CT studies; however, this did not translate into significantly higher DLP or effective dose estimates. There is significant variance in the effective dose depending on the method of calculation, complicating the prediction of biological effects. The statistical modelling highlights the need for low radiation exposure in young and in female patients. Further studies are warranted for the optimal method on effective dose calculation and possible cancer screening in patients receiving high cumulative doses.



FT-164 / #329

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

3D ECHOCARDIOGRAPHIC EVALUATION OF TRICUSPID ANNULUS MORPHOLOGY IN PATIENTS WITH PULMONARY ATRESIA OR SEVERE PULMONARY VALVE STENOSIS WITH INTACT VENTRICULAR SEPTUM.

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Background and Aim: To use 3D echocardiography to precisely evaluate the morphology of the tricuspid annulus in patients with Pulmonary Atresia with Intact Ventricular Septum (PAIVS) or Severe Pulmonary Stenosis with Intact Ventricular Septum (Severe PS + IVS), and to verify the reliability of conventional tricuspid annulus measurement using the four-chamber view (4CV).
Methods: The study included 15 cases diagnosed with PAIVS or Severe PS + IVS who underwent 3D transthoracic echocardiography (TTE) during the neonatal period at our institution between January 2022 and November 2025. Tricuspid annular diameter (4CV) measurements and Z-scores were calculated using 2D B-mode TTE. Furthermore, the maximum diameter (long axis), minimum diameter (short axis), and their average were measured using 3D echocardiography to evaluate the morphological characteristics of the tricuspid annulus.
Results: 1. Morphological Evaluation: Excluding the two cases that achieved biventricular repair, the tricuspid annular Z-scores were low in all patients, falling below -2, with a mean Z-score of -5.47 ±4.18. The short axis/long axis ratio (or Circularity) of the tricuspid annulus measured by 3D echocardiography was 0.88 (± 0.08), indicating a morphology that was elliptical but close to circular. 2. Reliability Verification of 4CV Measurement: The tricuspid annular diameter measured by 2D B-mode 4CV showed no significant difference when compared to the average 3D-measured annular diameter (mean difference: 0.24 mm, $p > 0.05$). However, the 4CV measurement was significantly smaller than the maximum 3D-measured annular diameter (long axis) (mean difference: 0.83 ± 1.07 mm, $P < 0.05$), and this difference was correlated with the Circularity/short axis-long axis ratio ($r = 0.62$, $p < 0.05$).
Conclusions: The morphology of the tricuspid annulus in patients with PAIVS and Severe PS + IVS is an elliptical shape close to circular. In cases with a high Circularity (closer to circular), conventional 2D B-mode measurement in the 4CV may underestimate the true maximum annular diameter (long axis). This suggests that accurate 3D morphological



evaluation, in addition to conventional 2D 4CV measurement, is essential for the objective assessment of the severity of tricuspid valve dysplasia in these patients.



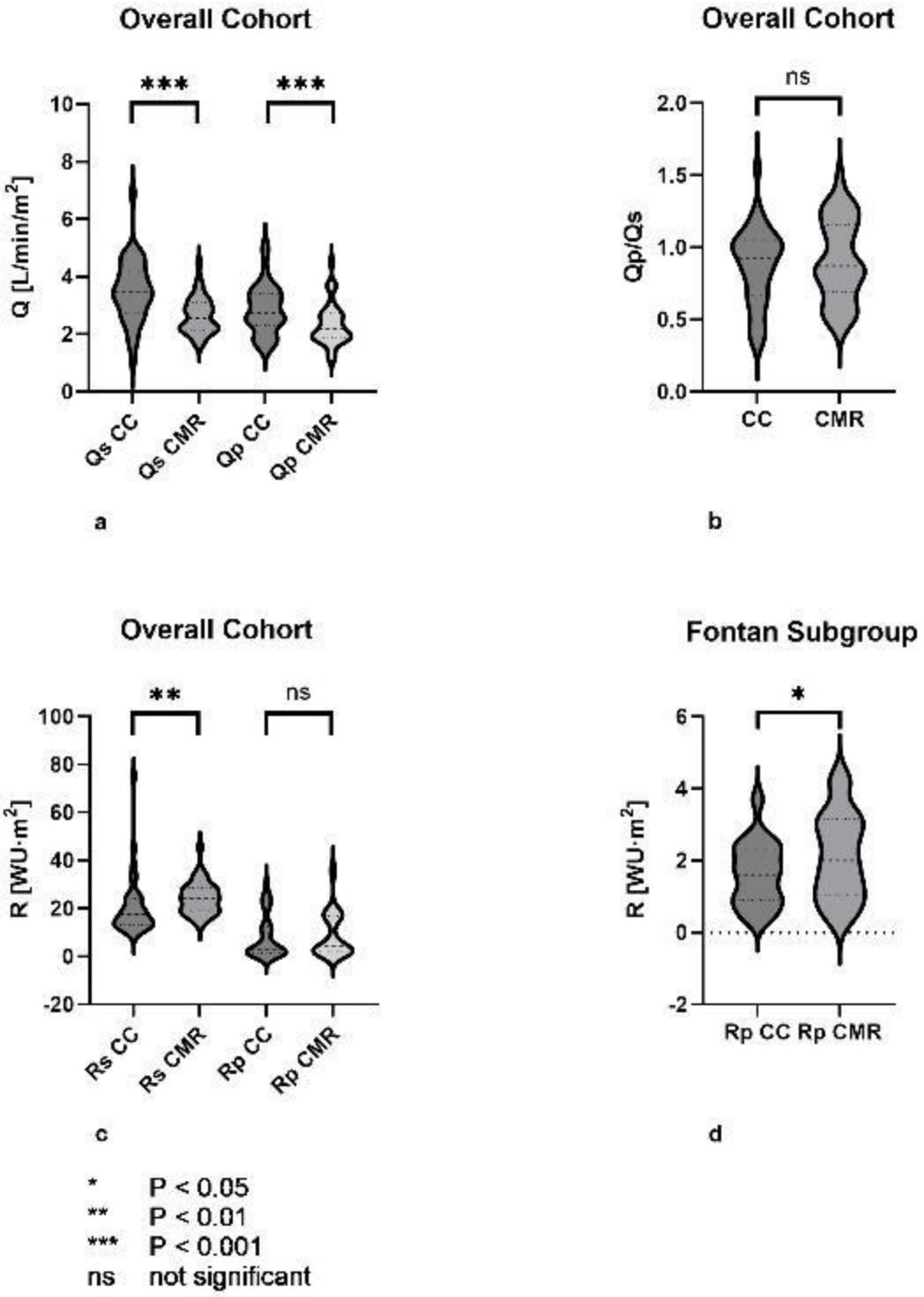
FT-165 / #682

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

OPTIMIZING HEMODYNAMIC ASSESSMENT BY INTEGRATING CARDIOVASCULAR MAGNETIC RESONANCE FLOW QUANTIFICATION WITH CATHETERIZATION MEASUREMENTS

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Background and Aim: The Fick principle, applied during cardiac catheterization (CC), is known to be susceptible to inaccuracies when oxygen consumption is estimated rather than measured, potentially leading to errors in calculating systemic blood flow (Qs) and pulmonary blood flow (Qp), as well as systemic vascular resistance (Rs) and pulmonary vascular resistance (Rp). Cardiovascular magnetic resonance (CMR) offers an alternative for precise flow quantification. The aim of our retrospective study was to assess differences between Fick-derived and CMR-derived flow and resistance parameters in patients with Fontan circulation, pulmonary hypertension and Eisenmenger physiology.
Methods: Patients with Fontan circulation (n=19), pulmonary hypertension (n=11), Eisenmenger physiology (n=6) who had undergone both CC with invasive pressure measurements and CMR flow quantification within one year of each other at our institution between January 2006 and October 2025 were included in this retrospective study. CMR-derived Qs and Qp, as well as Rs and Rp calculated from CMR flows combined with catheter pressures, were compared with CC-derived values calculated using the Fick principle. For the statistical analysis, we used nonparametric Wilcoxon signed-rank test. A P-Value of <0.05 was considered statistically significant.
Results: Compared with CMR-derived measurements, CC yielded slightly higher Qs and Qp values (mean differences 0.84 and 0.52 L/min/m^2, respectively), both reaching statistical significance (P=0.0001 and P=0.0007). The Qp/Qs ratio showed a non-significant difference between CC and CMR (mean difference –0.04; P=0.5469). Rs was significantly lower when measured by CC compared with CMR (mean difference –3.77 WU·m^2; P=0.0029), whereas Rp showed a non-significant trend towards lower values in CC (mean difference –0.99 WU·m^2; P=0.0551). Notably, in the Fontan subgroup, Rp was significantly lower in CC compared with CMR (mean difference –0.49 WU·m^2; P=0.0105).



Conclusions: Complementing invasive catheter measurements with CMR flow quantification allows a more comprehensive assessment of systemic and pulmonary circulation and may support a more precise clinical decision-making in Fontan,pulmonary hypertension and Eisenmenger patients by using more accurate flow values.



FT-167 / #589

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

THE USE OF THE TECHNICAL PERFORMANCE SCORE IN THE NORWOOD PROCEDURE FOR PREDICTING ADVERSE OUTCOMES

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Background and Aim: The Technical Performance Score (TPS) developed by Boston Children's Hospital is used to assess the adequacy of surgical repair and has been shown to correlate with outcomes when used on pre-discharge echocardiograms. The Norwood procedure (NP) is the high risk first stage of surgical palliation for hypoplastic left heart syndrome (HLHS) and other single ventricle lesions. We sought to look at the use of TPS intraoperatively in predicting adverse outcomes.
Methods: A single centre retrospective review of patients undergoing NP with a single surgical operator was performed. TPS as well as complications and mortality were recorded. We also looked at whether all criteria were reviewed on the epicardial.
Results: From 09/06/17 to 04/12/23, 57 patients underwent NP. Of the patients undergoing the Norwood 40 (70%) had HLHS, 13 (23%) underwent a NP following bilateral pulmonary bands or hybrid procedure. 45 (79%) patients had a Blalock-Taussig-Thomas shunt and 12 (21%) had a Sano shunt. All patients had a TPS recorded. 51 (89%) of the patients left theatre with an optimal TPS, 4 (7%) adequate and 2 (4%) inadequate (due to failure to come off bypass and needing ECMO, however one was successfully weaned with no further procedures required after 48 hours and the second was weaned following repositioning of the shunt in catheter lab). 1 of the 4 in the adequate group came off bypass on to ECMO. There were 7 deaths within 30 days of NP all had either optimal or adequate TPS. 3 patients underwent reintervention all had either optimal or adequate TPS scores. All reinterventions were shunt revisions. On review of the epicardial imaging 20 patients (35%) had an incomplete recording, with 4 patients having more than one criterion missing. The most common missing criterion was review of the interatrial communication.
Conclusions: The TPS is a useful modality to anticipate the immediate post-operative period with the majority of patient with inadequate TPS requiring ECMO. Mortality and re-intervention were still seen in patients with an optimal or adequate TPS, however this is likely since the majority of NP mortality is related to haemodynamic imbalance rather than technical issues.



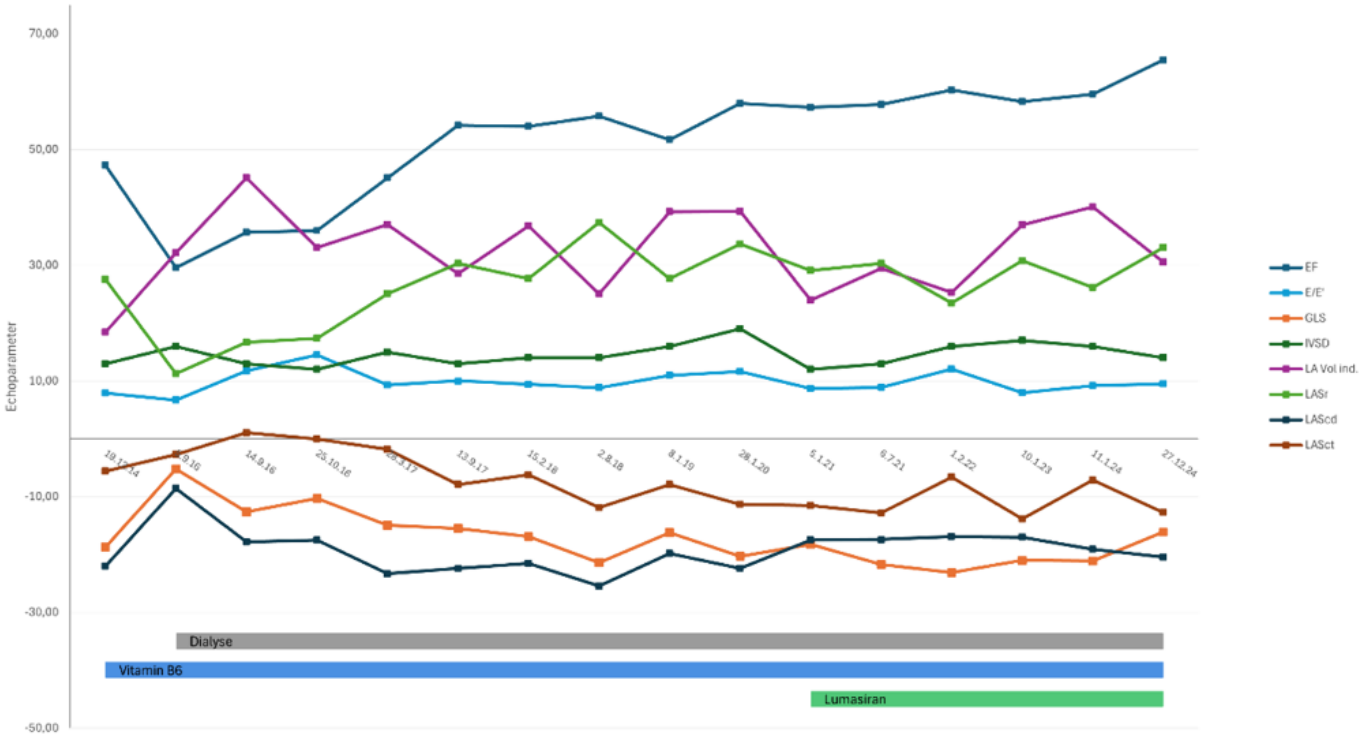
FT-168 / #215

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

LONGITUDINAL ECHOCARDIOGRAPHIC ASSESSMENT IN PATIENTS WITH PRIMARY HYPEROXALURIA TYPE 1

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Background and Aim: In primary hyperoxaluria type 1 (PH1) renal oxalate accumulation can lead to chronic kidney disease (CKD) and end-stage renal failure (ESRF). Oxalate accumulation in the myocardium can cause cardiomyopathy. We investigated echoparameters longitudinally in a large cohort of PH1-patients and evaluated associations with renal function, oxalate burden and RNA-interference therapy (RNAi).
Methods: Echocardiographic parameters of 45 PH1-patients (aged 0-75 years), totally 199 examinations (1-16 per patient) were correlated with urine and plasma oxalate concentrations (Uox, Pox) and glomerular filtration rate (GFR). Parameters were compared between patients with and without dialysis and with and without RNAi. Echoparameters included: M-Mode parameters, biplane EF, strain-analysis (GLS), AV-valve and tissue doppler parameters, indexed left atrial biplane volume (LAVi), left atrial strain. Echoparameters were individually examined in the longitudinal follow up in patients.
Results: Significant differences in echoparameters were observed between PH1-patients with and without dialysis. In dialysis we saw a thickened interventricular septum (12,3 mm vs. 9,4 mm; p<0,001), lower GLS (-18,2 vs. -20,3; p<0,001) as a sign of systolic impairment, higher LAVi (25,3 ml/m^2 vs. 20,2 ml/m^2; p=0,001) and E/e´ and lower left atrial conduit strain as signs of diastolic impairment. In patients without dialysis, we could not observe a significant correlation of distinct echoparameters with Uox, and Pox or GFR. Also, echoparameters did not differ between those with RNAi or without. Looking at individual long-term follow-up, a decline in systolic and diastolic function parameters coincided with ESRF and dialysis. Under dialysis an improvement of cardiac function could be observed over
time.



Conclusions: In this very large PH1 cohort, abnormal parameters were seen mostly in association with ESRF and dialysis. This has been also observed in patients with ESRF of other causes than PH1. In non-dialysis patients, we could not identify a distinct echoparameter that clearly correlated with grade of CKD or Uox or Pox concentrations or could foresee ESRF. Nevertheless, individually also non-dialysis PH1-patients showed abnormal echoparameters, especially diastolic ones. Therefore, an individual cardiac follow-up of PH1-patients is important and echoparameters should be incorporated in therapeutic decisions, including RNAi and transplantation. Avoiding ESRF and long-term dialysis seems most important to preserve cardiac function.



FT-169 / #393

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

LEFT ATRIAL STRAIN PATTERN IN DIFFERENT PHENOTYPES OF PEDIATRIC CARDIOMYOPATHY

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Background and Aim: Dilated and hypertrophic cardiomyopathies can be associated with increased left ventricular filling pressure, which impacts the left atrial function. Left atrial function can be assessed by speckle-tracking echocardiography with the following parameters: reservoir strain, conduit strain and contractile strain. The aim of the present study is to assess the impact of the cardiomyopathy phenotype on the left atrial function in children.
Methods: We conducted a prospective case control study on twenty-nine children with dilated cardiomyopathy, twenty-nine children with hypertrophic cardiomyopathy and twenty-six age and sex matched controls. Besides clinical and conventional echocardiographic parameters, left atrial strain indices (reservoir, conduit and contractile) were studied in all groups.
Results: The median age was 14 years [3.5-16] in the dilated cardiomyopathy group, 13.83 years [9.72–15.07] in the cardiomyopathy group and 15.44 years [11.58–16.7] in the control group, with no significant difference between groups. Left atrial reservoir strain showed an increasing tendency through the three groups: lower value in dilated cardiomyopathy group (21.1± 11.8 %), followed by hypertrophic cardiomyopathy patients (34.3 ± 12.7%) and then the control group (44.0 ± 11.4%). The difference between the three groups was statistically significant ($p<0.05$). The left atrial conduit strain follows the same trend but inversely: higher value in dilated cardiomyopathy group (-15.8 ± 7.0 %), followed by hypertrophic cardiomyopathy patients (-20.8 ± 14.3%), and then the control group (-32.7 ± 9.0 %). The left atrial contractile strain was mostly impaired in dilated cardiomyopathy group (-5.0 ± 5.9%) but not significantly affected in hypertrophic cardiomyopathy patients (-11.46± 6.78) compared to controls (-10.53 ± 4.96). In multivariate regression analysis reservoir and conduit left atrial strain were independent predictors of severe heart failure NYHA/ROSS



functional class ($p<0.01$), but not the contractile left atrial strain.

Conclusions: Left atrial strain parameters show a specific pattern of atrial dysfunction in different pediatric cardiomyopathy groups. Also, reservoir and conduit left atrial strain correlate with heart failure NYHA/ROSS functional class severity. **Funding:** This work was supported by the University of Medicine, Pharmacy, Science and Technology "George Emil Palade" of Târgu Mureș, Romania (Research Grant No. 511/5/17.01.2022).



FT-170 / #1450

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

NON-INVASIVE ASSESSMENT OF VORTEX PATTERNS IN PEDIATRIC VENTRICULAR SEPTAL DEFECT USING HYPERDOPPLER TECHNOLOGY

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Background and Aim: Alterations in intraventricular flow dynamics may contribute to ventricular remodeling in congenital heart disease. Vortex analysis using HyperDoppler technology may provide additional insights into left ventricular (LV) hemodynamics in children with ventricular septal defect (VSD).
Methods: This was a prospective observational study. Fifteen children with VSD (mean age 5.6 ± 5.4 years, range 1–17 years) underwent comprehensive transthoracic echocardiographic evaluation, including intracavitary flow analysis using HyperDoppler technology. The main vortex parameters analyzed were vortex area, vortex depth, and kinetic energy. Results were compared with those obtained in age- and sex-matched healthy controls. Data distribution was assessed using the Shapiro–Wilk test, and results are reported as descriptive statistics.
Results: Compared with controls, children with VSD exhibited higher vortex kinetic energy (mean 1.12 vs 0.94) and an increased vortex area (mean 24.2% vs 28.0%). Vortex depth was comparable between groups (29.1 vs 29.5). VSD patients showed a wider dispersion of vortex-related parameters, suggesting heterogeneous intraventricular flow remodeling despite preserved conventional LV systolic function.
Conclusions: Children with ventricular septal defect demonstrate altered LV intraventricular vortex dynamics, characterized by increased kinetic energy and increased vortex area, with preserved vortex depth. HyperDoppler-based vortex analysis may represent a sensitive marker of altered intraventricular flow organization and early



hemodynamic burden, potentially improving functional assessment and follow-up strategies in pediatric VSD.



FT-171 / #1441

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

THE ROLE OF STRESS ECHOCARDIOGRAPHY IN THE FOLLOW-UP OF REPAIRED CONGENITAL HEART DISEASE WITH RIGHT VENTRICLE OUTFLOW TRACT OBSTRUCTION

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Background and Aim: Stress echocardiography (SE) allows dynamic assessment of ventricular performance and hemodynamic adaptation during exercise. Its role in the follow-up of patients with repaired congenital heart disease (rCHD) and residual right ventricular outflow tract obstruction (RVOTO) remains insufficiently defined. This study aimed to explore the association between SE findings and subsequent clinical management in this population.
Methods: We conducted a single-center, retrospective observational study including patients with rCHD and RVOTO who underwent exercise stress echocardiography at the Pediatric Cardiology Unit of the University of Padua between January 2023 and June 2025. SE was considered abnormal in the presence of either: (a) a peak RVOT gradient ≥65 mmHg, or (b) a lower peak gradient associated with exercise-induced symptoms and reduction in right ventricular systolic function. Patients were classified according to SE result (abnormal vs normal). Baseline and peak-stress echocardiographic parameters were compared between groups. Parameters showing significant between-group differences were explored using ROC curve analysis.
Results: Fifteen patients were included (median age not specified). Seven patients showed an abnormal SE, while eight had a normal SE. During follow-up, 4 patients (57%) in the abnormal SE group underwent percutaneous reintervention and 2 (28%) underwent surgical reintervention, whereas no reinterventions occurred in the normal SE group. Baseline echocardiographic parameters did not differ significantly between groups. At peak stress, patients with abnormal SE showed higher RVOT gradients (73.6 ± 8vs52.5 ±8 mmHg, $p < 0.01$) and lower indices of right ventricular systolic function (TAPSE 16 ± 2.1vs19.9 ± 2.9



mm, p = 0.01; S' 8.3 ±2.1 vs 12.3 ±2.5 cm/s, p < 0.01; FAC 36.3 ±3.5% vs 47.5 ± 5%, p < 0.01). Exploratory ROC analysis identified peak-stress RVOT gradient and RV systolic indices as parameters associated with abnormal SE findings.

Conclusions: In this small, heterogeneous cohort of patients with rCHD and RVOTO, stress echocardiography identified exercise-induced hemodynamic and functional abnormalities that were associated with subsequent clinical reintervention. These findings support the potential role of SE as an adjunctive functional tool in follow-up assessment. Larger prospective studies with standardized protocols and longer follow-up are required to validate these observations and define clinically actionable thresholds.



FT-172 / #651

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

4D-FLOW CMR REVEALS REDUCED PULMONARY FLOW ADAPTABILITY IN PAEDIATRIC FONTAN CIRCULATION COMPARED WITH HEALTHY CONTROLS

Nike Nilsson[1], Charlotte De Lange[2], Pär-Arne Svensson[2,3], Linda Milkovic[4], Britt-Marie Ekman Joelsson[1], Kerstin Lagerstrand[5], Frida Dangardt[1]
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Background and Aim: Children with univentricular hearts palliated with a Fontan circulation experience lifelong hemodynamic compromise. Reduced pulmonary blood flow and chronic venous congestion contribute to exercise intolerance and late comorbidities, including atrioventricular valve regurgitation, Fontan failure, protein-losing enteropathy, bronchial casts, liver fibrosis, and supraventricular tachycardia. Understanding how pulmonary blood flow adapts under changing hemodynamic conditions is essential for evaluating circulatory reserve in this population. **This study aimed to assess the adaptability of pulmonary blood flow in children with Fontan circulation using 4D-flow CMR, comparing responses at rest and under increased preload with healthy controls.**
Methods: Twenty-one pediatric Fontan patients and nineteen healthy controls underwent comprehensive CMR including cardiac function imaging, lymphography, and 4D-flow acquisition. Flow in the superior vena cava (SVC) and inferior vena cava (IVC) was quantified using the Arterys® platform (figure). Measurements were performed at rest and during 60° passive leg elevation to increase preload. Baseline anthropometric variables (age, height, weight, body surface area) were comparable between groups.
Results: At rest, Fontan patients demonstrated lower caval and pulmonary blood flow than controls. Mean IVC flow was 1.49 L/min in Fontan patients versus 2.54 L/min in controls, and SVC flow was 1.36 L/min versus 2.42 L/min, respectively. Total pulmonary blood flow (SVC + IVC) averaged 2.85 L/min in Fontan patients compared with 4.97 L/min in controls. During 60° leg elevation, Fontan patients showed an increase in venous return: IVC flow rose to 2.20 L/min and SVC flow to 2.24 L/min, yielding a combined pulmonary flow of 4.44 L/min. Healthy controls, however, exhibited only minimal increases in venous return under preload (IVC 2.65 L/min; SVC 2.55 L/min; pulmonary flow 5.20 L/min). Heart rate remained



unchanged in both groups across conditions. Statistical comparisons confirmed significantly lower caval flows in Fontan patients versus controls at rest and during preload, while within-group preload responses differed markedly between cohorts.

Conclusions: Children with Fontan circulation show impaired adaptability of venous return and pulmonary blood flow. Their seemingly larger preload response reflects low baseline flow and inefficient venous return rather than true physiological reserve. Findings highlight intrinsic hemodynamic limitations and support 4D-flow CMR for evaluating preload-dependent responses in a clinical setting.



FT-173 / #1369

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

ECHOCARDIOGRAPHIC ASSESSMENT FOR CORONARY ANEURYSMS IN KAWASAKI DISEASE: RESULTS FROM A SYSTEMATIC AND STANDARDIZED ECHOCARDIOGRAPHIC METHOD OF DIAGNOSIS IN PEDIATRICS

Francesco Bianco[1], Greta Frisoni[2], Erilda Topuzi[3], Martina Lazzari[4], Francesca Capuani[2], Benedetta Bucciarelli[4], Camilla Manini[4], Gaia Martelli[5], Alessia Omenetti[5], Bianca Lattanzi[5], Emanuela Berton[1], Francesca Surace[1], Valentina Bucciarelli[1], Salvatore Cazzato[5], Maria Lionetti[4]
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Background and Aim: We sought to determine the diagnostic performance of a systematic and standardized echocardiographic method of screening for coronary artery aneurisms (CAA) in pediatric patients diagnosed with Kawaski disease (KD).
Methods: In 2018-25, we screened 56 inpatients [age 2.5 years (Q1-Q3: 1, 5)], referred for routine echocardiography during their hospitalisation for KD. For our purposes, we utilized four specific echocardiographic windows: parasternal short/long-axis and apical 4/5-chambers view (**Figure 1**). Coronary-CT confirmed CAA. For the performance analysis, two independent and double-blinded physicians retrospectively reviewed echocardiographic images.
Results: A total of N=11 CA were diagnosed. The overall prevalence was 0.0078%, mostly involving the anterior descending branch of the left coronary artery (n=5/11, 45.5%). Among the 11 patients with CAA, four patients (36.4%) demonstrated simultaneous involvement of two coronary arteries, namely the right and left coronary arteries, while one patient (9.1%) presented with diffuse involvement of all three coronary arteries. Over 7 years, we observed a significant increase in CA diagnostic rate (P for Trend=0.002), with 11 distal and giant aneurysms. Our method showed better sensitivity than traditional short-axis solely evaluation: 93% vs 83%, P=0.0030 [AUC 0.96, 95% CI (0.92, 0.99) and AUC 0.89, 95% CI (0.83, 0.95), respectively], with a good interobserver agreement (95%, k=0.83, P<0.001).
Conclusions: The application of a standardized echocardiographic approach for CAA-detection led to a significantly increased rate of identified distal and giant aneurysms. This approach demonstrated higher sensitivity than the traditional echocardiographic



assessment. Implementing this protocol in clinical practice may help to improve the CAA diagnosis in pediatrics with KD.



FT-174 / #788

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

CORRELATION OF ECHOCARDIOGRAPHIC FINDINGS AND CMR DERIVED EJECTION FRACTION (CMR-EF) IN FUNCTIONALLY UNIVENTRICULAR HEARTS (FUVH)

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Background and Aim: To determine whether echocardiographic parameters correlate with CMR-EF in complex congenital heart disease.
Methods: Retrospective analysis of fUVH from 1/2022 to 12/2025 in a tertiary centre. Data of 83 patients (mean age 18.2 y, 1.7 – 48.2 y, 39 females, 43 with dominant right ventricle, 32 with dominant left ventricle, 8 with biventricular morphology) were available and analysed. CMR-EF was compared to easily obtainable echocardiographic functional parameters in an apical 4-chamber view i.e. longitudinal strain (eLS), atrioventricular valve anular systolic plane excursion of the dominant ventricle (avAPSE), fractional area change (FAC) and, if applicable, three-dimensional ejection fraction (3DEF). The patient population was divided in 4 groups according to CMR-EF (> 55 (1), 45-55 (2), 35-45 (3) and < 35 % (4).
Results: No differences were observed between groups regarding avAPSE (p=0.94) and FAC (p=0.6), but in eLS (p<0.001) and 3DEF (p=0.003). eLS were sigificantly more positive in group 3 (-14.3 %) and 4 (-10.9 %) than in 1 (-17.4 %) and 2 (-16.0 %). Grouping according to eLS (< -15 % (1), -15 to -12 % (2), > -12 % (3) showed a large effect on CMR-EF (ANOVA eta^2 0.214, p<0.001) with a negative correlation (r=-0,45, CI -0,61,-0,25). The morphology of the dominant ventricle was not of importance.
Conclusions: eLS correlates with an impaired ventricular function as derived by CMR in fUVH, independently from morphology. As eLS is a user independent, computed parameter, that can be reproduced reliably, it may be of clinical importance for therapy steering and decision making



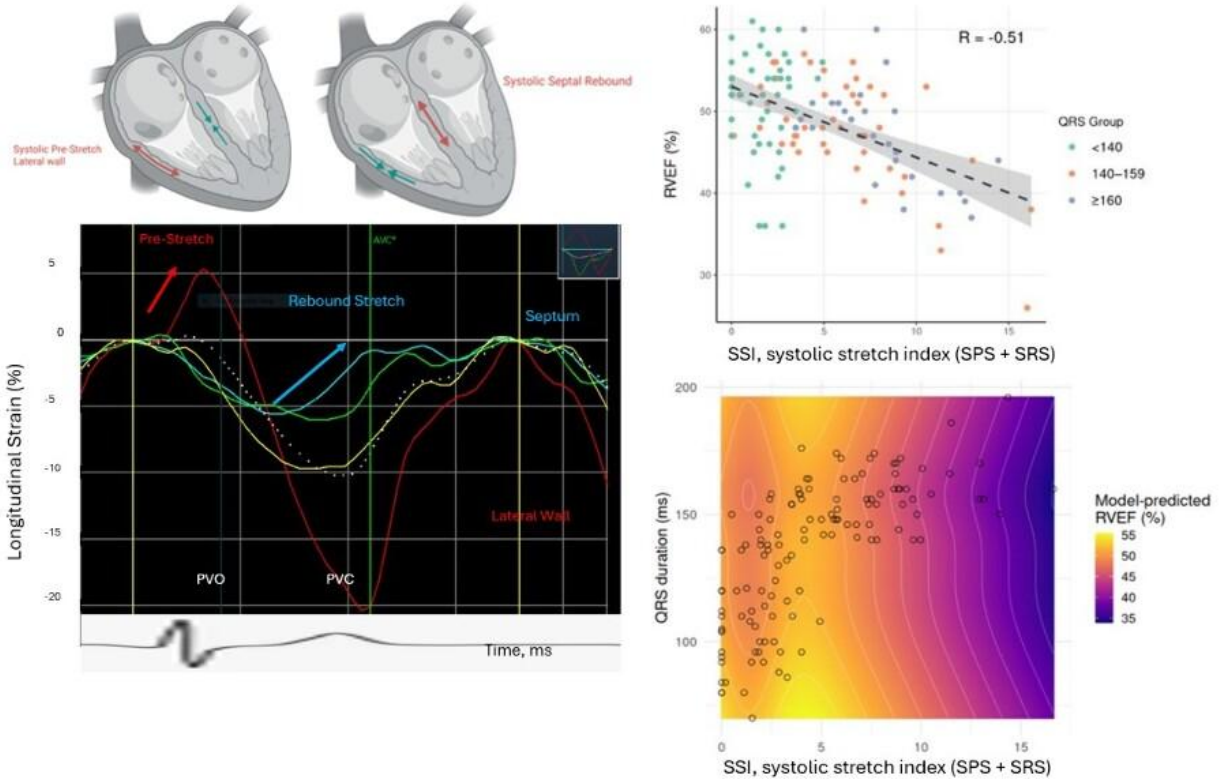
FT-175 / #502

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

RIGHT VENTRICULAR DYSFUNCTION IN REPAIRED TETRALOGY OF FALLOT: NEW IMAGING INSIGHTS FROM SYSTOLIC STRETCH PATTERNS

Emmanuelle Fournier[1], Raphael Joye[1], Yuval Bitterman[1], Alice Pozza[1], Wei Hui[1], Marisa Signorile[2], Luc Mertens[1], Mark Friedberg[1]
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Background and Aim: Right ventricular (RV) dysfunction is a major long-term complication in repaired Tetralogy of Fallot (rTOF). Although RBBB is common, only a subset of patients develops RV failure, suggesting that electrical delay alone does not reflect the complete electromechanical substrate. Speckle-tracking Imaging enables detailed assessment of dyssynchrony. Systolic pre-stretch (SPS) of RV lateral wall relates to electromechanical delay and impaired RV performance, while systolic rebound stretch (SRS) reflects septal deformation. When combined, SPS and SRS form the systolic stretch index (SSI), marker that may better quantify mechanical inefficiency. We aimed to evaluate RV systolic strain-stretch patterns in pediatric rTOF and determine whether SSI is associated with electromechanical delay and RV dysfunction.
Methods: A total of 126 children with rTOF (median age 14.7 years; median QRS 142 ms [112–156]) were retrospectively included from 2020 to 2024. All underwent echocardiography, ECG, and cardiac MRI. Longitudinal strain was analyzed in an RV-focused four-chamber view using EchoPac® software. Amplitudes and duration of SPS and SRS were measured, SSI was calculated as SPS+SRS. Patients were classified into SRS-pattern groups severity from 0 to 4. RV dysfunction was defined as RVEF <45%.
Results: RV dysfunction was present in 20% and varied minimally across QRS duration range. SPS and SRS amplitudes were significantly higher in patients with RV dysfunction (SPS 14.0% vs 4.8%, $p<0.001$; SRS 6.3% vs 1.5%, $p<0.001$), resulting in higher SSI (9.3 vs 3.1, $p<0.001$). Higher SRS-pattern categories (Groups 3–4) were almost exclusively associated with reduced RVEF ($p<0.001$). SSI outperformed SPS alone in differentiating dysfunctional from preserved RV function. In multivariable analysis, QRS duration was the only independent predictor of SSI ($\beta=0.09$, $p<0.001$), while RV dilation, and pulmonary regurgitation severity were not associated. A non-linear relationship between SSI and RVEF was noted ($p<0.001$): RVEF remained stable at low SSI (<5) but declined progressively beyond SSI ≥5.



Conclusions: Systolic stretch analysis identifies distinct mechanical patterns in pediatric rTOF. SSI, integrating SPS and SRS, reflects electromechanical dyssynchrony and inefficiency more comprehensively than SPS alone and shows a threshold-dependent relationship with RVEF. An SSI ≥5 may signify transition toward maladaptive RV mechanics, offering a potential target for earlier risk stratification and intervention in rTOF.



FT-176 / #1452

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

IMPACT OF OVERWEIGHT AND OBESITY ON BLOOD PRESSURE AND CARDIAC REMODELLING IN PEDIATRIC AND YOUNG ADULT PATIENTS WITH CONGENITAL HEART DISEASE

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Background and Aim: The impact of overweight and obesity on blood pressure and cardiac remodelling in pediatric patients with congenital heart disease (CHD) remains incompletely defined. To evaluate the impact of overweight and obesity on arterial blood pressure and cardiac remodeling in CHD pediatric patients and to investigate whether these associations differ according to ventricular physiology and underlying cardiac anatomy.
Methods: We conducted an observational study including CHD patients undergoing comprehensive clinical and echocardiographic evaluation. Patients were classified by weight status (normal weight, overweight, obese) and ventricular physiology (biventricular vs univentricular), with a secondary analysis by cardiac anatomy. Associations between BMI, arterial hypertension and echocardiographic parameters were assessed.
Results: A total of 451 patients were included (mean age 13.1 ± 3.9 years). Seventy-four patients had univentricular physiology; 113 had right ventricular outflow tract anomalies, 90 coarctation of the aorta and related conditions, 54 TGA, and 120 other forms of CHD. Overall, 9% of patients were overweight and 2% obese. Age increased progressively across weight categories (normal weight: 12.8 ± 3.9 years; overweight: 14.4 ± 3.1 years; obese: 16.0 ± 4.1 years). Arterial hypertension was identified in 16% of patients, increasing progressively across BMI categories (14% in normal weight, 26% in overweight, and up to 50% in obese patients). Overweight and obesity were rare in univentricular patients, with no significant differences in blood pressure or echocardiographic parameters. In contrast, among patients with biventricular circulation, increasing BMI was significantly associated with arterial hypertension and with higher interventricular septal thickness at end-diastole ($p < 0.001$) and indexed left ventricular mass ($p=0.012$). Global left ventricular systolic function and 3D circumferential and longitudinal strain did not differ significantly across weight categories in all subgroups. Interestingly, in patients with Tetralogy of Fallot, overweight was associated with reduced longitudinal strain ($p = 0.042$) and lower right ventricular ejection fraction ($p = 0.052$).



Conclusions: In pediatric CHD, overweight and obesity predominantly affect patients with biventricular anatomy and are associated with arterial hypertension and left ventricular remodeling. In Tetralogy of Fallot, excess weight may adversely impact right ventricular function. These findings highlight the importance of systematic BMI and blood pressure monitoring in CHD patients.



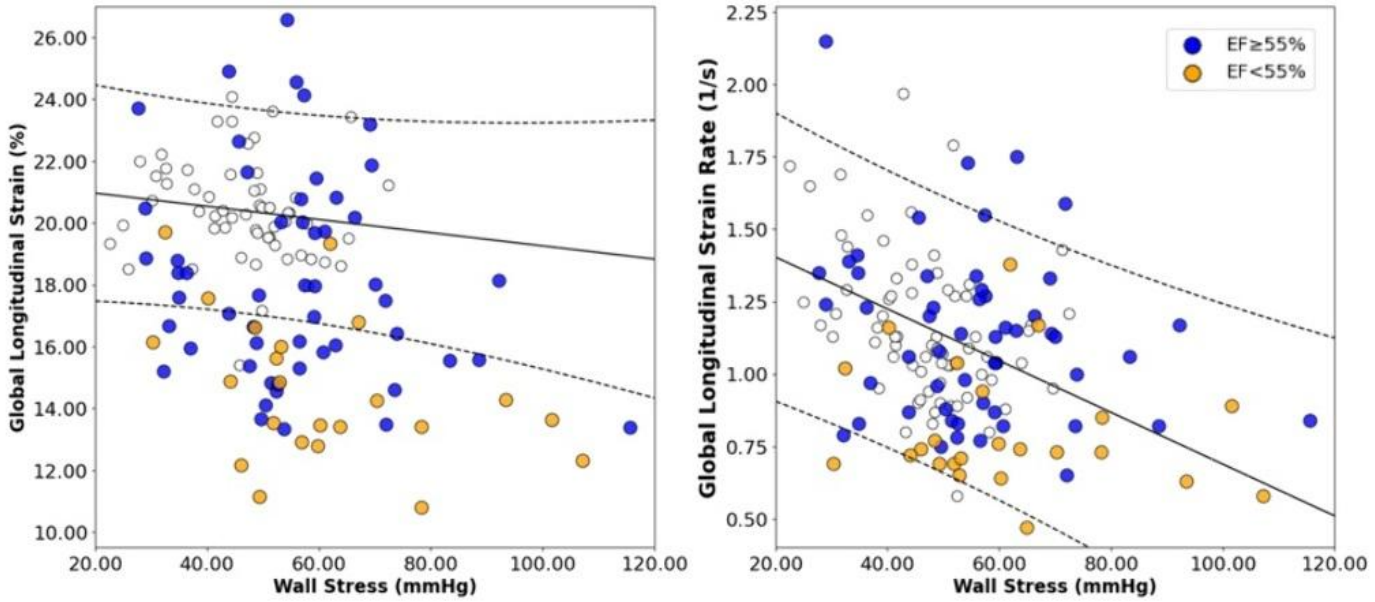
FT-177 / #314

FLASH TALK SESSION 8
16-05-2026 11:00 - 12:30

POSTOPERATIVE LONGITUDINAL MYOCARDIAL MECHANICS IN CHILDREN WITH AORTIC REGURGITATION: INSIGHTS FROM GLS AND GLSR INDEXED TO WALL STRESS

Ana Alexandra Oliveira[1], Thomas Salaets[2], Cesar Gonzalez De Alba[3], Pablo López[4], Mark Friedberg[5], Piet Claus[1]
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Background and Aim: Chronic aortic regurgitation (AR) induces subclinical myocardial remodelling. Standard postoperative global left ventricular (LV) assessment relies on ejection fraction (EF), but global longitudinal strain (GLS) and strain-rate (GLSr) indexed to wall stress may be more sensitive in children with AR.
Methods: Seventy-nine children with moderate-to-severe AR and age-matched healthy controls underwent transthoracic echocardiography before and one year after valve surgery. Blood pressure, LV diameters and wall thickness were used to calculate end-systolic meridional wall stress, reflecting the longitudinal afterload on subendocardial fibres. GLS and GLSr were expressed relative to meridional wall stress. The standard error of prediction (SEP) was derived from the control cohort. Postoperative values were classified as normal or abnormal based on SEP boundaries.
Results: One year after surgery, 24 patients (31%) had EF below 55%, with a mean of 56.83 ± 7.01%, compared to 63.07 ± 8.39% in controls ($p < 0.01$). End-systolic meridional wall stress decreased by 22%, reaching 57.23 ± 17.98% ($p < 0.01$). GLS decreased by 9% to 17.09 ± 3.45%, significantly lower than in controls (20.10 ± 1.64%, $p < 0.01$). Despite wall stress approaching control values, 54% of patients lay below the lower SEP boundary for GLS, of whom only 46% had EF < 55%. Overall, 83% of patients with EF < 55% were below the GLS SEP boundary ($p < 0.01$). GLSr, one year after surgery, decreased by 4% to 1.03± 0.31 s^{-1} ($p < 0.01$), significantly lower than in healthy controls (1.16 ± 0.25 s^{-1}, $p < 0.01$). However, 91% remained within the prediction intervals for the GLSr-wall stress, and 2 out of the 24 patients with EF < 55% are outside of the normal GLSr interval.



Conclusions: One year after AR correction in children, GLS indexed to end-systolic meridional wall stress detects abnormal longitudinal deformation in 54% of patients, many of whom retain a normal EF. Subclinical changes in myocardial systolic performance continue despite normalised EF. Long-term follow-up of children after AR surgery is necessary to assess the prognostic significance of these findings.



FT-178 / #760

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

IDENTIFICATION OF NOVEL BIOMARKERS VIA METABOLOMIC PROFILING IN DIAGNOSIS AND MONITORING OF PEDIATRIC PATIENTS WITH MYOCARDITIS

Seçil Sayın[1], Özkan Kaya[1], İlknur Alkan Kuşabbi[2], Emine Koç[3], Ozan Kaplan[3], İlker Ufuk Sayıcı[1], Sinem Nur Selçuk[1], Galip Arıcı[1], Canan Topçuoğlu[2], Mustafa Çelebier[3], Utku Arman Örün[1]
[1]Ankara Etlik City Hospital, Pediatric Cardiology, Ankara, Turkey, [2]Ankara Etlik City Hospital, Biochemistry, Ankara, Turkey, [3]Hacettepe University Faculty of Pharmacy, Analytical Chemistry, Ankara, Turkey

Background and Aim: Metabolomics is the quantitative analysis of endogenous and exogenous chemical compounds, including amino acids, carbohydrates, fatty acids, lipids, vitamins, hormones, and toxins, present in cells and biological fluids. Non-specific markers (leukocytosis, elevated ESR, and CRP) among myocarditis laboratory findings have limited diagnostic value. Cardiac troponins, while indicating myocardial injury, may be absent without excluding the diagnosis. These limitations highlight the need for more specific and sensitive biomarkers. Our research aims to identify biomarkers in the pathogenesis of pediatric myocarditis patients using metabolomic profiling.
Methods: This study included 55 children: 22 myocarditis patients followed at our Pediatric Cardiology clinic between July 2024 and January 2025, and 33 healthy controls. Metabolite identification and quantification were performed through liquid chromatography-quadrupole time-of-flight mass spectrometry (LC-QTOF-MS). Subsequently, partial least squares discriminant analysis (PLS-DA) was utilized to identify discriminatory metabolites based on their variable importance in projection (VIP) values. Downstream pathway enrichment analysis was then conducted to elucidate the biological significance of these metabolites.
Results: Metabolomic analysis revealed a profound alteration in the systemic metabolome of pediatric myocarditis patients. Principal Component Analysis (PCA) demonstrated a distinct and significant separation of metabolomic profiles when comparing patients at admission versus discharge, and myocarditis patients versus healthy controls. A total of 95 unique metabolites were significantly altered ($p < 0.05$). Notably, compared to healthy controls, acute myocarditis patients exhibited a dramatic upregulation of cortisone (294.4-fold) and kynurenine (64.6-fold), alongside a profound downregulation of 3,4-dihydroxyphenylglycol (-26.5-fold). Pathway enrichment analysis identified bile acid biosynthesis as the most significantly perturbed pathway ($p = 0.000638$). Furthermore,

significant dysregulation was consistently observed in fatty acid and tryptophan metabolism pathways, indicating these are central features of the acute disease state that are modulated during
recovery.

Figure 1. Combined PCA plots. The figure illustrates the clear separation of metabolomic profiles in two distinct comparisons: (a) myocarditis patients at admission (red) versus discharge (green), and (b) acute myocarditis patients at admission (green) versus healthy controls (red).

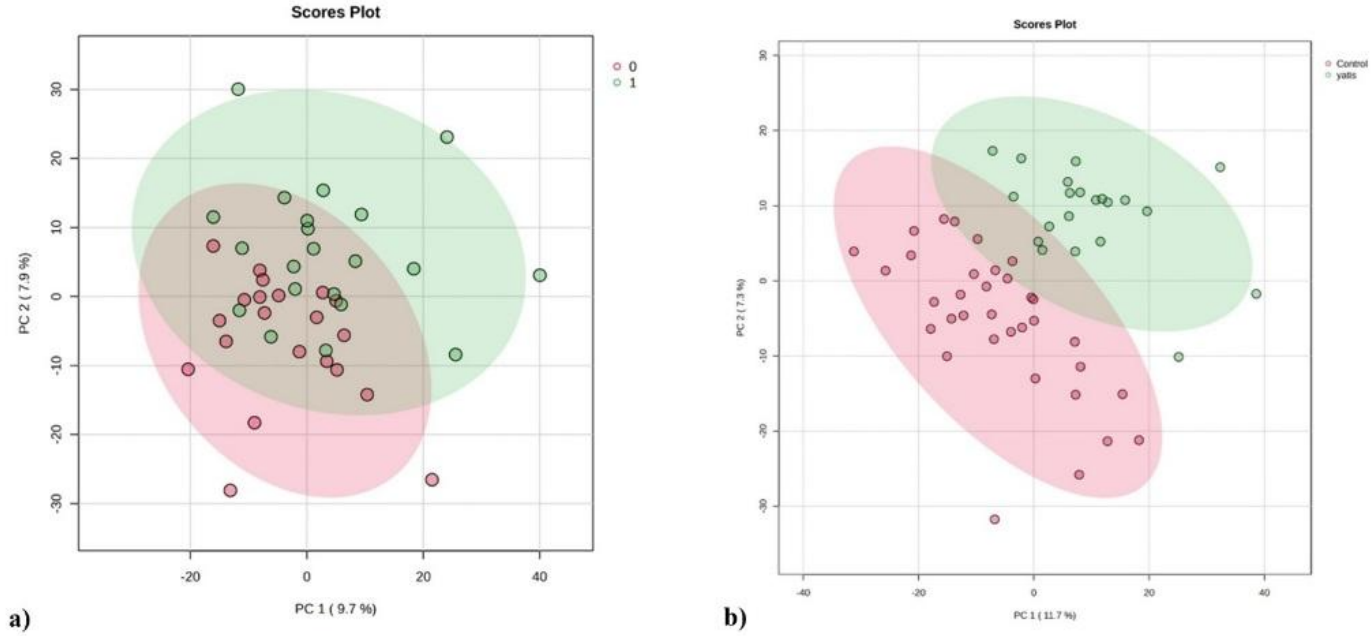


Figure 2. VIP score plots illustrating the key metabolites that most significantly distinguish between patients with (a) myocarditis at admission and discharge (b) myocarditis patients at admission and healthy controls. Metabolites with VIP scores exceeding 1.5 are highlighted as the most important discriminating variables.

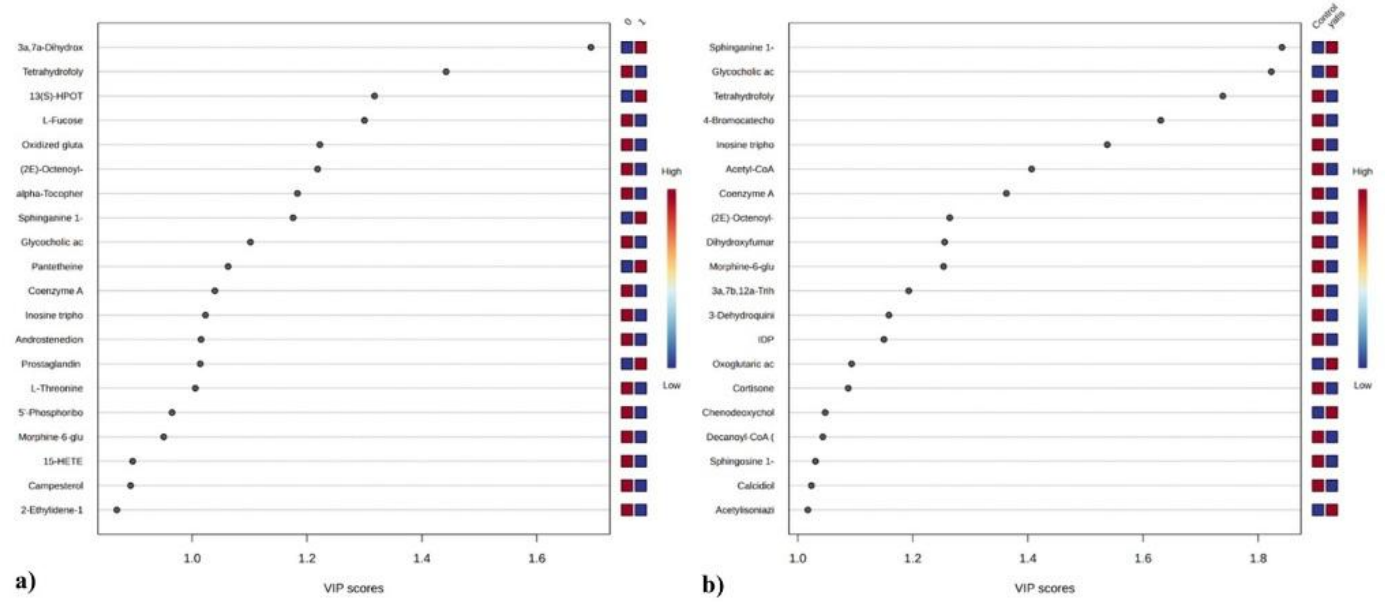
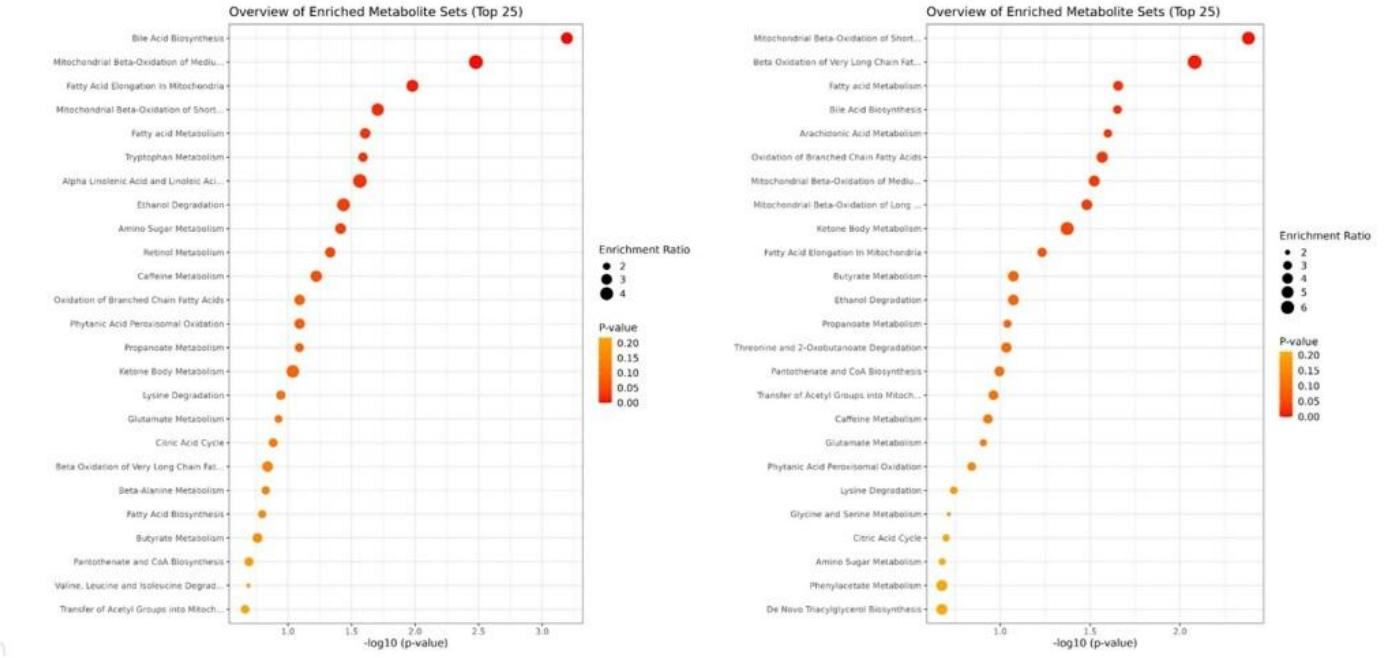


Figure 3. Combined pathway enrichment analysis plots. The bubble charts illustrate the most significantly impacted metabolic pathways for (a) myocarditis vs. healthy controls and (b) admission vs. discharge. The bubble size indicates the pathway impact, and the color intensity reflects the statistical significance.



Conclusions: This study identified a distinct metabolic signature in pediatric myocarditis,



revealing dysregulated bile acid biosynthesis and fatty acid metabolism as key pathophysiological mechanisms. Specific metabolites, including cortisone and kynurenine, emerged as promising biomarkers for diagnosis and disease monitoring. These findings suggest novel therapeutic targets and demonstrate the clinical potential of metabolomics in improving the diagnosis and management of pediatric myocarditis.



FT-179 / #293

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

APOLIPOPROTEIN B LEVEL ELEVATION AND GLUTATHIONYLATED PROTEINS AS NEW BIOMARKERS FOR CARDIAC HYPERTROPHY IN CHILDREN

Sara Di Marzio[1], Nicoletta Cantarutti[1], Marzia Bianchi[2], Flavia Grignaffini[2], Nadia Panera[2], Giulia Andolina[2], Anna Pastore[2], Marianna Cicenia[3], Anna Alisi[2], Massimo Silvetti[3]
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Background and Aim: Obesity leads to a series of pathophysiological alterations collectively referred to as metabolic syndrome (MS), thus making youngs and adults susceptible to an increased risk of cardiovascular events, including hypertension and cardiac hypertrophy (CH). In patients with MS, high levels of Apolipoprotein B (ApoB) and the imbalance of redox homeostasis are common mechanisms underlying MS and cardiovascular risk, but there is a little evidence that they may also play a role in the connection between MS traits and CH. Notably, among the multiple oxidative mechanisms, protein glutathionylation has recently emerged as a key regulator of the hypertrophic phenotype in cardiomyocytes, although it lacks evidence in patients. The primary objective of our study is to investigate whether levels of ApoB and glutathionylated proteins (ProSSG) can serve as proxy markers of CH in overweight/obese paediatric patients.
Methods: We designed an observational study enrolling 43 non-syndromic overweight/obese children (aged range, 10–18 years), of whom 44% (N=19) had no CH (CTRL), while 56% (N=24) had CH. We collected: i) anthropometric and biochemical parameters; ii) cardiac data; and iii) blood samples to evaluate ApoB and N-terminal pro B-type natriuretic peptide (NT-proBNP) by commercially available assays, and ProSSG levels in peripheral blood mononuclear cells (PBMCs) by mass spectrometry.
Results: Our results revealed no significant differences in anthropometric and biochemical parameters between CTRL and CH patients. On the contrary, we found that ApoB ($p<0.05$) and NT-proBNP (not significantly) levels were increased in the CH group compared to the CTRL group. Moreover, mass spectrometry analysis of the ProSSG pattern revealed that glutathionylation of 104 proteins occurred only in children with CH. Among these ProSSG proteins, it emerged that cytoskeletal (such as alpha and beta tubulin) and sarcomeric (such as tropomyosin A1 and tropomyosin 1) proteins were present.
Conclusions: Our preliminary findings demonstrated that individuals with CH have higher



ApoB and NT-proBNP levels, suggesting a possible role in pathogenetically linking MetS and CH. Additionally, the cardiac phenotype may be reflected in blood by assessing ProSSG levels. To confirm the translational applicability of our findings, a further study in a larger cohort is necessary



FT-180 / #1520

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

CLINICAL CHARACTERISTICS AND PREDICTORS OF MAJOR ADVERSE CARDIAC EVENTS IN PEDIATRIC HYPERTROPHIC CARDIOMYOPATHY: A MULTICENTER REGISTRY STUDY

Keiichi Hirono[1], Mami Nishiyama[1], Kaori Tsuboi[1], Mako Okabe[1], Hideyuki Nakaoka[1], Keijiro Ibuki[1], Sayaka Ozawa[1], Yukiko Hata[2], Naoki Nishida[2], Fukiko Ichida[3]
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Background and Aim: Risk stratification models for sudden cardiac death in hypertrophic cardiomyopathy (HCM) are well established in adults, but their applicability to pediatric patients remains unclear. Pediatric HCM may have distinct etiologies, particularly in infantile-onset cases. We aimed to identify clinical characteristics and predictors of major adverse cardiac events (MACE) in Japanese pediatric HCM patients, focusing on age-specific phenotypic differences.
Methods: We conducted a retrospective multicenter cohort study of 141 pediatric HCM patients in Japan. MACE was defined as a composite of death, heart transplantation, implantable cardioverter-defibrillator (ICD) implantation, and out-of-hospital cardiac arrest (OHCA). Patients were stratified by age at diagnosis (<1 year vs ≥1 year) and presence of sarcomere gene variants. Kaplan-Meier survival analysis and multivariable logistic regression were performed to identify independent predictors.
Results: Median age at diagnosis was 80 months (IQR 1.5–148.5), with 65.7% males. During median follow-up of 52 months, MACE occurred in 27 patients (19.1%): death in 10 (7.2%), ICD implantation in 11 (7.8%), and OHCA in 11 (10.7%). Pathogenic variants were identified in 76 patients (53.9%), including MYBPC3 (n=29, 20.6%), MYH7 (n=22, 15.6%), and other genes (n=25, 17.7%). Patients diagnosed at <1 year (n=43) showed significantly lower variant detection rates (27.9% vs 66.0%, P<0.0001), higher perinatal abnormalities (26.2% vs 0%, P<0.0001), and more symptomatic presentation (39.5% vs 18.1%, P=0.0102) compared to those ≥1 year. Multivariable analysis identified syncope at diagnosis (OR 17.77, 95%CI 6.07-139.19, P=0.0023), family history of sudden cardiac death (OR 4.60, 95%CI 3.28-15.31, P=0.0008), and age <1 year (OR 2.26, 95%CI 1.33-10.55, P=0.0169) as independent predictors of MACE. MACE-positive patients demonstrated elevated BNP (210.3 vs 68.7 pg/mL, P=0.0078), increased E/e' lateral (11.58 vs 8.76, P=0.0319), and higher Tei index (0.45 vs 0.30, P=0.0205). Notably, presence of pathogenic variants was not



associated with MACE.

Conclusions: In pediatric HCM, syncope, family history of sudden death, and infantile onset are independent MACE predictors. Clinical phenotypes differ substantially between infantile-onset and later-onset HCM, suggesting distinct etiologies. Development of pediatric-specific risk stratification incorporating age-specific factors and diastolic function parameters is warranted.



FT-181 / #266

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

MORPHO-FUNCTIONAL CHARACTERIZATION OF GENE-ELUSIVE VERSUS GENE-POSITIVE HYPERTROPHIC CARDIOMYOPATHY IN CHILDREN: A CMR-BASED STUDY

Francesca Bonanni[1,2,3], Gabrielle Norrish[3,4], Ella Field[3,4], Annabelle Barnes[3,4], Nina Mac Pherson[4], Elena Milano[3], Elena Cervi[3], Iacopo Olivotto[2], Juan Kaski[3,4]
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Background and Aim: Paediatric hypertrophic cardiomyopathy (HCM) shows substantial phenotypic heterogeneity, partly driven by genotype. While genotype–phenotype associations are well described in adults, paediatric data remain limited, and the characteristics of gene-elusive (genotype-negative, G–) disease in childhood are poorly defined. This study evaluated genotype-specific cardiac magnetic resonance (CMR) profiles in a large paediatric HCM cohort.
Methods: We included 191 patients aged ≤18 years with nonsyndromic HCM who underwent comprehensive genetic testing and baseline CMR at two tertiary centres. Patients were grouped as MYBPC3, MYH7, thin-filament variants (TNNT2, TNNI3, TPM1), or G- (including VUS and negative). Morphological and functional parameters were compared among groups.
Results: Median age at CMR was 13 [10–15] years, differing across genotypes (p=0.002), with thin-filament patients being older, while sex was similar across groups (p=716). G- patients showed intermediate ventricular volumes and the smallest left atrium (p=0.029). MYH7 carriers showed a hypercontractile phenotype, with the smallest LV volumes and highest LVEF (p<0.001), and were more frequently obstructive (p=0.019). Thin-filament variants exhibited the most dilated atrial and ventricular chambers, and the highest prevalence of LGE (although this was non-statistically significant, p=0.140). MYBPC3 patients had the largest LV end-diastolic volumes (p=0.006), resulting in the lowest LVEF and the lowest LGE prevalence.
Conclusions: Distinct genotype-specific morpho-functional signatures are already evident in paediatric HCM. MYH7 is associated with a hypercontractile–obstructive phenotype, MYBPC3 with lower LVEF, and thin-filament disease with a dilated, restrictive, fibrotic pattern, while G-patients occupy an intermediate profile, suggesting a biologically distinct substrate from adult gene-elusive disease. These findings support the value of CMR for



early genotype-informed phenotypic interpretation and may contribute to refined paediatric risk stratification.



FT-182 / #1186

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

CLINICAL APPLICATION OF BLOOD BIOMARKERS AND HEART FAILURE SCORING SYSTEMS IN CHILDREN WITH LEFT TO RIGHT SHUNTS

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Background and Aim: Children presenting with heart failure symptoms secondary to left to right shunts are initially managed with supportive medical management. Timing of surgical or device closure can vary based on local practice. This study aimed to identify if biochemical biomarkers, echocardiography or Modified Ross score could be used to predict the children more likely to require intervention and those at higher risk of complications during or post intervention.
Methods: Children were prospectively recruited following diagnosis of an ASD, VSD, AVSD or PDA on echocardiogram between March 2022 and July 2023. In addition, all underwent clinical examination, blood sampling and Modified Ross score assessment. Plasma was analysed for NT-proBNP, Troponin T, sST2 and Tetranectin. Data on feeding, medications, comorbidites, any subsequent cardiac interventions or complications were recorded.
Results: 21 participants aged 3 weeks to 56 weeks were recruited. Median age 12 weeks. 52% were inpatients at time of recruitment. 81% (17/21) had a ventricular septal defect, 14% (3/21) had a complete atrioventricular septal defect, 5% (1/2) had a persistent ductus arteriosus. 86% (18/21) of participants required surgical or device closure of their left to right shunt. 17% of participants undergoing closure had complications including complete heart block, persistent chylothorax and significant LV dysfunction. The Modified Ross score and NT-proBNP values were significantly higher at recruitment in the children who subsequently required shunt closure. There was no significant correlation with Troponin, sST2 or Tetranectin values and future shunt closure. NT-proBNP and Troponin T had significant negative correlations with age of participants. Reduced ventricular systolic function and atrioventricular valvar regurgitation on echocardiogram had no significant correlation with future shunt closure. Modified Ross scores were significantly higher in the participants who had early post-repair complications (8.67+/- 1.5) compared to those that did not (4.77 +/-1.6) (*t(14)=-3.85 p=0.002)*.
Conclusions: The role of biomarkers and risk stratifying scores should be to aid clinical decision making. This study suggests there is benefit in NT-proBNP analysis in this cohort and utilising the Modified Ross score, which incorporates NT-proBNP and echocardiogram



parameters, to identify children more likely to require intervention and subsequently higher risk of complications at the time of diagnosis.



FT-183 / #68

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

LONG-TERM OUTCOMES OF PEDIATRIC DILATED CARDIOMYOPATHY AFTER BERLIN HEART EXCOR® EXPLANTATION WITH RECOVERY OF CARDIAC FUNCTION

Yuka Hayashida, Hidekazu Ishida, Nao Koho, Yuri Suehiro, Tatsuya Baba, Hiroki Nagano, Atsuko Kato, Ryo Ishii, Jun Narita
The University of Osaka Hospital, Pediatrics, Suita city, Japan

Background and Aim: Pediatric dilated cardiomyopathy (DCM) carries a poor prognosis, with 26% of patients dying or requiring heart transplantation within one year of diagnosis. Some patients supported with the Berlin Heart EXCOR® ventricular assist device exhibit remarkable cardiac recovery and can be successfully weaned from mechanical support. However, long-term outcomes after explantation remain unclear. To evaluate the long-term clinical outcomes of pediatric DCM patients who were weaned from EXCOR following recovery of cardiac function.
Methods: Twenty-six pediatric DCM patients underwent EXCOR implantation at the University of Osaka Hospital between 2013 and 2024. Among these, eight patients achieved recovery of cardiac function (left ventricular ejection fraction, LVEF ≥45%) and were successfully weaned from EXCOR. We retrospectively analyzed clinical data including blood tests, echocardiography, cardiac magnetic resonance imaging (cMRI), cardiac catheterization, and endomyocardial biopsy.
Results: The cohort consisted of one male and seven females; two patients carried pathogenic DCM-associated genetic variants. The median age at diagnosis was 7.5 months (range, 4–12), the median age at EXCOR implantation was 8.5 months (range, 4–25), and the median duration of EXCOR support was 6.2 months (range, 3.7–14.1). The median follow-up duration after explantation was 77 months (range, 28–106). BNP levels decreased markedly within three months of EXCOR implantation and remained within the normal range after explantation. All patients were asymptomatic, and the median LVEF at the last follow-up was 59.6% (range, 45.1–72.1). Hemodynamic parameters—including pulmonary arterial wedge pressure, right atrial pressure, and cardiac index—remained within normal ranges during follow-up. cMRI revealed no late gadolinium enhancement in any patient; however, 7 of 8 patients (88%) had an extracellular volume >30%, suggesting persistent myocardial fibrosis. Endomyocardial biopsy demonstrated interstitial fibrosis in 7 of 8 patients (88%). All patients continued treatment with beta-blockers and either ACE inhibitors or angiotensin receptor–neprilysin inhibitors.
Conclusions: In pediatric DCM patients who achieved complete recovery of cardiac



function during EXCOR support, cardiac function remained stable in the mid- to long-term after EXCOR explantation. However, residual myocardial fibrosis was present in most patients, indicating that long-term heart-failure therapy may be warranted even after apparent functional recovery.



FT-184 / #251

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

MACHINE LEARNING-BASED MORTALITY PREDICTION FOR PEDIATRIC FULMINANT MYOCARDITIS USING CYTOKINE PROFILES

Saori Sugawara[1], Takanori Suzuki[2], Yoji Nomura[1], Jing Sihuan[3], Kaysuyuki Kunida[3], Yuichi Sakuma[3], Hidetoshi Uchida[2], Ryoichi Ito[1], Kazuyoshi Saito[2], Machiko Kito[1], Satoru Kawai[1], Kenta Suzuki[3], Junichiro Yoshimoto[3], Tetsuji Yoshikawa[2], Kazushi Yasuda[1]
[1]Aichi Children's Health and Medical Center, Pediatric Cardiology, Aichi-ken,Obu-shi, Japan, [2]Department of Pediatrics, Fujita Health University, Aichi, Japan, Pediatric Cardiology, Aichi, Japan, [3]Graduate School of Science and Technology, Nara Institute of Science and Technology, Nara, Japan, Nara, Japan

Background and Aim: Fulminant myocarditis (FM) is a rare but life-threatening pediatric condition that can rapidly progress to cardiogenic shock and fatal arrhythmias. Identifying prognostic biomarkers is essential for guiding timely and targeted treatment. Although inflammatory cytokines have been implicated in FM pathogenesis, their prognostic value remains insufficiently defined. This study aimed to identify mortality-associated markers by integrating cytokine profiles with clinical variables using a machine learning approach.
Methods: We retrospectively analyzed 21 pediatric FM cases from two tertiary centers between 2012 and 2022. At admission, 37 cytokines and 14 clinical parameters were measured. Partial least squares discriminant analysis (PLS-DA) was used to identify prognostic features, and variable importance in projection (VIP) scores quantified each feature's contribution. Model performance was evaluated using leave-one-out cross-validation. Statistical significance was assessed using the Benjamini–Hochberg method with a false discovery rate of 0.05.
Results: Of the 51 features analyzed, 23 emerged as key predictors, including 20 cytokines and 3 clinical parameters with VIP scores above 1.0. Six cytokines—TNF-α, M-CSF, MIP-1α, IL-8, IL-6, and IL-15—were both statistically significant and highly influential within the model. TNF-α had the highest VIP score, showing a strong association with mortality. Among clinical variables, elevated CK-MB and lactate levels and lower pH were linked to poor outcomes. The machine learning model demonstrated robust performance, achieving an AUC of 0.92, 85.7% accuracy, 92.9% sensitivity, and 71.4% specificity in predicting in-hospital mortality.
Conclusions: Machine learning–based analysis of cytokine profiles may help identify biomarkers relevant to the pathogenesis and prognosis of pediatric FM. TNF-α emerged as a central cytokine associated with mortality, supporting its potential role as a prognostic



biomarker and therapeutic target. These findings highlight the value of integrating cytokine profiling with clinical data to improve early risk stratification in pediatric FM.



FT-185 / #270

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

CARDIAC TROPONINS IN URINE

Matija Bakoš, Daniel Dilber, Dorotea Bartoniček, Marina Mihalec, Dorotea Šijak, Kristina Kljaić, Manca Martinčić, Katija Kragić, Dalibor Šarić
Uhc Zagreb, Zagreb, Croatia

Background and Aim: High-sensitivity cardiac troponins T and I (hsTnT, hsTnI) are well-established markers of myocardial injury in adults and children, yet no previous study has explored their presence in urine as potential indicators of cardiac damage in pediatric patients. Troponins regulate the interaction between myosin and actin within cardiomyocytes in response to intracellular calcium fluctuations, and their highly sensitive detection in serum has transformed the understanding of minor myocardial injury. In infants and young children, serum troponin levels correlate with postoperative cardiac injury severity and may predict outcomes. However, the mechanisms underlying troponin elimination, including possible urinary excretion, remain unclear. This study aimed to assess serum and urinary hsTnT and hsTnI levels in healthy children and in those younger than 24 months undergoing cardiac surgery.
Methods: A total of 90 infants and children under 24 months were included and divided into three groups: (1) patients after intracardiac ventricular septal defect (VSD) repair (experimental group), (2) patients after extracardiac cavopulmonary anastomosis (Glenn procedure), and (3) healthy controls. Serum and urine concentrations of hsTnT and hsTnI were measured at five time points: preoperatively (T0), immediately postoperatively (T1), and on postoperative days 1 (T2), 3 (T3), and 5 (T4). In healthy controls, a first-morning urine sample was obtained for troponin analysis. Renal function was assessed via estimated glomerular filtration rate using creatinine clearance.
Results: The study partially confirmed the initial hypothesis by demonstrating a positive correlation between serum and urinary hsTnT values, whereas hsTnI remained below the detection threshold in over 90% of samples. Renal function significantly influenced urinary hsTnT concentrations, with a negative correlation observed between serum and urinary hsTnT levels and estimated glomerular filtration rate. VSD patients exhibited significantly higher serum hsTnT concentrations during the first three postoperative measurements compared with Glenn patients. Preoperatively, VSD patients with pulmonary hypertension had higher hsTnT levels than those without, a pattern not seen for hsTnI.
Conclusions: Renal function appears to be a major determinant of urinary hsTnT levels after pediatric cardiac surgery, raising concerns about its suitability as a marker of



myocardial injury in this setting. hsTnI was not detectable in urine and is not a viable postoperative biomarker.



FT-186 / #817

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

CARDIOPULMONARY EXERCISE TESTING IN PAEDIATRIC HYPERTROPHIC CARDIOMYOPATHY: FUNCTIONAL PROFILES AND PROGNOSTIC VALUE

Gian Luca Ragazzoni[1], Gabrielle Norrish[2], Nathan Riding[3], Elena Cervi[4], Juan Kaski[2]
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Background and Aim: Despite advances in imaging and genetics, functional assessment in paediatric hypertrophic cardiomyopathy (HCM) remains limited. Cardiopulmonary exercise testing (CPET) offers valuable insights into exercise tolerance and cardiovascular efficiency, but paediatric evidence is scarce, mostly derived from small cohorts, and its prognostic significance in children and adolescents is not well established.

the aim of this study was to characterise CPET profiles in a large paediatric HCM cohort and assess correlations with echocardiographic parameters, BNP levels, and clinical outcomes.
Methods: We performed a retrospective study of 244 paediatric HCM patients evaluated between 2000 and 2024. A total of 587 cycle-ergometer CPETs with an echocardiogram performed within 12 months were analysed. In 103 tests, BNP measured within 3 months was available and its relation to functional indices was analysed. Each CPET was considered independently, and associations with death, heart failure (transplant or HF-related death), and ventricular arrhythmias (sudden cardiac death, cardiac arrest, appropriate ICD shock, or ventricular tachycardia) within 5 years were assessed using Cox regression.
Results: Mean age at first CPET was 12.1±2.8 years; 162 patients were male. Outcomes occurred at a mean of 1.7±1.3 years from the CPET during a mean follow up of 4.5±2.96 years (death in 10 patients, heart transplant in 8, cardiac arrest in 19, apropriate ICD shock in 19, ventricular tachycardia in 18). Aerobic capacity was mildly reduced (VO_2 peak 32.0±10.0 ml/kg/min; Z-score −1.72±2.25), while ventilatory efficiency was preserved (VE/VCO_2 slope 30.8±5.1). VO_2 Z-score negatively correlated with maximal wall thickness ($r=-0.29$, $p<0.001$) and LVOT gradient ($r=-0.22$, $p\leq0.001$). Higher BNP levels were



associated with lower VO_2 Z-score (r=−0.29, p=0.002) and higher VE/VCO_2 slope (r=0.27, p=0.005). A one-unit decrease in VO_2 Z-score was associated with increased 5-year risk of death (HR 0.70, 95% CI 0.64–0.97, p=0.02), heart failure (HR 0.68, 95% CI 0.61–0.77, p<0.001), and ventricular arrhythmias (HR 0.84, 95% CI 0.75–0.94, p=0.001).

Conclusions: Functional capacity is frequently reduced in paediatric HCM, and VO_2 emerges as an independent prognostic marker associated with adverse outcomes, more severe phenotype, and elevated BNP. CPET should be considered as an important tool in the comprhensive functional evaluation and longitudinal monitoring of children and adolescents with HCM.



FT-187 / #776

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

NON INVASIVE MARKERS OF GRAFT INJURY IN A COHORT OF PAEDIATRIC AND ACHD PATIENTS AFTER HEART TRANSPLANT: AN INTERIM ANALISYS

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Background and Aim: Acute myocardial rejection remains one of the major complications after heart transplantation. Surveillance is traditionally based on repeated endomyocardial biopsies, an invasive and resource-intensive procedure associated with procedural risks and, in paediatric patients, general anesthesia. Donor-derived cell-free DNA (dd-cfDNA) has recently emerged as a biomarker of allograft injury. The release of donor-DNA into the recipient's bloodstream reflects graft necrosis, providing a non-invasive marker that has already been validated in adult kidney transplant recipients.
However, its applicability in paediatric/ACHD transplant recipients remains unclear. These populations present unique biological characteristics, given the inherently high and developmentally variable rates of cellular turnover, which may influence baseline dd-cfDNA levels and affect diagnostic thresholds.
This study aims to evaluate the feasibility of dd-cfDNA monitoring in paediatric/ACHD heart transplant recipients, assess the influence of patient-related variables on measured values, and identify an optimal cutoff for this specific population and relevant age subgroups.
Methods: We are conducting a prospective, single-center study enrolling all paediatric/ACHD transplant recipients undergoing endomyocardial biopsy for rejection surveillance. Peripheral blood samples are collected immediately prior to each biopsy and analyzed using the CareDX dd-cfDNA assay. At the time of submission, samples from 50 patients have been obtained, and the first 18 have been processed and included in preliminary analyses.
Results: ROC curve analysis demonstrated strong association between circulating dd-



cfDNA levels and biopsy-proven myocardial rejection. The adult-derived cutoff published in literature showed adequate diagnostic performance in our cohort (sensitivity 80%, specificity 77%). Applying the Youden index, we identified an empirical optimal cutoff of 0.37, which achieved excellent diagnostic accuracy (AUC 0.95; sensitivity 100%, specificity 91%).

Due to the predominance of adolescent and young adult patients with full pubertal maturation among the processed samples, age-stratified subgroup analyses could not yet be performed.

Conclusions: Preliminary results indicate that dd-cfDNA is a promising non-invasive biomarker for rejection monitoring in paediatric/ACHD heart transplant recipients. Nonetheless, the optimal cutoff in younger patients may differ from adult reference values. Completion of the full cohort analysis will help define age-appropriate thresholds and clarify the potential confounding impact of growth-related changes in cellular turnover. Larger, multicenter studies will be required to validate these preliminary findings.



FT-188 / #797

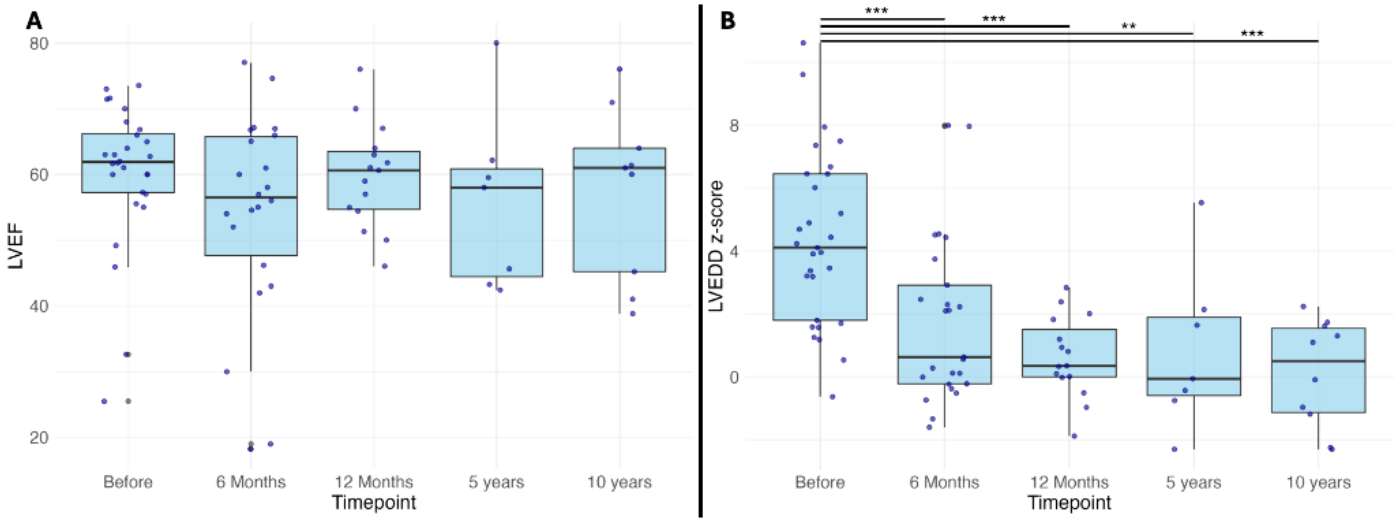
FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

MYOCARDIAL RECOVERY AFTER MITRAL VALVE SURGERY IN CHILDREN WITH MARFAN SYNDROME: A MULTICENTRE EUROPEAN STUDY.

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Background and Aim: Patients with Marfan syndrome (MFS) are at increased risk of ventricular dysfunction and arrhythmias. Volume overload being poorly tolerated, heart failure (HF) may develop earlier. Nonetheless, surgical management of mitral valve (MV) insufficiency typically follows standard pediatric guidelines. This study evaluated surgical characteristics, postoperative outcomes, and long-term cardiac function in children with MFS undergoing MV-surgery.
Methods: We performed a retrospective multicentre study across six centres in Belgium, Spain, Norway, and the United Kingdom, including 31 children with MFS (19 [61.3%] females, median age 11.8yrs, 5 [16.1%] early-onset MFS) who underwent MV-surgery between 2002–2024. Data were collected on patient history, surgical details, and echocardiographic parameters (before surgery and at 6months, 1year, 5years, and 10years postoperatively).
Results: Among 31 children, 77.4% underwent MV-plasty with annuloplasty, 12.9% plasty without annuloplasty, and 9.7% mechanical MV-replacement. Concomitant procedures were performed in 61.3%. Short-term complications included urgent reintervention in 12.9%, arrhythmia in 16.1% and infection in 12.9%. Median ICU and hospital stays were 3 and 10 days, respectively. During follow-up (total 107 patient-years), 9.7% required MV-reintervention, 29% developed HF with 22.2% needing heart transplantation, and 6.4% had arrhythmias. Mortality was 19.4%, with one-third occurring within 3 months postoperatively. Early-onset MFS accounted for 50% of deaths, significantly higher than the

16% prevalence in the rest of the cohort (p=0.04). Children who developed HF had a significantly larger left ventricular end-diastolic diameter (LVEDD)(median z-score 6.5 [IQR 4.9–7.5] vs 3.3 [IQR 1.6–4.4], p=0.001) and a trend toward lower left ventricular ejection fraction (LVEF)(58.5% [IQR 49.8–62.1] vs 62.9% [IQR 60.0–67.6], p=0.08). Using ROC-analysis, an LVEDD z-score >4.0 predicted HF during follow-up with 100% sensitivity and 70% specificity (AUC 0.861). Postoperatively, LVEF remained stable, whereas LVEDD decreased significantly within 6 months (p<0.001) and remained stable thereafter.



Conclusions: MV-surgery in children with MFS stabilizes postoperative ventricular function and reduces ventricular dimensions, suggesting partial myocardial recovery. However, LVEF does not significantly improve, and nearly one-third still develop postoperative HF or ventricular dysfunction. Children with pronounced preoperative ventricular dilation remain at elevated risk of HF, emphasizing the need for earlier intervention and long-term tailored follow-up.



FT-189 / #528

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

EARLY RIGHT VENTRICULAR REMODELING IN AN EXPERIMENTAL MODEL OF PULMONARY REGURGITATION

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Background and Aim: Pulmonary regurgitation (PR) results in chronic right ventricular (RV) volume overload and initiates tissue remodeling. While left ventricular (LV) remodeling has been extensively characterized, RV responses to volume overload remain insufficiently investigated. This study aimed to characterize early molecular and structural RV remodeling in an experimental porcine model of PR.
Methods: Twelve one-month-old piglets were randomly assigned to PR or control groups. PR was surgically induced by placing external plication sutures along the lateral hemi-circumference of the pulmonary valve cusps; controls underwent a sham procedure. Ten weeks later, PR severity was quantified by cardiac MRI. Hearts were then harvested for histological and molecular analyses. Gene expression profiling was performed using qRT-PCR, targeting fibrosis-related, inflammation-related, and fetal gene program markers. Tissue remodeling was assessed by Picro-Sirius Red (PSR) staining for fibrosis and Wheat Germ Agglutinin (WGA) staining for cardiomyocyte hypertrophy.
Results: PR and RV volume overload could reproducibly be induced, as quantified by cardiac MRI. COL1A2 expression was decreased in the RV, while both COL1A2 and COL3A1 were reduced in the LV. MMP-2 and MMP-9 expression remained unchanged; however, TIMP1 and TIMP3 were downregulated in both ventricles. TGF-β1 expression was stable in RV and LV. IL-6 expression was reduced in the RV only. BAD was downregulated in both ventricles. BMPR-2 expression was reduced in the RV. The fetal gene program marker MHC-β was upregulated in both ventricles. ANP and BNP expression levels were largely unchanged, except for decreased ANP in the LV. Histological analysis revealed no significant fibrosis on PSR staining but showed RV hypertrophy on WGA staining,



consistent with early volume overload.

Conclusions: PR-induced RV volume overload initiated early remodeling processes that extended beyond the RV and involved the LV, underscoring the close functional and molecular interdependence of both ventricles. Despite the intervention targeting only the RV, both ventricles showed early alterations in extracellular matrix- and fetal-gene-related pathways. The absence of fibrosis and the unexpected reduction of proapoptotic signaling markers such as BAD suggest that the animals remained in a compensated early phase of volume overload. These findings help understanding early pathophysiological changes in patients with PR.



FT-190 / #646

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

USING WEARABLE TECHNOLOGY TO MONITOR EXERCISE CAPACITY IN CHILDHOOD HYPERTROPHIC CARDIOMYOPATHY

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Background and Aim: The assessment of symptoms and exercise capacity in childhood hypertrophic cardiomyopathy (HCM) is challenging. Cardiopulmonary exercise testing (CPET) is recommended but is resource-intensive and often difficult to perform in younger children. Wearable technology could provide an alternative assessment of symptomatic status and exercise capacity.
Methods: 40 children (6-18 years) with HCM used a wearable device (Garmin watch) for 31 days to document daily activity levels. Activity data were correlated with symptoms, cardiac phenotype and CPET results. Patient acceptability was assessed through end of study questionnaires.
Results: Median age at recruitment was 14 years (IQR 10,16). Nine patients (22.5%) were classified as overweight and 7 (17.5%) as obese, according to their BMI centiles. Thirty-three (83%) had asymmetric hypertrophy [maximal left ventricular (LV) wall thickness (MLVWT) Z-score 12.1+/- 7.1], 12 (30%) had LV outflow tract obstruction (n=12, 30%) and 13 (30%) diastolic impairment. Nineteen patients (47.5%) were symptomatic [15 (38%) NYHA class >=II] and 20 (50%) had an implantable cardiac defibrillator. The wearable device was worn for a mean of 22 days+/-10 (range 1-31) with a median daily wear time of 17.2 hours (IQR 12, 20.9). Average daily step count was 7,213+/- 2,473 (range 1,623 - 15,132). Only 6 (15%) met recommended >10,000 daily steps. Daily step count was inversely correlated with age (R -0.478, p<0.002) and lower in those with symptoms (6,255+/-2,218 Vs 8,033+/-2,431; p=0.023) or an ICD (6,369+/-2,706 vs 8,014+/-1,976; p=0.036). Step count was positively correlated with peak VO2 (R 0.653, P <0.001) but there was no correlation between imaging phenotype including MLVWT, outflow tract gradient or measures of diastolic/systolic function. Patients and family found wearable technology easy to use and an accessible method of additional monitoring.
Conclusions: Most patients with childhood HCM do not meet recommended daily activity levels. Mean daily step count correlates well with CPET measures of cardiorespiratory



fitness but was not associated with clinical features of disease severity, suggesting other non-disease related factors may be limiting daily activity. Wearable technology could be a useful adjunct for monitoring patients exercise capacity and reduce the need for labour and time intensive CPET assessment.



FT-191 / #99

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

NATURAL WAVE VELOCITY AS A MARKER OF FIBROSIS IN A REVERSIBLE RIGHT VENTRICULAR PRESSURE OVERLOAD MODEL

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Background and Aim: Right ventricular (RV) pressure overload, commonly observed in conditions such as tetralogy of Fallot or pulmonary hypertension drives adverse RV remodeling. Identifying irreversible remodeling processes and determining optimal timing for therapeutic interventions remain critical clinical challenges in congenital heart diseases. This study aimed to assess natural wave velocity (NWV) as a marker of RV myocardial stiffness in a rat model of RV pressure overload and to explore its potential for reversibility following pressure unloading.
Methods: Twenty rats underwent PAB, and six sham-operated rats served as controls. After 3 weeks, half of the PAB rats were debanded to simulate pressure unloading, while the other half remained banded until 6 weeks. Conventional echocardiography and ultrafast ultrasound were performed preoperatively, early post operatively, at 3 weeks and at 6 weeks. All animals underwent terminal evaluation at 6 weeks, followed by histological assessment.
Results: NWV increased shortly after PAB and continued to rise with sustained pressure overload. Following PAB reversal, NWV remained elevated despite normalization of conventional echocardiographic morphological and functional parameters. Notably, NWV stopped increasing after debanding, whereas it continued to rise in the kept banded group. A strong correlation was observed between RV NWV and histological fibrosis content.
Conclusions: NWV outperformed other functional and morphological parameters in detecting fibrosis-related changes in pressure-overload conditions. Early identification of elevated NWV may guide timely interventions, potentially preventing irreversible RV damage and optimizing patient outcomes.



FT-192 / #322

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

LONGITUDINAL EVALUATION OF LYMPHATIC ABNORMALITIES IN NOONAN SYNDROME AND MOSAIC RASOPATHIES USING SEQUENTIAL DYNAMIC CONTRAST-ENHANCED MAGNETIC RESONANCE LYMPHANGIOGRAPHY

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Background and Aim: Central conducting lymphatic anomalies (CCLAs) are common in patients with RASopathies, particularly Noonan Syndrome (NS), however, pathogenic mechanisms underlying lymphatic disease remain incompletely characterized in this population. Advances in imaging, including T2-weighted magnetic resonance lymphangiography (MRL) and particularly dynamic contrast-enhanced (DC) MRL, have facilitated more detailed characterization of CCLA in NS. On T2-weighted MRL, pulmonary perfusion abnormalities and pleural effusion are frequently identified, whereas DCMRL commonly demonstrates intercostal reflux and thoracic duct abnormalities. This study aimed to characterize the progression and imaging features of central lymphatic abnormalities in RASopathies through longitudinal T2-weighted MRL and DCMRL in patients with NS and mosaic RASopathy undergoing specialized lymphatic treatments.
Methods: We conducted a retrospective study of 14 individuals with RASopathies and lymphatic disease who underwent sequential T2-weigthed MRL and DCMRL. The cohort comprised eight individuals with NS, seven of whom had congenital heart disease, and six individuals with mosaic RASopathies. Progression of central lymphatic abnormalities and responses to targeted therapies, including MEK inhibition and lymphatic interventions, were assessed using a lymphatic scoring system applied to the longitudinal imaging dataset.



Results: Baseline lymphatic imaging revealed extensive central lymphatic abnormalities in all individuals, including thoracic duct pathology and abnormal lymphatic perfusion with edema across the supraclavicular, mediastinal, pulmonary, mesenteric, and retroperitoneal regions, along with pleural effusions and ascites. Following targeted treatment, significant improvement in lymphatic imaging findings, defined as a reduction of ≥ 2 points in lymphatic score, was observed in seven individuals under 15 years of age, all of whom underwent treatment with MEK inhibition ($p = 0.08$).

Conclusions: The trend toward greater improvement in individuals with NS and mosaic RASopathy younger than 15 years did not reach statistical significance compared with older patients, but superior treatment responses in the younger RASopathy population cannot be excluded.



FT-193 / #813

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

EXPLORING CLINICAL FEATURES INDICATING HIGH RISK FOR ADVERSE OUTCOME IN HYPERTROPHIC CARDIOMYOPATHY ASSOCIATED WITH NOONAN SYNDROME AND OTHER RASOPATHIES

Ingegerd Östman-Smith[1], Lidia Ziolkowska[2], Katarzyna Łuczak-Woźniak[3], Eszter Szepesvary[4], Gunnar Sjöberg[5], Jenny Alenius Dahlkvist[6], Eva Fernlund[7]
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Background and Aim: Several recent studies have highlighted the fact that there are hardly any patients with hypertrophic cardiomyopathy associated with Noonan syndrome and other Rasopathies (Ras-HCM) that are offered implantation of a primary prophylactic ICD, perhaps not surprising as Ras-HCM are explicitly excluded from use of HCMRisk-Kids, PRIMACY-SCD and ESC HCM Risk-SCD algorithms. Furthermore, patients with Ras-HCM also have a high early mortality in congestive heart failure, where new treatments with anti-cancer drugs like trametinib and everolimus in selected cases can be life-saving. Thus early identification of patients at high risk is important.
Methods: A multinational multi-centre study (Sweden, Poland, England) collected 97 patients with Ras-HCM, predominantly associated with Noonan syndrome, age at diagnosis 0.3 [0.1-2.6]y with a median follow-up of 13.5y. There were 10 deaths associated with early heart failure (CCF-death), at age 0.8 [0.1-2.6]y, and 13 sudden cardiac deaths (SCD), occurring at 13.0 [9.0-21.5]y of age.
Results: In whole group 59% had left ventricular outflow obstruction (LVOTO) and 48% had right ventricular outflow-obstruction (RVOTO), but obstruction was overrepresented with CCF-death (80% LVOTO, and 70% RVOTO), and under-represented with SCD (47% LVOTO and 31% RVOTO). Maximal wall thickness Z-scores were high already at diagnosis for patients with subsequent SCD, 25.1 [16.8-32.6] as compared both with survivors 14.3 [8.1-19.0] and CCF-deaths, 12.7 [9.6-21.3], whereas only posterior wall Z-score separated CCF-deaths from survivors, 8.1[3.0-12.8] versus 4.4 [1.5-6.9]. Still less overlap separating



CCF-deaths from survivors is seen in free left ventricular wall-to-cavity ratio, 0.57 [0.38-0.72] versus 0.32 [0.26-0.40] suggesting that cavity size may be important, and on Cox-hazard analysis left ventricular wall-to-cavity ratio was the only significant predictor of CCF-death, p=0.002. ECG-parameters did not predict CCF-death, but on univariate Cox-hazard both limb-lead amplitudes (p<0.001), QTc (p<0.001), 12-lead amplitude-duration sum (p<0,001) and ECG Risk-score (p=0.002) showed significant prediction of SCD. At diagnosis maximal wall thickness Z-score (p=0.014), septum-to cavity-ratio (p=0.004) and HCMRisk-Kids score (p=0.021 were also associated with risk of subsequent SCD, but PRIMACY-SCD score was not significant (p=0.70).

Conclusions: There are several parameters that show promise of predicting risk for SCD in Ras-HCM, and at least one that indicates high risk for CCF-death.



FT-194 / #127

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

CLINICAL FEATURES AND OUTCOMES OF PEDIATRIC RESTRICTIVE CARDIOMYOPATHY

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Background and Aim: Pediatric restrictive cardiomyopathy (RCM) is an extremely rare myocardial disease characterized by diastolic dysfunction, with a 2-year transplant-free survival rate of 40% in the North American registry. No established treatment exists other than heart transplantation. RCM accounts for 15% of pediatric heart transplants in Japan; however, some patients remain stable with medical therapy alone, underscoring the need to clarify its clinical features and improve risk stratification. This retrospective cohort study aimed to define the clinical characteristics and outcomes of pediatric RCM.
Methods: We retrospectively analyzed clinical records of patients diagnosed with RCM before 15 years of age who were managed at The University of Osaka Hospital between 1998 and 2005. Genetic testing and echocardiographic strain analyses were performed for risk stratification.
Results: The study cohort included 52 pediatric patients with RCM (26 males and 26 females). The median age at diagnosis was 6 years (interquartile range [IQR], 2–8). The diagnosis was prompted by school heart screening (n=24, 46%), heart failure symptoms (n=19, 37%), or incidental chest X-ray findings (n=8, 15%). Over a median follow-up of 8.5 years (IQR, 4.8–13), 26 patients (50%) underwent heart transplantation, 4 (8%) died before transplantation, 12 (23%) remained on the waiting list, and 10 (19%) continued medical therapy. Overall survival rates at 5, 10, 15, and 20 years were 96%, 96%, 96%, and 82%, respectively. Transplant-free survival rates at 5, 10, 15, and 20 years were 45%, 39%, 39%, and 19%, respectively. Among the 28 patients who underwent genetic testing, pathogenic variants were identified in 14 (50%) and were associated with significantly worse transplant-free survival (log-rank test, $p<0.05$). The most frequent pathogenic gene was *TNNI3* (n=9). Patients diagnosed through school screening had better outcomes than those diagnosed for other reasons (log-rank test, $p<0.05$). No significant differences in hemodynamic parameters at diagnosis were observed between patients who died or underwent transplantation and those who remain alive on medical therapy. However, left atrial diastolic strain at diagnosis effectively predicted poorer transplant-free survival (log-rank test, $p<0.01$).



Conclusions: Pediatric RCM carries a poor prognosis without transplantation. Genetic testing and left atrial strain analysis may help predict clinical outcomes.



FT-195 / #116

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

MYH6 IN CONGENITAL HEART DEFECTS: A GENOTYPE-PHENOTYPE CHARACTERIZATION IN A FRENCH COHORT

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Background and Aim: Congenital heart defects (CHD) are among the most frequent congenital anomalies and represent a significant source of morbidity and mortality in infants. Both genetic and environmental factors are involved, and variants in the *MYH6* are potential major genetic factors. The objective of the present study was to describe cardiac phenotypes in individuals with CHD and *MYH6* variants.
Methods: We included individuals with CHD and a *MYH6* variant identified in four French genetics laboratories. Clinical and family data were collected.
Results: Of the 29 individuals included, 20 (69%) had a principal phenotype of left heart defect: hypoplastic left heart syndrome (n=11, 37.9%), left heart obstruction at multiple sites (n=6, 20.7%), and coarctation of aorta (n=3, 10.3%). Nine individuals (31%) had other CHD, such as tetralogy of Fallot, pulmonary stenosis, and septal defects. Prevalence of persistent left superior vena cava (LSVC) was much higher here (n=11, 37.9%) than in literature (0.31%–5.9%). Most of the 19 *MYH6* variants were heterozygous, missenses and inherited. Family screening demonstrated incomplete penetrance and variable phenotypic expressivity.
Conclusions: *MYH6* variants are associated to various CHD with a predominance of left



heart defects and persistent LSVC. Our findings support broad indication for the molecular screening of *MYH6* in CHD - particularly when familial recurrence is uncertain.



FT-196 / #556

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

GENETIC ANALYSIS AND CLINICAL OUTCOMES OF NONCOMPACTION CARDIOMYOPATHY IN FETUSES AND CHILDREN

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Background and Aim: To study the genetics and clinical outcomes of Noncompaction Cardiomyopathy in Fetuses and Children.
Methods: This retrospective study (Oct 2019–Dec 2025) included all fetuses and children with genetically confirmed noncompaction cardiomyopathy. Their clinical outcomes were analysed and reported.
Results: During the study, 2953 fetal echocardiograms were conducted. Six fetuses and four children were included, with genetic mutations identified in 5/6 fetuses [MT-ATP6, SCN5A (n=2), TPM1, KCNH2] and four children (MIB1, ACTN2, TNNT2, MYBPC3). Fetal findings included cardiomegaly (n=6), ventricular tachycardia (n=1), long QT (n=2), 2:1 AV block (n=1), torsades de pointes (n=1), and hydrops fetalis (n=2); all children showed symptoms of congestive heart failure. Seven out of nine cases involved female patients, including five postnatal cases, one identified through autopsy, and three following pregnancy termination. One fetus underwent autopsy and histopathology examination. Three fetuses with associated heart defects [ventricular septal defect (n=3) and right aortic arch (n=1)], experienced 2:1 AV block, with two cases identified prenatally and one after birth. Among the prenatal cases: fetal demise (n=2), termination (n=2), awaiting delivery (n=1), and a fetus with associated muscular ventricular septal defect has reached two years of age with normal left ventricular function, remaining stable following device closure and ongoing supportive care. Of the five children studied, including a surviving prenatal case, an infant with a MYBPC3 mutation expired at one month of age. This infant was a sibling of a prenatally diagnosed case in which no genetic evaluation was performed. Of the four surviving children, three regained normal LV function with supportive care. Of the six prenatal cases, four showed involvement of both ventricles, which is linked to rhythm disorders and poorer outcomes. In contrast, postnatal cases displayed involvement of only the left ventricle.
Conclusions: Females exhibit greater involvement. Cases diagnosed prenatally, particularly those with biventricular involvement and associated rhythm disorders,



demonstrated a more adverse prognosis compared to postnatal cases. In contrast, postnatal cases were associated with better short-term outcomes.



FT-197 / #355

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

A MULTI-GENE REGENERATIVE STRATEGY TO BOOST CARDIOMYOCYTE PROLIFERATION AND ANGIOGENESIS FOLLOWING MYOCARDIAL INJURY

Agustina Scharn[1,2,3], María Del Rosario Bauzá[2], Pilar Ferrer[2], Alejandro Simonin[4], Francisco Cimbaro[2], Alberto Crottogini[2], Mariano Belaich[4], Alice Tomas[1,3], Agnese Lauroja[1,3], Anna Maria Tolomeo[1,3], Daniela Olea[2], Giovanni Di Salvo[1,3]
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Background and Aim: Cardiovascular disease remains the leading cause of mortality worldwide, with myocardial infarction (MI) and the resulting loss of cardiomyocyte (CM) representing one of its most severe consequences. Among emerging regenerative strategies to overcome this, is the stimulation of CM cell cycle re-entry to promote cell proliferation. Here, we evaluated the in vitro effects of FGF6, miR302d and miR19b overexpression on CM proliferation and angiogenesis in neonatal rat CMs (NRCMs), and initiated in vivo assessment of this approach in a rat model of acute MI (AMI).
Methods: NRCMs were transduced with a baculoviral vector encoding FGF6, miR302d and miR19b (Bv-FGF6-miR302d-miR19b) at MOI 200. Transgene expression was evaluated at 2 and 5 days' post-transduction (PT). Cell proliferation was assessed by MTS assay, while gene expression and immunocytochemistry were used to characterize molecular responses. Angiogenic potential was analyzed through tubulogenesis assays at the same time points. In vivo studies in a rat MI model are currently underway to examine early myocardial responses to Bv-FGF6-miR302d-miR19b administration via RT-qPCR and immunohistochemical analyses.
Results: Cyclin D1 and cyclin A2 transcripts were markedly upregulated in cardiomyocytes transduced with Bv-FGF6-miR302d-miR19b compared with Bv-Null at both 2 and 5 days' post-transduction. MTS assays showed a consistent increase in proliferative activity in cells exposed to conditioned media from treated cardiomyocytes. Immunocytochemistry confirmed a significantly higher proportion of $Ki67^+$ CMs at both time points. Tubulogenesis assays further showed increased ring formation, indicating an enhancement of angiogenic potential.
Conclusions: Multi-gene overexpression induces robust pro-proliferative and pro-angiogenic response in CM highlighting its potential as a regenerative strategy to counteract myocardial injury. These in vitro findings provide a strong foundation for the



ongoing in vivo studies, which will be critical to determine the therapeutic relevance and cardiac repair potential of this approach.



FT-198 / #462

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

ELEVATED FECAL ALPHA1-ANTITRYPSIN CONCENTRATION IN ASYMPTOMATIC FONTAN PATIENTS IS A RISK FACTOR FOR THE DEVELOPMENT OF PROTEIN-LOSING ENTEROPATHY: A REPORT FROM THE FONTAN CARE NETWORK.

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Background and Aim: The clinical significance of asymptomatic elevation of fecal alpha-1 antitrypsin (eA1AT) concentration, a marker of increased enteric protein-loss, in Fontan patients is unknown. We sought to assess clinical factors associated with eA1AT, and whether Fontan patients with eA1AT are at risk for development of protein-losing enteropathy (PLE) during follow-up.
Methods: A retrospective chart review was performed of Fontan patients who had been screened for enteric protein-loss by measuring fecal alpha-1 antitrypsin (fA1AT) levels. Patients with PLE at baseline were excluded. Associations between demographics, clinical characteristics and laboratory parameters were explored. Serum NT-proBNP and markers of systemic inflammation [red cell distribution width (RDW), and neutrophil-lymphocyte ratio (NLR)] were reviewed. RDW of > 14.5% was defined as elevated (eRDW).
Results: Forty-five Fontan patients (31.1% female; mean age 11.8 ± 6.9 years) were screened. An increased fecal A1AT level (> 0.40 g/l or > 500 ug/g, depending on the assay used) was found in 16 patients (35.6%), and eRDW was observed in 11/42 patients (26.2%). There were no significant differences in demographics, clinical data and laboratory parameters between Fontan patients with and without eA1AT (all > p 0.05). However, patients with eA1AT were more likely to have systemic inflammation (eRDW; p = 0.042). Furthermore, we found strong correlations between fA1AT and RDW (r = 0.453, p = 0.014), and between RDW and NTproBNP (r = 0.468, p = 0.002).There was an inverse relationship between NTproBNP and serum protein levels (r – 0.321, p = 0.043). Follow-up data on enteric protein-loss were available in 8/16 (50%) patients with eA1AT. eA1AT normalized in 3 patients (median follow-up 14 months, range 8 – 39 months), remained elevated in 2 patients, and PLE developed in 3 patients (37.5%), 8,10 and 36 months after the first eA1AT level was noted, respectively. None of the patients without eA1AT at baseline developed PLE.



Conclusions: Asymptomatic eA1AT seems a risk factor for the development of PLE in Fontan patients. Routine testing of Fontan patients for asymptomatic eA1AT might be a promising screening strategy for detecting preclinical PLE.



FT-199 / #1262

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

SERUM CATECHOLAMINE LEVELS AS BIOMARKERS IN CHILDREN WITH PULMONARY ARTERIAL HYPERTENSION

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Background and Aim: Pediatric pulmonary arterial hypertension (PAH) is a rare and progressive disease marked by increased pulmonary vascular resistance and right ventricular overload, ultimately resulting in heart failure. Accurate monitoring of disease severity is essential, and risk stratification is the cornerstone of current treatment strategies. However, optimal biomarkers for such risk stratification are yet to be determined. Catecholamines (noradrenaline, adrenaline, and dopamine) are released in response to sympathetic activation and hemodynamic stress. This study investigates whether plasma catecholamine levels can serve as biomarkers for disease severity and transplant-free survival in children with PAH.
Methods: A retrospective analysis was performed in the prospective Dutch National Registry for Pulmonary Hypertension in Childhood, including patients younger than 18 years with PAH. Catecholamine serum levels were included in the standard diagnostic and monitoring work-up. Children with at least one baseline catecholamine measurement were included. Associations between catecholamine levels and disease severity were analyzed using linear regression and linear mixed-effects models for serial measurements. Cox proportional-hazards regression, including time-dependent analyses, evaluated the relationship between catecholamine levels and transplant-free survival, with Kaplan-Meier curves and log-rank testing used to illustrate outcomes.
Results: A total of 111 children were included in the study. Elevated noradrenaline levels were associated with worse WHO functional class, higher NT-proBNP, increased uric acid levels, elevated heart rate, and reduced TAPSE. In multivariate Cox regression, baseline noradrenaline independently predicted decreased transplant-free survival (HR 1.38, 95% CI 1.14–1.67, $p = 0.001$). Time-dependent analyses with serial measurements further confirmed noradrenaline as a strong predictor (HR 1.55, 95% CI 1.37–1.74, $p < 0.001$). Patients with baseline noradrenaline above 2.775 nmol/L experienced significantly worse transplant-free survival compared to those below this threshold (log-rank $p < 0.0001$). Adrenaline and dopamine levels did not demonstrate consistent associations with outcomes.



Conclusions: In summary, elevated noradrenaline levels independently indicate worse functional status and reduced transplant-free survival in children with PAH, highlighting the potential value of noradrenaline as a minimally invasive biomarker for risk stratification and follow-up in children with PAH.



FT-200 / #100

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

SYSTOLIC AND DIASTOLIC RIGHT VENTRICULAR MYOCARDIAL STIFFNESS BASED ON SHEAR WAVE ELASTOGRAPHY IN PEDIATRIC PULMONARY HYPERTENSION

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Background and Aim: Pediatric pulmonary hypertension (PPH) is a rare yet severe condition, characterized by increased pulmonary arterial pressures and resistance, leading to right ventricular (RV) adaptative changes such as hypertrophy, fibrosis and potentially dysfunction. This study aims to quantify diastolic and systolic RV myocardial stiffness (MS) in PPH patients using ultrasound-based shear wave elastography (SWE), hypothesizing increased RV MS in this group.
Methods: We prospectively recruited 20 pediatric pulmonary hypertension (PPH) patients (mean age = 7.6 ± 6.8 years; WHO Group 1 and 3) and an age-matched population of 20 healthy volunteers (HV). Each participant underwent conventional echocardiography and full cardiac cycle stiffness assessment using ECG-trigged SWE for the RV free wall. Recent cardiac catheterization data (<1 year) was also retrospectively collected for seven PPH patients.
Results: PPH patients exhibited significantly higher peak systolic shear wave velocity (SWV) (4.2 ± 0.89 m/s) and mean diastolic SWV (2.3 ± 0.34 m/s) compared to healthy volunteers (2.92 ± 0.51 m/s and 1.67 ± 0.51 m/s, respectively, $p < 0.01$). Among PPH patients with invasive data, patients with mean pulmonary artery pressure (mPAP) > 20 mmHg had elevated peak systolic (4.6 ± 0.4 m/s) and mean diastolic SWV (2.5 ± 0.35 m/s) compared to those with mPAP < 20 mmHg (3.79 ± 0.6 m/s and 1.8 ± 0.3 m/s, respectively, $p < 0.01$). Similarly, PPH patients with pulmonary vascular resistance index (PVRi) > 3 Wood units·m^2 had elevated peak systolic (4.6 ± 0.4 m/s) and mean diastolic SWV (2.9 ± 0.35 m/s) compared to those with PVRi < 3 Wood units·m^2 (3.5 ± 0.3 m/s and 1.78 ± 0.3 m/s, respectively, $p < 0.01$). Notably, patients hospitalized for right heart failure (n=3/20) exhibited highest peak systolic SWV (5.0 ± 0.2 m/s versus 3.9 ± 0.4 m/s, $p<0.01$) but comparable mean diastolic SWV (2.5 ± 0.3 m/s versus 2.4 ± 0.4 m/s, $p=0.4$) to non-hospitalized patients.
Conclusions: PPH patients exhibit significantly elevated RV MS compared to healthy



controls. This abnormal MS seems to be correlated with well-established risk factors. Further studies need to explore RV MS as a new surrogate for clinical outcomes in PPH patients.



FT-201 / #1535

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

NOVEL DATA-DRIVEN PHENOTYPIC CLUSTERING APPROACH FOR PREDICTING PROGNOSIS IN PAEDIATRIC PULMONARY ARTERIAL HYPERTENSION

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Background and Aim: Early identification of patients at high risk of mortality is pivotal for guiding treatment strategies and optimizing outcomes in paediatric pulmonary arterial hypertension (PAH). Traditional risk stratification may overlook complex patterns across different data modalities. This study aimed to explore a data-driven clustering approach to define phenotypic subgroups and evaluate their association with transplant-free survival in paediatric PAH.
Methods: Patients from the Dutch National Registry for Pulmonary Hypertension in Childhood with a diagnosis of PAH and sufficient data availability were included. Diagnostic data from multiple data modalities was used, including patient demographics, clinical characteristics, haemodynamic measurements, biomarkers, echocardiography, and ECG. The initial dataset was filtered according to data availability, excluding variables with > 50% missing values. For 6-minute walk distance-related variables, a threshold of 60% was applied due to age-related availability. Remaining missing values were addressed using multiple imputation. Gower distance matrices were computed to integrate the different data modalities. K-medoids clustering was applied to identify clusters in two datasets: one including all variables and one including only non-invasive measures, excluding invasive haemodynamic data. Transplant-free survival was analysed using Kaplan–Meier estimates and compared between clusters with log-rank tests.
Results: In total, 121 children with PAH were included, of whom 67 were female, with a median age of 7.0 years (IQR 2.2- 12.9). Analysis of the full dataset, consisting of 75 variables, revealed two distinct phenotypic clusters: Cluster 1 comprised 53 patients and Cluster 2 comprised 68 patients. The clusters differed significantly across multiple data modalities, demonstrating distinct phenotypic profiles. Patients in Cluster 2 had significantly worse transplant-free survival compared with those in Cluster 1 ($p = 0.004$). In the non-invasive dataset comprising 60 variables, Cluster 1 counted 19 patients and Cluster 2 included 102 patients. Patients in Cluster 1 showed poorer prognosis, with a log-rank p-value just above the conventional significance threshold ($p = 0.051$).



Conclusions: In this study, we demonstrated a data-driven clustering approach that identified distinct phenotypic clusters in children with PAH, which were associated with differences in transplant-free survival. These findings highlight the potential of phenotypic clustering to refine risk stratification in paediatric PAH.



FT-202 / #38

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

ATRIAL STRAIN AS A MARKER OF DIASTOLIC DYSFUNCTION IN CHILDREN WITH FONTAN CIRCULATION

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Background and Aim: Fontan circulation in patients with single ventricle (SV) physiology is associated with diastolic dysfunction, a key determinant of long-term morbidity. Conventional echocardiography provides limited insight into atrial mechanics, whereas speckle-tracking echocardiography (STE) enables direct assessment of left atrial (LA) function. This study aimed to evaluate LA strain components in pediatric Fontan patients with single left ventricle anatomy and compare them with healthy controls.
Methods: Left atrial reservoir (LASr), conduit (LAScd), and contractile (LASct) strain were assessed by STE in 22 pediatric Fontan patients and 44 controls. Strain indices were measured relative to R- and P-wave onset, and their correlations with conventional echocardiographic parameters were analyzed to characterize atrioventricular interactions.
Results: Fontan patients showed significantly reduced LASr and LAScd compared with controls ($p<0.0001$), while LASct was relatively preserved. In the Fontan group, LASr and LASr_AC correlated positively with peak mitral inflow velocity at atrial contraction ($r=0.4$, $p<0.05$), and LASr_AC correlated with MAPSE ($r=0.43$, $p=0.046$). LASct_AC was associated with the mitral E/A ratio ($r=0.55$, $p=0.008$). Expected correlations with early diastolic parameters were present in controls but absent in Fontan patients.
Conclusions: Atrial strain analysis in Fontan circulation showed impaired reservoir and conduit function with preserved contractile strain, reflecting compensatory reliance on atrial systole to maintain preload. These indices provide sensitive markers of altered atrioventricular interaction and may serve as prognostic indicators, supporting their



potential role in routine surveillance of this high-risk population. *Acknowledgement*:"This work was supported by the George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu-Mureș Research Grant number 795/6/22.01.2025"



FT-203 / #175

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

MECHANICAL SIGNATURES OF POST-MYECTOMY LBBB IN PEDIATRIC HYPERTROPHIC CARDIOMYOPATHY

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Background and Aim: Septal myectomy is an effective surgical strategy to relieve left ventricular outflow tract obstruction (LVOTO) in pediatric hypertrophic cardiomyopathy (HCM). However, postoperative left bundle branch block (LBBB) is common and may be accompanied by mechanical dyssynchrony. Data describing the mechanical “signature” of post-myectomy LBBB in children remain limited. The aim of this study is to characterize echocardiographic markers of mechanical dyssynchrony in pediatric HCM patients who developed LBBB following septal myectomy.
Methods: We retrospectively reviewed 13 pediatric and young adult patients with obstructive HCM who underwent surgical septal myectomy and subsequently developed LBBB. Echocardiographic assessment included interventricular and intraventricular mechanical dyssynchrony. Interventricular mechanical delay (INTER-VD) was evaluated using pulsed-wave Doppler by measuring the difference between pre-ejection intervals in the pulmonary artery and left ventricular outflow tract. Intraventricular mechanical delay (INTRA-VD) was assessed using M-mode echocardiography. Significant dyssynchrony was defined as INTER-VD >40 ms and INTRA-VD >130 ms. Additional parameters included Simpson LVEF, mitral inflow and tissue Doppler filling indices, and ventricular wall thickness and cavity dimension z-scores. Time from surgery to echocardiographic assessment was recorded.
Results: The cohort included 6 males(46.2%) and 7 females(53.8%). Median weight at assessment was 51.5 kg(IQR 28–63) and median BSA was 1.50 m^2 (IQR 0.99–1.69). The median interval between surgery and echocardiographic assessment was 60 months (IQR 7–70; range 3–136). Median INTER-VD was 40 ms (IQR 31–50; range 3–66), and 6/13 patients(46.2%) exceeded the >40 ms threshold. Median INTRA-VD was 82 ms (IQR 58–115;



range 13–365), with 3/13 patients (23.1%) demonstrating marked intraventricular dyssynchrony(INTRA-VD >130 ms). Despite mechanical delay signals, global systolic function was largely preserved: median Simpson LVEF was 70% (IQR 63–72; range 50–78), and only one patient had LVEF of 50%. Septal thickness remained increased (IVSD z-score median 5.9; IQR 4.8–6.2), while LV cavity dimensions were generally within normal ranges (LVIDd z-score median 0.2; IQR −0.69 to 0.8).

Conclusions: In pediatric HCM patients with post-myectomy LBBB, mechanical dyssynchrony is measurable, with nearly half showing significant interventricular delay and a subset demonstrating pronounced intraventricular dyssynchrony (INTRA-VD >130 ms). Global systolic function remained preserved in most patients. Systematic dyssynchrony surveillance may help identify patients requiring closer longitudinal follow-up.



FT-204 / #1187

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

TWENTY-YEAR STRUCTURED HEPATIC SURVEILLANCE IN FONTAN PATIENTS: EVIDENCE OF PROGRESSIVE REMODELING IN A CONTEMPORARY COHORT

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Background and Aim: Fontan-associated liver disease (FALD) is an increasingly recognized major long-term complication of Fontan circulation, yet clinical data describing hepatic involvement in pediatric and young-adult are scarce. We aimed to characterize hepatic findings in a contemporary Fontan cohort and explore markers of early structural remodelling.
Methods: We performed a retrospective observational study including all consecutive Fontan patients followed at a tertiary pediatric center (2004–2024) within a structured hepatic surveillance program. Demographic, clinical, biochemical, echocardiographic, ultrasound (including Doppler), elastography, and histologic data were reviewed. Non-parametric statistics were used for correlation and subgroup analyses.
Results: A total of 56 Fontan patients (median age 21 years; time since Fontan 14.7 years) were included. The majority were male (55%), had a systemic dominant left ventricle (64%), underwent an extracardiac conduit Fontan (96%), and were in NYHA class I (83%). Median laboratory values were: AST 32 U/L (IQR 25–39), ALT 28 U/L (IQR 23–44), GGT 59 U/L (IQR 46–90), platelets 183×10^9/L (IQR 153–240), albumin 43.9 g/L (IQR 41.4–46.9), and APRI 0.50 (IQR 0.30–0.60). Ultrasound identified structural changes in nearly half of patients: abnormal echotexture (43%), hepatomegaly (20%), splenomegaly (14%), and hepatic nodules (11%). Elastography (n=5) showed uniformly elevated liver stiffness (median 16.3 kPa), compatible with congestive hepatopathy. Liver biopsy in three patients demonstrated chronic congestion and fibrosis consistent with FALD. Time since Fontan correlated with worsening echotexture ($\rho=0.31$, $p=0.046$) and showed a near-significant association with



higher GGT (ρ=0.27, p=0.056), suggesting progressive hepatic remodelling. Splenomegaly was accompanied by trends toward lower platelets and higher APRI and ALP. Persistent fenestration was associated with lower GGT, less splenomegaly, and absence of nodularity, suggesting a potential protective hemodynamic effect.

Conclusions: Hepatic abnormalities were common despite young age and excellent functional status, demonstrating that clinically silent but progressive liver remodelling may begin early after Fontan completion. The association between longer Fontan duration, rising GGT, and worsening echotexture underscores the need for standardized, multimodal hepatic surveillance from childhood into adulthood. Our findings support routine ultrasound-based structural assessment in long-term follow-up, as these changes may signal early FALD progression.



FT-205 / #23

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

COMPARATIVE OUTCOMES OF STAGE 1 INTERVENTIONAL EXTRACARDIAC FONTAN VERSUS CONVENTIONAL BIDIRECTIONAL GLENN: REAL-WORLD EXPERIENCE FROM A SOUTH ASIAN TERTIARY CENTRE

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Background and Aim: Single ventricle palliation remains one of the most complex challenges in paediatric cardiology. The conventional staged pathway involves bidirectional Glenn followed by surgical Fontan completion, which carries risks of redo sternotomy and cardiopulmonary bypass. Interventional Extracardiac Fontan (iECF) is a novel hybrid modification wherein a dormant extracardiac conduit is surgically placed at the Glenn stage (Stage 1) and later activated by transcatheter stenting (Stage 2), thus avoiding a second open-heart surgery. This study aimed to compare short-term outcomes of Stage 1 iECF with conventional BDG in a resource-constrained setting.
Methods: We conducted an ambispective, single-centre study including 238 patients (194 BDG, 44 Stage 1 iECF) who underwent staged palliation at our centre between January 2019 and December 2024. Children aged 0–25 years with anatomical or functional single ventricle were eligible; patients undergoing 1.5 ventricle repair, Kawashima, hemi-Mustard and off-CPB BD Glenn were excluded. Detailed perioperative, intensive care, and follow-up data were analysed, with emphasis on mortality, complications, vasoactive-inotropic score, ICU recovery and feasibility of Fontan completion.
Results: iECF patients were significantly older (mean 11.3 years vs. 2.8 years, $p<0.001$), with higher rates of prior surgery (31.8% vs. 14.9%) and redo sternotomy (18.2% vs. 3.1%). Operative times (CPB, cross-clamp) and need for adjunct procedures were higher in iECF. Despite this, in-hospital mortality was low and comparable (4.5% iECF vs. 2.1% BDG, $p>0.9$). ICU stay was slightly longer in iECF (median 5 vs. 4 days), but hospital stay and ventilation duration did not differ significantly. ECMO use and VIS ≥15 strongly correlated with mortality, whereas surgical strategy did not. At follow-up of 44 iECF patient, 17 have also underwent successful transcatheter Fontan completion without mortality or major complications, demonstrating technical feasibility and safety.
Conclusions: Stage 1 iECF is a safe and effective alternative to BDG, achieving non-inferior early outcomes despite older, anatomically complex candidates. It offers the unique advantage of CPB-free, catheter-based Fontan completion, reducing reoperation risk. These findings support the feasibility of iECF as a scalable, modular strategy for single



ventricle palliation, particularly in low- and middle-income settings where delayed referrals and limited resources remain challenges.



FT-206 / #247

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

POPULATION PHARMACOKINETIC MODELING OF TADALAFIL IN PEDIATRIC PULMONARY HYPERTENSION TO APPLY TO PHARMACODYNAMIC ANALYSES

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Background and Aim: Tadalafil (TAD) is approved in Europe for treating pulmonary arterial hypertension (PAH) in children aged ≥2 years, but it is not reimbursed in Japan, and optimal pediatric dosing and target plasma concentrations remain unclear. We previously developed a population pharmacokinetic (PPK) model using sildenafil concentrations. This study aimed to establish a new PPK model for tadalafil to characterize its pharmacokinetics in Japanese children with pulmonary hypertension and to estimate weight-based dosing required to match adult exposure. In addition, we explored sensitive PAH biomarkers for TAD concentrations using pharmacodynamic (PD) modeling.
Methods: Pediatric patients with pulmonary hypertension treated with tadalafil were retrospectively identified. A total of 130 concentration–time points from 64 patients were included.A stepwise approach was applied for covariate selection. Model performance was evaluated using prediction-corrected visual predictive checks (pcVPC). For the PD analyses, relationships between PD markers (PVRI, mPAP, LAP, Qp) and the time after the treatment of TAD were drawn and the most sensitive marker was selected. Then, PD models were developed with a covariate of TAD steady state concentrations (Css) which were obtained from the presented PPK model analysis.
Results: The final model adequately described observed concentrations, with pcVPC showing the majority of measured values falling within the 90% prediction interval. To achieve an area under the curve (AUC) equivalent to that of adults receiving 20 mg TAD (AUC 11,500 ng·h/mL), the predicted oral dose required was approximately 1–2 mg/kg for pediatric patients. However, simulations indicated that these weight-based doses may yield maximum plasma concentrations (C_max) exceeding those observed in adults administered 40 mg. For the PD model analyses, mPAP was selected as the most sensitive PD marker. The TAD Css was incorporated as the significant covariate of the PD model for mPAP.
Conclusions: Compared with sildenafil, tadalafil more readily achieves adult-equivalent exposure in children, suggesting that lower mg/kg doses may be sufficient. Although the



potential for elevated C_max warrants careful monitoring for adverse effects, these findings support tadalafil as a potentially more effective option than sildenafil for pediatric pulmonary hypertension. By using the PPK model, PD model of mPAP was developed with the significant covariate of TAD Css.



FT-207 / #1400

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

QUANTITATIVE PROFILING OF THE PULMONARY ARTERIAL BED USING CTA-THORAX SHOWS DISTINCT VOLUMETRIC PATTERNS IN PULMONARY ARTERIAL HYPERTENSION OF CHILDHOOD

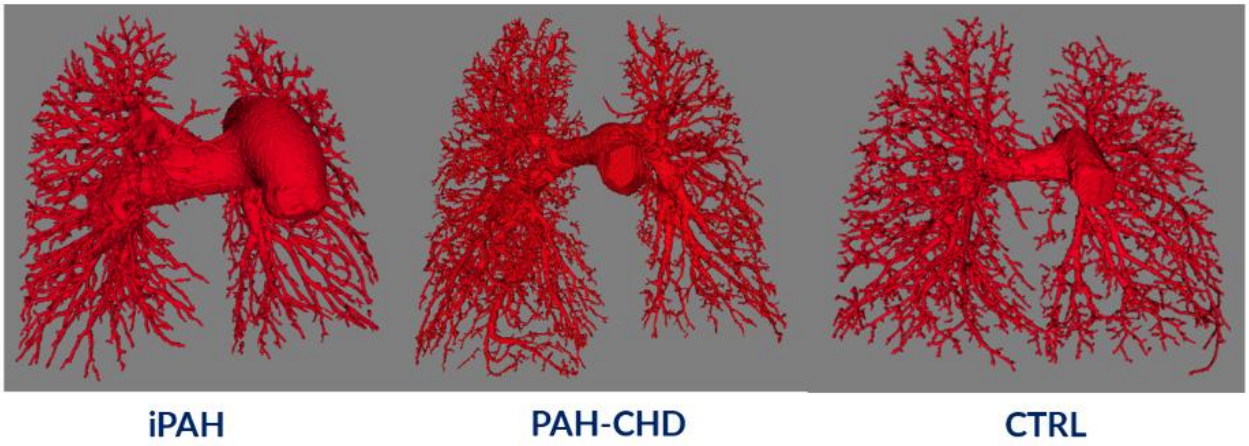
Rosaria Ferreira[1], Olga Szot[2], Gaston Van Hassel[1], Chantal Lokhorst[1], Tineke Willems[3], Johannes Douwes[1], Rolf Berger[1]
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Background and Aim: Pulmonary arterial hypertension (PAH) of childhood is characterized by progressive pulmonary vascular remodeling. In children idiopathic PAH and PAH-CHD are most prevalent etiologies. In PAH-CHD increased pulmonary blood flow plays an etiological role. To characterize changes in the pulmonary arterial (PA) bed, we non-invasively investigated the volumetric profiles of the PA bed in iPAH, PAH-CHD and controls using a CTA-Thorax post-processing algorithm, and assessed their relationship with invasive hemodynamics, functional parameters and transplant-free survival.
Methods: We retrospectively collected 90 CTAs from 23 patients with idiopathic or hereditary PAH, 28 patients with PAH-CHD and 39 age- and sex-matched controls from the Dutch national registry for pediatric pulmonary hypertension. Volumetric profiles from the third pulmonary arterial generation until the last generation visible on CTA were quantified using an in-house built algorithm. Relative volumes at each branching generation were compared between the groups using a Mann-Whitney U test. Relationships with indexed pulmonary vascular resistance (PVRi) and mean pulmonary arterial pressure (mPAP) were tested using spearman's correlation coefficient. Association with world health organization-functional class (WHO-FC) and transplant-free survival were tested using a chi-square test and a cox-proportional hazards analysis respectively.
Results: Patients with iPAH had significantly lower relative volumes peripherally than patients with PAH-CHD ($p \leq 0.001$) and tended to have higher relative volumes proximally than PAH-CHD and controls ($p < 0.1$). Patients with PAH-CHD had similar relative volumes proximally than controls, but tended to have higher relative volumes peripherally. In both the iPAH and the PAH-CHD group, peripheral relative volumes correlated significantly with mPAP and PVRi, but in iPAH the relationship was negative ($p \leq 0.001$, rho: -0.5 to -0.58) while

in PAH-CHD the relationship was positive ($p<0.05$, rho: 0.37 to 0.83). Furthermore, in the PAH-CHD group, higher peripheral relative volumes tended to correlate with a higher WHO-FC ($p=0.08$) and predicted increased risk of death or transplantation ($p<0.05$, HR: 0.16, CI: [0.03-0.29]).

Conclusions: PA volumetric profiles differed significantly between iPAH, PAH-CHD and controls (see Figure 1). When comparing iPAH to PAH-CHD, peripheral relative volumes had opposite relationships with invasive hemodynamics. These findings are the first to describe a distinctive link between PA volumetric patterns, invasive hemodynamic measurements and underlying disease
etiology.

Figure 1. Visual reconstruction of the pulmonary artery of age- matched subjects with iPAH, PAH-CHD and a Control





FT-208 / #654

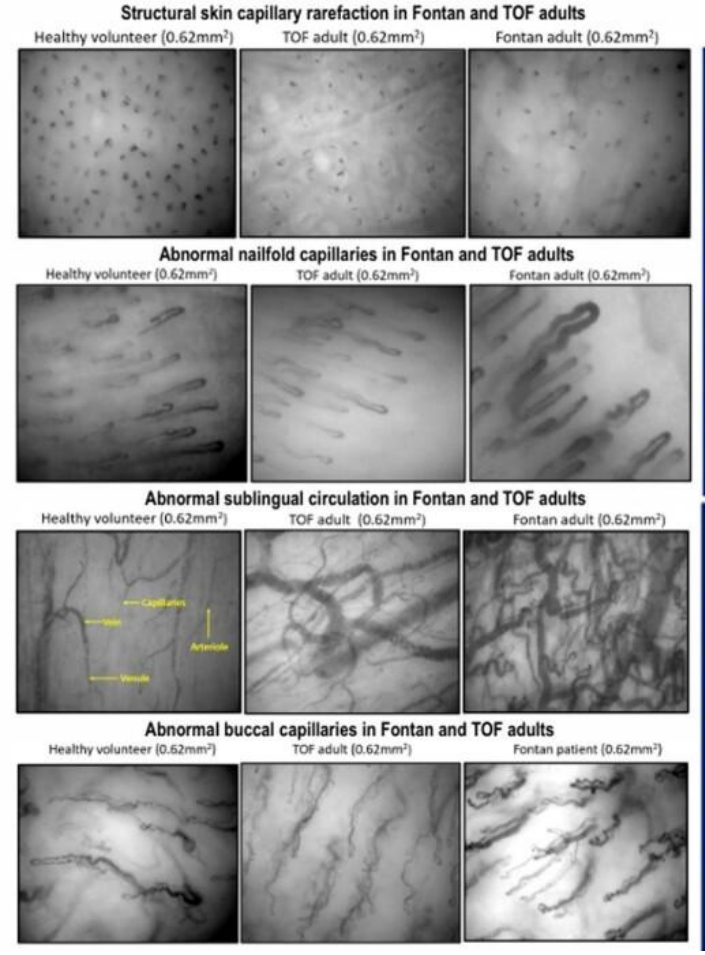
FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

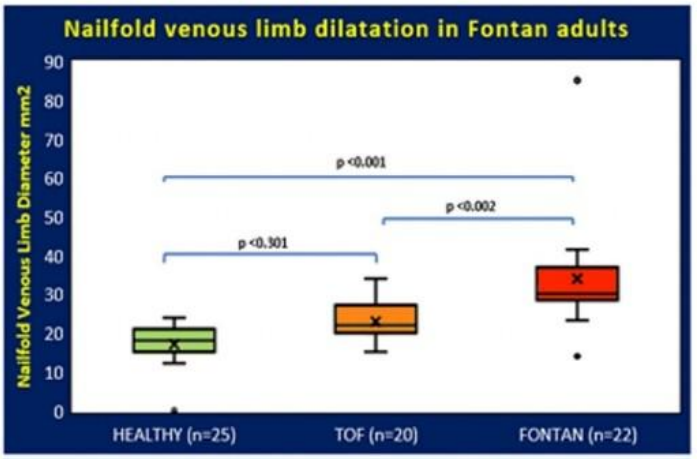
STRUCTURAL CAPILLARY RAREFACTION AND VENOUS ABNORMALITIES IN FONTAN AND POST TETRALOGY REPAIR ADULTS: A PILOT STUDY.

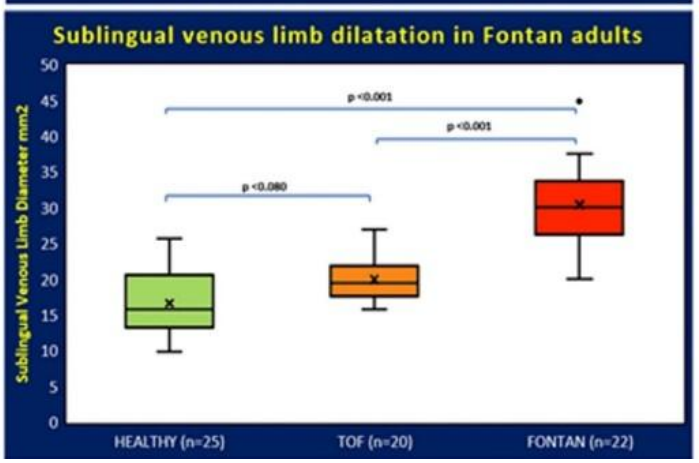
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Background and Aim: The microcirculation consists of arterioles, capillaries, and venules <150 µm, a major terminal vascular network of the systemic circulation. However, little is known about the microvascular structure and function in the ACHD population.
Methods: We evaluated the microcirculation in 22 adults with a Fontan circulation (26±6 years), 20 adults post childhood Tetralogy of Fallot (TOF) repair (31±10 years), and 25 healthy adult controls (31.7±10 years). Handheld Capillary Microscopy (HVCS, Honiton, UK) was used to assess the vessels in the hands, feet, nailfolds, and oral cavity. Basal and Maximal Capillary Density (BCD & MCD) were recorded & measured on the dorsum of the hand and feet after venous congestion. Central blood pressure, augmentation index, and pulse wave velocity (PWV) were measured using Mobil-O-Graph® device (Stolberg, Germany).
Results: Significant functional and structural capillary rarefaction was observed in both TOF (BCD-mean difference -11 capillaries/field, p = 0.014; MCD-mean difference -17 capillaries/field, p = 0.002) and Fontan patients (BCD-mean difference -18 capillaries/field, p = 0.001; MCD-mean difference -24 capillaries/field, p = 0.001) compared to healthy controls. Both Fontan and TOF adults have visible thickening of the capillaries, increased looping, distortion, and widening of venous limb of the capillary loop in the sublingual/nailfold/buccal microcirculation. These adverse effects were more accentuated in the Fontan group. Fontan patients tended to have lower Systolic BP (-8.6 mmHG, p<0.008) and Central BP (-11.7 mmHg, p<0.010), and PWV (-0.56 millisecond, p<0.029) compared to those with Tetralogy.
Conclusions: Both Fontan and TOF adults have significant structural capillary rarefaction, with the adverse microvascular changes more accentuated in Fontan patients. Comparison with other CHD groups may clarify whether this is a casual association with

CHD or a response to circulatory challenges such as high systemic venous pressure.









FT-209 / #770

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

STRUCTURAL EQUATION MODELLING AND MULTIMODAL PROGNOSTIC SCORES IN REPAIRED TETRALOGY OF FALLOT

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Background and Aim: Prognostic stratification in repaired Tetralogy of Fallot (rTOF) remains challenging. Structural Equation Modeling (SEM) hypothesized relationships between variables (defined as causal "paths"), then the path analysis estimates the magnitude and statistical significance of each association, and creates a latent variable which theoretically reflects the global disease severity. The primary aim of the study was to develop prognostic scores using SEM, based on multimodal and clinical evaluations, while the secondary purpose was to compare the prognostic value of three different models.
Methods: This monocentric study enrolled consecutive rTOF patients who underwent cardiac magnetic resonance. Clinical and imaging data as well as adverse outcomes were recorded. Three SEM models were developed; the first one (rTOF-SEM score1) incorporated baseline variables available in routine clinical practice, including age, sex, QRS duration, tricuspid regurgitation, biventricular volumes, ejection fraction, and pulmonary regurgitation fraction. The second model (rTOF-SEM score2) additionally included right atrial end-systolic volume, while the third one (rTOF-SEM score3) further incorporated NT-proBNP, VO_2/kg/min, right ventricular late gadolinium enhancement, and infundibulum function. Scores were subsequently rescaled to a 0-10 range.
Results: 411 rTOF patients were included (age 28 ±13.9 years). During a median follow-up of 39.9 months (interquartile range 8.1–79.3), 29% experienced at least one adverse event. The primary outcome (sudden death, sustained ventricular tachycardia) occurred in 9.1%, whereas 22.5% experienced another adverse event. ROC curve identified a cutoff of 5.49 (sensitivity 63%, specificity 75%), 4.36 (sensitivity 63%, specificity 63%), and 5.8 (sensitivity 78%, specificity 62%) as a predictor of the primary outcome for rTOF-SEM scores 1, 2 and 3, respectively. AUC comparison revealed that rTOF-SEM score3 was significantly higher than rTOF-SEM score1 (p = 0.041). For the secondary outcome, the three cut-offs were 4.27 (sensitivity 71%, specificity 52%), 4.16 (sensitivity 67%, specificity 62%), and 6.59 (sensitivity 81%, specificity 60%), respectively. rTOF-SEM score3 obtained



an AUC of 0.770 (95% CI 0.715-0.825), and both scores 2 and 3 demonstrated significantly superior performance compared to score 1 ($p= 0.0001$ and $p<0.0001$, respectively).
Conclusions: SEM could be useful for risk stratification in rTOF. Including multimodal parameters in rTOF-SEM score improves prognostic evaluation. Further multicentric studies are needed to confirm our results.



FT-210 / #742

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

CHEST PAIN AND TROPONIN RISE IN A YOUNG ADULT WITH REPAIRED TETRALOGY OF FALLOT: NOT ALWAYS MYOCARDITIS

Giulia Guglielmi[1], Davide Ceruti[1], Giulia Pasqualin[1], Francesca Bevilacqua[1], Angelo Fabio D'Aiello[1], Diana Gabriela Negura[1], Angelo Micheletti[1], Alessandro Giamberti[2,3], Luca Testa[3,4], Mattia Squillace[4], Massimo Chessa[1,3]
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Background and Aim: In young ACHD patients, chest pain associated with troponin elevation is frequently attributed to myocarditis, particularly in the absence of cardiovascular risk factors and in the presence of inflammatory marker elevation. However, acute coronary syndromes (ACS) may present atypically and lead to diagnostic delay. We report a case of acute anterior myocardial infarction in a young adult with repaired tetralogy of Fallot (TOF), highlighting the importance of clinical judgement over anchoring bias.
Methods: A 27-year-old man with repaired TOF and no major cardiovascular risk factors presented to another centre with chest pain. Baseline electrocardiography showed sinus rhythm with complete RBBB, and transthoracic echocardiography showed a preserved LVEF in the absence of regional wall motion abnormalities. High-sensitivity troponin (TnIHs) progressively increased to >8000 ng/L, then partially decreased and plateaued around 3000 ng/L. Mild inflammatory marker elevation was observed, and chest pain improved with non-steroidal anti-inflammatory (NSAIDs) therapy and proton pump inhibitors; myocarditis was therefore suspected. Due to persistent diagnostic uncertainty, he was transferred to our ACHD referral centre for cardiac magnetic resonance (CMR).
Results: At admission, the patient was completely asymptomatic. Routine blood tests showed a significant troponin rise (TnIHs 12000 ng/L). Transthoracic echocardiography revealed new regional wall motion abnormalities involving the mid-apical anterior, anteroseptal and anterolateral segments. A contrast CT scan performed the year before had shown normal coronary origins, and a normal calibre main pulmonary artery. However, based on troponin kinetics and echocardiographic findings, ACS was suspected and the catheterisation laboratory was alerted while CMR was ongoing. CMR demonstrated myocardial oedema and extensive LGE with a predominantly ischemic distribution in the



anterior and anteroseptal walls. Emergency coronary angiography revealed a left-dominant coronary circulation with sub-occlusive ostial stenosis of the left anterior descending artery, successfully treated with urgent PCI, achieving complete restoration of flow without complications.

Conclusions: This case highlights that in young ACHD patients, chest pain and troponin rise should not be automatically attributed to myocarditis, even in the presence of normal coronary origin, inflammatory markers and transient response to NSAIDs. Troponin dynamics and echocardiographic evidence of regional ischemia should prompt early reconsideration of ACS, as timely invasive management may be life-saving.



FT-211 / #1259

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

RIGHT VENTRICULAR ADAPTATION TO PRESSURE VERSUS VOLUME LOAD AFTER TETRALOGY OF FALLOT REPAIR – INTEGRATING CLINICAL DATA WITH MULTIMODALITY EXPERIMENTAL MODELS

Gilles Mets[1], Tim Van Loon[2], Yuval Bitterman[3], Zakaria Jalal[4], Elizabeth Goldmuntz[5], Brigitte Mueller[6], Laura Mercer-Rosa[7], Rachel Wald[8], David Benoist[9], Joost Lumens[2], Mark Friedberg[3]
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Background and Aim: Right-ventricular outflow tract obstruction (PS) and pulmonary regurgitation (PR) determine long-term physiology after tetralogy of Fallot (TOF) repair, but their relative impact on right-ventricular (RV) structure, function and exercise performance remains unclear. We integrated clinical data, animal models and computational simulations to evaluate isolated and combined PS–PR loading.
Methods: We analyzed retrospective cross-sectional data from 213 pediatric and 111 adult patients, including echocardiography, cardiac MRI and exercise testing. Porcine models of PS (pulmonary artery banding) and PR (resection of ≥2 pulmonary valve leaflets) were created, with MRI assessment of RV size and function across isolated and combined loading (n=4–6/group). In-silico simulations (CircAdapt) modeled graded PS–PR interactions on venous pressure, ventricular remodeling, ejection fraction and exercise capacity.
Results: In both pediatric and adult human cohorts, PR fraction strongly correlated with RV end-diastolic volume index ($p<0.001$). In children, RV ejection fraction (RVEF) was preserved regardless of pressure or volume loading. In adults, RVEF declined once RV outflow tract (RVOT) gradient exceeded ~20–25 mmHg ($p=0.003$). Exercise capacity showed



a similar age-dependent pattern: peak VO_2 in adults decreased with increasing PS independent of PR (p=0.045), whereas in children neither lesion significantly affected exercise performance (p=0.94–0.95). Animal models confirmed disproportionate RV dilation with volume loading and increased wall thickness with pressure loading. Computer simulations supported limited functional impact of isolated PR, while PS substantially decreased RVEF, accelerated central venous pressure rise during exercise and reduced modeled exercise tolerance, especially when RV contractility was impaired.

Conclusions: While current guidelines for pulmonary valve replacement rely heavily on RV dilatation, driven largely by PR, our multimodal analysis shows that although PR indeed drives RV dilation, it has little impact on exercise capacity or RVEF. Conversely, in adult rTOF patients even mild–moderate PS adversely affects exercise capacity and RVEF, particularly when contractility is impaired. The absence of this relationship in children may indicate greater compensatory capacity. Thus, vigilant surveillance for, and timely relief of, RV outflow tract and pulmonary artery obstruction may be key to preserving long-term RV function.



FT-212 / #499

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

IRON DEFICIENCY IN ADULTS WITH COMPLEX AND/OR CYANOTIC CONGENITAL HEART DISEASE: WHICH DIAGNOSTIC CRITERIA IDENTIFY CLINICALLY RELEVANT DISEASE?

Fabian Von Scheidt[1], Sebastian Freilinger[1], Magnus Scharffetter[1], Zsuzsanna Wolf[2], Steffen Montenbruck[1], Carsten Uhlig[2], Michaela Sander[2], Anna Kamphues[1], Peter Ewert[1], Nicole Nagdyman[1], Stefan Holdenrieder[2], Harald Kaemmerer[1]
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Background and Aim: Iron deficiency (ID) is common in adult congenital heart disease (ACHD). Specific diagnostic and therapeutic guidelines tailored to this population are lacking. Even in acquired heart disease, the diagnostic ID criteria of the current ESC and AHA heart failure guidelines remain debated, with a transferrin saturation (TSAT)-centered approach recently proposed. In cyanotic CHD secondary erythrocytosis, apparently 'normal' ferritin levels and red blood cell indices mask ID, hindering the establishment of ID diagnosis and appropriate treatment, despite iron supplementation being a cornerstone of heart failure therapy.
This study aims to assess various contemporary ID diagnostic criteria in an ACHD cohort with complex and/or cyanotic CHD.
Methods: In this cross-sectional study, clinical and laboratory data were collected from 317 patients (53% female; mean age 37.2 ±13.3 years) with complex and/or cyanotic CHD. Incorporating clinical and laboratory data, different ID definitions were evaluated: (1) Absolute ID (Ferritin <20 µg/l) vs. ESC heart failure (ESC-HF) guideline (Ferritin <100µg/L, irrespective of TSAT; or Ferritin 100 to 299µg/L if TSAT <20%) vs. (3) TSAT (<20%) definition.
Results: Cyanosis (SpO_2 ≤90%) was present in 65% (207/317) of patients. Applying the different diagnostic criteria, the prevalence of ID in non-cyanotic / cyanotic patients was 16%/22% using (1) absolute ID criteria, 69%/71% using the ESC-HF definition, and 56%/53% using the (3) TSAT definition, respectively. Hemoglobin levels and red blood cell indices were significantly lower across all ID diagnostic criteria (all $p<0.05$). Oxygen saturation as a possible confounder did not differ between subgroups. In multivariable regression analysis, cyanosis, TSAT-defined ID, and female sex were independently associated with higher log-transformed NT-proBNP concentrations. TSAT-defined ID



showed the strongest effect (B = 0.71, p<0.001). Functional class was not associated with NT-proBNP.

Conclusions: Iron deficiency is highly prevalent in adults with complex and/or cyanotic CHD applying diagnostic heart failure guideline criteria. In this study, the TSAT-based definition identifies fewer but clinically more severely affected patients, reflected by higher NT-proBNP. Until further evidence emerges, we recommend applying the TSAT ID definition to guide decisions on iron supplementation in complex/cyanotic ACHD with heart failure.



FT-213 / #505

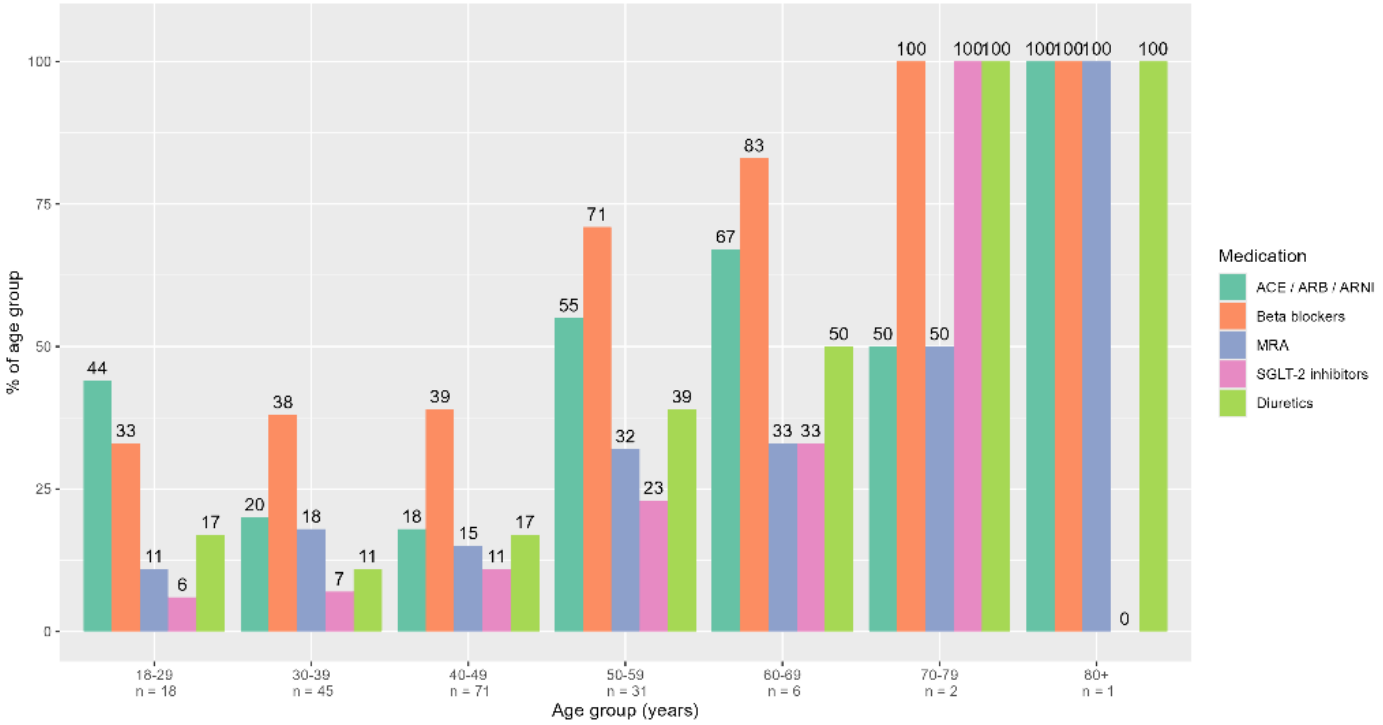
FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

CLINICAL BURDEN AND TREATMENT PATTERNS IN ADULTS WITH SYSTEMIC RIGHT VENTRICLE: INSIGHTS FROM THE PATHFINDER-CHD REGISTRY

Fabian Von Scheidt[1], Steffen Montenbruck[1], Annika Freiberger[1], Helena Dreher[1], Sebastian Freilinger[1], Ann-Sophie Kaemmerer-Suleiman[2], Mathieu Suleiman[2], Renate Kaulitz[3], Frank Klawonn[4], Peter Ewert[1], Michael Huntgeburth[1], Nicole Nagdyman[1], Jürgen Hörer[5], Harald Kaemmerer[1]
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Background and Aim: Adults with congenital heart disease (ACHD) and a systemic, morphologic right ventricle (sRV) face a substantial morbidity and mortality risk with advancing age. Progressive sRV dysfunction, heart failure (HF), systemic atrioventricular valve regurgitation, and arrhythmia are the core determinants of adverse outcomes, yet evidence guiding HF therapy is limited. The PATHFINDER-CHD registry provides prospective, multi-center, real-world data aspiring to establish foundational knowledge to ultimately improve treatment strategies in ACHD, comprising over 2,000 ACHD patients to date.
This study aims to characterize a contemporary sRV cohort to improve understanding of current clinical status and treatment patterns.
Methods: In this cross-sectional study, sRV patients with transposition of the great arteries (d-TGA) after atrial-switch or congenitally corrected TGA (cc-TGA) were enrolled at our tertiary ACHD center in the PATHFINDER-CHD registry between November 2022 and November 2025. Demographic, clinical, and therapeutic data were analyzed.
Results: A total of n=174 patients (42% female), mean age 42.7±10.3 years, were included: n=119 with d-TGA after atrial switch (43% female), and n=55 (40% female) with cc-TGA. At enrollment, 93.2% of female and 82.2% of male participants were in functional class I/II.

Yet, 18.6% (16.9% d-TGA vs. 24.5% cc-TGA) had a history of HF decompensation.
Use of HF medications increased markedly with age (Figure 1). Above 50 years, the majority of patients were treated with HF medication. Overall, only 33.9% of patients had no medication at all, despite 77.0% of the patients being younger than 50 years.
Arrhythmia burden was substantial. 30.5% of patients had undergone catheter ablation therapy, and 31.6% had a pacemaker or ICD. Ablation procedures were more frequent in d-TGA, whereas device implantation was more common in cc-TGA.



Conclusions: This study of a contemporary cohort of ACHD with sRV highlights the significant disease burden in these patients. Despite the majority reaching a good clinical status, comorbidities are common and the need for HF treatment is significant. As the post-atrial-switch population demographically ages into higher-risk decades, targeted surveillance and optimized HF management become increasingly critical. Prospective longitudinal data and dedicated intervention trials are urgently needed to refine evidence-based treatment strategies for sRV patients.



FT-214 / #1361

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

AI ASSISTED MORTALITY RISK STRATIFICATION IN EISENMENGER SYNDROME

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Background and Aim: ***Background*** Mortality risk stratification is crucial for managing Eisenmenger syndrome (ES). Although several prognostic markers have been identified, no validated risk score is currently available to guide clinical decision-making or transplant referral. Two models (MUSES-1 and MUSES-2) have been proposed. Still, neither was designed as a practical scoring tool, nor has either been validated in an external, independent cohort.
Methods: ***Methods*** We developed and externally validated a novel mortality risk score (AI-MUSES), an artificial intelligence-based tool for predicting all-cause of mortality, using two independent multicentre ES cohorts (development: n= 410 of 1080; validation: n= 244 of 537). Predictor selection relied on Random Survival Forests and Multivariable Fractional Polynomials. Model performance was evaluated using the C-index, cross-validation, and calibration analyses, and was compared with the performance of the existing MUSES-1 and MUSES-2 models.
Results: ***Results*** The final model included four non-invasive predictors: shunt type, resting oxygen saturation (SaO_2), presence of pericardial effusion, and 6-minute walk distance (6MWD). AI-MUSES showed higher discrimination (C-index 0.756 in development, 0.721 in validation) than MUSES-1 (0.659) and MUSES-2 (0.696). Kaplan-Meier curves demonstrated significant mortality stratification according to the number of high-risk criteria (0, 1, 2, or ≥3; log-rank $p<0.01$). The model performed consistently across heterogeneous patient populations.
Conclusions: ***Conclusions*** AI-MUSES is a simple and externally validated tool for mortality risk stratification in ES. Based on four routinely available variables, it provides practical framework to support timely transplant referral and individualized management in this high-risk population.



FT-215 / #1305

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

RESTRICTIVE LUNG FUNCTION IS COMMON IN CHILDREN WITH FONTAN PALLIATION AND FUNCTIONALLY HIGHLY RELEVANT WITH DISPROPORTIONATE EXERCISE LIMITATION.

Alina Ofenheimer[1], Jakob Usemann[2], Alexander Moeller[2], Andreas Vogt[2], Simon Vogt[2], Barbara Burkhardt[1], Emanuela Valsangiacomo Büchel[1], Alessia Callegari[1]
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Background and Aim: Previous studies have shown that lung function is impaired in children with single ventricles (SV) after Fontan palliation and that pulmonary function is an important predictor of clinical outcome. In order to properly assess restrictive lung function, full body plethysmography is required. Cardiopulmonary exercise testing (CPET) allows an integrated evaluation of ventilatory, gas exchange, and circulatory responses to exercise. The aim of this study was to determine the prevalence of restrictive lung function in a cohort of children with SV and to investigate its functional association with CPET.
Methods: This observational study, conducted at a tertiary paediatric heart centre, examined 31 SV patients (mean age 13 years, 35.5% females). Lung function was assessed by spirometry (forced expiratory volume in 1 second; FEV1, forced vital capacity; FVC) and by body plethysmography (total lung capacity; TLC). Impaired lung function was defined as z-score < -1.645. Restrictive lung function was defined by spirometry as low FVC with normal FEV1/FVC and by body plethysmography as low TLC. Moreover, CPET was performed in all 31 patients. Results were compared between patients with and without restrictive lung function by Mann-Whitney U test.
Results: Restrictive lung function was observed in 10 patients (32%). In total, 48% of SV patients complained of dyspnea, and in 19% dyspnea was associated with restrictive lung function. CPET demonstrated reduced exercise capacity, marked ventilatory inefficiency, and abnormal gas exchange, despite adequate maximal effort in children with restrictive lung function with significant differences compared to non-restrictive patients (see Table 1).



Table 1

Parameters	Restrictive	Non-restrictive	p-values
Maximal ventilation z-score	−1.78 (−2.63 to −0.53)	−0.71 (−1.36 to 0.22)	**0.01**
Breathing reserve (%)	19 (11–31)	35 (22–48)	**0.02**
Respiratory rate at peak (breaths/min)	41 (29–55)	34 (26–41)	0.08
VE/VCO_2 peak value	39.3 (30.2–49.6)	34.5 (31.5–37.0)	**0.004**
VE/VO_2 peak value	40.2 (34.8–58.0)	35.0 (32.1–40.4)	**0.01**
OUES z-score	−2.72 (−3.28 to −1.42)	−1.06 (−1.55 to −0.62)	**<0.001**
Minimal $PETCO_2$ (mmHg)	46.6 (37.1–57.5)	54.4 (45.2–61.1)	**0.03**
Minimal SpO_2 (%)	83 (80–90)	89 (85–93)	**0.02**
RER at peak	1.0 (1.0–1.2)	1.1 (1.0–1.2)	0.61
VO_2 peak z-score	−2.43 (−3.56 to −1.72)	−1.21 (−1.98 to −0.65)	**0.002**
Work rate peak z-score	−2.45 (−3.19 to −1.41)	−1.02 (−1.56 to −0.77)	**0.001**
O_2 pulse z-score	−1.81 (−2.78 to −1.16)	−1.06 (−1.52 to −0.38)	**0.03**
Maximal heart rate z-score	−2.17 (−3.81 to −0.75)	−1.13 (−2.29 to −0.19)	0.07

Legend: Values are median (IQR); p-values from Mann–Whitney U test
Abbreviations: *VE/VCO_2: Minute ventilation/Carbon dioxide production, OUES: Oxygen uptake efficiency slope, $PETCO_2$: End-tidal carbon dioxide pressure, SpO_2: peripheral oxygen saturation, RER: respiratory exchange ratio, VO_2: oxygen uptake*
Z-scores according to: Blanchard J, et al.: Med Sci Sports Exerc. 2019 Jul;51(7):1571.

Conclusions: Restrictive lung physiology is associated with impaired ventilatory efficiency, abnormal gas exchange, and limitation of circulatory performance during exercise. Thus, restrictive lung disease in Fontan patients is functionally highly relevant, identifying a subgroup with disproportionate exercise limitation unexplained by the underlying cardiac physiology or deconditioning alone. Lung function assessment should be routinely performed during follow-up in Fontan patients.



FT-216 / #448

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

COAGULATION PHENOTYPE FOR RISK STRATIFICATION IN SINGLE-VENTRICLE INFANTS: A MULTICENTER LONGITUDINAL ANALYSIS

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Background and Aim: Coagulation abnormalities are frequent in single-ventricle (SV) patients. Whether these precede surgical palliation, how they evolve, and whether distinct haemostatic phenotypes relate to outcomes remains unknown.
Methods: In this multicentric longitudinal study, 61 SV-patients (24 left-ventricle) and 110 healthy-controls (HC) were included. Coagulation parameters were measured prior to Stage-I, and at pre-Stage-II and pre-Stage-III catheterization. Age-adjusted Z-scores were derived using a hybrid reference dataset (HC <1-year + literature references >1-year). Longitudinal trajectories of coagulation parameters were clustered using hierarchical Ward linkage. Clinical outcomes included invasive haemodynamics, thrombotic/thromboembolic events, and postoperative course.
Results: At **Stage I** Protein-C, Protein-S-function, Antithrombin, and Factors II-V-VII-IX-X (all $p<0.001$), while Factor VIII ($p=0.06$) and vWF-Activity/-Antigen ($p=0.3/p=0.9$) were similar to HC. **Between Stage I and II** some recovery of hepatic synthesis occurred: Z-scores increased for Protein-C ($\Delta Z=+1.58/p<0.001$), Antithrombin ($\Delta Z=+1.10/p<0.001$), and Factors II-VII-IX-X (all $p<0.05$), while Factor V remained reduced ($\Delta Z=-0.09/p=0.001$). Endothelial-activation markers increased: Factor VIII ($\Delta Z=+0.41/p=0.03$), and vWF-Antigen ($\Delta Z=+0.46/p=0.05$). **Between Stage II and III**, most hepatic factors stabilized (Protein-C/-S, Antithrombin, Factor II-V-VII-IX, $\Delta Z=+0.05$-$0/p>0.05$), while Factor VIII ($Z=+2.38/p=0.012$) and vWF-Antigen ($+1.08/p=0.029$) increased. Clinical thrombotic/thromboembolic complications were suspected systemic shunt thrombosis (n=5), acute stent obstruction (n=3), stroke (n=7), suspected thromboembolic intestinal ischemia (n=4), and intracardiac/coronary thrombus (n=2). No major bleeding occurred. **Clustering** proposed three coagulation phenotypes (Figure-1A/B). -*Cluster-A* (n=7): neonatal synthetic deficiency with near-normalization by Stage-III associated with longer ICU-stay at Stage-I ($p=0.005$), thrombotic complications at Stage I+II ($p<0.001$). -*Cluster-B* (n=10): persistent

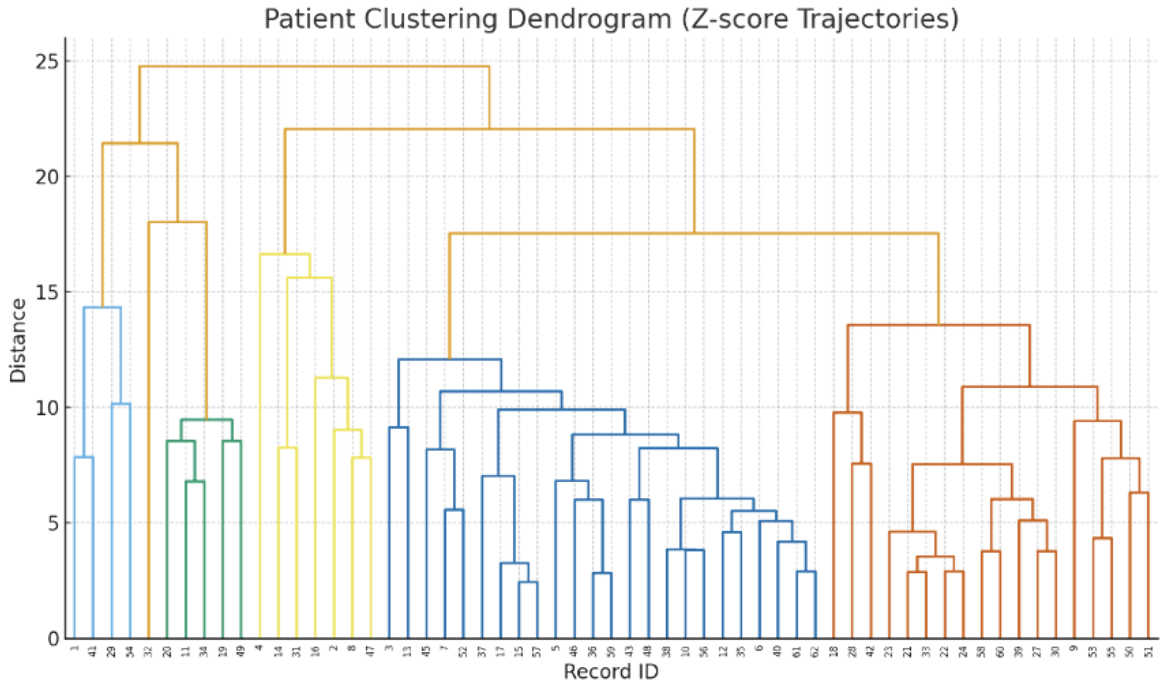
endothelial-activation associated with impaired invasive hemodynamics at Stage-II+III (p=0.04/p<0.001) and prolonged pleural drainage at Stage-III (p<0.001). -*Cluster-C (n=42):* most favorable coagulation phenotype. Early Cluster identification seems feasible: Stage-I FactorV Z<-1.64, combined with Protein C/S and/or Antithrombin was associated with Cluster-A (p=0.023), whereas Factor VIII and/or vWF Z>-1.64 at Stage-I was associated with Cluster-B
(p=0.011/0.022).

Figure 1A. Clustered heatmap of patient Z-score trajectories across Stages I-III. Columns represent coagulation parameters. Rows represent individual patients. Blue = reduced Z-scores, yellow = elevated Z-scores.



A

Figure 1B. Hierarchical-clustering dendrogram of patient Z-score trajectories.



B

Conclusions: SV patients exhibit frequent abnormalities before any intervention, likely reflecting decreased hepatic synthesis, reduced vitamin K level, and inflammatory processes with endothelial activation. Thrombotic/thromboembolic events are multifactorial and additional contributors (foreign material, inflammatory/SIRS episodes) play a substantial role, therefore causality between haemostatic phenotypes and clinical events cannot be established. Nevertheless, these early laboratory markers could help in risk stratification and support individualized treatment strategies.



FT-217 / #679

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

PORTAL VEIN 4D-FLOW DYNAMIC EVALUATION IN FONTAN CIRCULATION

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Background and Aim: In Fontan-associated liver disease (FALD), histological fibrosis is often not accurately reflected due to the influence of portal pressure. The objective of this study was to develop new indicators for evaluating FALD using portal vein hemodynamic analysis with 4D-flow MRI.
Methods: After obtaining approval from the institutional ethics committee at Sakakibara Heart Institute, we performed 4D-flow MRI of the main portal vein in post-Fontan patients and healthy subjects. We measured kinetic energy (KE; unit: mJ/mL), energy loss (EL; unit: mW/mL), wallshear stress (WSS; unit: Pa), and helicity (unit: m^4/s^2). KE and EL were normalized by dividing by the main portal vein lumen volume. Helicity was defined as the vector quantity of clockwise and counterclockwise spirals and calculated as a sum. All parameters were averaged over one cardiac cycle to evaluate portal vein hemodynamics. The 4D-flow analysis was performed using iTFlow3.3 (Cardio Flow Design, Japan).
Results: 4D-flow MRI of the main portal vein was performed in 15 post-Fontan patients (Group F; 19.3±6.4 years, 9 males) and 5 healthy subjects (Group N; 35.0±7.0 years, 5 males). Diagnoses in Group F included double-outlet right ventricle (4 cases), pulmonary atresia with intact ventricular septum (4 cases), Ebstein anomaly (2 cases), and one case each of single left ventricle, single right ventricle, tricuspid atresia, transposition of the great arteries, and atrio-ventricular septal defect. All Fontan procedures were total cavopulmonary connections without fenestration. Catheter examinations were performed concurrently in 13 cases, with a mean central venous pressure (CVP) of 11.6±4.4 mmHg. KE was significantly higher in Group N (F vs. N; 3.08E-03±1.22E-03 vs. 4.38E-03±4.50E-03, $P< 0.05$), while WSS was significantly higher in Group F (F vs. N; 1.34±0.27 vs. 1.04±0.26, $P< 0.05$). In terms of helicity, counterclockwise spiral flow was predominant in both groups. KE showed correlation with EL (r=0.69) and WSS (r=0.75), and EL demonstrated a weak correlation with CVP (r=0.56).
Conclusions: This study revealed that portal blood flow in post-Fontan patients exhibits higher WSS, lower KE, and reduced spiral flow compared to healthy subjects. We plan to increase the number of cases for more detailed analysis and establish the utility of portal 4D-flow MRI in evaluating FALD.



FT-218 / #234

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

LINKING DECREASED WALL SHEAR STRESS IN PULMONARY ARTERIES AND SERUM PROTEOMICS: MECHANOTRANSDUCTION IN THE FONTAN CIRCULATION

David Renaud[1], Matthias Einkemmer[2], Fatima Ageed[2], Ronny Schmidt[3], Ramy Girgis[3], Marco Klein[3], Kai Thorsten Laser[4], Miriam Michel[2]
[1]Innsbruck Medical University, Paediatrie Iii, Innsbruck, Poland, [2]Innsbruck, Paediatrie Iii, Innsbruck, Austria, [3]Sciomics GmbH, Neckargemünd, Germany, [4]Heart and Diabetes Center North Rhine-Westphalia, Bad Oeynhausen, Germany

Background and Aim: Background: The surgical rerouting of systemic venous blood in Fontan circulation (FC) leads to non-pulsatile blood flow, elevated central venous pressure, and limited cardiac output, with resulting alteration of blood (and lymph) flow properties with a marked reduction in wall shear stress (WSS). Given that WSS is a key regulator of endothelial function and structure, its marked reduction in this physiology raises important questions about endothelial vulnerability. Prior omics findings in peripheral venous blood of Fontan patients (FP) without overt comorbidities identified elevated syndecan-1 (SDC1). This highlight potential endothelial glycocalyx degradation, underscoring the need to better define how abnormal WSS contributes to endothelial dysfunction in this unique circulation. **Aim:** This study aimed to investigate the correlation between peripheral vein blood markers involved in endothelial function and structure alteration in two different groups of FP, and to establish a computational model of WSS related changes in involved proteins.
Methods: Methodology: Serum Proteomics by an immune-based platform (Sciomics GmbH, Neckargemünd , Germany) were integrated with a custom computational model to quantify protein abundancy and to assess the hypothetical impact of WSS endothelial regulatory pathways.
Results: TGF-β-levels (as expressed by fold changes values between patients and controls) correlated positively with LIF- and NGF- β-levels. SDC1 and LIF levels correlated negatively. SDC1 and NGF- β levels correlated weakly negatively.
Conclusions: Our findings indicate that SDC1 is linked to the downregulation of LIF and NGF-β, likely through TGF-β–dependent mechanisms. The TGF-β1 response pattern points to a specific WSS range that optimally activates signaling without inducing SDC1 shedding, suggesting preserved endothelial glycocalyx integrity under these conditions. Together, SDC1 and TGF-β1 emerge as central regulators of WSS-mediated endothelial stability, potentially shaping the severity of Fontan-associated complications, including lymphatic



and hepatic dysfunction, elevated pulmonary vascular resistance, and collateral vessel formation. These results support the existence of an optimal WSS window in which endothelial integrity is maintained.



FT-219 / #1487

FLASH TALK SESSION 6
15-05-2026 14:30 - 16:00

TOWARD PHYSIOLOGY-GUIDED NEUROPROTECTION IN INFANT CARDIAC SURGERY: A TINYBRAINS MULTIMODAL NEUROMONITORING STUDY

Marta Camprubí-Camprubí[1,2], Osman Melih Can[3], Alba Rivas Piorno[4], Alejandra Daniela Lopez-Solís[3], Georgina Tresanchez[3], Nishigandha Patil[3], Cristina Ruiz[5], Turgut Durduran[3], Joan Sánchez De Toledo[6]
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Background and Aim: Neurodevelopmental impairment remains a major morbidity in infants with congenital heart disease (CHD), with cardiac surgery (CS) representing a critical period of neurological risk. Current neuromonitoring systems do not allow continuous, non-invasive measurement of cerebral blood flow (CBF) and total hemoglobin concentration (THb). Diffuse correlation spectroscopy (DCS) and time-resolved near-infrared spectroscopy (TRS) enable bedside quantification of these parameters. This study aims to validate a combined optical device for perioperative neuromonitoring in infants with CHD.
Methods: This is a prospective observational study in infants ≤6 months of age undergoing CS or invasive hemodynamic procedures. Patients were longitudinally monitored using the TinyBrains device, a non-invasive multimodal neuromonitoring platform combining time-resolved near-infrared spectroscopy (TRS), diffuse correlation spectroscopy (DCS), and clinical EEG. DCS and TRS were used to quantify cerebral blood flow (CBF), cerebral oxygenation (StO_2), and total hemoglobin concentration (THb), and cerebral metabolic rate of oxygen ($CMRO_2$) was derived from CBF and arterial StO_2. Monitoring was performed perioperatively, including continuous intraoperative monitoring and up to 6 hours after surgery. Serum and urinary biomarkers were measured preoperatively and at 0, 24, and 72 hours postoperatively. Neuromonitoring data were integrated with standard vital parameters, postoperative MRI, and structured neurodevelopmental follow-up.
Results: Thirty-three infants were included. Most underwent CS, only two underwent cardiac catheterization. Cardiopulmonary bypass was used in 19 cases, with median bypass and cross-clamp times of 114 and 52 minutes, respectively. Selective Cerebral



perfusion was used in seven patients. The neuromonitoring platform was successfully implemented throughout the perioperative period, demonstrating robustness and high data retention in routine clinical conditions. CBF showed more changes during surgery, especially during cannulation. CMRO2 remained parallel to baseline values for most of the time, decreasing only during cannulation. Postoperative increases in brain injury biomarkers were temporally associated with periods of altered cerebral hemodynamics detected by the device. Follow-up data is not available yet.

Conclusions: Multimodal non-invasive neuromonitoring integrated with perioperative biomarkers is feasible in infants with CHD.

This approach represents a step toward physiology-guided perioperative care, with the potential to identify infants at higher neurodevelopmental risk and to inform timely, brain-focused interventions in pediatric cardiac surgery.



FT-220 / #1405

FLASH TALK SESSION 2
14-05-2026 14:30 - 16:00

SYMPTOMATIC FETAL CONGENITAL HEART DISEASE: PATHOLOGICAL CHARACTERIZATION AT FETAL AUTOPSY

Marny Fedrigo[1], Gloria Zanutto[1], Paola Veronese[2], Silvia Visentin[3], Alessia Cerutti[4], Sabrina Salvadori[5], Giovanni Di Salvo[6], Cristina Basso[1], Annalisa Angelini[1]
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Background and Aim: Many congenital heart defects remain clinically silent in utero because of the parallel nature of fetal
circulation and the presence of the ductus arteriosus and foramen ovale. However, severe cardiac
lesions may manifest before birth with signs of hemodynamic compromise (i.e., "symptoms" in
fetal medicine). A detailed anatomical definition of symptomatic congenital heart disease (CHD)
and associated anomalies may support prenatal counselling and perinatal management.
Methods: We reviewed 1,492 fetal autopsies performed between 2014 and 2024 at the Cardiovascular
Pathology Unit, University Hospital of Padua. Among these, 202 fetuses had CHD. For each case,
we collected pregnancy clinical information, first- and second-trimester ultrasound reports, and fetal
echocardiography findings. Symptomatic cases were defined by evidence of hemodynamic instability on the last fetal echocardiogram and confirmed at autopsy, including hydrops fetalis,
ascites, pleural effusion (hydrothorax), and/or pericardial effusion (hydropericardium).
Results: Seventy-nine of 202 cases (39%) showed signs of fetal heart failure, and the distribution of heart anomalies was described in the following table.



Distribution of congenital heart defect with signs of heart failure during fetal life

Type ofCHD	Frequency	%of total	% Cumulative
HLHS	25	31,6	84,4
Aortic Arch Anomalies	17	21,5	53,2
CAV	14	17,7	21,5
Valvulopathies	12	15,2	100
Combined defects	8	10	31,6
Ebstein Anomaly	3	3,8	3,8

Extracardiac anomalies were present in 53/79 cases (67%): multiple anomalies in 29/79 (37%) and
single-organ anomalies in 24/79 (30%). Isolated CHD was observed in 26/79 cases (33%). Pregnancy outcome included second-trimester elective termination (50 cases), intrauterine
demise/spontaneous abortion (14 cases), early neonatal death (6 cases), and late neonatal death (7
cases).

Conclusions: Detailed cardiac and extracardiac assessment at fetal autopsy improves characterization of
symptomatic fetal CHD and may aid interpretation of prenatal hemodynamic compromise and
neonatal outcome, supporting counselling and perinatal management.



FT-221 / #110

FLASH TALK SESSION 4
15-05-2026 09:00 - 10:30

SYSTEMATIC REVIEW AND META-ANALYSIS OF CLINICAL SCIENTIFIC EVIDENCES ON SELF-EXPANDABLE PERCUTANEOUS PULMONARY VALVE IMPLANTATION

Gianfranco Butera, Carlo Barsali, Marcello Chinali, Mara Pilati, Claudia Montanaro, Enrico Piccinelli, Micol Rebonato
ospedale bambino gesù, roma, Italy

Background and Aim: Percutaneus pulmonary valve implantation (PPVI) is an options for dysfunctional right ventricular outflow tract (RVOT) in patients with native or surgically repaired anatomies. Several self-expanding valve platforms, including Venus-P-Valve, Alterra Harmony and Pulsta, all with different frame geometries and anchoring strategies are now available. But nowdays comparative data remain limited. The aim of the study is to systematically evaluate procedural success, early, mid-term, and late outcomes of self-expanding PPVI systems and to explore differences in complication profiles.
Methods: A systematic review and meta-analysis was conducted including clinical studies reporting outcomes of self-expanding PPVI. Articles published between 2000 and 2025 were identified through database searches. Patients with congenital heart disease undergoing PPVI for regurgitation and/or stenosis of the RVOT were eligible. Primary endpoints were procedural success and major complications rate. Secondary endpoints included total complications. The complications were stratified as early (<30 days), mid-term (30 days–1 year) and late (>1 year). Pooled proportions were calculated using a random-effects model with logit transformation and continuity correction for rare events. Heterogeneity was assessed using I^2 and τ^2.
Results: Fifty-two studies comprising 1,404 patients were included. Most patients were repaired Tetralogy of Fallot or severe pulmonary regurgitation. Overall procedural success was 95.1% (95% confidence interval [CI] 92.3–97.1%), with no significant difference between devices. Early complications occurred in 9.7% of patients, whereas severe early complications were uncommon (3.4%), mainly device embolization, vascular injury, or pericardial effusion; early mortality was not reported. Anedoctical cases of coronary injuries has been reported. Mid-term total and severe complications occurred in 11.8% and 4.6% of patients, respectively; endocarditis (1.7%) was the leading severe event. Late complications and severe late events occurred in 13.9% and 5.8% of patients.
Conclusions: PPVI with self-expanding devices shows high and comparable procedural success across all valve types with a low rate of severe and total complications.



FT-222 / #45

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

THE POSTOPERATIVE COURSE OF TROPONIN T AND NT-PROBNP LEVELS IN THE PEDIATRIC POPULATION IMPLANTED WITH THE HEARTMATE 3 DEVICE

Şeyma Şebnem Ön[1], Zülal Ülger[1], Eser Doğan[1], Meral Yilmaz[1], Burcu Acar Alkan[1], Hakan Kurt[1], Burcugül Karasulu Beci[1], Reşit Levent[1], Pınar Yazici Özkaya[2], Kübra Cebeci[2], Aslı Taşdemir[3], Osman Tuncer[4], Çağatay Engin[4], Tahir Yağdi[4], Mustafa Özbaran[4]
[1]Ege University, Pediatric Cardiology, izmir, Turkey, [2]Ege University, Pediatric Intensive Care, izmir, Turkey, [3]Ege University, Pediatrics, izmir, Turkey, [4]Ege University, Cardiovascular Surgery, izmir, Turkey

Background and Aim: Objective: Cardiac troponin T (cTnT) and NT-proBNP are key biomarkers reflecting myocardial injury and hemodynamic load in heart failure or after cardiac surgery. However, data on their postoperative course in pediatric HeartMate 3 recipients are limited. This study aimed to evaluate the clinical significance of postoperative changes in these biomarkers.
Methods: Methods: This retrospective case series included pediatric patients who underwent LVAD implantation between 2022 and 2024 at our center. Clinical and laboratory data were retrospectively obtained from medical records.
Results: Results: Ten patients with dilated cardiomyopathy (PEDIMACS profiles 1–3) were included. The median preoperative cTnT level was 98.5 ng/L [IQR 42.5–236.5]. Median postoperative cTnT levels were 182.6 ng/L [IQR 88.3–342.9] at 1 month, 54.0 ng/L [IQR 32.0–92.0] at 6 months, and 43.2 ng/L [IQR 25.8–71.4] at 12 months. Median BNP levels were 7,510 ng/L [IQR 5,350–10,850] preoperatively, 4,122 ng/L [IQR 2,963–7,288] at 1 month, 954.8 ng/L [IQR 520.3–1,426.0] at 6 months, and 1,041 ng/L [IQR 619.8–1,524.0] at 12 months. The mean ICU stay was 24.1 ± 16.3 days. Troponin levels returned to normal by postoperative month 6 in all but two patients. Spearman analysis showed a significant positive correlation between preoperative cTnT and ICU stay ($\rho = 0.687$, $p = 0.028$).
Conclusions: Conclusion: In pediatric HeartMate 3 recipients, cTnT and NT-proBNP levels reflect postoperative myocardial recovery and serve as reliable indicators of intensive care duration.



FT-223 / #155

FLASH TALK SESSION 7
15-05-2026 16:30 - 18:00

MAKING THE INVISIBLE VISIBLE: LIVED EXPERIENCES OF ADOLESCENTS AND YOUNG ADULTS ENROLLED IN THE TRANSITION-CHD RANDOMIZED TRIAL

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Background and Aim: Advances in pediatric cardiology and surgery have significantly improved CHD survival rates. As these patients age, continuity of care becomes essential to mitigate the risk of care disruption, particularly during the transition from pediatric to adult health services. This ancillary qualitative study was conducted alongside the TRANSITION-CHD randomized controlled trial to explore how adolescents and young adults with CHD experienced both the process of transition to adult care and their engagement in the TRANSITION-CHD therapeutic education program.
Methods: This qualitative ancillary study used semi-structured interviews with 16 participants, aged 14–26 years, who participated in the intervention arm of the TRANSITION-CHD trial. A purposive sampling strategy ensured variability in CHD type, gender, and sociodemographic background. Data collection and analysis were guided by grounded theory, with iterative assessment of data saturation.
Results: Four categories emerged: (1) Adolescents described transition as a developmental process rather than a disease-focused one, prioritizing autonomy and peer relationships. (2) Participants often coped by minimizing the visibility of their condition, although clinical encounters and educational sessions sometimes challenged this strategy. Peer interactions and physical activity were well received, whereas theoretical content was frequently perceived as emotionally burdensome or quickly forgotten. (3) Adolescents shaped their identities across various social spheres, with the pediatric cardiologist viewed as a key relational figure. Transition to adult care was often seen as a minor logistical shift. (4) Participants had ambivalent experiences of the program—empowering when peer-focused, but anxiety-provoking when overly clinical.
Conclusions: This qualitative study offers new insight into the lived experiences of



adolescents and young adults with CHD during their transition to adult care. These findings may help refine transition education programs by promoting peer exchange, addressing stigma, and tailoring content to the emotional needs of adolescents and their families.



FT-225 / #868

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

LIPIDOMICS LANDSCAPE IN PATIENTS WITH UNIVENTRICULAR HEART POST-FONTAN

Silvia Rocchiccioli[1], Giovanni Signore2[2], Barbara Coco[3], Luca Guidi[2], Elisa Ceccherini[1], Rossella Mosca[2], Adrian Suman[1], Ilenia Foffa[4], Cecilia Vecoli[4], Ludovica Simonini[2], Giovanni Petralli[3], Simona Storti[5], Marrone Chiara[6], Pierluigi Festa[6], Lamia Ait Ali[4]
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Background and Aim: Patients with univentricular heart disease who have undergone Fontan palliation frequently present an altered lipid profile; however, the pathophysiological mechanisms underlying this dyslipidemia remain poorly understood. Lipidomics enables large-scale characterization of circulating lipid species using advanced analytical chemistry techniques and high-throughput technologies. This study aimed to characterize the plasma lipidomic landscape in Fontan patients compared with a healthy age- and sex-matched controls.
Methods: We analyzed 49 Fontan patients (31 male (64.4%), mean age 27.5 ± 11 years) and 44 matched healthy subjects. Surgical history, clinical data and imaging were extracted from medical records. A metabolic lipid panel was assessed, and targeted plasma lipidomic analysis was performed using HPLC-MS/MS.
Results: The classical lipid profile in our population showed significantly lower total cholesterol and LDL cholesterol levels in Fontan patients compared with the control group (136±24 vs 188±32 mg/dL, $p < 0.01$; LDL: 76 ± 21 vs 124 ± 29 mg/dL, $p < 0.01$, respectively), whereas triglycerides and HDL cholesterol were similar between groups. Lipidomics quantified 175 lipid species, including triglycerides (TG), cholesteryl esters (CE), ceramides (Cer), sphingomyelins (SM), diacylglycerols (DG), phosphatidylcholines (PC), lysophosphatidylcholines (LPC), phosphatidylethanolamines (PE), and lysophosphatidylethanolamines (LPE). 38 lipid species were significantly down-regulated in Fontan patients compared with controls (adjusted $p < 0.05$), including 13 CE, 2 Cer, 3 DG, 3 LPC, 5 LPE, 2 PC, 1 PE, and 9 SM. Analysis of fatty acid chain length and degree of unsaturation revealed significant differences between the Fontan population and the control group, specifically an increased polyunsaturated-to-monounsaturated fatty acid ratio was noted. Moreover, several lipid species correlated with peripheral oxygen saturation, most notably CE 16:1 (Spearman $r=0.46$, $p=0.04$).



Conclusions: Fontan patients exhibit a distinct plasma lipidomic signature, characterized predominantly by alteration of Phospholipid (PL) . These alterations may reflect dysregulated cellular signaling and metabolic pathways, chronic low-grade inflammation, and changes in the functional and/or structural properties of the vasculature. The correlation with oxygen saturation raises the possibility that cellular hypoxia contributes to the dyslipidemia profile observed in Fontan patients. Larger studies are needed to confirm our results.



FT-226 / #688

FLASH TALK SESSION 9
16-05-2026 09:00 - 10:30

SURVIVAL AND COMORBIDITIES IN DOWN SYNDROME: INSIGHTS FROM A LARGE COHORT ANALYSIS (1990-2023)

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Background and Aim: Down Syndrome (DS) is the most common chromosomal abnormality with an average incidence of 1.71 per 1,000 live births in Northern Ireland (NI). Life expectancy of those with DS has increased substantially and subsequently a wide range of comorbidities associated with DS have been noted. This study focuses on survival and comorbidities of individuals with DS in NI.
Methods: A database containing all patients born with DS in NI from 1990-2023, held in Royal Belfast Hospital for Sick Children, was expanded to include survival status and numerous comorbidities. Electronic and paper medical records were reviewed to obtain information on congenital heart disease (CHD), coeliac disease, thyroid dysfunction, ear nose and throat (ENT) and ophthalmology conditions. Descriptive statistics were applied to investigate the prevalence of common comorbidities. Temporal trends in mortality were assessed using Cox proportional hazards models with birth year as a continuous predictor and gender as a covariate.
Results: 1384 individuals were born with DS from 1990-2023, now aged from 2-35 years, of which 94% are alive and 6% (89) are deceased. CHD is highly prevalent, occurring in 49%. A quarter (25%) have hypothyroidism, 1% hyperthyroidism and 4% have coeliac disease. A high proportion (72%) have at least one ENT condition, most commonly glue ear (n=648, 47%). Over half have visual impairment (53%), and 41% have ophthalmology conditions, most commonly strabismus (16%). A higher proportion of the deceased had CHD (68%), most commonly atrioventricular septal defect (AVSD) (n=33, 54%) and 66% had cardiac surgery. Most of those who died were under 1 year (55%). The leading cause of death was cardiac related (42%), including post cardiac surgery complications, heart failure and pulmonary hypertension. Cox proportional hazards modelling showed no evidence of a temporal trend in mortality across birth years (HR 1.01 per year, 95% CI 0.98–1.03, p=0.58).
Conclusions: Individuals with DS and CHD are at greater risk of death and the majority of deaths occur in the first year of life, potentially related to timing of cardiac surgery.



As the DS population is affected by a wide range of comorbidities, it is essential that healthcare professionals are aware of screening and management.



FT-228 / #1505

FLASH TALK SESSION 10
16-05-2026 11:00 - 12:30

AGE NORMALISED SINUS TACHYCARDIA ON 24-HOUR HOLTER ECG EFFECT ON LEFT VENTRICULAR EJECTION FRACTION IN DUCHENNE MUSCULAR DYSTROPHY CHILDREN

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Background and Aim: Duchenne muscular dystrophy (DMD) is complicated by progressive cardiomyopathy and high prevalence of sinus tachycardia (ST). Whether average heart rate (avr.HR) on 24-hour Holter monitoring is associated with left ventricular function is unclear. We assessed the relationship between Holter and echocardiographic findings.
Methods: Retrospective analysis of historic dataset -prior to adopting strategy to start beta-blockers for ST. Inclusion criteria: confirmed DMD diagnosis, age 0-18 years, no beta-blockers, 24h Holter electrocardiography and echocardiography done as routine annual follow-up (not symptom-triggered) less than 30 days apart. Avr.HR z-score (avr.HRz) was derived from Salameh reference data and ST was defined as avr.HRz >+1.645 (one-sided 95th percentile). Left ventricular ejection fraction was calculated by the Teichholz method (LVEFt). Descriptive statistics, Pearson correlation and Mann–Whitney test (two-sided $p<0.05$) were calculated.
Results: We included 290 paired assessments from 108 patients. Median number of observations was 5 (range 1-12) with a median timespan between pairs of 0.6 days. Age at first observation was 8.8±3.8 years and 10.3±3.7 years overall. Avr.HR=100.1±10.0bpm, avr.HRz=1.5±0.9, LVEFt 63.1±5.9%. Age correlated positively with avr.HRz ($r=0.35$; $p<0.001$; coef=0.1) and inversely with LVEFt ($r=-0.41$; $p<0.001$; coef=-0.6).
Tachycardic patients had lower LVEFt to those without (62.0% vs 64.2%; $p<0.001$), and avr.HRz showed weak negative correlation with LVEFt ($r=-0.125$; $p=0.033$; coef=-0.8) but not in age-adjusted linear regression ($p=0.212$ and $p=0.710$ respectively).
Tachycardic patients at the first observation had similar LVEFt to those without baseline tachycardia across follow-up (62.9% vs 63.5%; $p=0.373$) and as at the last visit (62.0% vs 62.9%; $p=0.468$). Baseline tachycardia was not predictive of age-corrected LVEFt across all



future visits (0.070) as well as the last (p=0.300).

Conclusions: In a real-world paediatric DMD annual surveillance cohort, age-normalised 24-hour Holter tachycardia and average heart rate (z-score) were weakly associated with lower LVEFt but not after correcting for age. These findings seem to contradict a common belief on the subject matter and call for further longitudinal observations and modelling (like mixed-effects modelling) to determine whether sinus tachycardia is a marker of early ventricular dysfunction or its early predictor or just an innocent bystander. Equally important question remains whether sinus tachycardia in young DMD patients is a modifiable therapeutic target.



MODERATED POSTER ABSTRACTS



MP-001 / #48

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

ILLNESS EXPERIENCE IN THE SUPPORT NETWORK OF ADULTS WITH A FONTAN CIRCULATION: A QUALITATIVE STUDY

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Background and Aim: Univentricular heart defects are among the most complex congenital heart diseases. Fontan palliation has markedly improved survival, yet patients remain chronically ill and face high morbidity and premature mortality. Chronic disease affects patients and their support network, comprising family members and close friends, potentially triggering a range of emotional responses. This study aimed to explore illness experience of the support network of adults living with Fontan circulation.
Methods: A qualitative research design using interpretive description was employed. Semi-structured interviews (n = 10; duration 17-72 minutes) were conducted and thematically analyzed according to Braun and Clarke. Participants also completed the Hospital Anxiety and Depression Scale (HADS), consisting of 14 items (seven per subscale) rated 0–3, yielding subscale scores from 0 to 21, with higher scores indicating greater symptom severity.
Results: A total of n=10 support network members of eight patients participated, including four mothers, three partners, two siblings, and one friend (mean age 44.7 ± 16.1 years). Two main themes emerged, namely: *Treatment from the Second Row* and *Impact of the Illness on Everyday Life*. Theme one encompasses the varying involvement of the support network in disease management. During childhood, mothers manage treatment and care, focusing later on support and prevention. Partners and siblings mainly provide emotional support and focus on prevention. The second theme describes the condition's influence on routines and well-being, which varies depending on patient age and health status. Mothers report higher stress levels than others in the support network. This is reflected in HADS results, with mean anxiety and depression scores of 5.2 ± 3.9 and 2.9 ± 2.5, respectively, indicating no clinically relevant symptoms overall. Mothers do present higher anxiety (8.5 ± 4.4) and depression (4.3 ± 2.6) than others (anxiety 3.0 ± 1.3; depression 2.0 ± 2.1).
Conclusions: Members of the support network of adults with Fontan circulation



experience the condition differently, with varying influences on daily life. Active involvement in disease management may enhance patient outcomes. Findings underscore the importance of integrating the support network in treatment and care to promote well-being for both patients and those close to them.



MP-002 / #195

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

LONG-TERM OUTCOMES AND EXERCISE CAPACITY IN ECC-TCPC PATIENTS: IMPACT OF CONDUIT SIZE AND TEMPORAL CHANGES

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Background and Aim: The extracardiac conduit total cavopulmonary connection (ECC-TCPC) is widely used for Fontan palliation in patients with univentricular heart defects. Although survival now exceeds 90% in contemporary cohorts, long-term morbidity remains substantial. Optimal conduit diameter continues to be debated, with limited comparative data linking conduit size to long-term functional outcomes. Cardiopulmonary exercise testing (CPET) is a key tool for assessing Fontan circulatory performance over time.
This study evaluates long-term survival, morbidity, and serial CPET performance in a single-center ECC-TCPC cohort, with particular focus on longitudinal changes in exercise capacity and the potential influence of conduit size.
Methods: All patients who underwent ECC-TCPC at Leipzig Heart Center (1996–2022) and completed at least one maximal CPET (RER ≥1.0) between 2004–2024 were retrospectively analyzed. Patients were grouped by conduit diameter: 14 mm, 16 mm, and ≥18 mm. Clinical outcomes, morbidity, and CPET parameters were assessed, and longitudinal analyses were performed in patients with ≥2 CPETs.
Results: A total of 105 patients were included (14 mm: n=7; 16 mm: n=78; ≥18 mm: n=19), with a median follow-up of 12.9 years. Transplant-free survival was 98.9%. Morbidity occurred in 52 patients, most commonly reinterventions within the pulmonary circulation or aorta (n=50).
At first CPET, the 16-mm group showed significantly higher peak VO_2 (29.6 ml/kg/min) compared with the 14-mm and ≥18-mm groups (25.6 and 23.2 ml/kg/min; p=0.003), at significantly younger ages. Among 41 patients with serial CPETs, peak VO_2 declined by 3.6 ml/kg/min (14 mm) and 4.7 ml/kg/min (16 mm), but remained stable in the ≥18-mm group (+0.3 ml/kg/min). Across the cohort, the steepest VO_2 decline occurred between ages 10–20, with a plateau in adulthood.
Conclusions: Long-term survival after ECC-TCPC was excellent, while morbidity remained substantial. Exercise capacity declined with age and time since TCPC, particularly during



adolescence. Differences between conduit-size groups were strongly influenced by patient age and follow-up duration. Continuous functional assessment and larger prospective studies are needed to clarify the role of conduit diameter in long-term performance.



MP-003 / #635

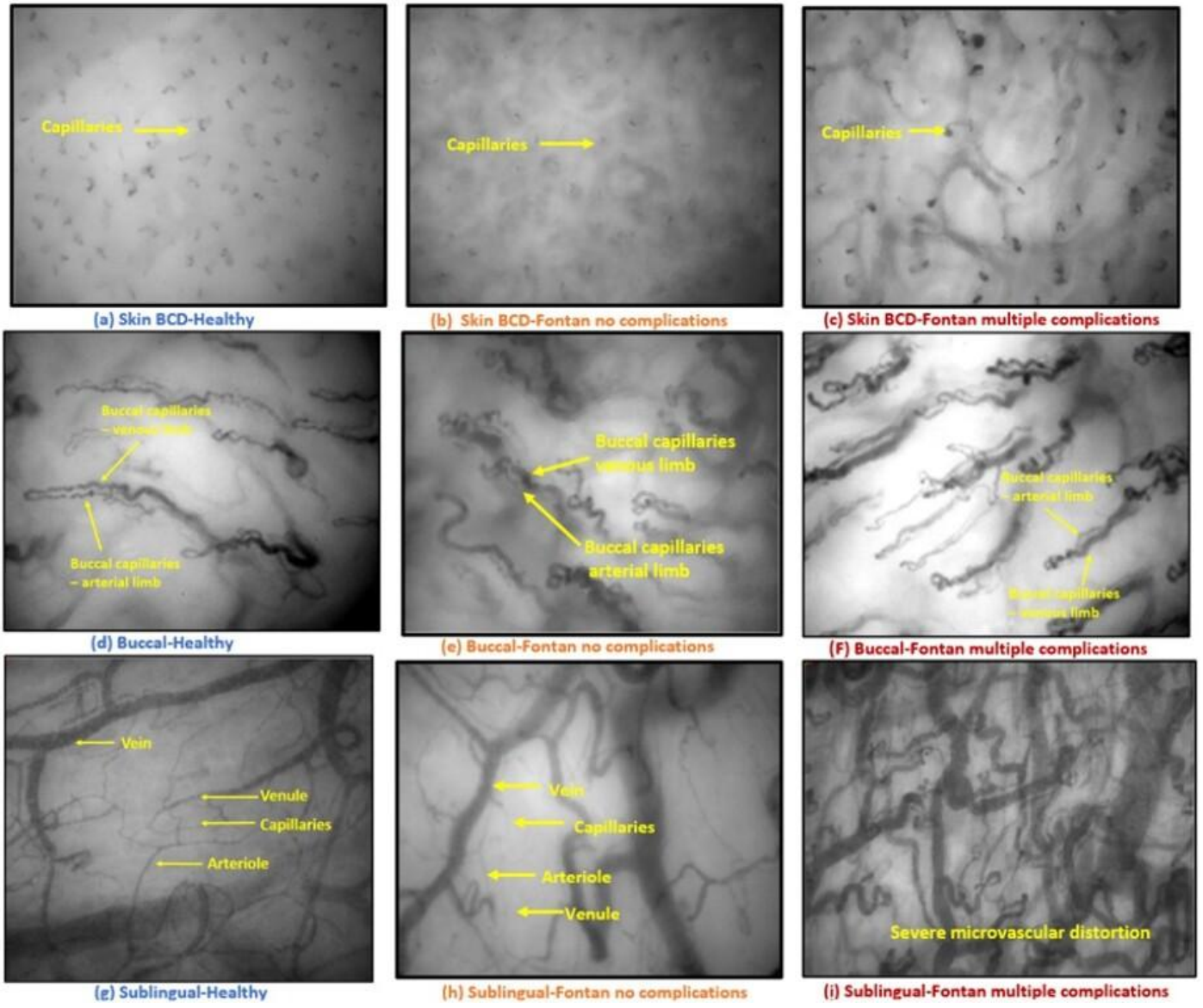
SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

DO SUBLINGUAL AND PERIPHERAL SKIN VENOUS MALFORMATIONS PREDICT THE INCIDENCE AND SEVERITY OF LONG-TERM FONTAN ASSOCIATED COMPLICATIONS? A CASE REPORT.

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Background and Aim: Lack of a sub-pulmonary pump and pulmonary vascular resistance in the Fontan circulation influence antegrade pulmonary blood flow and systemic venous congestion. Microvascular maladaptation may play a key role in the pathogenesis of Fontan multi-organ sequelae. We presented here extreme microvascular changes seen in one young Fontan adult associated with multiple and severe long-term complications.
Methods: We have studied a 21-year-old frail adult with a complex functionally single ventricle (isomeric) heart, who underwent late Fontan completion (aged 11) with early onset of multiple Fontan associated complications & poor functional capacity. He has AV valve regurgitation, heart failure, raised PA pressure. PLE, FALD, right->left shunting, small systemic->PA collaterals, managed atrial flutter & resolved plastic bronchitis. He is unsuitable for heart or heart-liver transplant, and end-of-life care pathway is in place. Heart rate was 72 bpm, BP 124/75mmHg, & oxygen saturations were 64%. ECG showed sinus rhythm, and echocardiography demonstrated laminar IVC & SVC flows, moderate AV-valve regurgitation & reasonable ventricular function. We evaluated his microcirculation using Handheld Capillary Microscopy (HVCS, UK) in the skin, nailfolds, oral sublingual, and buccal area. Basal and Maximal Capillary Density (BCD & MCD) were recorded & measured on the dorsum of the hand and feet after venous congestion. Central blood pressure, augmentation index, and pulse wave velocity (PWV) were measured using Mobil-O-Graph® device (Germany).
Results: Extreme changes in the dermal microcirculation of the hands & feet, and of his sublingual and buccal mucosa were noted, compared to other Fontan patients with lesser or no complications. Apart from skin capillary rarefaction, extreme sublingual and buccal microvascular remodelling including extensive capillary looping, severe venous dilatation, and increased tortuosity of capillaries, venules, and veins seen. The dilatation of the venous limb of the capillaries was a specific finding in all the sites imaged.

Conclusions: Microvascular remodelling may play a key role in the pathogenesis of long-term Fontan complications. Sublingual microvascular and venous remodelling changes are associated with, and may predict, the incidence of severity of long-term Fontan complications. Further studies are important to quantify and score sublingual vascular changes specific to the Fontan circulation.





MP-004 / #915

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

IS IRON DEFICIENCY A RISK FACTOR FOR ADVERSE EVENTS IN ADULT PATIENTS WITH FONTAN CIRCULATION?

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Background and Aim: Patients with Fontan circulation have different mechanisms of failure, many of which are not entirely understood, and it is well known that Fontan patients face decreased functional capacity, multiple hospitalisations and a higher mortality in their adult life. Iron deficiency (ID) is a recognised risk factor in patients with HF and may contribute to the failing of the Fontan circulation. Data upon the prevalence and the role of ID in adult patients with Fontan circulation are lacking. In this study we investigate the prevalence of iron deficiency in a cohort of adult Fontan patients and its association with adverse events.
Methods: We retrospectively reviewed consecutive adult patients with Fontan circulation electively admitted for reassessment at our institution. ID was diagnosed as ferritin <100 ng/mL or serum ferritin 100-299 ng/mL with transferrin saturation (TSAT) <20%, as per as per ESC Guidelines. The following adverse events were considered: death, cardiac transplant, acute hospital admission, cardiac surgery or percutaneous intervention, uptitration of medical therapy.
Results: The study included 37 patients (40.5% males, mean age 25.4 ± 10.1 years). Fontan circulation was atrio-pulmonary in 3/37 (8.6%), lateral tunnel in 12/37 (32.4%) extracardiac in 21/37 (56.7%). 22/37 (59.4%) patients had a systemic left ventricle, 10 (27.0%) systemic right, 5 (13.5%) other morphology. Mean SpO2 was 94.3 ± 3.3%, mean VO2 peak was 25.9 ± 6.60 mlO_2/kg/min. Mean Hb was 151 ± 14 g/L, median ferritin 35 (IQR 19;65) ng/ml, and median TSAT 14 (IQR 9;23) %, median NTproBNP 147 (IQR 69.5;270)ng/l; ID was present in 29/37 (78.4%) patients. Female sex (OR 15.75, CI95 2.23-323, p = 0.017) was the only risk factors for ID. Nor VO2 peak or NTproBNP values were associated to ID. 11 adverse events (29.7%) occurred during a median follow up of 41 (IQR 25; 47) months, ID was not associated with adverse events (HR 1.20; p = 0.866)
Conclusions: Iron deficiency is highly prevalent in adult patients with Fontan circulation,



particularly among women. In this preliminary analysis, iron deficiency was not associated with heart failure severity, as assessed by NT-proBNP levels, nor did it appear to be related to adverse clinical events.



MP-005 / #1285

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

EXPLORING THE CARDIAC-RENAL RELATIONSHIP IN FONTAN PATIENTS: IMPLICATIONS FOR CLINICAL FOLLOW UP

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Background and Aim: Background: The unique Fontan circulation physiology leads to chronically altered hemodynamics and reduced end-organ perfusion, making progressive renal dysfunction a potential long-term consequence. We aimed to determine which markers of kidney injury are most relevant for follow-up and to identify the optimal timing for their assessment.
Methods: Methods: Single centre retrospective study (June 2021-June 2022). Patients with univentricular physiology after Fontan surgery were included. Renal function was assessed by estimated glomerular filtration rate (eGFR). Proteinuria was considered pathological if ≥1 g/m^2/day. Chronic tubulopathy was defined by the presence of at least one abnormal tubular marker: α1-microglobulin >17 mg/g creatinine, β2-microglobulin >0.2 mg/L, or tubular reabsorbtion of phosphates (TRP) <85%. Regression models were applied for each renal outcome. Significant predictors were reported with p-values, ORs, and model performance indices.
Results: Results: We enrolled 69 patients (age at study 20.96 ± 9.22 years, 46.4%F). Higher mean renal resistance index (RI) was associated with elevated NT-proBNP (p=0.011), earlier age at Fontan hospitalization (p=0.004), and shorter duration of Fontan hospitalization (p=0.005). The model explained 46% of RI variability (R^2 = 0.456). Reduced eGFR (OR 28.6; p=0.047) was the only predictor for proteinuria, reinforcing the link between early glomerular dysfunction and urinary protein loss, despite preserved global renal function. Independent predictors of reduced eGFR included altered diastolic filling (E/A



ratio) (OR 76.0; p=0.030) and lower VO_2max on cardiopulmonary exercise test (OR 0.74; p=0.048). The logistic model demonstrated strong performance (R^2= 0.7), indicating a robust association between subclinical renal impairment and markers of both diastolic dysfunction and reduced exercise capacity. Notably, all patients maintained eGFR >60 mL/min/1.73 m^2, highlighting that these relationships emerge even at early stages of renal decline. Chronic diuretic use was the only significant predictor of tubulopathy (OR17.4; p=0.005). No hemodynamic or cardiac indices were associated with tubular injury.
Conclusions: Conclusions: Early decline in renal function in Fontan patients strongly correlates with abnormal diastolic filling and reduced exercise capacity, reflecting the cardiorenal interplay in this population. Tubulopathy appears primarily linked to diuretic exposure, while RI demonstrates limited utility, with NT-proBNP emerging as its only consistent correlate.



MP-006 / #171

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

CARDIAC RESYNCHRONIZATION THERAPY WITH PHYSIOLOGY-BASED SINGLE-SITE VENTRICULAR PACING IN CHILDREN WITH UNIVENTRICULAR PHYSIOLOGY: A THREE-CASE SERIES

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Background and Aim: Cardiac resynchronization therapy (CRT) using single-site ventricular pacing has not been established in patients with univentricular physiology. We aimed to evaluate the haemodynamic and clinical effects of physiology-guided single-site ventricular pacing in children with univentricular hearts and interventricular dyssynchrony who developed progressive heart failure despite optimal medical therapy.
Methods: Three paediatric patients with univentricular physiology were retrospectively reviewed: one tricuspid atresia patient after a Glenn operation and two right isomerism patients after Fontan completion. All had a dominant ventricle with a rudimentary chamber and exhibited bundle branch block–associated interventricular dyssynchrony with worsening heart failure symptoms. During cardiac catheterisation, temporary pacing was performed from multiple ventricular sites while monitoring arterial pressure, ventricular dp/dt, QRS duration, and speckle-tracking indices of interventricular mechanical delay. The site showing the greatest acute haemodynamic improvement and mechanical resynchronisation was selected for permanent epicardial lead implantation. Global longitudinal strain (GLS), N-terminal pro–B-type natriuretic peptide (NT-proBNP), QRS duration, and clinical status were assessed before and after CRT.
Results: All patients demonstrated acute haemodynamic improvement during temporary pacing and subsequently underwent permanent CRT using single-site ventricular pacing. Pacing sites were the left ventricular posterior wall in the tricuspid atresia patient and the right ventricular inferoposterior or anterior wall in the two right isomerism patients. After implantation, GLS improved (13.8%→16.9%, 3.5%→11.8%, 10.8%→16.2%), NT-proBNP decreased (23,720→2,899 pg/mL; 3,777→28 pg/mL; 1,732→564 pg/mL), and QRS duration shortened (130→109 ms; 176→126 ms; 164→102 ms). Mechanical delay between ventricles was abolished. All patients showed clinical improvement and remained stable during follow-up.
Conclusions: CRT with physiology-based single-site ventricular pacing appears feasible in



selected children with univentricular physiology and interventricular dyssynchrony and may improve electrical synchrony, mechanical coordination, and heart failure status.



MP-007 / #198

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

PREDICTION OF NEED FOR A PERMANENT PACEMAKER IN CHILDREN AND ADULTS WITH LEFT ATRIAL ISOMERISM IN A UNIVENTRICULAR PATHWAY.

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[1]Bristol Royal Hospital for Children, Bristol, United Kingdom, [2]Royal Brompton Hospital, Paediatric Cardiology, London, United Kingdom, [3]Evelina Children's Hospital, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom, [4]The Freeman Hospital, Newcastle Upon Tyne, United Kingdom, [5]East Midlands Congenital Heart Centre, Leicester, United Kingdom, [6]Great Ormond Street Hospital, London, United Kingdom, [7]Leeds General Infirmary, Leeds, United Kingdom, [8]University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom

Background and Aim: Patients with left atrial isomerism (LAI) commonly have a hypoplastic or absent sinus node and abnormal atrioventricular conduction predisposing them to bradyarrhythmias, including junctional rhythm and complete heart block. These disturbances, resulting in loss of atrioventricular synchrony, are particularly detrimental to haemodynamics after single-ventricle palliation. Reported pacemaker implantation rates in left atrial isomerism are 31%. We investigated rates and indications for pacemaker implantation in a UK cohort with LAI who had undergone single-ventricle palliation.
Methods: Retrospective data was collected from eight UK centres. Inclusion criteria were patients with left atrial isomerism with a Fontan circulation or were over seven years with a Kawashima. Patients were excluded if they did not require single-ventricle palliation or had not survived to Kawashima. Baseline and data on pacemaker insertion, revisions and follow-up data were collected. Counts are shown as whole numbers with percentages in brackets.
Results: 46 patients (59% female) met criteria; 42 (91%) underwent Fontan completion at median age six (4-9) years. 43 (93%) were alive at time of data collection.

Cardiac Baseline Diagnosis	Count (Percentage)
Hypoplastic Left Heart Syndrome	3 (7%)



Unbalanced Atrioventricular Septal Defect	26 (57%)
Double Outlet Right Ventricle	8 (17%)
Transposition of the Great Arteries	3 (7%)
Other Diagnosis	4 (9%)

18 (39%) required permanent pacemakers at median age five (2-9) years. Eight (45%) before, four (22%) at and six (33%) after Fontan completion. Pacing indications were junctional rhythm in three (17%), complete heart block in four (22%), sinus node dysfunction in six (33%) and other in five (28%). Median follow-up was 15 years. At the latest follow-up seven (19%) were in sinus rhythm, 14 (39%) atrial rhythm, two (6%) junctional rhythm, 10 (28%) pacing-dependant and three (8%) another rhythm. Seven (39%) had required at least one revision at any point.

Conclusions: Patients with left atrial isomerism undergoing single-ventricle palliation have a high incidence of bradyarrythmias requiring permanent pacing. This should be considered when planning the Fontan completion with consideration of implanting epicardial pacing wires at the same time.

MP-008 / #524

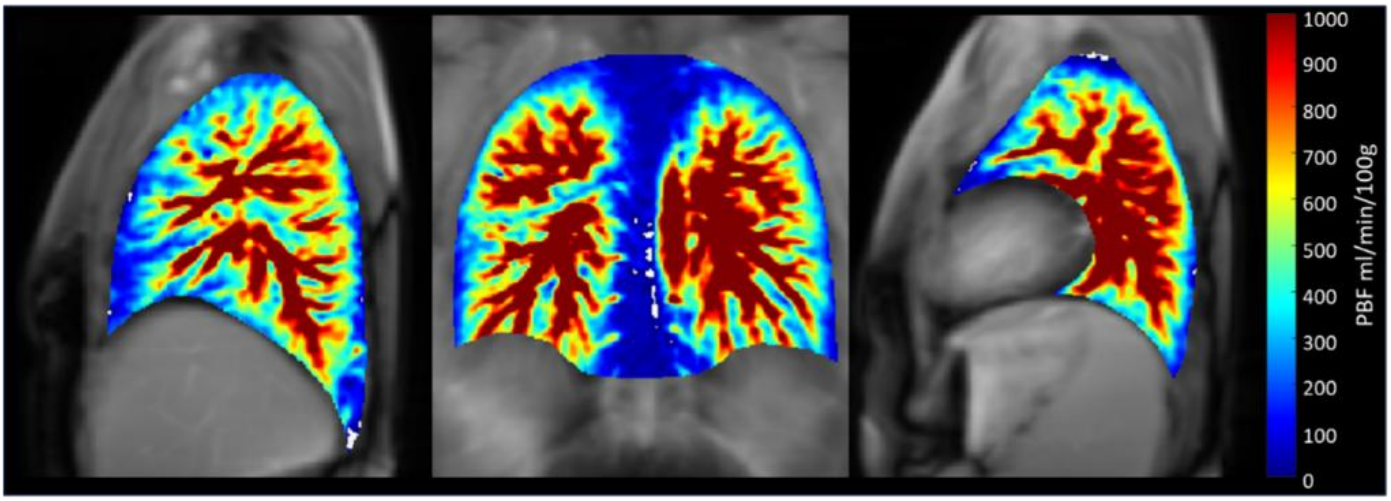
SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

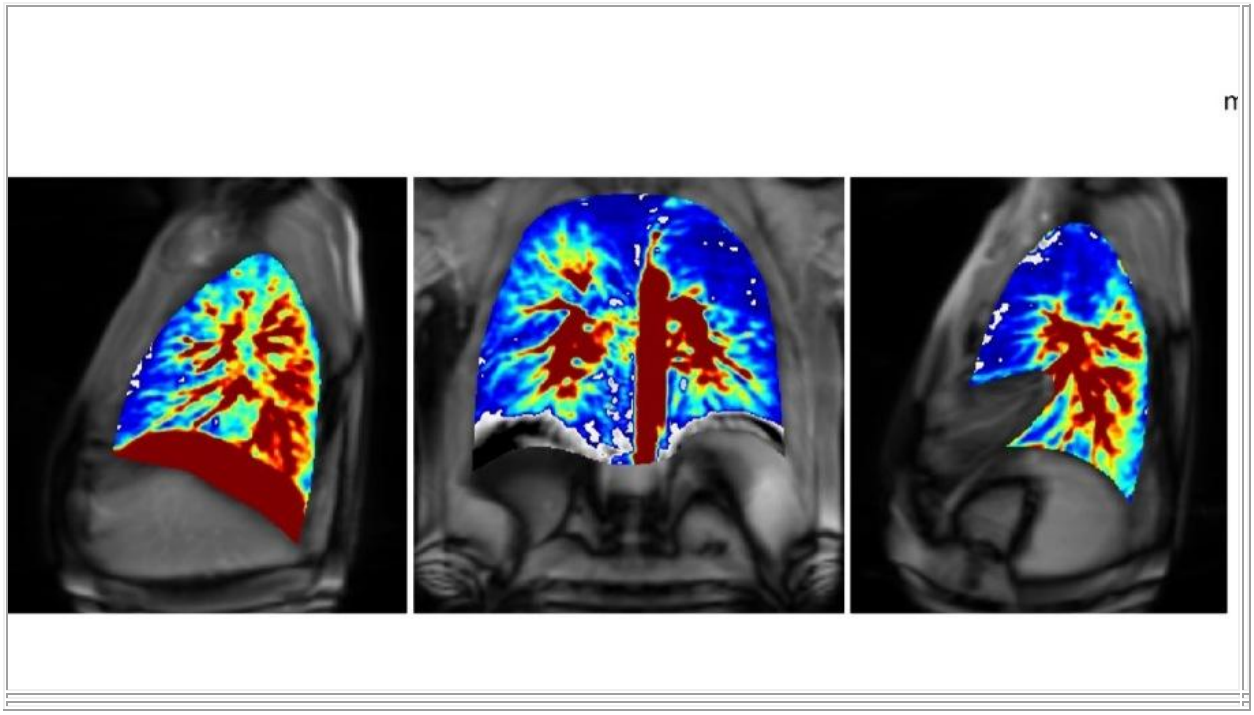
LUNG PERFUSION IMAGING IN PATIENTS WITH FONTAN CIRCULATION USING CONTRAST-FREE ARTERIAL SPIN LABELING MRI

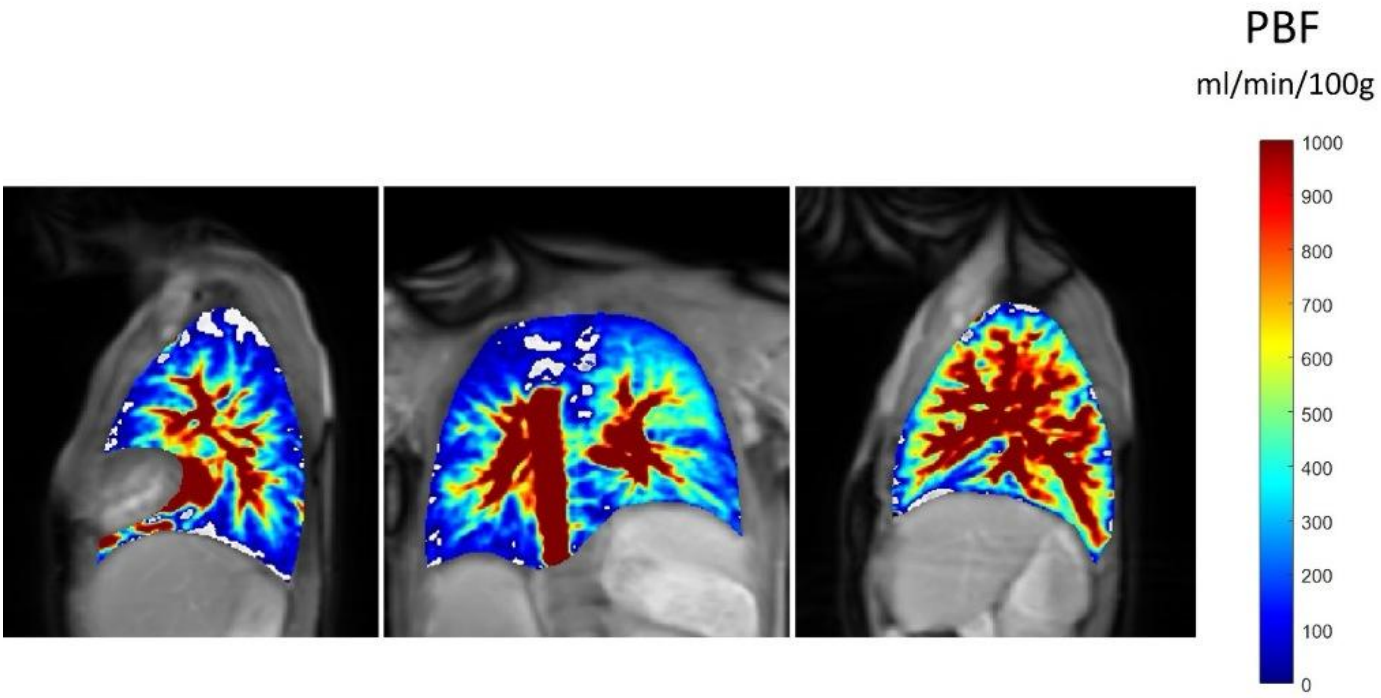
Anja Hanser[1], Sarah Nordmeyer[2], Heiner Latus[1], Thomas Küstner[3], Ludger Sieverding[1], Fritz Schick[4], Patrick Krumm[2], Ferdinand Seith[2], Jürgen Schäfer[2], Konstantin Nikolaou[2], Johannes Nordmeyer[1], Petros Martirosian[4]
[1]University Hospital of Tübingen, Department Of Pediatric Cardiology, Tübingen, Germany, [2]University Hospital of Tübingen, Department Of Diagnostic And Interventional Radiology, Tübingen, Germany, [3]University Hospital of Tübingen, Medical Image And Data Analysis (midas.lab), Department Of Diagnostic And Interventional Radiology, Tübingen, Germany, [4]University Hospital of Tübingen, Section On Experimental Radiology, Tübingen, Germany

Background and Aim: Pulmonary perfusion distribution is crucial for Fontan haemodynamics. Conventional MRI visualization requires two peripheral venous accesses, including one from the leg for contrast administration, which is painful and impractical. Arterial spin labeling (ASL) enables contrast-free MRI perfusion imaging by magnetizing water protons in supplying vessels. This study provides proof-of-concept for the feasibility and potential clinical applicability of ASL as a non-invasive alternative in patients with univentricular heart after total cavopulmonary connection (TCPC).
Methods: Fifteen patients aged 21.1 (13.3;29.8) years [median (Q1;Q3)] were examined 16.4 (8.8;27.7) years after TCPC with a FAIR True-FISP ASL sequence on a 1.5T MRI scanner. Slices in coronal and sagittal orientations were recorded under free breathing condition. The sequence parameters were: TI 1200ms, TR/TE 2.2/1.1ms, FA 70°, voxel size $2.5\times2.5\times20mm^3$, FoV $480\times480\times20mm^3$. Examinations with 24 control/label scans and a separate PDw scan were performed within 3:48 min for each slice orientation. Quantitative perfusion maps were calculated according to an established kinetic model.
Results: Analysis of pulmonary perfusion was feasable in all patients based on ASL images quality. Quantitative perfusion mapping of the lung revealed parenchymal perfusion values of about 300-500 ml/min/100g **(Fig 1)**. Suitable positioning of the imaging plane of interest was found crucial. Especially with FAIR ASL, it is important that the feeding vessels (IVC/SVC) are not in the recorded plane, as this leads to undesired perfusion signal reduction. In cases of heterogeneous anatomy, finding a suitable imaging plane position was challenging and required additional scans to visualize the IVC/SVC. In one patient (**Fig. 2**), a perfusion deficit was found in the upper region of the left lung (e.g. flow ratio was:

RPA/LPA=59%/41%), while another patient (**Fig. 3**) showed hypoperfusion in the upper region of the right lung (RPA/LPA=24%/76
%).







Conclusions: The preliminary results of this ongoing study demonstrate that non-invasive ASL MRI provides visualization and potentially quantitative assessment of the distribution of pulmonary perfusion in patients after TCPC without contrast agents. Further studies are needed to standardize the application of the ASL method and compare the results with established methods so that the proposed non-invasive technique can be integrated into patient management for Fontan circulation.



MP-009 / #638

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

LONGTERM OUTCOMES AND LYMPHATIC COMPLICATIONS AFTER TOTAL CAVOPULMONARY CONNECTION: A SINGLE-CENTER COHORT STUDY

Jan Hinnerk Hansen[1,2], Wiebke Schneider[2], Katy Rinne[2], Inga Voges[1,2], Juliane Schulze-Nagel[2], Jens Scheewe[3], Tim Attmann[1,3], Anselm Uebing[1,2]
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Background and Aim: Outcomes of single-ventricle patients undergoing the Fontan operation have improved over the past decades, yet morbidity and late mortality remain a significant concern. Elevated systemic venous pressure contributes to lymphatic congestion. We aimed to evaluate survival and incidence of protein-losing enteropathy (PLE) or plastic bronchitis (PB) after total cavopulmonary connection (TCPC) in a large single-center cohort.
Methods: Medical records of patients undergoing TCPC between 1996 and 2018 were reviewed. Survival, freedom from heart transplantation or Fontan-takedown, and freedom from PLE and PB were assessed.
Results: Overall, 383 patients (240 males, 143 females) were included. Right ventricular morphology was present in 253 (66.1%), with hypoplastic left heart syndrome being the most common diagnosis (n=200, 52.2%). Median age at TCPC was 2.7 (IQR 2.3-3.2) years. Early failure occurred in 5 (1.3%) patients (4 deaths, 1 takedown). Median follow-up for hospital survivors was 12.6 (IQR 8.2-17.3) years. Freedom from death, transplant, or takedown was 98%, 96%, and 88% after 5, 10, and 20 years. Within the follow-up period, PLE was diagnosed in 22 and PB in 13 patients. Median follow-up until presentation was shorter in PB compared to PLE (1.1 (0.7-3.8) vs. 2.4 (1.7-8.7) years). The combined incidence rate of PLE and PB was 0.74 cases per 100 patient-years. Estimated freedom from PLE or PB was 97%, 93%, 91% and 89% at 1, 5, 10 and 20 years. The risk for PLE or PB was higher in patients with a systemic right ventricle (OR 3.1, 95%CI 1.2-8.1, p=0.018). A history of chylothorax during admission for TCPC was associated with a significantly increased risk for PLE or PB during later follow-up (OR 6.4, 95%CI 3.2–12.6, p<0.001). 10 years after TCPC, freedom from PLE or PB was 65% for patients with a history of chylothorax in the postoperative course compared to 95% in those without.
Conclusions: Long-term outcomes following TCPC in this large single-center cohort are



favorable. However, lymphatic complications like PLE or PB remain major complications, particularly within the first 10 postoperative years. Chylothorax during the postoperative course of TCPC is a strong predictor of late lymphatic complications.



MP-010 / #794

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

RIVAROXABAN THERAPY FOR VENTRICULAR THROMBUS IN HYPOPLASTIC LEFT HEART SYNDROME: A CASE REPORT

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Background and Aim: Hypoplastic left heart syndrome (HLHS) is a congenital heart defect managed through staged surgical palliation, ultimately completed with the Fontan procedure, resulting in a single-ventricle circulation. This non-physiological hemodynamic state is associated with various systemic consequences, including a chronic prothrombotic tendency. In addition, the specific anatomy of HLHS may predispose to intracardiac blood stagnation caused by reduced and non-laminar blood flow. This case supports further investigation into the safety of direct oral anticoagulants (DOACs), efficacy, and optimal indications in the Fontan population.
Methods: A 9-year-old patient with evolutionary HLHS secondary to critical mitral stenosis and aortic atresia, following staged single-ventricle palliation and ultimately a completed Fontan circulation, was diagnosed with a thrombus located in the hypoplastic left ventricle. The thrombus was detected on transthoracic echocardiography performed in the early post-procedure period following a diagnostic cardiac catheterization.
Results: Initial management included therapeutic-dose enoxaparin titrated by anti-Xa levels. The control echocardiography showed slight reduction in thrombus size. Given the absence of antegrade flow through the native aortic valve, interventional treatment was not pursued. A clinical decision was made to transition anticoagulation to rivaroxaban and continue close surveillance. At the two-month follow-up, echocardiography showed further reduction in thrombus dimensions. At five months after the initial diagnosis, no thrombus was visualized.
Conclusions: Patients following Fontan palliation are highly predisposed to thrombi. This case illustrates the potential role of rivaroxaban as an alternative therapeutic option for intracardiac thrombus in patients with Fontan physiology, especially with growing popularity of DOACs. The mechanism of fibrinolytic activity of rivaroxaban has been found to be caused by activated clotting factor X, which cleavage products enhance the production of tissue-type plasminogen activator, causing the rise in levels of plasmin. Given the convenience of use of DOACs as well as increasing data suggesting its similar



efficacy to vitamin K antagonists in treatment of thrombi, this case supports further investigation into their use in the Fontan population.



MP-011 / #1257

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

SWITCHING TO DIRECT ORAL ANTICOAGULANTS IN CHILDREN WITH FONTAN CIRCULATION

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Background and Aim: Children with Fontan circulation have a lifelong risk of thrombotic complications. Standard thromboprophylaxis (acetylsalicylic acid (ASA) and/or vitamin K antagonists (VKAs)) may be ineffective due to variable responses and practical limitations. Direct oral anticoagulants (DOACs) could be an alternative. The aim is to evaluate changes in the hemostatic system and the short-term safety of DOACs in children in the late period after the Fontan procedure when switching from standard thromboprophylaxis.
Methods: 6 children (4 boys) aged 12 [11–14] years in the late period after the Fontan procedure (114 [93–126] months), receiving standard thromboprophylaxis (ASA (n=3) or VKA (n=3)), were included. 2/6 had a history of thrombosis (2-4 episodes each, ≈1 episode every 2 years). All patients were switched to DOACs: rivaroxaban (n=4) or apixaban (n=2) at pediatric dosing regimens. Hemostasis was assessed on standard thromboprophylaxis and after initiating DOACs. We used a global method for assessing hemostasis – thrombodynamics test (the principle is shown in Fig. 1), which measured the following parameters: clot growth rate (V; N: 20–29 μm/min), initial clot growth rate (Vi; N: 38–56 μm/min), clot growth delay (Tlag; N: 0.6–1.5 min), clot size (CS; N: 800-1200 μm), spontaneous clot formation time (Tsp, min; N:
absent).

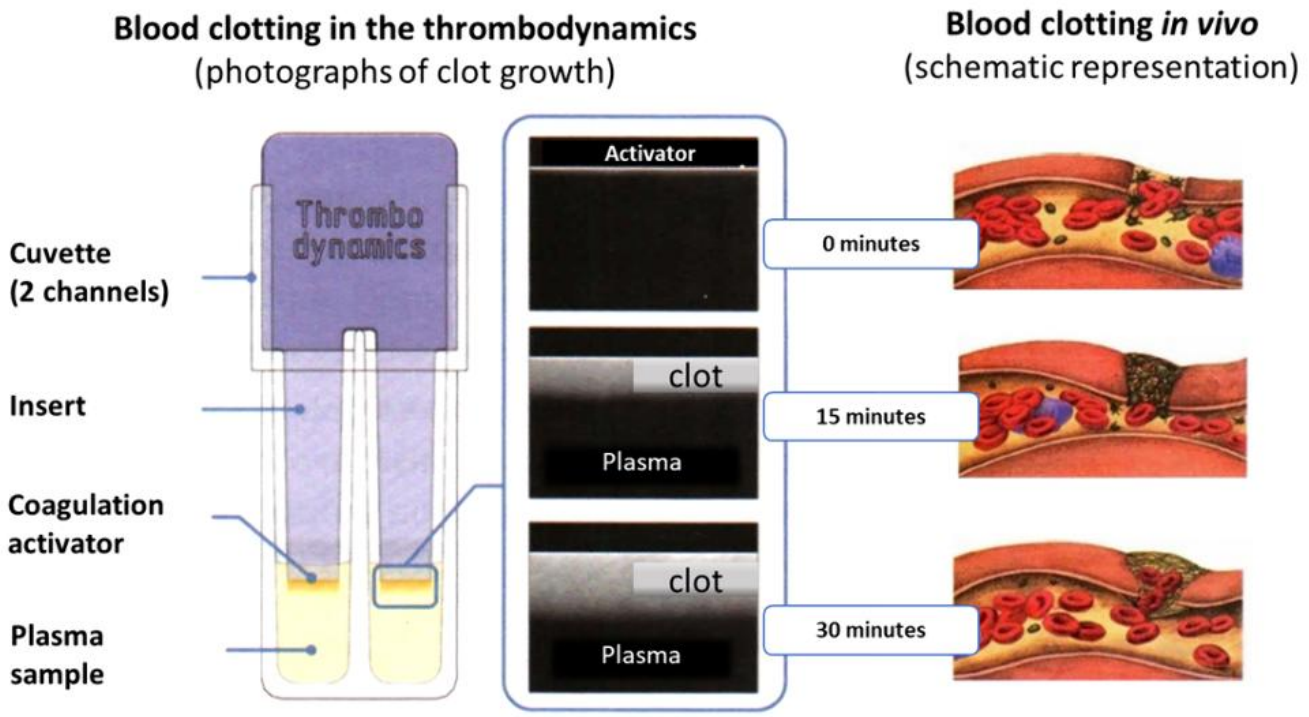
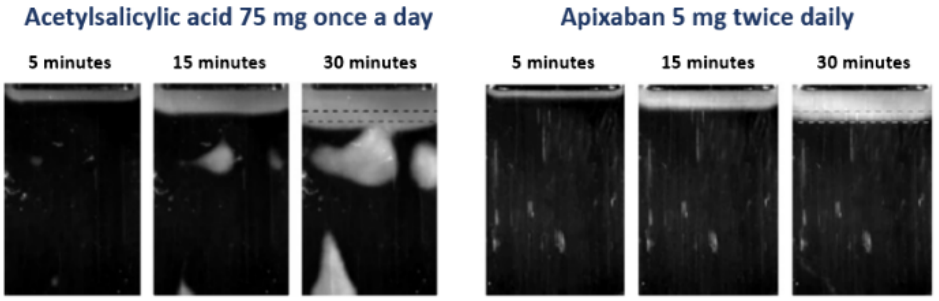


Figure 1. The principle of the thrombodynamics test

Results: On standard thromboprophylaxis, thrombodynamics test revealed hypercoagulability in all patients: V was elevated in 6/6 (39.4 [36.8; 40.6] μm/min), Vi in 5/6 (60.4 [56.3; 61.9] μm/min), and CS in 6/6 (1374 [1320; 1442] μm). Spontaneous clotting occurred in 4/6 (Tsp 23.8 [18.0; 26.9] min). At 3.5 [2.2; 4.0] days after DOAC initiation, thrombodynamics test results changed in all patients (representative example in Fig. 2): V decreased to 28.9 [28.2; 29.0] μm/min, Vi to 53.6 [47.4; 55.0] μm/min, CS to 1087 [1059; 1141] μm, and Tlag increased from 1.20 [1.10; 1.20] to 1.85 [1.80; 2.70] min (p=0.03, Wilcoxon). Spontaneous clotting was no longer observed. During 4.5 [2; 5] months of observation, no clinically significant bleeding or thrombosis was recorded.



Clot growth rate (V)	39,6 µm/min ↑	29 µm/min
Initial clot growth rate (Vi)	62,9 µm/min ↑	54,4 µm/min
Clot growth delay (Tlag)	1,2 min	1,9 min ↑
Clot size after 30 minute (CS)	1468 µm ↑	1108 µm
Spontaneous clot formation time (Tsp)	**15 min**	absence

Figure 2. An example of a change in the parameters of the thrombodynamics test after switching from acetylsalicylic acid to apixaban

Conclusions: In children with Fontan circulation, hypercoagulability often persists on standard thromboprophylaxis (ASA/VKA). Switching to DOACs was associated with rapid attenuation of procoagulant potential and a favorable short-term safety profile.



MP-013 / #241

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

NON-INVASIVE EVALUATION OF FONTAN-ASSOCIATED LIVER DISEASE IN CHILDREN: LONGITUDINAL PERFORMANCE OF TRANSIENT ELASTOGRAPHY AND APRI IN A SINGLE-CENTRE COHORT

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Background and Aim: Children with Fontan circulation are at lifelong risk of Fontan-associated liver disease due to chronic systemic venous hypertension and reduced cardiac output. Surveillance strategies increasingly incorporate transient elastography (FibroScan®) and serum fibrosis indices such as the AST-to-Platelet Ratio Index (APRI), yet their longitudinal performance and relationship to invasive assessments remain poorly defined. This study evaluated serial elastography and APRI trends in a pediatric Fontan cohort and explored their association with clinical, hemodynamic, and histological findings.
Methods: We performed a retrospective cohort study of all patients who underwent a Fontan procedure at BCCH (2000–2024) and had ≥2 elastography measurements. Demographic variables, serial liver biochemistries, APRI, ultrasound findings, echocardiographic parameters, and elastography values were extracted from clinical follow-up. Cardiac catheterization data—including Fontan pressures—and transjugular liver biopsy results were incorporated. Fibrosis was graded using METAVIR, CHFS, and Ishak scoring. Longitudinal trends were analysed using mixed-effects models and correlation analyses.
Results: Ninety-one patients (53.8% male) contributed 345 elastography assessments (median 3/patient; range 2–10). Measurements spanned 0.2–23 years post-Fontan. Median liver stiffness (per-patient median) was 16 kPa. Liver biopsy was performed in 22 patients (24.2%). Liver-stiffness correlated weakly with time since Fontan (r = 0.214; p = 0.0001). Individual variability was substantial: patient-level ranges extended from 0.10 to 41.70 kPa (median 8.7 kPa). No consistent progression was observed longitudinally (median slope 0.03 kPa/year). Liver stiffness correlated weakly with APRI (r = 0.265; p = 0.0012), while



APRI itself showed no significant temporal change (0.0013 units/year; p = 0.8323). Of the 22 patients with a liver biopsy, 15 had an elastography measurement within 6 months of biopsy. Nine had a congestive hepatic fibrosis score of 0 or 1, and five had a score of 2A or 2B; median liver stiffness between these groups was similar; 22 (IQR 18.4-37.4) vs. 17.6 (IQR 17.5-21.0) kPa respectively.

Conclusions: In this pediatric Fontan cohort, elastography and APRI showed weak relationships with time since Fontan, each other, and histologic severity. Their substantial intra-individual variability and lack of consistent progression highlight limitations of current non-invasive surveillance tools. Multimodal, hemodynamically informed assessment strategies are required to improve early detection and risk stratification of FALD in children.



MP-015 / #453

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

THYROID-GUT-AXIS ABNORMALITIES IN FONTAN PATIENTS: A REPORT FROM THE FONTAN CARE NETWORK.

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Background and Aim: Thyroid dysfunction is common in Fontan patients. Emerging evidence suggests an important bidirectional link between thyroid function and gut health. An intact intestinal epithelial barrier (IEB) is essential for maintaining this relationship. When the IEB is disrupted (intestinal hyperpermeability), bacterial translocation from the gut lumen to the bloodstream occurs, resulting in low-grade systemic inflammation and organ-damage. In this study, we investigated the thyroid-gut-axis, using biomarkers of IEB integrity, bacterial translocation and inflammation in a cross-sectional cohort of Fontan patients.
Methods: Forty-six patients (mean age 12.2 ± 8.2 years; female 34.8 %) in whom thyroid function was tested were included in this prospective study. Patients with protein-losing enteropathy were excluded. Fontan patients with a free serum T3/ free serum T4 level ratio (fT3/fT4) < 25th percentile were classified as the low fT3/fT4 group. Serum biomarkers of IEB disruption (intestinal fatty-acid binding protein 2 (FABP2)), bacterial translocation (endotoxin-core antibodies (EndoCAbs), lipopolysaccharide-binding protein (LBP) and lipoteichoic acid (LTA)), and C-reactive protein (CRP) were measured. Clinical data and standard laboratory measures were compared between the groups (low and high fT3/fT4 ratio groups).
Results: There were no significant differences in demographics and clinical data between the fT3/fT4 ratio-groups. However, serum LTA-antibody level, a major constituent of the cell wall of gram-positive bacteria, was significantly higher in patients from the low fT3/fT4 ratio group ($p = 0.020$). Importantly, serum albumin, protein and Immunoglobulin G (IgG) levels in this group were significantly lower (all $p < 0.05$). A strong inverse association between LTA antibodies and serum fT3 serum levels ($r = -0.355$; $p = 0.016$) was observed. Furthermore, strong inverse correlations were found between FABP2 and fT3/fT4 ratio ($r = -0.326$, $p = 0.035$), serum IgG levels (FABP2 vs IgG: $r = -0,410$, $p = 0.012$) and serum protein levels (FABP2 vs protein: $r = -0.313$, $p = 0.043$), suggesting that patients with a low fT3/fT4 ratio



status (thyroid dysfunction) are more susceptible for IEB disruption and have lower IgG and protein serum levels.

Conclusions: Disruption of the IEB (intestinal hyperpermeability/ “leaky gut”) and higher LTA antibody serum levels (bacterial translocation) seem to be associated with thyroid function in Fontan patients.



MP-016 / #1316

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

THE CLINICAL IMPLICATIONS OF RENAL DOPPLER ULTRASONOGRAPHY FOR PREDICTING CHRONIC KIDNEY DISEASE AND FONTAN FAILURE

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Background and Aim: Renal congestion caused by increased central venous pressure has been one of the main pathophysiologic findings in the Fontan associated kidney dysfunction.Despite widespread availability of screening tools for renal function, data regarding the kidney diseases in Fontan patients are very limited.We aim to characterize new approaches to evaluate renal congestion using Doppler ultrasonography in Fontan population evaluating the clinical relevance of the Renal Resistance index (RRI) compared to conventional surrogates for chronic kidney diseases, adverse clinical events and/or other surrogates of Fontan Failure
Methods: RRI was assessed using Doppler ultrasonography in 22 patients who had previously undergone Fontan palliation.Clinical parameters, echocardiography, and biochemistry were recorded. Standard renal function assessment was obtained by the measurement of creatinine serum levels and the estimation of the glomerular filtration rate (GFR) using bedside Schwartz" equation in children (< 18 years) and the Modification of Diet in Renal Disease (MDRD) equation in adults. The IVC diameters were indexed to the body surface area (iIVC).
Results: Median age was 16 +5 years and 72% were female patients. All patients had previously undergone the Fontan procedure at a median age of 5 years (range 1-11 years). The median GFR was 120,8 mL/min/1.73m 2. Patients with RRI > 75 showed a higher rate of clinical adverse events after Fontan palliation (75%) compared to those with RRI < 75 (16%) (p=0.0178). However, there were no significant relations between the RRI and the finding of the iIVC diameter > 1 cm/m2
Conclusions: The renal doppler ultrasonography may be a useful tool to monitor Fontan



pathophysiology. Specifically, high RRI may predict the risk of Fontan failure in these patients. Continued investigation of the effects of chronically venous congestion on kidneys and other factors associated with renal dysfunction in patients with Fontan circulation is warranted.



MP-017 / #117

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

DETERMINANTS OF EXERCISE CAPACITY IN FONTAN PATIENTS

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Background and Aim: The cardiopulmonary capacity, measured as VO_2peak represents the best predictor for mortality and morbidity in patients with Fontan physiology. The VO_2peak in Fontan patients usually reaches 51 – 65% of the predicted value. Factors influencing this parameter consist of cardiac, pulmonary and muscular function. Cardiac function consists of ventricular function and flow restrictions. Pulmonary function is influenced by pulmonary capacity, pulmonary vascular resistence, and by surgical complications. Less activity results in less mitochondrial and capillary density in the muscle tissue. In this study we wanted to investigate what differentiates Fontan patients with a supranormal VO_2peak.
Methods: A clinic for Fontan patients was established in our department. This evaluation consists of echocardiography and MRI, analysis of several laboratory parameters, and cardiopulmonary exercise testing. This is undertaken on a treadmill using an individualized protocol. Only patients who achieved maximal exertion (RER > 1) were included in this study. A supranormal VO_2peak was considered when values at or above 70% of the predicted value were achieved.
Results: Overall a number of 118 patients (mean age 19 years, 62% male) were included of which 92 achieved peak exertion. The group of subnormal achievers (44 patients) consisted of significantly younger patients (15.5 vs. 22.7 years of age) which also had a higher percentage of systemic right ventricles (22% vs. 11%). Additionally in this group the parameters describing exercise capacity (VO_2peak, OUES, VO_2/P) were significantly higher in the supranormal group whereas the parameters describing cardiac function (peak HR and O_2pulse) were comparable. Typical pulmonary parameters (VEpeak and VE/VCO_2) were significantly better. Parameters used for the evaluation of the muscular compartment (VO_2 at VT1 and HRR) were also higher.
Conclusions: A relatively high number of patients achieved supranormal values of a VO_2peak above 70% of their predicted value. The significant difference with respect to age may be explained by a higher percentage of systemic right ventricles in the younger group. Interestingly, the pulmonary parameters, especially those pointing towards a diffusion-perfusion mismatch a pulmonary issue in the subnormal achievers. The fact that the



muscular parameters were notably enhanced in the overachievers, stress the importance of physical activity



MP-018 / #748

SESSION 1 - FONTAN
14-05-2026 13:15 - 14:15

STROKE VOLUME AUGMENTATION IS THE MAIN PREDICTOR OF PEAK OXYGEN CONSUMPTION IN CHILDREN AND ADOLESCENTS WITH FONTAN CIRCULATION

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Background and Aim: In Fontan patients, exercise intolerance has traditionally been attributed to preload limitation, with relative contributions from other mechanisms such as chronotropic impairment and extracardiac factors. However, their relative influence on exercise limitation remains unclear. This study aimed to identify the variables that best predict peak oxygen consumption (VO_2peak) in children and adolescents with Fontan circulation.
Methods: We retrospectively analyzed cardiopulmonary exercise tests performed from 2022 to 2025 in patients with Fontan circulation (8–17 years) at Hospital Universitari Vall d'Hebron (Barcelona, Spain). Tests were conducted on a treadmill. Submaximal tests and those from patients with pacemakers were excluded. Multiple linear regression was performed to identify predictors of VO_2peak using three physiologically relevant variables: peak oxygen pulse (VO_2/HRpeak, marker of stroke volume), peak heart rate (HRpeak, chronotropic response), and peak breathing reserve (BRpeak, ventilatory limitation).
Results: Fourteen patients were included (57% male; 13.3 ± 2.6 years). A restrictive spirometry pattern was observed (FEV_1 z-score –1.91 ± 1.20; FVC z-score –2.03 ± 1.32; FEV_1/FVC 0.87 ± 0.56). Exercise capacity (VO_2peak 28.0 ± 9.2 ml/min/kg; z-score –2.88 ± 1.77), stroke volume augmentation (VO_2/HRpeak 7.1 ± 1.7 mLO_2/beat; z-score –2.40 ± 1.64) and chronotropic response (HRpeak 176 ± 16 bpm; z-score –11.33 ± 0.86) were markedly reduced. Ventilatory inefficiency (VE/VCO_2 slope 47.9 ± 5.3; z-score 5.10 ± 1.01) and ventilatory limitation (43% BRpeak < 15%; BRpeak 19.1 ± 13.6%) were also observed. In the regression model, VO_2/HRpeak z-score was the strongest predictor of VO_2peak z-score ($\beta = 0.897$, $p < 0.001$), followed by HRpeak z-score ($\beta = 0.310$, $p < 0.001$), whereas BRpeak showed a nonsignificant effect ($\beta = -0.065$, $p = 0.068$). The model explained approximately 99% of the variance in VO_2peak ($R^2 \approx 0.998$).
Conclusions: Children and adolescents with Fontan circulation exhibit significantly



reduced VO_2peak, primarily determined by limited augmentation of stroke volume and, secondarily, by an impaired chronotropic response. Ventilatory limitation did not independently predict VO_2peak, though a trend toward significance suggests it may contribute with a larger sample.



MP-019 / #32

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

SUCCESSFUL EXTUBATION TO NON-INVASIVE NAVA IN AN INFANT WITH ALCAPA AND UNILATERAL DIAPHRAGMATIC PARALYSIS AFTER COMPLEX CARDIAC SURGERY

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Background and Aim: Extubation failure is a common complication in infants following complex congenital heart surgery, particularly when postoperative diaphragmatic paralysis contributes to respiratory insufficiency. Reintubation is associated with increased morbidity and prolonged intensive care. Conventional non-invasive ventilation modes often provide inadequate patient–ventilator synchrony in these fragile patients. NAVA delivers ventilatory support in proportion to the patient's own diaphragmatic electrical activity (Edi), thereby improving synchrony and reducing the work of breathing. This case report aims to describe the successful use of Non-Invasive NAVA (NIV-NAVA) for extubation in an infant with anomalous left coronary artery from the pulmonary artery (ALCAPA) and unilateral diaphragmatic paralysis after multiple cardiac operations.
Methods: Perioperative data, ventilatory parameters, and clinical outcomes were reviewed retrospectively from the patient's medical record. Extubation readiness was determined based on hemodynamic stability, acceptable blood gases, and evidence of spontaneous respiratory effort. After failure of two extubations to conventional non-invasive support (CPAP and pressure support), a third attempt was made using NIV-NAVA. Edi signals were monitored via a specialized nasogastric catheter to guide ventilator assistance in synchrony with the patient's neural drive. Blood gas analysis, respiratory rate, and clinical stability were assessed continuously after extubation.
Results: The patient, a 6-month-old infant with ALCAPA, severe left ventricular dysfunction, and mitral regurgitation, underwent coronary reimplantation and mitral valve annuloplasty. Persistent right diaphragmatic paralysis was confirmed during cardiac catheterization. Despite improved cardiac function, two prior extubation attempts to CPAP and pressure support failed due to hypercapnia and respiratory distress. Following mitral valve replacement and full hemodynamic recovery, the patient was extubated directly to NIV-NAVA. Under NAVA support, the infant demonstrated improved patient–ventilator synchrony, stable Edi signals from the intact hemidiaphragm, reduced respiratory effort, and normalization of gas exchange. No reintubation was required, and non-invasive support was successfully weaned over subsequent days.
Conclusions: NIV-NAVA enabled successful extubation in a high-risk postoperative



cardiac infant with unilateral diaphragmatic paralysis where conventional modes had failed. By utilizing diaphragm-triggered assistance, NIV-NAVA optimized synchrony and reduced respiratory workload. This approach may represent an effective extubation strategy for infants with complex congenital heart disease and postoperative ventilatory challenges. Further studies are needed to evaluate its broader applicability.



MP-020 / #150

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

FIFTEEN-YEAR OUTCOMES OF 12 MM BOVINE JUGULAR VEIN CONDUITS VERSUS SMALL HOMOGRAFTS FOR RIGHT VENTRICULAR OUTFLOW TRACT RECONSTRUCTION IN NEONATES

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Background and Aim: To evaluate long-term outcomes in neonates undergoing right ventricular outflow tract (RVOT) reconstruction using 12 mm bovine jugular vein conduits (Conduit A) and small homografts (8-13 mm) (Conduit B).
Methods: A retrospective single-center review was conducted of consecutive neonates who received Conduit A or B for RVOT reconstruction from January 2005 to December 2020. Conduit failure was defined as replacement ≤5 years post-implantation (early) or >5 years (late).
Results: Sixty-three neonates (median age 16 days, IQR 11-29 days) were included. Conduit A and Conduit B were implanted in 49 (78%) and 14 (22%) patients, respectively. Eight patients (5 Conduit A, 3 Conduit B) required early reintervention for non-conduit reasons (e.g., truncal valve repair, Yasui take-down) and were excluded. Early conduit failure occurred in 3/44 (7%) Conduit A patients and 3/11 (27%) Conduit B patients (p=0.09), primarily due to branch pulmonary artery stenosis or distal anastomotic issues. Five patients (3 Conduit A, 2 Conduit B) were lost to follow-up. In the remaining cohort (n=50), median follow-up was 12.3 years (IQR 9.7-14.7 years), with median freedom from conduit-related reoperation of 10.6 years for Conduit A and 6.4 years for Conduit B (p=0.31). One-year mortality was 13% (8/63); 10-year overall survival was 86%. Conduit durability >10 years was observed in 35% (12/34) of Conduit A and 30% (3/10) of Conduit B cases. The longest interval to replacement was 16 years for Conduit A and 15.5 years for Conduit B.
Conclusions: In neonates, 12 mm bovine jugular vein conduits provide durable RVOT reconstruction with low early failure rates and median freedom from reoperation exceeding 10 years. Compared to small homografts, they showed trends toward lower early failure and greater longevity, though differences were not statistically significant.



MP-021 / #229

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

PREVALENCE AND TIMING OF ACUTE KIDNEY INJURY AFTER PEDIATRIC CARDIAC SURGERY

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Background and Aim: Acute kidney injury (AKI) is a frequent and serious complication after pediatric cardiac surgery with cardiopulmonary bypass (CPB), associated with adverse outcomes and higher mortality. Despite well-described epidemiology, data on the timing and progression of AKI remain limited. This study sought to examine the prevalence and temporal patterns, including duration, time to onset, and progression time between stages, of AKI in a large nine-year pediatric ICU cohort.
Methods: We retrospectively analyzed the occurrence of AKI during the first postoperative week in children undergoing CPB-supported cardiac surgery at a single tertiary center. An established rule-based clinical decision support system assigned AKI stages I–III in a time-resolved manner. AKI prevalence, duration, timing relative to surgery completion, stage progression, and 30-day mortality were assessed.
Results: AKI occurred in 555 of 1,296 cases (42.8%), with highest stages of I, II, and III reached in 27.6%, 9.9%, and 5.3% of cases, respectively. Median age at surgery was 9 months (IQR 3–51), median surgical complexity (RACHS-1) was 3 (IQR 2–3), and 56 patients (4.3%) required renal replacement therapy. Median postoperative time to onset was 9 hours (IQR 1–32), 17 hours (IQR 8–37), and 28 hours (IQR 19–47) for stages I–III. Median AKI duration increased with severity, with values of 22 (IQR 9–46), 23 (IQR 15–47), and 96 hours (IQR 42–168) across the three stages. Thirty-day mortality was 0.2% in stage I and II, and 0.6% in stage III ($p<0.001$, χ^2). Among progressing patients, median progression times were 7 hours (IQR 0–31) from stage I to II and 10 hours (IQR 0–29) from stage II to III, with overall stage I to III escalation occurring at 23 hours (IQR 11–40).
Conclusions: AKI occurred in 42.8% of pediatric CPB cases and showed early postoperative onset, with all stages emerging predominantly within the first two days after surgery. More severe AKI was associated with longer duration and rapid progression after



onset, emphasizing the importance of vigilant early monitoring to detect worsening kidney injury. These temporal patterns may help refine postoperative surveillance and timely intervention.



MP-023 / #620

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

COVID-19 PANDEMIC AND THE SERVICE OF CONGENITAL HEART SURGERY IN LITHUANIA: INTERMEDIATE FOLLOW-UP RESULTS OF INFANTS WHO UNDERWENT NON-PALLIATIVE CORRECTION OF LOW AND MEDIUM COMPLEXITY CONGENITAL HEART DISEASE

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Background and Aim: Global COVID-19 pandemic has posed significant challenges to the delivery of all COVID-19 unrelated healthcare services, including congenital heart surgery. Aim of this study was to investigate the intermediate term outcomes of congenital heart surgery in infants who underwent non-palliative correction of low and medium complexity congenital heart disease in Lithuania during the entire period of COVID-19 pandemic.
Methods: This retrospective non-randomised study analyses anonymized follow-up data of infants (1 month to 1 year old) who underwent non-palliative repair of low and medium complexity congenital heart disease during the whole period of COVID-19 pandemic in Lithuania and compares it to a similar pre-pandemic cohort. Patient survival and the rate of unplanned cardiac reinterventions during the follow-up period were evaluated.
Results: Pandemic and prepandemic cohorts were similar in their case volume (47 and 62 cases, *p*-value > 0,05) and male-to-female ratio (1,7:1 and 1:1,1, *p*-value > 0,05). Most frequently performed procedures in both groups were resection of aortic coarctation, correction of atrial and/or ventricular septal defect, correction of atrioventricular septal defect. Median follow-up time was 42,6 (IQR: 27,3 – 50,1) months for the pandemic group and 73,8 (IQR: 62,3 – 82,6) months for the pre-pandemic group. Immediate postoperative survival after the initial procedure was 93,6 % for the pandemic group and 96,8 % for the pre-pandemic group. Actuarial survival 12 and 36 months after the initial procedure was 93,6 % and 91,5 % in the pandemic group; 93,6 % and 93,6 % in the prepandemic group (*p*-value > 0,05). Actuarial reintervention rate of patients 12 and 36 months after the procedure was 16,56 % and 16,56 % in the pandemic group; 10,0 % and 12,7 % in the pre-pandemic group, respectively (*p*-value > 0,05).
Conclusions: Intermediate term follow-up analysis of survival and reintervention rate among infants who underwent non-palliative surgical repair of low and medium complexity



congenital heart disease during the global COVID-19 pandemic showed no significant differences when compared to a similar pre-pandemic group.



MP-024 / #766

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

USE OF DECELLULARIZED EQUINE PERICARDIUM FOR CARDIAC DEFECT REPAIR: MID- AND LONG-TERM OUTCOMES IN 388 PATIENTS

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Background and Aim: Decellularized equine pericardium is an increasingly used material for the repair of congenital and acquired cardiac defects. This study evaluates the mid- and long-term performance of this novel xenopericardial patch across a wide range of congenital cardiac lesions in both pediatric and adult patients.
Methods: A total of 488 patches were implanted in 388 patients between 2013 and 2024. The cohort included neonates, children, and adults with univentricular and biventricular physiology. Collected data included demographics, age at surgery, diagnosis, operative procedure, patch location, follow-up duration, and patch-related reinterventions or reoperations
Results: Median age at implantation was 9.5 months (range 9 days–89 years). Of 75 adult patients (19.3%), the majority had congenital cardiac conditions (n=46, 61.3%). In the pediatric cohort, the most common indications were atrioventricular septal defect (AVSD, n=75, 19.3%) and tetralogy of Fallot (TOF, n=66, 17.0%). Over a maximum follow-up of 11 years, the overall rate of reintervention or reoperation was 29.9%. Patch-related reinterventions occurred in 16 patients (3.3%), predominantly in the pulmonary artery (PA) position (n=13, 81.3%). The patch-related reoperation rate was 1.4%. No patch-related failures were observed in atrial septal defect (ASD) repair (n=98, 20.1%) or right ventricular outflow tract (RVOT) reconstruction (n=104, 21.3%). Favorable results were also observed in ventricular septal defect, aortic valve, mitral valve, and pulmonary vein procedures, although numbers were limited.
Conclusions: This analysis demonstrated effectiveness of decellularized equine pericardium for repair of a variety of congenital and acquired heart defects, particularly to in ASD repair and RVOT augmentation with good long-term performance.



MP-026 / #186

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

THE USE OF CUTTING BALLOONS IN THE TREATMENT OF RESISTANT PERIPHERAL PULMONARY STENOSIS FOLLOWING SURGICAL TREATMENT OF CONGENITAL HEART DEFECTS

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Background and Aim: Peripheral pulmonary stenoses are often difficult to access surgically, and significant percentage of them are post-surgical stenoses, most often following unifocalization procedures. The use of conventional high- and low-pressure balloons is often ineffective, and therefore cutting balloons(CB) are sometimes the only alternative.The aim of this study is to evaluate their effectiveness in the treatment of resistant peripheral pulmonary stenoses.
Methods: From October'2011 to November'2025, 65 angioplasties using CB were performed on 46 patients: 32 with single-vessel angioplasty, 11 with double-vessel, 2 with triple-vessel, and 1 with five-vessel angioplasty. The procedure was performed in 4pts after surgical treatment for HLHS (previous banding), 2-after TAC, 2-after TGA, and 38-after PA+VSD+unifocalization (82.6%). Patient ages ranged from 0.4 to 16 years (5.4±5.1; median-3.8); body weight- 9 to 65kg (17.2±18.9kg). In 37 cases of stenosis (56.9%), previous unsuccessful or ineffective high-pressure balloon angioplasty was performed. In majority- 45/65 (69.2%), calibration with low-pressure balloon was performed to select appropriate CB. The procedure was considered successful if it achieved a minimum increase in the lumen diameter at stenotic site by at least 50%.
Results: The procedure resulted in increase in the diameter of stenosis from 2.1±0.8mm to 5.8±1.3mm (effectiveness- 83% -54/65). 4mm balloons were used in two stenoses(3,08%), 5mm in three(4,62%), 6mm in 13(20%), 7mm in eight(12,3%), and 8mm in 29 stenoses(60%). The balloon-to-stenosis ratio was 2.8±0.9. In 58 (89.2%) cases of stenosis after CB-plasty, high-pressure-balloon angioplasty was performed, and in 2 cases (after recurrence of stenosis) a drug-eluting balloon was introduced. The RV/Aø ratio decreased from 0.69±0.2 to 0.43±0.14 (patients with HLHS were excluded). In 6pts (8.7%), complications occurred: in 2pts.- transient bleeding into respiratory tract (not requiring blood transfusion), in 2pts.- hematoma at the puncture site, in 1pt.- delivery sheath was cut during removal of CB, and in 1pt- the blade partially detached and bent from the balloon, but it was safely removed.
Conclusions: The use of CB for refractory pulmonary artery stenoses is effective method,



primarily in patients in whom other methods have failed. It's safe for post-surgical stenoses with scar tissue, but it should be performed in centers experienced in this method and with cardiac surgical support.



MP-027 / #255

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

KONAR MFO OCCLUDER– NEW DEVICE FOR MULTIPLE PURPOSES

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Background and Aim: Konar MF Occluder is a new design device dedicated for ventricular septa defect closure. Its shape resemble Amplatzer Duct Occluder (ADO) type I, but with an extra disc makes the device potentially suitable for multiple use. There are some congenital and acquired heart defects anatomy or physiology that makes the type of construction the best option for use. The aim was to evaluate usefulness of new devices in closure rare anatomy.
Methods: There were 12 patients with arterial duct (PDA), 8 patients with native ventricular septal defect (VSD), 1 pt with ruptured Valsalva aneurysm and 1 pt with posinfarct VSD closed using Konar MFO device in the period of 2 years – from 07.2023-12.2025. All procedures were performed in iv sedation, and the implantation was performed from arterial in 8 cases and 14 from venous access.
Results: All procedures were successful and uneventful and the implanted devices were in sizes – for PDA 7/5 mm (9 pts), 8/6 mm (2 pts) and 9/7 (1 pt) for VSD 7/5 mm (6 pts), 8/6 mm (2 pts), ruptured Valsalva aneurysm 10/8 mm and postinfarct VSD 14/12 mm. Sheaths used for implantation were from 4 to 7F. All PDA were in conical shape with mean size of 2,96 mm and mean length of 6,3 mm. In patients with VSD defect size was mean 3,4 mm. In two pts with PDA with pulmonary hypertension post procedure pulmonary pressure drop significantly. There was minor residual shunt directly post procedure and disappeared in 24 hours in all cases. There were no significant complication.
Conclusions: Konar MF devise is a new device suitable for multiple defect closure particularly ventricular septal defects and patent arterial duct but also some acquired defects Its length and additional disk make advantage and it is suitable for complex anatomy and elevated pulmonary pressure.



MP-028 / #258

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

SUCCESS RATE OF CATHETER BALLOON DILATIONS AND OUTCOMES IN PEDIATRIC PATIENTS WITH CONGENITAL PULMONARY STENOSIS - SINGLE CENTER COHORT 2011-2024

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Background and Aim: Congenital heart disease (CHD) affects 1% of live births. Pulmonic valve stenosis (PS) accounts for 8-12% of all CHD. Percutaneous pulmonary valvuloplasty, is the recommended procedure for severe PS. Our aim was to evaluate the outcomes and predictors for success of PS balloon dilations.
Methods: We conducted a retrospective observational study, reviewing 125 balloon dilations for severe PS in patients aged 0-18 years between the years 2011-2024, at our hospital. Complete success was defined as achieving a pressure gradient under 30mmHg over the pulmonic valve, by Doppler-echo, one day after the balloon dilation. A decrease of at least 20mmHg from baseline was considered partial success. All other cases were defined as failures. In addition, major and minor complications details and long-term follow-up data were collected and analysed.
Results: The average time of follow-up was 38 months (range 1-145). 25 out of 125 (20%) patients were lost to follow-up. Overall success rate was 88.8% (47.2% complete success and 41.6% partial success). 11.2% of the procedures failed. Procedure failure among patients younger than 1 month of age was only 1.8%, while older than 1-month patients had nearly 20% failures. The use of large balloons (130% of anulus size or larger) increased the success rate among children who had no success with smaller balloons. The average free from re-intervention time was 9.8 (+- 0.5) years. Out of 100 patients with complete follow-up, 79.6% remained free from re-intervention during the time of follow-up. 18 patients had re-intervention, all within 3 years of first balloon dilation and 15 of them (83%) within the first year. No cath-related mortality was observed in this study cohort. 12 procedures (9.6%) had major complications. An additional 10 procedures had minor complications (8%). A factor associated with increased risk of complications was using balloons with relatively large length (>30mm).
Conclusions: Balloon dilation for PS is effective and relatively safe procedures. The procedure is significantly more effective in the neonates group. Balloon size of 130% of



anulus size or larger is effective and relatively safe, especially with balloon length of 30mm or less, and could be considered when smaller balloons fail.



MP-029 / #354

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

EFFICACY AND SAFETY OF TRANSCATHETER CLOSURE OF ATRIAL SEPTAL DEFECTS USING THE AMPLATZER SEPTAL OCCLUDER VERSUS THE COCOON SEPTAL OCCLUDER: A RETROSPECTIVE MULTICENTER STUDY

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Background and Aim: Transcatheter closure has become the preferred treatment for atrial septal defects (ASD), with the Amplatzer Septal Occluder (ASO) being the most widely used device. [1] However, rare but serious complications including cardiac erosion and nickel allergy have been reported with ASD closure using the ASO. [2-4] The Cocoon Septal Occluder (CSO), featuring nanoplatinum coating and enhanced softness, was developed to address these concerns. [5] We present comparative efficacy and safety data of these occluders from a large European retrospective multicenter cohort study.
Methods: We recruited 1150 consecutive patients with ASD who underwent catheter closure with ASO (Group 1, 586 patients) and CSO sept occluders, respectively. Cocoon septal occluder (CSO) (Group 2, 564 patients), respectively. The median age was comparable between groups, with 16 years (range 3-68) in the ASO group and 15 years (range 4-72) in the CSO group, respectively. The patients were selected from 4 European centers according to common patient selection criteria, procedural and follow-up protocol approved by the Ethical committees of each participating hospital. Informed consent was obtained in each patient. Clinical, electrocardiographic, echocardiographic, and follow – up data were collected from each participating hospitals with the use of Microsoft Excel 10 and entered a database for analysis. Procedures were performed under general anaesthesia with fluoroscopy and 2D/3D transoesophageal echocardiography guidance.
Results: Our findings demonstrated excellent efficacy for both devices, with closure rates exceeding 99%. Some rare issues included one cardiac erosion and three severe nickel allergic reactions with ASO device. However, the absence of cardiac erosion and nickel allergy in the CSO group represents a clinically meaningful safety advantage. The nanoplatinum coating of CSO prevents nickel leaching, eliminating hypersensitivity reactions in susceptible patients.
Conclusions: Both ASO and CSO demonstrated excellent efficacy for transcatheter ASD



closure. However, CSO's structural improvements, particularly nanoplatinum coating and enhanced softness, appear to eliminate nickel-related complications and may reduce erosion risk. These findings suggest CSO represents a safer alternative, especially for patients with nickel sensitivity or challenging anatomy. Prospective randomized trials with extended follow-up are warranted to confirm these observations.



MP-031 / #1239

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

BREAKING THE BLOCK: SUCCESSFUL RADIOFREQUENCY RECANALIZATION OF SUPERIOR VENA CAVA OBSTRUCTION AFTER GLENN TAKEDOWN

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Background and Aim: Superior vena cava (SVC) obstruction is a recognized postoperative complication after Glenn takedown in congenital heart disease. When standard endovascular recanalization fails, sharp recanalization techniques (SRTs) using needle-assisted techniques, re-entry devices, or radiofrequency (RF) wires can significantly increase technical success. The Sniper Technique, a form of RF sharp recanalization, allows precise and controlled crossing of chronic central venous occlusions. The Nykanen Baylis RF guidewire delivers focal RF energy at the tip, enabling targeted perforation under fluoroscopy while minimizing vascular injury.
Methods: Clinical Case A 3-year-old child with Tetralogy of Fallot, previously palliated with a right bidirectional Glenn shunt, underwent complete repair including Glenn takedown with right atrial re-anastomosis. . Follow-up echocardiography and CT angiography revealed complete SVC occlusion, with azygos collateral drainage.
Results: Procedure Endovascular recanalization was performed through the right internal jugular vein. The long-segment SVC occlusion, with distance confirmed on CT, was approached using the Nykanen Baylis RF wire, applying the Sniper Technique. Under biplane fluoroscopic, short controlled RF energy pulses (2 s continuous mode) were delivered at the wire tip toward a 15-mm femoral snare positioned at the distal end of the occlusion, allowing safe traversal of the occluded segment. Once precise fluoroscopic alignment between the wire tip and the snare was confirmed in AP, RAO and LAO projections, the wire was advanced incrementally with continuous reassessment. Once the occlusion was crossed, the RF wire was snared to establish a veno-venous loop. A 0.035” stiff wire was then exchanged to perform balloon angioplasty, followed by deployment of a 34-mm covered CP stent on a 12-mm BIB balloon. Final venography showed complete SVC patency without extravasation. The patient was discharged on dual



antiplatelet therapy, with sustained SVC patency on follow-up imaging.

Conclusions: RF-assisted Sniper Technique using the Nykanen Baylis wire provides a controlled and effective approach for complex and extended SVC occlusions after Glenn takedown, achieving precise recanalization when conventional techniques fail. Accurate alignment of the RF wire and the snare across multiple fluoroscopic projections is essential to ensure success and minimize complications, offering a superior safety profile for long venous occlusions, as demonstrated in our case.



MP-032 / #1260

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

MELODY VALVE IMPLANTATION IN PATIENTS WITH 22Q11 ANOMALY – IS THERE A HIGHER RISK OF INFECTIVE ENDOCARDITIS?

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Background and Aim: Patients with 22q11 anomaly may have an increased risk to develop infective endocarditis (IE) after Melody valve implantation (PPVI) due to a compromised immune system and some centers therefore stopped the implantation in these patients. The aim is to analyze our own cohort of Melody patients, seek for differences in the development of IE and infer consequences for further management.
Methods: Retrospective analysis of 112 consecutive patients after PPVI in our institution from 1/2009 – 12/2023 with a follow-up until 12/2024. Out of these 112 patients 85 (76%) had normal genetics and 20 (18%) were 22q11 individuals. 7 patients showed other genetic disorders like Trisomy 21. There was no difference in the patients characteristics regarding sex, age and weight, and no difference regarding conduit type, age and size. Non of the 22q11 individuals had a severe immune deficiency or a history of severe bacterial infections. The underlying heart defect was significantly different in 22q11 patients, as there was only a proportion of 4,5% aortic stenosis and 95,5% conotruncal malformations, whereas in normal genetics the proportion of Ross-patients was 38%. The predominant lesion showed no differences as well, as it was predominant stenosis in 81% of the 22q11 group and 86% in the normal genetics group.
Results: During the follow-up interval of 1-15 years Infective endocarditis occurred in 3 patients with 22q11 and in 13 patients with normal genetic, which is 14,3 and 14,5% respectively. 1 endocarditis was found in a patient with Trisomy 21.
Conclusions: The incidence of IE after PPVI was the same in 22q11 patients as in the genetically normal group. 22q11 patients without history of severe bacterial infections and without heavily impaired immune-status seem to bear no elevated risk for infective endocarditis following PPVI. Infections in 22q11 patients do not seem to be a result of their immune-deficiency itself. We could not find a striking argument for withholding PPVI in 22q11 patients.



MP-033 / #1319

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

CLINICAL OUTCOMES OF PERCUTANEOUS PFO CLOSURE USING A SINGLE OCCLUDER: A SINGLE-CENTER EXPERIENCE.

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Background and Aim: Percutaneous closure of patent foramen ovale (PFO) is an established intervention for secondary prevention of cryptogenic stroke. This study reports our single-center experience with the Cardia Ultrasept Occluder, evaluating procedural outcomes, symptomatic atrial fibrillation (AF), and residual shunt, and exploring potential associations with patient risk factors.
Methods: We retrospectively analyzed 239 consecutive patients undergoing PFO closure between June 2021 and November 2025. All procedures were performed using the Cardia Ultrasept Occluder, a self-expanding double-disc device with nitinol/titanium frame, polyester/PVA membrane.
A structured follow-up was planned, including clinical visit, ECG, and echocardiography at 1 month and 1 year, and transcranial Doppler at 1 year.
Results: Baseline characteristics: mean age 45 ± 19 years, 139 females (58%), 119 >50 years (50%), 72 hypertensive (30%), 8 diabetic (3%), 53 current/former smokers (22%), atrial septal aneurysm in 111 patients (46%), PFO >12 mm in 200 patients (84%). Procedural success was 100%, with 1 minor vascular complication (0.4%) and 1 device thrombosis at 1 month.
Device distribution: 35 mm: 64 patients; 30 mm: 145 patients; 25 mm: 31 patients. 183 patients completed 1-month clinical follow-up and 122 patients underwent 12-month transcranial Doppler for detect residual shunt. During the first month after the procedure, 14 of 183 patient experienced symptomatic AF. Incidence was higher in patients receiving the 35 mm device (5/45, 11%) compared with 30 mm (8/114, 7%) and 25 mm (1/24, 4.2%) although the difference was not statistically significant (p=0.55). AF was more frequent in patients > 50 yrs and in hypertensive patients, but these associations were also not signficant. At 12 month, residual shunt was detected in 13 of 122 patients (10.7%).



Brakdown by device: 35 mm 3/26 (11.5%), 30 mm : 9/80 (11.3%), and 25 mm: 1/16 (6.3%) indicating similar shunt closure rate across devide size.

Conclusions: Percutaneous PFO closure with the Cardia Ultrasept Occluder demonstrated excellent procedural success and minimal complications. Rates of symptomatic AF at 1 month and residual shunt at 12 months are fully consistent with published literature. Although not statistically significant, AF incidence was higher with the 35 mm device, while shunt closure was similar among devices.



MP-035 / #629

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

PERCUTANEOUS NECK CANNULATION IN INFANTS: A SAFE, FEASIBLE, AND EFFECTIVE ALTERNATIVE FOR RELIABLE VASCULAR ACCESS IN VA-ECMO?

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Background and Aim: Surgical neck cannulation performed by paediatric cardiac surgeons remains the standard approach for veno-arterial extracorporeal membrane oxygenation (VA-ECMO) in infants. Although percutaneous cannulation is established in adults and increasingly utilised in larger infants, emerging experience suggests it may also be feasible in smaller children. The objective of this report was to describe the technical feasibility of echocardiography-assisted percutaneous neck cannulation for VA-ECMO in children weighting <15kg, and to compare procedural cannulation times with a surgically approach in a single-center cohort.
Methods: All patients weighing <15 kg with neck cannulation for VA-ECMO due to cardiac arrest or low cardiac output at our institution between 2012 and 2025 were analysed retrospectively. The study population was divided into two groups according to the cannulation approach: open surgical by a paediatric cardiac surgeon vs. percutaneous cannulation by a paediatric interventional cardiologist (PIC) using bedside echocardiographic guidance. Outcomes assessed included technical feasibility, procedural duration time, attained flow rates and peri-procedural complications.
Results: Among 21 patients with neck cannulation, 6/21 received percutaneous echo-guided approach by a experienced PIC. All procedures were carried out under low cardiac output (9/21) or ongoing CPR (12/21). No intervention related complication including haemorrhage, cannula malposition, or dislodgement was observed. Procedural duration time for percutaneous cannulation was comparable to that of surgical access (median time 42,5 vs. 45 minutes). No patient required conversion from percutaneous to surgical approach. Targeted ECMO flow was set at 200mL/kg for univentricular and 120mL/kg for biventricular circulation, sufficient flow (range 102–200%) was reached in all patients. 2



patients of the percutanous approach received post-explant imaging of the cannulated neck vessels and demonstrated patent cervicocerebral vessels.

Conclusions: Percutaneous neck cannulation for VA-ECMO performed by experienced operators is feasible and effective in infants <15kg. Cannulation times were comparable, making this approach a viable alternative. In both procedures no cannulation-related adverse events occured. As experience with the percutaneous procedure and available material grows, procedural times may further decrease.



MP-036 / #422

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

VIRTUAL 3D PLANNING OF HEARTMATE 3 IMPLANTATION IN PEDIATRIC PATIENTS USING CT-BASED ANATOMICAL MODELLING

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Background and Aim: Pediatric implantation of the HeartMate 3 remains limited by the lack of objective anatomical criteria for preoperative candidate selection. Current clinical decision-making often relies on Left Ventricular End-Diastolic Diameter thresholds that may exclude suitable patients. We present a practical image-based workflow in which CT/MRI scans are segmented to reconstruct patient-specific left-ventricular anatomy, followed by virtual placement of a HeartMate 3 model to assess spatial feasibility.
Methods: In the first Spanish pediatric HeartMate 3 implantation (LVEDD 49.0,mm), 3D evaluation confirmed that the cannula could be positioned intraventricularly with safe clearance from both valves, matching the successful surgical outcome. Applying the same virtual assessment retrospectively we reviewed all our pediatric patients who needed a ventricular assist device prior to transplantation. We reviewed from 2015 (date in which HeartMate 3 was commercially available in Spain) till 2025.
Results: We identified five pediatric transplant candidates (LVEDD 27.3–52.6,mm), two patients showed adequate space for HM3 accommodation, while three had insufficient ventricular volume.
Conclusions: These findings indicate that 3D anatomical evaluation can identify pediatric candidates who might be considered ineligible using LVEDD alone, while also clarifying non-viability in very small ventricles. This supports the use of patient-specific modelling as a complementary anatomical tool for pediatric ventricular assist device planning.



MP-037 / #563

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

PERCEIVED SYMPTOMS DURING PREGNANCY IN WOMEN WITH AND WITHOUT CHD

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Background and Aim: An increasing number of women with congenital heart disease (CHD) reach childbearing age, facing elevated risks of cardiac complications such as heart failure and arrhythmia. Understanding their pregnancy experiences, symptom interpretation, and psychosocial challenges is essential for tailored care. This study aimed to explore women's experiences during pregnancy, including their understanding and management of symptoms, and to assess self-rated health, quality of life (QoL), fatigue, and illness perception compared to women without CHD.
Methods: This work combines findings from two complementary studies within a larger project on pregnancy and CHD. First, semi-structured interviews were conducted with 18 women with CHD of varying complexity, recruited from four Swedish tertiary adult CHD centres. Interviews (30–60 min) were held via Zoom and analysed using qualitative content analysis. Second, an exploratory cross-sectional study invited 220 pregnant women (202 without CHD, 18 with CHD) to complete a web-based questionnaire. Measures included self-rated health (EQ-5D VAS), QoL (LAS), fatigue (MFI-20), anxiety/worries, and illness perception (Brief IPQ for CHD participants). Descriptive statistics and Student's t-tests were used for group comparisons.
Results: Interview analysis revealed an overarching theme: *Concerned but feeling safe during pregnancy*, comprising three themes—Feeling confident, Having concerns and fear, and Understanding bodily changes. Women expressed difficulty interpreting symptoms but valued regular follow-up and multidisciplinary support. Questionnaire responses were received from 170 controls and 10 CHD participants. Self-rated health was slightly higher in CHD women (79 vs. 77), and QoL scores were similar (84 vs. 83). Fatigue levels showed no major differences. Breathlessness and fatigue were common in both groups, while anxiety and worry were reported by 80% of CHD women versus 58% of controls. Open-ended responses clustered into five themes, highlighting emotional and physical concerns.
Conclusions: Women with CHD generally felt confident during pregnancy despite significant worries and symptom interpretation challenges. Anxiety was prevalent, underscoring the need for continuous support and clear communication. Regular follow-



up and multidisciplinary care may reduce unplanned interventions and enhance safety. Combining qualitative and quantitative insights emphasizes the importance of amplifying women's voices to guide individualized care for pregnancies complicated by chronic disease.



MP-038 / #709

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

OUTCOME OF PREGNANCY IN A COHORT OF WOMEN WITH CONGENITAL HEART DISEASE- A- 23 – YEAR, SINGLE-CENTER EXPERIENCE

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Background and Aim: Pregnancy may be associated with adverse outcome in women with congenital heart disease (CHD). However, data regarding the outcome of pregnancy in women with CHD who receive care in cardiac-obstetric expert units are limited.
Methods: We retrospectively analyzed baseline characteristics and outcome of pregnancy in females with CHD who received medical care in our tertiary center between 2002 and 2025.
Results: 136 pregnancies that occurred in 97 women with congenital heart disease who registered at our hospital between January 2002 and February 2025 were reviewed. According to the modified World Health Organization (mWHO) risk scale for pregnancy, CHD lesions in 52 enrolled women (54%) were classified as mWHO class I or II, and in 45 females (46%) as mWHO class III or IV. Elective caesarean sections were planned for 19% of all pregnancies, while 12,5% required an emergency caesarean section, mostly for obstetric reasons. Maternal cardiac complications included a case of postpartum pulmonary oedema, two cases of symptomatic arrhythmia (a case of atrial flutter and a case of non-sustained ventricular tachycardia) and occurred in mWHO III-IV class. There was no case of maternal death/infective endocarditis. Neonatal complications occurred in 20% of pregnancies and included preterm delivery (11%), small for gestational age (8%), and neonatal death (0,7%) Preterm births (< 35 weeks gestational age) were more frequent in mWHO III-IV (10 pregnancies, with a case of neonatal death) than mWHO I-II classes (5 pregnancies). In 5% of pregnancies, fetal congenital heart disease occurred.
Conclusions: Pregnancy in women with congenital heart disease was found to be associated with maternal cardiac and neonatal complications. Adverse cardiac events and



preterm deliveries should be anticipated in pregnant women with CHD, especially in those with mWHO classes III or IV. Therefore, these pregnancies should be under close surveillance and managed in specialized, multidisciplinary tertiary referral centers.



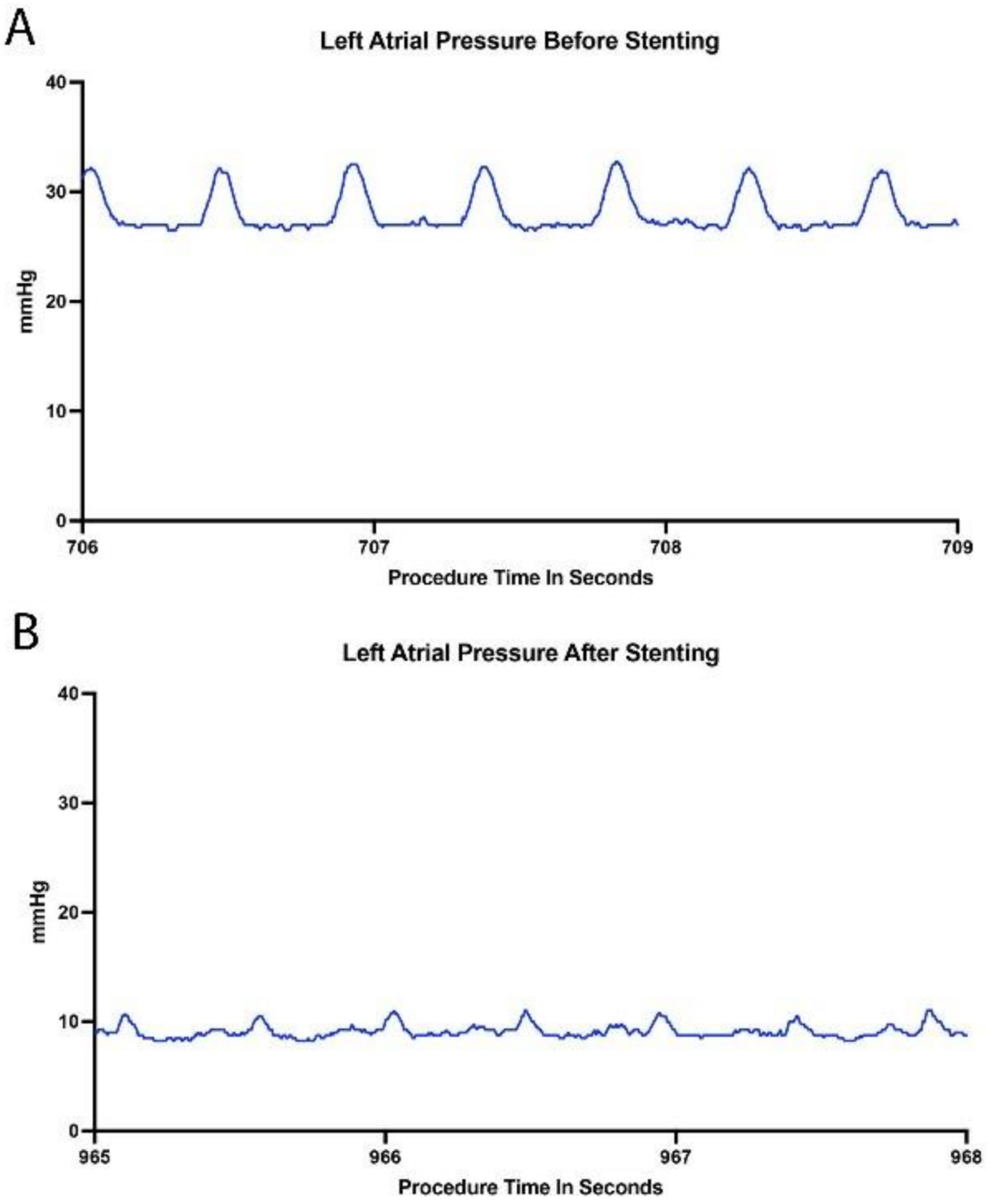
MP-040 / #191

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

FIRST IN-FETAL USE OF AN EVEROLIMUS-ELUTING STENT IN A FETUS WITH HLHS WITH INTACT ATRIAL SEPTUM

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Background and Aim: Hypoplastic left heart syndrome (HLHS) combined with a severely restrictive or intact atrial septum (IAS) poses an extremely high risk for perinatal morbidity and mortality. Severe left atrial hypertension may also lead to pulmonary lymphangiectasia, so called nutmeg lung. In-utero stenting of the atrial septum has been introduced, but in-stent stenosis due to endothelial overgrowth may diminish interventional results. We hereby report, to the best of our knowledge, the first successful use of an Everolimus-eluting stent in a fetus, aimed at maintaining long-term patency of the atrial communication.
Methods: A 29-year-old pregnant woman (G1P0) was referred to our institution at 28+6 weeks of gestation due to HLHS and IAS with nutmeg lung and pleural effusion. Thus, in utero stenting was indicated given the high risk of neonatal mortality.
Results:



At 29+0 weeks' gestation, the procedure was performed with ultrasound guidance. Here, the atrial septum was perforated with a 17G needle and subsequently stented using a 3.5x8mm Everolimus eluting stent and dilated to 16 atm (= 3.7mm). A pressure-guidewire was used for continuous fetal pressure and heart rate monitoring (Figure). Left atrial mean



pressures decreased significantly from 28mmHg before stenting down to 9mmHg after stenting. Doppler-examination showed unrestricted left-to-right shunting with normalization of pulmonary venous flow. Two weeks after intervention, pleural effusions had resolved completely. The child was born at a gestational age of 38+1 weeks via cesarian section, with Apgar-Scores 8 and 8 (1 and 5 minutes). There was normal postnatal adaptation without signs of respiratory distress and stable saturations, without need of invasive respiratory support. Upon neonatal echocardiography, there was unrestrictive left-right shunting through the interatrial stent with normal pulmonary venous flow. Laboratory testing showed an Everolimus level of 0.5 ng/L (therapeutic range: 3–8 ng/L). At 5 days, the child underwent the Norwood procedure and was subsequently discharged. The baby is now awaiting the Glenn procedure at a follow up of 4,5 months.

Conclusions: The use of Everolimus-eluting stents in fetuses with HLHS and IAS seems to be feasible and safe. Drug-eluting stents may lower the risk of in-stent stenosis until delivery, with, in this case, subtherapeutic postnatal Everolimus levels.



MP-043 / #557

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

EVOLVING PRACTICE OF GENETIC TESTING IN ANTENATAL AND POST-NATAL DIAGNOSIS OF MAJOR CONGENITAL HEART DISEASES IN A TERTIARY CENTRE

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Background and Aim: Approximately one-third of congenital heart diseases (CHD) has a genetic aetiology. Chromosomal microarray (CMA) and Next-Generation Sequencing (NGS) are increasingly being used in antenatal and post-natal diagnosis of CHD. We herein report the evolution of antenatal and post-natal genetic testing in the diagnosis of major CHD in our tertiary centre experience.
Methods: We conducted a retrospective cohort study, recruiting patients from National University Hospital, Singapore, from 2018 to 2022, with a foetal diagnosis of major CHD during their antenatal screen. We defined the subtype of major CHD using pre- and post-natal echocardiographic findings. Cases with antenatal and/ or post-natal genetic testing were reviewed, noting the outcomes of the genetic test(s) and the extracardiac manifestation(s).
Results: Of 25,117 screened pregnancies, 119 (0.47%) had major CHD. Of these, 61 (51.2%) underwent antenatal or post-natal confirmatory genetic testing. The diagnostic yields for CMA and NGS, including antenatal and post-natal cases, were 19.7% (12/61) and 24.6% (15/61) respectively, compared to 11.4% (7/61) for chromosome analysis (CA). Of note, the diagnostic yield of genetic tests was significantly higher in cases with extracardiac manifestations (50%, eight of 16 cases) compared to those without (15.5%, seven of 45 cases). Balancing clinical utility and cost-effectiveness, we recommend clinicians to consider in the antenatal period CMA for the evaluation of all major CHD; and NGS should there be associated extracardiac manifestations and / or strong family history



in institutions with access to genetic expertise. The choice of genetic testing in the post-natal evaluation of major CHD depends upon the clinical phenotype guided by the differentials considered: where well-recognised syndromes are suspected, specific gene testing, CA and / or fluorescence in-situ hybridization (FISH) could be more appropriate; in contrast, where there are extra-cardiac manifestations with no clear syndrome identified, NGS, namely exome and genome sequencing, may be more beneficial given the higher diagnostic yield.

Conclusions: CMA and NGS are useful genetic tests to be considered in the evaluation of major CHD given their increased diagnostic yield. However, the interpretation of NGS may not be as straightforward, particularly in the antenatal period, and should ideally be undertaken with a geneticist.



MP-045 / #1392

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

EARLY FOETAL DIAGNOSIS OF SINGLE-VENTRICLE PHYSIOLOGY COMPARED WITH STANDARD FOETAL DIAGNOSIS

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Background and Aim: Standard foetal echocardiography (SFE), performed between 18-22 weeks' gestation, is a routine component of antenatal care. Early foetal echocardiography (EFE), performed between 12-16 weeks' gestation, is increasingly available as an option for earlier detection of congenital heart disease (CHD). Currently, there is limited data analysing the impact of EFE on pregnancy outcomes. We sought to evaluate the impact of EFE compared to SFE on the live-born experience for antenatally detected single-ventricle physiology.
Methods: We conducted a single-centre retrospective cohort study of all patients diagnosed with single-ventricle physiology on foetal echocardiography between July 2020 and June 2025. The primary outcome was liveborn rates for single-ventricle physiology diagnosed with EFE compared with SFE.
Results: 3179 foetal echocardiograms were performed over the 5-year period, 2921 were SFE and 258 were EFE. In the EFE group, there were 57/258 (22%) diagnoses of single-ventricle physiology (38 hypoplastic left heart syndrome, 12 hypoplastic right heart syndrome, 5 complicated double inlet left ventricle, and 2 complex single ventricles). The mean gestation at diagnosis was 14.4 weeks. Of those diagnosed with single-ventricle physiology on EFE, 51/57 (89%) proceeded to termination of pregnancy, 4/57 (7%) proceeded to a live-birth and 2 patients were lost to follow-up. In the SFE group, there were 120/2921 (4%) diagnoses of single-ventricle physiology (72 hypoplastic left heart syndrome, 22 hypoplastic right heart syndrome, 14 double inlet left ventricle and 12 complex single ventricles). The mean gestation at diagnosis was 22.9 weeks. Of those diagnosed with single-ventricle physiology on SFE, 28/120 (23%) proceeded to termination of pregnancy, 72/120 (60%) proceeded to live-birth, 8/120 (7%) underwent intra-uterine foetal demise and 12 were lost to follow-up.
Conclusions: Termination of pregnancy was more common with single-ventricle physiology diagnosed with EFE compared to a later diagnosis with SFE. Intra-uterine foetal demise was more common with SFE.



MP-047 / #1443

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

DETERMINING THE IMPACT OF REMOTENESS OF RESIDENCE AND LOWER SOCIOECONOMIC STATUS ON ACCESS TO FETAL ECHOCARDIOGRAPHY IN SASKATCHEWAN, CANADA

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Background and Aim: Congenital heart disease (CHD) is the leading cause of infant mortality due to birth defects. Prenatal diagnosis by fetal echocardiography (FE), can improve survival rates, decrease morbidity, and reduce healthcare costs. The aim of this study was to identify the impact of remoteness of residence (ROR) and lower socioeconomic status (SES) on access to FE in Saskatchewan.
Methods: Data collected included indications for FE, maternal place of residence, postal code, age, gravidity and parity, and fetal gestational age at first FE and CHD diagnoses. Maternal ROR and SES were calculated using postal code, geocoding, and Chan SES index quintiles.
Results: From 1Jan2020 to 30Jun2025, 488 first FE were performed in Saskatoon and 313 in Regina. Indications for FE were mostly suspected CHD on obstetric ultrasound (48.4%), previous family history of CHD (30.2%), abnormal prenatal maternal screening (7.6%), fetal extracardiac diagnoses (5.6%), fetal arrhythmia (3.2%) and poorly controlled maternal diabetes (2.7%). Mean maternal age at first FE was 31±6 years and median gravidity was 3 (IQR 2-4) and parity was 1 (IQR 0-2). Median gestational age in completed weeks was 27 (IQR 24-30) for all first FEs, 27 (IQR 24-31) for the 354 with CHD diagnoses, and 25 (IQR 23-28) for the 134 with complex CHD diagnoses. ROR assessed as distance of ≥100km of the maternal place of residence from the tertiary referral centres in Saskatoon and Regina was 41.1% for all FEs, 43.8% for all CHD diagnoses, and 50.7% for complex CHD diagnoses. Multivariate regression analysis of predictors of gestational age at first FE, showed lower SEC quintile was a statistically significant predictor of later gestational age at first diagnosis of complex CHD (F-value 2.66, p-value 0.026), whereas ROR (<100km vs. ≥100km), maternal age, gravidity and parity were not found significant.
Conclusions: Many women in Saskatchewan live remotely from the tertiary referral centres where fetal echocardiography is performed. Lower SEC quintile was found to predict later



gestational age at first diagnosis of complex CHD suggesting SEC negatively impacts access to fetal echocardiography.



MP-048 / #1503

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

CROSS-CULTURAL ADAPTATION OF A PRENATAL COUNSELING QUESTIONNAIRE FOR CONGENITAL HEART DISEASE IN BRAZIL

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Background and Aim: Congenital heart disease (CHD) is the most common congenital anomaly and a major cause of neonatal morbidity and mortality worldwide. A prenatal diagnosis of CHD is a psychologically distressing event that requires sensitive and effective counseling. However, no validated tool exists in Brazilian Portuguese to assess the quality of counseling provided to families following such diagnosis. This study aims to conduct the cross-cultural adaptation and content validation of "Kovacevic Questionnaire" for evaluating parental counseling after prenatal CHD diagnosis into Brazilian Portuguese
Methods: This cross-sectional study followed the standardized guidelines for cultural adaptation proposed by Beaton et al. The process included translation, synthesis, back-translation, expert review, pre-testing, and psychometric evaluation. Two Expert Committees assessed semantic, idiomatic, cultural, and conceptual equivalence. Content Validity Index (CVI), Prevalence- and Bias-Adjusted Kappa (PABAK), and Content Validity Coefficient (CVC) were calculated. The adapted instrument was pre-tested with ten pregnant women carrying fetuses diagnosed with CHD.
Results: The adaptation process resulted in a culturally relevant and linguistically accurate Brazilian version. Expert agreement was high, with most items achieving CVI and PABAK values close to 1.0 and CVC values ≥ 0.80. Minor linguistic refinements were made for clarity and cultural sensitivity. Pre-test participants rated all items as clear and relevant, with CVI and PABAK equal to 1.00.
Conclusions: The Brazilian Portuguese version of "Kovacevic Questionnaire" demonstrated high validity and acceptability. It provides clinicians and researchers with a



reliable tool to assess and enhance counseling quality for families facing prenatal CHD diagnoses, particularly in diverse and resource-constrained settings such as the Amazon region.



MP-049 / #193

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

IMPACT OF MATERNAL POLYCYSTIC OVARY SYNDROME ON THE STRUCTURE AND FUNCTION OF THE NEWBORN HEART: A COPENHAGEN BABY HEART STUDY

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Background and Aim: Polycystic ovary syndrome (PCOS) affects 10-13% of women of reproductive age and is characterized by endocrine and metabolic disturbances that may influence fetal cardiac development. We investigated whether maternal PCOS was associated with alterations in newborn cardiac structure and function and risk of minor congenital heart diseases (CHDs).
Methods: We performed transthoracic echocardiography (TTE) in newborns from the Copenhagen Baby Heart Study, a large, prospective, population-based cohort study of children born in Copenhagen, Denmark (2016-2018). Maternal PCOS was identified using medical registers (ICD-10 code E28.2). We used multiple linear regression and log-linear binomial regression to estimate adjusted mean difference (aMD) in TTE parameters and risk ratios (RRs) for minor CHDs, comparing newborns exposed to maternal PCOS and unexposed newborns.
Results: Of 25,572 newborns, 391 were exposed to maternal PCOS. In the overall cohort, maternal PCOS was only associated with lower newborn heart rates (aMD -3.24 bpm, 95% confidence interval [CI] -5.29, -1.20). However, sex-stratified analyses showed evidence of effect modification (all p-values for interaction <0.01) by sex for left ventricular (LV) internal



diameter at end-diastole (girls: aMD 0.25 mm, 95% CI 0.05, 0.44; boys: -0.16 mm, -0.37, 0.05), LV internal diameter at end-systole (girls: aMD 0.15 mm, 95% CI -0.01, 0.32; boys: aMD -0.16 mm, 95% CI -0.34, 0.01), LV end-diastolic volume (girls: aMD 0.39 mL, 95% CI 0.08, 0.71; boys: aMD -0.20 mL, 95% CI -0.55, 0.15), LV end-systolic volume (girls: aMD 0.16 mL, 95% CI 0.01, 0.31, boys: aMD -0.14 mL, 95% CI -0.30, 0.02), and heart rate (girls: aMD -6.05 bpm, 95% CI -8.96, -3.14; boys: aMD -0.44 bpm, 95% CI -3.31, 2.44). Maternal PCOS was not associated with increased prevalence of minor CHDs at birth (RR 1.00, 95% CI -0.62, 0.62).

Conclusions: Overall, heart rates differed between newborns exposed to maternal PCOS and unexposed newborns. Further, among girls, maternal PCOS was associated with slightly larger LV volumes and internal dimensions, and a lower HR. Longitudinal follow-up is warranted to determine whether this potential sexual dimorphism persists and translates into altered cardiovascular disease risk later in life.



MP-050 / #402

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

IMPACT OF PRETERM BIRTH ON DIASTOLIC FUNCTION IN NEWBORNS

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Background and Aim: Preterm birth affects more than one in 10 live births and is associated with increased risk of cardiovascular disease later in life. Previous studies have shown altered diastolic function, indicating impaired ventricular relaxation. We investigated whether newborns born moderate to late preterm show changes in diastolic left ventricular (LV) function compared with infants born at term.
Methods: We included newborns from the Copenhagen Baby Heart Study, a prospective, multicentre, population-based cohort study of children born in Copenhagen, Denmark, 2016-2018, who underwent neonatal transthoracic echocardiography (TTE). We defined moderate to late preterm as 32-36 completed weeks of gestation. LV diastolic function was assessed using end-systolic volume of the left atrium (LAESV) and mitral inflow velocities. Multiple linear regression adjusted for sex, weight, length, and age at examination was used to estimate differences in diastolic parameter means between preterm and term newborns.
Results: Among 25,496 newborns, 1,199 were born moderate-to-late preterm. 79 newborns were excluded due to GA < 32 weeks. Both groups comprised 52% males. The median age at the time of TTE was 11 (IQR 13) in the preterm group and 11 (IQR 7) days in the term group, and the corresponding mean birthweights were 2,526 g (SD 492) and 3,535 g (SD 478), respectively. Preterm infants had smaller mean LAESV (adjusted mean difference [aMD] -0.1cm^3, 95% confidence interval [CI] -0.15, -0.05, p<0.001*)*, though peak flow velocities across the mitral valve during early diastole (MV E Vel) and during atrial contraction (MV A Vel) did not reach significant levels in difference ((aMD -0.50 cm/s, 95% CI -1.52, 0.52, p=0.34, and aMD 1.12 cm/s, 95% CI -0.22, 1.80, p=0.13, respectively), the MV E/A-ratio was slightly lower in preterm newborns (aMD -0.02, 95%CI -0.05, -0.005, p=0.02). There was no difference in deceleration time across the MV (MV DecT,aMD 1.84



ms, 95% CI -0.42, 4.10, p=0.11).

Conclusions: Moderate-to-late preterm newborns exhibited subclinical differences in diastolic LV function compared with term infants, suggesting an altered diastolic physiology. Follow-up studies are needed to determine whether these subtle differences in neonatal diastolic function are associated with later cardiovascular disease risk.



MP-051 / #906

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

MATERNAL AND FETAL OUTCOMES AFTER THE ROSS PROCEDURE

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Background and Aim: The Ross procedure is increasingly used in young patients with aortic valve disease, so more women reach childbearing age with a pulmonary autograft in the aortic position. Evidence on pregnancy risk, need for reintervention and effects on autograft function remains limited. We aimed to describe maternal and fetal outcomes and echocardiographic changes during pregnancies after the Ross procedure in a tertiary centre.
Methods: We performed a retrospective observational study of all women who underwent the Ross procedure between 1992 and 2017 and subsequently conceived. Baseline surgical characteristics, redo operations and obstetric histories were extracted from institutional records. Echocardiographic data were collected before and after the first and second pregnancies, including neoaortic valve mean gradient, left ventricular ejection fraction (EF), right ventricular size and volumes, aortic root diameter and severity of aortic regurgitation (AR), pulmonary regurgitation (PR) and pulmonary stenosis (PS). Continuous data were summarised with medians; longitudinal changes were explored with non-parametric tests.
Results: Sixteen of 26 women conceived after the Ross procedure, accounting for 20 pregnancies. Median age at surgery was 17.5 years and median age at first pregnancy 29 years, with a median interval of 10 years between operation and conception. Delivery mode was vaginal in 13/20 (65 %) and caesarean section in 7/20 (35 %). There were no maternal deaths, heart failure, aortic dissection or clinically significant arrhythmias during pregnancy. Most pregnancies (9/14, 64 %) were free of major complications; reported events included one placenta praevia, two neonates with hypoxic–ischaemic encephalopathy and three miscarriages overall. Neoaortic valve gradients and EF remained stable across follow-up, while right ventricular dimensions and volumes showed only small, inconsistent changes. The main structural change was a modest but statistically significant increase in aortic root diameter, driven by enlargement after the second pregnancy; shifts in AR, PR and PS severity were generally mild.
Conclusions: Pregnancy after the Ross procedure in this cohort was usually well tolerated, with good maternal survival and acceptable fetal outcomes. Echocardiographic follow-up



showed preserved neoaortic valve function and modest aortic root dilatation, supporting the feasibility of pregnancy in appropriately selected women with a Ross procedure.



MP-053 / #1419

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

GENETIC AND CARDIAC DISCORDANCE IN TWIN PAIRS

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Background and Aim: Congenital cardiac anomalies are reported to occur more frequently in twin pregnancies than in singleton pregnancies. In some twin pairs, congenital heart anomalies may be discordant, even in monochorionic pregnancies. Additionally, in certain twin pairs, both genetic and cardiac findings may differ between siblings. This study aimed to investigate potential factors associated with genetic and cardiological discordance in twin pairs.
Methods: Medical records of twin siblings who had undergone at least one evaluation at the pediatric cardiology outpatient clinic of our hospital between December 2018 and 2025 were retrospectively reviewed.
Results: The study group consisted of 10 infants (4 boys and 6 girls). In each twin pair, one infant was genetically and cardiologically normal, while the co-twin exhibited discordant findings. In four twin pairs, the sexes of the twins differed. Three pregnancies resulted from in vitro fertilization, six were spontaneous twin pregnancies. Chorionicity was dichorionic diamniotic in almost all pregnancy. Gestational ages ranged from 29+4 to 38+2 weeks, and birth weights ranged from 1,330 to 2,890 grams. Seven infants were born from first pregnancies. Parental consanguinity was present in only one twin pair. Maternal ages ranged from 29 to 34 years. Maternal risk factors during pregnancy included in four mothers (hypothyroidism, hypertension , gestational diabetes mellitus). The genetic abnormalities and cardiac findings observed in the cases are summarized in the table.

Case	Sex	Genetic Syndrome	Cardiac Pathology
1	F	Noonan	VSD +pulmonary stenosis
2	F	Noonan	Transvers arc hypoplasia, Perimembranous VSD+ BAV+PFO
3	F	DiGeorge	VSD+ Pulmonary atresia



4	M	22.11q duplication	Muscular VSD+PFO
5	F	4q12q25 duplication	Perimembranous VSD+ PLSCV
6	F	Genetic ,Type N/A	Muscular VSD
7	F	Beckwith-Wiedeman	PFO+ Mild Aortic insufficiency
8	M	Down	PFO+ Mild Aortic insufficiency
9	M	Down	WPW syndrome
10	M	Down	PFO

VSD:Ventricular Septal Defect, PFO: Patent Foramen Ovale, WPW : Wolf Parkinson White, PLSCV: Persistant Left Subclavian Vein, BAV: Bicuspid Aortic Valve

Conclusions: This single-center study, limited by a small sample size, did not identify any significant common features associated with genetic and cardiological discordance in twin pairs. Larger, multicenter studies are required to better elucidate potential contributing factors.



MP-054 / #15

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

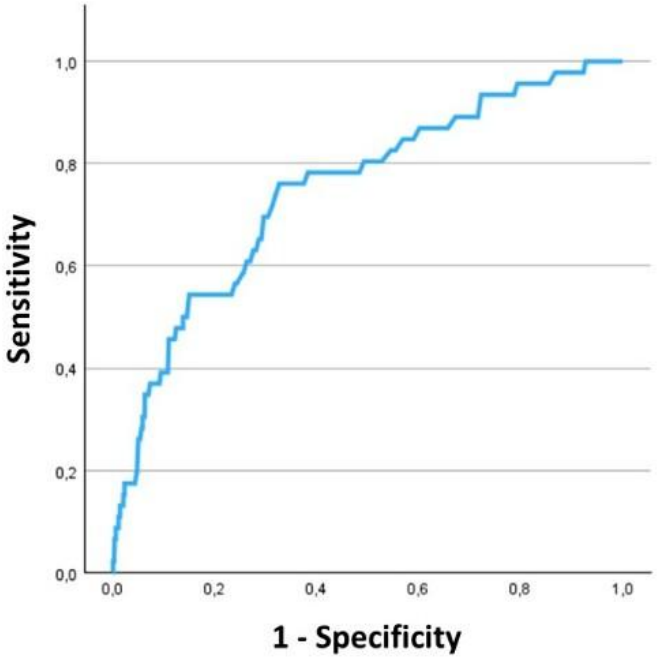
RED CELL DISTRIBUTION WIDTH: A RISK FOR MORTALITY IN ADULT PATIENTS FOLLOWING CONGENITAL HEART SURGERY

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Background and Aim: Red cell distribution width (RDW) has prognostic value in heart failure and coronary heart disease. We investigated the impact of RDW on hospital mortality following surgery for adult congenital heart disease (ACHD).
Methods: All ACHD patients who underwent cardiac surgery between 2005 and 2023 were reviewed. Preoperative laboratory variables were collected, and their impact on hospital mortality was analyzed.
Results: A total of 1,577 patients were included (821 male and 756 female, 1522 biventricular and 55 single-ventricle circulation). Cyanosis (oxygen saturation below 90%) was observed in 82 patients. NYHA classification was class I in 757 patients, class II in 457, class III in 281, and class IV in 30 (52 unknown). Median 1(IQR: 1-3) day before the procedure, the median haemoglobin level was 14.2 (IQR: 13.1-15.2) g/dL, haematocrit; 41.0 (IQR: 38.1-43.5) %, RBC; 4.7 (4.3-5.0) T/L, MCH; 30.2 (IQR: 29.1-31.2) pg/cell, MCV; 87.0 (IQR: 84.1-90.0) fL, RDW; 42.0 (IQR: 39.8-45.3) fL, leucocytes; 6.7 (IQR: 5.6-8.1) G/L, and platelets; 222 (IQR: 184-266) G/L. Median age at operation was 33.0 (IQR: 24.5-44.4) years. Primary cardiac surgery was performed in 745 patients, and repeated sternotomy in 832. The median hospital length of stay was 12 (IQR: 9-17) days with 46 hospital deaths. Elevated RDW (odds ratio (OR): 1.115, p< 0.001) and decreased platelet count (OR: 0.989, p<0.001) were risk factors for hospital mortality, whereas haematocrit (OR: 1.004, p=0.885), RBC count (OR: 0.996, p=0.987), hemoglobin level (OR: 0.999, p=0.995), MCH (OR: 1.002, p=0.977), MCV (OR: 1.018, p=0.574), or leucocyte count (OR: 1.015, p=0.807)

not. ROC analysis identified RDW cut-off value of 43.9 fL (sensitivity 76%; specificity 68%; area under the curve 0.75). When sub-group analysis was performed in males and females, elevated RDW was a risk factor for mortality both in male (OR: 1.115, p< 0.001) and in female (OR: 1.128, p< 0.001), whereas decreased platelet count was a risk only in male (OR: 0.984, p<0.001), but not in female (OR: 0.995, p=0.214).

Receiver operating characteristics analysis for hospital mortality in the entire cohort



Conclusions: RDW is associated with mortality in adults following surgery for ACHD, independently of sex. This readily available biomarker could therefore be considered as an additive biomarker for risk stratification in these patients.



MP-055 / #686

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

PREVALENCE AND CHARACTERISTICS OF WEIGHT LOSS MEDICATION USE AMONG ADULTS WITH CONGENITAL HEART DISEASE: A DANISH COHORT STUDY

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Background and Aim: The use of weight loss medication has been increasing in the general population in recent years. However, the use of this medication among adults with congenital heart disease (ACHD) remains unknown. We aimed to investigate the characteristics and the temporal trend in the use of weight loss medication among ACHD patients.
Methods: This retrospective cohort study identified 5,697 ACHD patients who were followed regularly at specialized ACHD centres in the eastern part of Denmark. Patients were included at the earliest prescription date for weight loss medication or, if not treated, the last contact date at the centres from September 2018 to September 2024.
Results: During the 7 year study period, 169 (3.0%) out of 5,697 ACHD patients were treated with weight loss medication (95.2% on semaglutide, 1.8% on liraglutide and 3.0% on other oral weight loss medications). The prevalence of weight loss medication use increased among ACHD patients from 0.09% to 3.3% in the study period. Compared to the non-treated ACHD patients, treated ACHD patients were more often female (47.3% vs 40%), were younger (50 vs 53), had higher BMI (33 vs 31), and had equally often ≥1 cardiovascular or obesity-related comorbidity (76% vs 78%). Hypertension (45.0%), diabetes (43.8%), and dyslipidaemia (31.4%) were among the most common comorbidities. In ACHD patients with a BMI of ≥27 and ≥1 obesity-related risk factor or a BMI of ≥30, 90.4% (N=1,400) were not treated.
Conclusions: Despite the high prevalence of weight-loss medication use among ACHD patients, a substantial number of obese ACHD patients who meet criteria for treatment remain untreated.



MP-056 / #1349

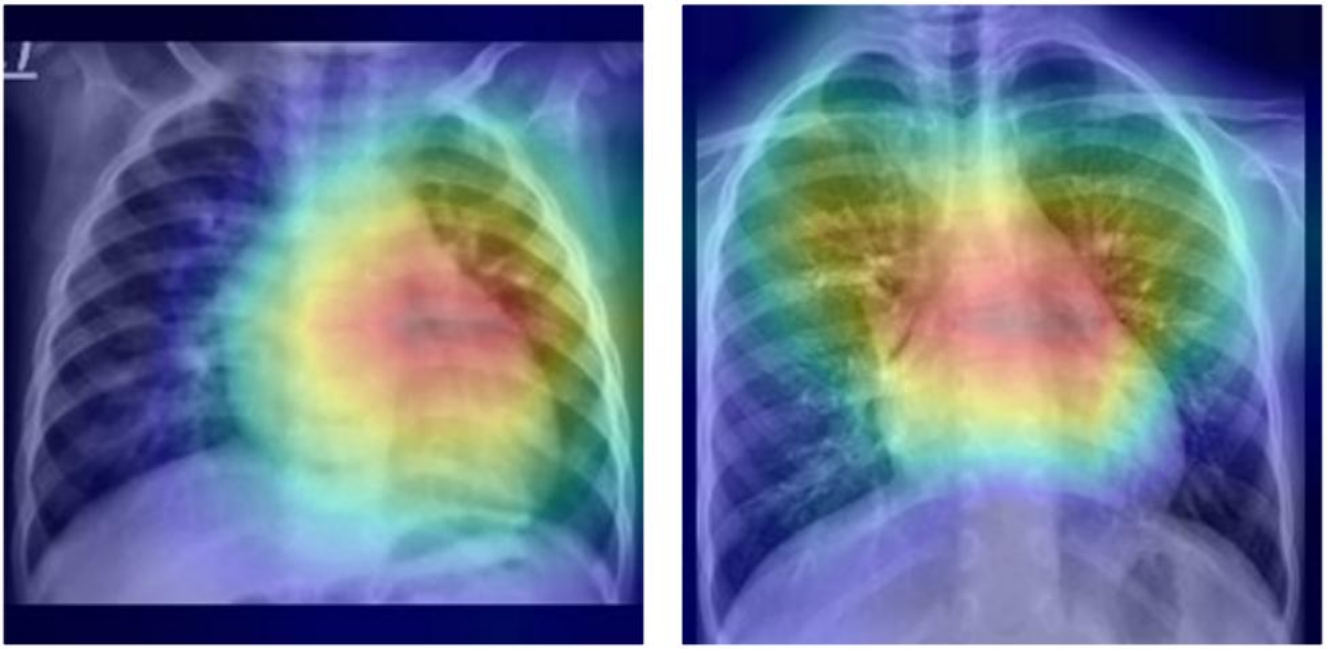
SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

MULTIMODAL DEEP LEARNING MODEL INTEGRATING CHEST X-RAYS AND CLINICAL FEATURES FOR NONINVASIVE PREDICTION OF QP/QS IN CHILDREN WITH CONGENITAL HEART DISEASE

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Background and Aim: Accurate evaluation of the pulmonary-to-systemic flow ratio (Qp/Qs), a key hemodynamic parameter in congenital heart disease (CHD), requires cardiac catheterization, which is invasive and carries procedural risks. To explore a noninvasive alternative, we developed a multimodal artificial intelligence (AI) model integrating chest X-rays, clinical features, and laboratory data to estimate Qp/Qs in pediatric CHD.
Methods: We retrospectively analyzed patients who underwent cardiac catheterization between April 2012 and March 2025. Subjects included acyanotic CHD with increased pulmonary flow and Kawasaki disease with coronary aneurysms as the normal Qp/Qs group. Chest X-rays and biochemical data obtained during hospitalization were used. A convolutional neural network-based model classified Qp/Qs ≥1.5 or <1.5 by integrating image data with age, body surface area (BSA) and laboratory data. Five-fold cross-validation was performed, and mean accuracy, AUC, sensitivity and specificity were calculated.
Results: Among 311 cardiac catheterizations from 270 patients, 307 datasets with complete laboratory data were analyzed: 205 CHD cases (ventricular septal defect 121, atrial septal defect 80, patent ductus arteriosus 22, atrioventricular septal defect 6) and 102 Kawasaki disease cases. The image-only model achieved an accuracy of 0.7946 and an AUC of 0.9073 (sensitivity 0.7989, specificity 0.7905). Integrating age or BSA improved performance (age: accuracy 0.8177, AUC 0.9114, sensitivity 0.7520, specificity 0.8745; BSA: accuracy 0.8241, AUC 0.9187, sensitivity 0.7606, specificity 0.8797). Adding major biochemical parameters (B-type natriuretic peptide, aspartate aminotransferase, alanine aminotransferase, total bilirubin, creatinine, and hemoglobin) also enhanced model performance (accuracy 0.8405, AUC 0.9131, sensitivity 0.7584, specificity 0.9080). Gradient-weighted Class Activation Mapping revealed an intriguing shift in model attention. Whereas previous studies primarily focused on the peripheral pulmonary arteries, our model showed clear emphasis on the regions surrounding the right ventricular outflow

tract and the central pulmonary arteries (Figure).



Conclusions: Although chest X-ray images alone allowed approximate estimation of Qp/Qs, the addition of age, body size, and laboratory data further improved predictive accuracy. Because chest X-ray appearances vary with age and body size in children, these clinical parameters are essential for maximizing the diagnostic potential of AI-based hemodynamic assessment in the pediatric population. Furthermore, the AI model may capture physiologically relevant regions that are often challenging for clinicians to interpret visually.



MP-057 / #549

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

LESSONS LEARNED: ESTSBLISHING BASIC PEDIATRIC CARDIOLOGY SERVICES IN THAKHEK, LAOS

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Background and Aim: Thakhek Provincial Hospital in central Laos provides pediatric care for a large and predominantly rural population but has no structured pediatric cardiology services. As a result, congenital and acquired heart disease remains widely underdiagnosed, and children with cardiac conditions often present late or not at all. Kinder und Medizin Hilfe Laos e.V., a nonprofit medical support association, has worked with the hospital for more than 15 years. Over the past three years, continuous consultancy in the pediatric ward, including the neonatal and pediatric intensive care units, has highlighted the urgent need for basic diagnostic and management capabilities in pediatric cardiology. The aim of this project is to establish sustainable foundational pediatric cardiology care through targeted capacity building and training.
Methods: A structured training and implementation program was developed to strengthen local diagnostic competence. Core components include annual on-site teaching missions focusing on basic echocardiography, recognition of common congenital and acquired cardiac defects, hemodynamic assessment, and initial management strategies. To ensure standardized and progressive learning, we created a Structured Curriculum for Training in Essential Echocardiography (SCtEE). In addition, remote case-based consultation is provided throughout the year to reinforce clinical decision-making and monitor skill retention.
Results: During the first three years of the program, the primary achievement was the systematic establishment of the prerequisites for a functional pediatric cardiology service. Through on-site work and direct exchange with the local pediatric team, existing diagnostic and therapeutic gaps were identified and mapped. In several supervised examinations, significant congenital heart defects were detected in children who had previously remained undiagnosed.
Conclusions: A structured, context-adapted training program can substantially improve pediatric cardiac diagnostic capacity in a resource-limited provincial hospital. The establishment of foundational pediatric cardiology services in Thakhek demonstrates that sustainable capacity building is feasible with regular on-site teaching, standardized curricula, and ongoing remote support. Further expansion of the program aims to



strengthen local autonomy and develop a fully independent pediatric cardiology baseline service.



MP-060 / #1365

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

PREVALENCE OF NASOPHARYNGEAL CARRIAGE, SEROTYPE DISTRIBUTION AND ANTIBIOTIC SUSCEPTIBILITY OF STREPTOCOCCUS PNEUMONIAE AMONG CHILDREN WITH CONGENITAL HEART DISEASE AND PNEUMONIA

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University college of Medical Sciences, Pediatrics, Delhi, India

Background and Aim: Pneumonia is a leading cause of under-5 mortality worldwide, with *S.pneumoniae* being the most common organism causing pneumonia in children. Nasopharyngeal carriage of *S.pneumoniae* serves as a reservoir for infections, increasing the risk of invasive diseases. Chronic diseases like CHD have a significantly higher risk of invasive pneumococcal disease. We conducted this study with the objective to compare the prevalence of nasopharyngeal carriage, serotype distribution and antibiotic susceptibility of *S.pneumoniae* among children with and without CHD hospitalised with pneumonia.
Methods: This case-control study was conducted in a medical college-affiliated public hospital from May 2023-November 2024. Fifty hospitalised children (aged 2 months – 59 months) with WHO defined pneumonia and echocardiographic confirmed congenital heart disease were included as cases. Fifty hospitalised children (2-59 months) with pneumonia without CHD were included as the comparison group. Nasopharyngeal swabs were collected from both cases and controls at enrollment. *S.pneumoniae* was isolated by culture and Triplex PCR and serotyping was done by Quellung and triplex method. All samples were processed as per the Clinical and Laboratory Standards Institute standards. Risk factors associated with carriage were determined by univariate and binary logistic regression.
Results: On culture *S.pneumoniae* was isolated in 3 (6%) children with CHD and pneumonia compared to none in without CHD group (P=0.07). On triplex PCR, *S.pneumoniae* was isolated in 8 (16%) children with CHD compared to 12 (24%) without CHD (P=0.31), which was comparable. Serotypes of *S.pneumoniae* detected among children with pneumonia and CHD by Quellung and PCR were 13A, 19A(N=2), 35F, 11A/11D (N=2), 23A, and 23F (N=1 each), majority were non PCV-13 serotypes. In children without CHD, predominant serotypes were 18A/18B/18C/18F (N=3), 11A/11D, 6A/B/C/D (N=2), serotype 1, 9A/9V, and 15A/15F(N=1 each), majority were PCV-13 serotypes. All isolates were resistant to Erythromycin and high resistance was observed for Clindamycin, Tetracycline and Cotrimoxazole. On univariate analysis and logistic regression, none of the



risk factors were significantly associated with pneumococcal carriage.

Conclusions: Children with CHD and pneumonia are highly susceptible to *S.pneumoniae* colonization, particularly non-vaccine serotypes. Increasing pneumococcal vaccination coverage with newer conjugate vaccines could be an effective strategy in reducing invasive pneumonia in this high risk group.



MP-061 / #1381

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

VENOUS STIFFENING IS COMPENSATORY MECHANISM AGAINST COMPROMISED CARDIAC RESERVE IN THE CHILDREN WITH CONGENITAL HEART DISEASE - A NOVEL MARKER OF CARDIOVASCULAR REMODELING AND END ORGAN DAMAGE

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[1]Iwate medical university, Pediatric Cardiology, shiwa, Japan, [2]Iwate Medical University, Shiwa, Japan, [3]Michinoku Medical Center for Disabled Children, Pediatrics, Shiwa, Japan

Background and Aim: Venous function is a compensatory mechanism in heart failure, mobilizing venous return and securing preload, which primarily exert the Frank-Starling mechanism. We hypothesized that venous system remodeling reflects compensation of reduced ventricular reserve, thus serve as a hemodynamic marker in the children with congenital heart disease.
Methods: Ninety-four consecutive cases of non-Fontan circulation were enrolled in this study. During cardiac catheterization, circulating plasma volume per body weight (PV) was measured using the dye dilution method and the ratio of PV to the CVP (PV/CVP) was calculated as an index of venous stiffness. The relationship of PV/CVP with circulatory parameters and peripheral organ markers was analyzed.
Results: The patients' age, body weight and PV were 10.8±7.8 years, and 34±21 kg, and 87.5±38.8 ml/kg, respectively. PV was independent of CVP (p=0.63), right/left ventricular systolic pressures or pulmonary vascular properties, but decreased with increasing right ventricular end-diastolic pressure (EDP, p=0.0060). Meanwhile, PV/CVP exhibited a strong negative correlation with biventricular EDPs, as well as with pulmonary capillary wedge pressure, suggesting venous stiffening occurs as a compensatory mechanism against impaired ventricular diastolic filling ($p< 0.001$ for all), either due to right or left ventricular functions. Indeed, PV/CVP was negatively correlated with serum aldosterone levels (adjusted for age, p=0.015), which is the key triggering of cardiovascular stiffening and fibrosis. PV/CVP, not CVP, showed a positive correlation with cardiac index (p=0.0003), indicating that a compliant venous system is related to flexible systemic vascular properties and cardiac output reserve. PV/CVP also showed a negative correlation with the Indocyanine Green concentration at 15-minute of injection, a marker of hepatic reserve (p=0.0006) and indicated a negative trend with eGFR.
Conclusions: Venous stiffening, not augmentation of plasma volume, is an important compensation to preserve cardiac output reserve due to impaired cardiovascular



properties, which could serve as a marker for cardiovascular remodeling and potentially serve as a marker for end-organ dysfunction related with heart failure.



MP-062 / #844

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

IMPACT OF CORTICOSTEROID THERAPY ON BLOOD PRESSURE AND AUTONOMIC FUNCTION IN DUCHENNE MUSCULAR DYSTROPHY

Madiha Mohammadi[1], Aarshia Gulhar[2], Bazim Shajahan[1], Abhishek Singla[2], Ritu Amit Chhabria[2], Jarosław Meyer-Szary[2], Magdalena Bazgier[3], Joanna Kwiatkowska[2]
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Background and Aim: Corticosteroids are used to maintain muscle strength and function for longer in Duchenne Muscular Dystrophy (DMD). Prolonged steroid administration, however, entails significant systemic risk. This review studies the different steroid regimens to evaluate the specific relationship between steroid use and blood pressure (BP) trends in DMD patients.
Methods: A systematic literature review was performed using PubMed. The inclusion criteria: last 20 years, Duchenne Muscular Dystrophy, pediatric population, steroids administration, and BP measurement.
Results: The search resulted in 137 studies; after abstract screening, 45 were included for full-text reading. Only 22 studies reported drug therapies and BP values, and 10 reported steroid use and were included in further analysis. Hypertension was notably reported in 32%(9/28) of patients, with the majority (8/9) on active steroid therapy. In another study, it was noted that approximately 18%(3/17) patients on steroids had daytime elevated BP, and 35%(6/17) had nighttime elevated BP. A third study illustrated that about 30%(14/46) patients had systolic hypertension, and about 39%(18/46) had diastolic hypertension, out of which 69.6% used corticosteroids and were found to have no effect on any ABPM measure. Loss of Circadian BP Dipping was observed in 53%(9/17) of patients who used steroids. In a different study 15%(7/46) showcased “reverse dipping”. Altered mean blood pressure variability (BPV) was also reported. Randomized trial comparing Daily vs. Weekend Prednisone showed no significant BP difference between dosing groups. Interestingly, RCT comparing Prednisone vs. Placebo also found no difference in BP between groups.
Conclusions: Corticosteroids are essential for preserving muscle and cardiac function in DMD, but they increase cardiovascular risk (hypertension, non-dipping nocturnal BP). Although mean BP values often remained within clinically normal ranges, prevalence data



indicate a statistically significant trend toward hypertension. Steroid exposure, not the dosing schedule, appears to drive these hemodynamic effects. Conversely, some studies suggest that hypertension is not directly related to steroid use, possibly stemming from other risk factors prevalent in this population. Long-term steroid use is imperative for improved outcomes in DMD patients, but such treatment necessitates careful BP monitoring and adjunctive measures.



MP-063 / #1336

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

RECURRENT EPISODES OF TROPONINEMIA AND ATYPICAL CHEST PAIN AS AN INDICATION OF A GENETIC SUBSTANCE IN A YOUNG ADOLESCENT

Antonios Belegrinos[1], Evaggelia Grigoraki[2], Soultana Kourtidou[3], Evangelos Karanasios[4], Aikaterini Giannakopoulou[5]
[1]Medical School of National and Kapodistrian University of Athens, ATHENS, Greece, [2]TZANEIO HOSPITALCARDIOLOGY CLINIC,, ATHENS, Greece, [3]Onassis Cardiac Surgery Center, Pediatric Cardiology And Adult Congenital Heart Disease Department, Kallithea, Attiki, Greece, [4]Departments of Cardiology "Aghia Sophia" Children's Hospital, Athens, Greece, Cardiollgy, Athens, Greece, [5]Cardioloogy Department Agia Sofia Childrens Hospital, Athens, Greece, Athens, Greece

Background and Aim: Cardiac troponins are commonly used as biomarkers among adults. Clinical significance among children and adolescents remains controversial.
Methods: We report a case of a 15-year-old adolescent, referring to our Children's Hospital from a regional hospital due to troponinemia (5-fold increase in troponin I) following atypical chest pain and recent respiratory infection.
Results: In admission, electrocardiogram showed ST elevation in II-III-aVF leads while echocardiographic exam revealed low normal ejection fraction (50%), with normal dimensions of cardiac chambers. The child was treated with ACE-I, beta-blocker and spironolactone and was hospitalized until troponin levels were normalized. 1445 (1.6%) premature monomorphic ventricular contractions (PVCs) were detected in holter monitoring as isolated and couplets. Cardiac MRI at baseline was compatible with acute myocarditis. Episodes of atypical chest pain continued after discharge and elevated cardiac troponin I levels were detected in random tests . The child was subsequently hospitalized twice again due to chest pain and troponinemia. CMR was repeated 6 months after baseline and revealed focal subepicardial fibrosis in the basal inferior-lateral and inferior wall of the left ventricle with late gadolinium enhancement (LGE) percentage of approximately 6% of total left ventricular mass. In between hospitalizations, exercise stress testing and heart rate monitoring remained normal. Taking into account the clinical presentation and the presence of family history of cardiomyopathy in both maternal grandparents, genetic testing was recommended, which turned out positive for the phospholamban mutation NM-002667.5:c116>G, p(Leu39), a membrane protein that regulates calcium channels in cardiac cells. The last CMR, a year after, showed mild focal edema/inflammation of the myocardium at the apex, focal pathological subepicardial LGE



in a non-ischemic pattern in the inferior basal and medial lateral wall and a new focus in the apical lateral wall, representing both edema and fibrosis. Close follow up takes place, heart failure medication continues and genetic testing for first degree relatives has been recommended.

Conclusions: Pathogenic variants in phospholamban gene are associated with hypertrophic , dilated and arrhythmogenic cardiomyopathy. Persistent, recurrent "myocarditis-like" episodes in children and adolescents may be associated with positive genetic background. Findings support genetic testing and close monitoring in such cases.



MP-064 / #200

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

BLOOD, GROWTH, AND PERFORMANCE: DEVELOPMENTAL HEMOGLOBIN PATTERNS IN COMPETITIVE YOUTH ATHLETES

Sebastian Freilinger, Jonas Haferanke, Lisa Baumgartner, Maximilian Dettenhofer, Frauke Mühlbauer, Tobias Engl, Thorsten Schulz, Renate Oberhoffer
TUM School of Medicine and Health, Technical University of Munich, Institute Of Preventive Pediatrics, Munich, Germany

Background and Aim: Aerobic performance in childhood and adolescence depends critically on hemoglobin (Hb)-mediated oxygen delivery. While normative developmental patterns are established in non-athletic cohorts, data on trained youth - who undergo both physiological maturation and sport-specific adaptation - remain scarce.
Methods: Fasting Hb concentrations were obtained from venous samples, and maximal aerobic power ($\dot{V}O_2$peak) was determined by standardized cardiopulmonary exercise testing (CPET) in n=124 competitive youth athletes (62 boys, 62 girls; aged 10–16 years). Participants were matched by age and sex.
Results: Boys demonstrated higher Hb concentrations than girls (14.43±0.85 vs. 13.60±0.74 g/dL; $p < 0.001$) and showed a marked age-related increase (B=0.29, $p<0.001$), while girls remained stable across ages. Correspondingly, $\dot{V}O_2$peak was greater in boys (50.03±6.18 $mL \cdot kg^{-1} \cdot min^{-1}$; $p<0.001$). Hb emerged as a strong independent predictor of $\dot{V}O_2$peak (β=0.40, $p<0.001$).
Conclusions: Even in highly trained youth, classical sex- and age-related Hb trajectories persist and remain a key determinant of aerobic capacity. These results highlight the clinical and developmental relevance of hematological monitoring - particularly in female athletes - to support optimal cardiovascular adaptation and performance development.



MP-065 / #348

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

MULTIDIMENSIONAL ASSESSMENT OF MOTOR SKILLS, PHYSICAL ACTIVITY, WEARABLE ACCURACY IN CHILDREN WITH CONGENITAL HEART DEFECTS AND CHRONIC DISEASES

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[1]TUM School of Medicine and Health, Applied Sport Science, München, Germany, [2]Technical University Munich, TUM School of Medicine and Health, Institute of Preventive Pediatric and TUM Klinikum Deutsches Herzzentrum, Department of Congenital Heart Disease and Pediatric Cardiology, Munich, Germany, [3]Klinikum Stuttgart, Olgahospital, Zentrum für Kinder- Jugend- und Frauenmedizin, Stuttgart, Germany

Background and Aim: Children and adolescents with chronic conditions, particularly congenital heart disease (CHD), often face restrictions in physical activity participation and may demonstrate reduced motor performance as well as lower moderate-to-vigorous physical activity (MVPA). Special sports programs such as KidsTUMove provide structured and supportive environments to assess physical functioning in real-world settings. The study aimed to evaluate and analyse motor performance results, heart rate monitoring using wearables, and MVPA derived from actigraphy in the KidsTUMove Camps.
Methods: During the kidsTUMove wintercamp, 32 participants (mean age 12.22 ± 2.35 years; 17 chronic illnesses (CI), including 11 with CHD) completed standardised motor tests. Tasks included push-ups, sit-ups, standing long jump, and a timed coordination test.During the kidsTUMove sommercamp, wearable validation was conducted in 14 children with CHD (12.71 ± 2.40 years) by comparing the Garmin Forerunner 265 with a Firstbeat Sports chest strap under resting and active conditions.In total, 43 children (mean age 12 ± 3 years) wore actigraphs to assess MVPA.
Results: Motor performance did not differ significantly between healthy and CI girls. CI boys performed significantly worse in push-ups ($p = 0.015$) and tended to perform worse in sit-ups, long jump, and coordination. Boys with CHD showed significant deficits in push-ups ($p = 0.035$) and long jump ($p = 0.022$).Smartwatch validation indicated that the device corresponded well with chest-strap heart rate data during activity; however, greater deviation was observed at rest.Actigraphy revealed significantly lower daily MVPA in chronically ill participants (152.4 ± 39.7 min) compared with healthy peers (180.1 ± 28.6 min; $p = 0.011$). However, all camp participants met the WHO guidelines.
Conclusions: Deficits in motor performance were observed in the group of CI boys and in the subgroup of boys with CHD. However, many CI children were apparently able to



compensate for many disease-related deficits. Participation in the KidsTUMove project also showed that chronically ill children meet the WHO recommendations of at least 60 minutes of moderate to vigorous physical activity. Smartwatches can help identify individual stress limits and boost confidence in physical activities. They can be valuable tools, especially in everyday life, school sports, and leisure activities.



MP-066 / #592

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

SINGING AS RESPIRATORY PHYSIOTHERAPY? BREATHING-TRAINING INTERVENTION IN CONGENITAL HEART DISEASE: A PILOT STUDY

Lamia Ait Ali[1], Giosuè Catapano[2], Alessandro Pingitore[3], Francesca Mastorci[3], Silvia Favilli[4], Luca Ioseffini[5], Silvano Boccai[5], Sara Matteucci[5], Moreno Signorini[6], Enrico Moggi[6], Phillip Bonhoeffer[7], Pierluigi Festa[8]
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Background and Aim: Background and Aim: Several studies have reported impaired lung function in patients with congenital heart disease, particularly in those with a functionally univentricular heart (UVH) after Fontan palliation. Moreover, growing evidence highlights the beneficial connection between music and health, including singing. The aim of this pilot study was to evaluate singing as a breathing-training intervention in a small cohort of patients with predominantly complex CHD. We hypothesized that singing-based respiratory training could improve diaphragmatic function and enhance overall quality of life in this population
Methods: Methods: Children < 16 years with CHD were enrolled in a 3-month singing-centered respiratory training program conducted by choir masters from the Children's Choir of the Opera House. Diaphragmatic function was assessed by ultrasound for each hemidiaphragm during quiet breathing (QB) and deep breathing (DB). Measurements included diaphragmatic thickness, excursion, and thickening fraction (TF), calculated as: (Tdi-insp – Tdi-exp) / Tdi-exp × 100. At the end of the program, patients and their parents completed an anonymous questionnaire evaluating satisfaction with the project and its perceived impact on the child's well-being.
Results: Results: Eight patients were included in the study, five of whom with UVH post-Fontan. The median age was 9.4±2.1 years. Adherence to the training protocol was good, and all participants took part in the final choral performance. In two patients, diaphragmatic functions remained unchanged. In the remaining five, improvement was observed in at least one parameter: diaphragmatic excursion increased in two children during DB, in two during QB, and in one during both; TF improved in three patients; and in two children, baseline diaphragmatic contraction speed also increased. Overall



satisfaction was high. Most children enjoyed the activity (88%). The parents reported also a positive impact on emotional well-being (extremely: 12.5%, very: 87.5%), social/relational functioning (extremely:12.5%, very: 62.5%, moderately:25%), and physical well-being (extremely: 25%, very: 50%, moderately:25%).

Conclusions: Conclusions: This pilot study suggests that singing, used as a structured breathing-training intervention, may improve diaphragmatic function in children with complex CHD. Additionally, patient and family satisfaction was consistently high. Future developments will aim to extend the program to a larger cohort to confirm these encouraging preliminary findings.



MP-067 / #848

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

DYNAMIC HYPERINFLATION DURING EXERCISE IN PATIENTS WITH CONGENITAL HEART DISEASE AND HEALTHY CONTROLS - A CROSS-SECTIONAL STUDY

Viktoria Ludwig[1], Jan Müller[2], Charlotte Schöneburg[3], Julia Hock[4], Peter Ewert[5], Alfred Hager[6]
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Background and Aim: Exercise intolerance in congenital heart disease (CHD) is traditionally attributed to cardiac limitations. Dynamic hyperinflation (DH) may further restrict exercise, yet its prevalence, severity, and clinical relevance in CHD are poorly understood. This study evaluated DH during exercise, its association with lung function, and its impact on exercise performance in CHD patients versus healthy controls.
Methods: In this prospective, cross-sectional study, 1,618 CHD patients (age 8–80 years) and 67 healthy controls underwent symptom-limited CPET with inspiratory capacity (IC) maneuvers. Spirometry was performed at rest. DH was defined as IC reduction ≥150 mL; severe DH required IC reduction plus expiratory flow limitation (EFL/VT >50%) and concave flow-volume curve. Exercise parameters included VO_2peak and VE/VCO_2 slope. Analyses were adjusted for age, BMI, sex, and beta-blocker therapy using linear and logistic regression.
Results: Preliminary results show that the DH prevalence was 22.7% in CHD and 35.8% in healthy controls ($p < 0.001$). Severe DH occurred only in CHD (n = 21; 2%). In CHD, DH was associated with reduced exercise capacity: VO_2peak −11.0 mL/kg/min, Wmax −73 W, VEmax −30 L/min, VE/VCO_2 slope +2.21 (all $p < 0.05$). Severe DH further reduced VO_2peak by −3.2 mL/kg/min ($p = 0.030$) and Wmax by −36.6 W ($p < 0.001$). CHD-nonDH participants also showed exercise limitations, though less pronounced. Healthy DH participants showed no significant impairment in VO_2peak, Wmax, VEmax, or VE/VCO_2 slope. Heart rate, oxygen saturation, and RRSDS z-scores were unaffected by DH. Notably, 260 CHD-DH (70.8%) and 16 healthy-DH (66.7%) had normal resting FEV1/FVC, indicating DH detection



required exercise IC maneuvers. CHD-DH also had lower FEV1 and FVC z-scores versus healthy non-DH ($p \leq 0.001$).

Conclusions: DH occurs in both CHD and healthy individuals during exercise, but clinically relevant severe DH is confined to a subset of CHD patients. DH impairs exercise performance only in CHD. Resting spirometry often fails to detect DH, emphasizing the value of exercise-based IC assessment. Evaluating DH in CHD provides clinically relevant information for risk stratification, individualized exercise prescription, and optimization of cardiopulmonary management, highlighting its potential value in the routine assessment of patients with CHD.



MP-068 / #1252

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

SYSTEMATIC REVIEW ON EXERCISE PRESCRIPTION IN CHILDREN WITH HEART DISEASE

Arnav Rustogi[1], Gabrielle Norrish[2], Sara Moscatelli[2], Juan Kaski[2]
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Background and Aim: Background: Exercise is vital for maintaining long-term health. However, determining its benefits in children with heart disease – congenital heart disease (CHD), cardiomyopathies, and inherited arrhythmias – is difficult, given greater limitations in functional and developmental capacity. While adult studies demonstrate strong evidence for efficacy, limited robust paediatric data precludes recommendation in children. **Objective:** This review aimed to synthesise current evidence on exercise prescription in children with heart disease, focusing on safety, efficacy, and integration into care, comparing studies, and identifying limitations in research.
Methods: Studies published between 1983-2025 on exercise interventions for children with heart disease were identified through systematic database searches and screened in accordance with PRISMA 2020 guidelines. Methodological quality and risk of bias were independently assessed using standardised appraisal tools, and results were synthesised narratively due to heterogeneity in interventions and outcome measures.
Results: Across 30 studies (28 congenital, 2 cardiomyopathy; n=1,208; mean age 12.8 ± 3.1), significant improvements were reported in aerobic fitness (57% of studies), functional fitness (37%), and QoL (20%). Most CHD programmes implemented moderate-intensity aerobic or combined training, with 60-minute sessions 2-3 times weekly over 12 weeks. Evidence for non-CHD populations was limited; however, light-to-moderate exercise appeared beneficial in cardiomyopathy. Adherence averaged 84%, with adverse events rarely seen post-intervention and none during interventions. No significant differences were observed between home and centre-based interventions. Methodological quality was mixed, with frequent bias from poor blinding, measurement issues, limited controls, and lack of long-term follow-up. Changes in cardiac phenotype were seldom assessed.
Conclusions: Exercise prescription can be an effective adjunct in paediatric CHD care. In light of methodological issues, insufficient evidence for long-term safety, and potential for benefit in non-congenital diseases, multicentric, randomised controlled trials across diverse diagnoses are needed to guide individualised prescription.



MP-069 / #1383

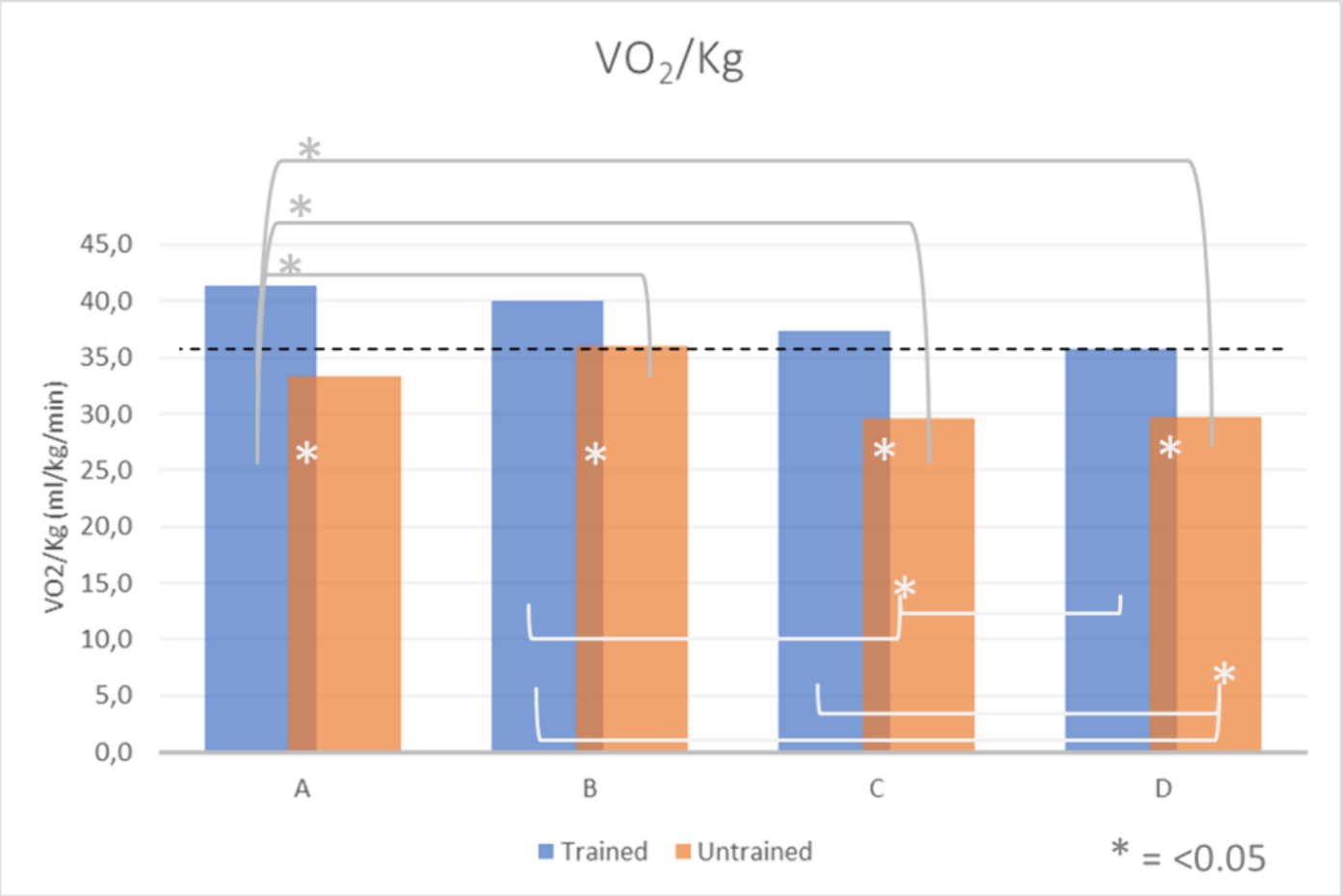
SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

THE IMPACT OF PHYSICAL ACTIVITY LEVEL ON CARDIORESPIRATORY FITNESS IN PATIENTS WITH CONGENITAL HEART DISEASES ACROSS COMPETITIVE SPORT CLASSES.

Francesca Battista[1], Daniel Neunhaeuserer[1], Emiliano Scettri[2], Nicola Borasio[2], Sara Ortolan[3], Marco Vecchiato[4], Gino Degano[3], Andrea Gasperetti[3], Federica Duregon[1], Giovanni Di Salvo[5], Andrea Ermolao[2]
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Background and Aim: Cardiorespiratory fitness (CRF) is a strong prognostic marker olaso in individuals with congenital heart diseases (CHD). These people could benefit from regular physical activity according to their morpho-functional status. The aim of the study is to evaluate the impact of physical activity level on cardiorespiratory fitness (CRF) as a solid prognostic marker.
Methods: Retrospective study of 401 patients with surgically corrected CHD and evaluated with maximal cardiopulmonary exercise test (CPET). Subjects were divided in 4 classes according with ESC 2020 guidelines and corresponding to the eligibility for all competitive sport (A), all except endurance (B), only skill disciplines (C) or not eligible (D).
Results: 266 patients (66.3% males), median (IQR) age was 18.0 (13.0; 21.5) years; 34% were in class D, 13% in class B, 25% in class C and 28% in class A. Within the entire population, 179 subjects (44,6%) carried out structured exercise training (60,7% in class A, 45,1% in class B, 41,7% in class C and 41,1% in class D). VO_2peak/Kg was similar between class A and B, but significantly different between class A [39,2 (33,6-44,4) mL/Kg/min] vs. class C [33,3 (28,3-41,4) mL/Kg/min, p<.0001] and class D [32,2 (27,6-39,3) mL/Kg/min, p<.0001]. Significant functional impairment (VO_2peak <85% for age and sex), resulted significantly higher in classes C-D (prevalence 55.1%-57.0%) than in A-B (prevalence 22.5-42.5%, p <.0001). Paired comparison showed significant differences in CRF (VO_2/Kg) between trained and untrained subjects both within and across ESC 2020 classes, while there was no significant difference between paired groups of different classes with the same physical activity level (Figure

1).



Conclusions: Subjects in class A had better functional capacity than those in C and D classes, but exercise training (including competitive or non-competitive activities) can have a significant impact on CRF level. Figure 1 shows that trained people in D class had higher CRF than untrained in A class, supporting the fact that functional evaluation and an individualized exercise prescription may recruit functional "reserve" by improving the VO_2peak that is a key component for quality of life and life expectancy.



MP-070 / #157

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

CARDIAC RECOVERY, FUNCTIONAL IMPROVEMENT, AND SCHOOL REINTEGRATION WITH ELAMIPRETIDE IN BARTH SYNDROME

Mathieu Andrianoely[1], Arielle Desir[2], Madeline Rheault[3], Alyssia Venna[4], Pascal Amedro[2]
[1]Bordeaux University, Department Of Pediatric And Congenital Cardiology, Pessac, France, [2]Children's National Hospital, Department Of Cardiology, Washington, United States of America, [3]Children's National Hospital, Heart Institute, Washington, United States of America, [4]Children's National Hospital, Department Of Cardiovascular Surgery, Washington, United States of America

Background and Aim: Barth syndrome (BTHS) is a rare X-linked mitochondrial disorder characterized by cardiomyopathy, neutropenia, and skeletal myopathy. Elamipretide is a mitochondria-targeting peptide that stabilizes cardiolipin and improves mitochondrial function. While use of elamipretide in infants with BTHS has been reported in the United States, no cases have been described outside the US or in older children.
Methods: We report the first case of a preschool-aged child with genetically confirmed BTHS and advanced heart failure who was treated with elamipretide. At initiation, this 5-year-old patient presented with severe left ventricular dysfunction (LVEF = 20%) and moderate-to-severe mitral regurgitation. Subcutaneous elamipretide (0.5 mg/kg/day) was initiated alongside maximal conventional heart failure therapy. Over six months, LVEF improved to 50%, mitral regurgitation decreased to trivial, Ross class improved from IV to I, and substantial gains were observed in functional capacity, physical activity level, nutritional status, and health-related quality of life (HRQoL). The patient returned to full-time school and remained temporarily suspended from the transplant list.
Results: This is the first pediatric case of elamipretide therapy reported outside the United States, and the first in a preschool-aged child with Barth syndrome (BTHS). Elamipretide was provided outside of FDA approval, within the framework of the European Rare Disease Plan, and delivered via the pediatric home hospitalization (HAD) team using a subcutaneous regimen specifically adapted to pediatric needs and compatible with ambulatory care. Treatment was generally well tolerated, therapy was not interrupted, and overall safety remained favorable throughout the 6-month follow-up.
Conclusions: Elamipretide may improve cardiac function, exercise tolerance, nutrition, and HRQoL in preschool-aged pediatric BTHS patients, potentially delaying the need for transplantation. Broader pediatric evaluation is warranted. Further strategies, such as



youth-tailored hybrid cardiac rehabilitation programs, could complement pharmacological therapy and further optimize outcomes in this population.



MP-071 / #618

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

LIFESPAN PATTERNS OF PSYCHOSOCIAL VULNERABILITY IN ADULTS WITH CONGENITAL HEART DISEASE: A MIXED-METHODS STUDY

Floor Van Der Meijs[1], Henk Elzevier[1], Arno Roest[2], Loes Van Winden[3], Marloes Duijkers[1], Veronica Janssen[3], Philippine Kies[3]
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Background and Aim: Improved survival has resulted in a rapidly growing population of adults with congenital heart disease (ACHD). Given the substantial psychosocial challenges associated with living with a congenital heart condition, this demographic shift increases the need for comprehensive psychosocial research. Previous studies often relied on isolated quantitative indicators or small qualitative samples, limiting understanding of patients' lived experiences across developmental stages. To address this gap, this study aimed to characterize psychosocial experiences among ACHD patients by examining how concerns emerge in life, evolve across developmental stages, and differ according to disease complexity, sex, and age.
Methods: A national online survey was administered to Dutch ACHD patients aged 16 years and older between October and December 2024. Participants were recruited via the national patient association. The survey was part of a broader questionnaire on psychosocial and sexual health. Fifteen items on demographics and psychosocial experiences were analyzed. Closed-ended responses were summarized descriptively. Open-ended responses underwent inductive thematic analysis to identify recurring patterns and subgroup variations, with particular attention to developmental timing and age-specific shifts.
Results: A total of 259 participants (68.6% female; 47.1% aged 26–40) responded. Most had undergone cardiac surgery (75.9%), and disease complexity was severe (36.8%), moderate (45.5%), or mild (13.2%). Nearly all (94.1%) reported at least one fear or insecurity related to CHD-affected life domains, including physical endurance (64.7%), visible scarring (47.8%), and reproduction (64.0%). Social concerns were also common, such as relationship challenges (47.8%), fear of rejection (39.0%), and worries about others' judgement (38.2%). These concerns emerged before age 11, with physical and social worries dominating childhood and reproductive and employment-related concerns (31.1%) increasing from adolescence onward. Although many insecurities stemmed from



earlier experiences, participants described effective coping strategies and meaningful adaptation.

Conclusions: Psychosocial difficulties are heterogeneous and present across all ACHD groups. Many individuals demonstrate substantial resilience.Their early onset and age-specific evolution highlight the need for developmentally informed care. Recognizing when concerns arise and how they shift across life stages is essential for timely, tailored psychosocial support. Proactive attention is warranted during childhood and transitional stages, when emerging concerns may shape long-term psychosocial trajectories.



MP-073 / #22

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

OPM-BASED FETAL MAGNETOCARDIOGRAPHY: FETAL CARDIAC TIME INTERVALS IN HEALTHY PREGNANCIES COMPARED TO POSTNATAL ECGS

Karin Narushima[1], Gabriela Tardelli[2], Ronald Wakai[2], Janette Strasburger[3], Lena Wunderl[4], Tobias Jensch[4], Reinhard Heckel[3], Silvia Lobmaier[5], Nicole Nagdyman[1], Peter Ewert[1], Peter Fierlinger[4], Annette Wacker-Gussmann[1]
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Background and Aim: Fetal magnetocardiography (fMCG) is the most accurate method to assess fetal heart rhythm and conduction. New quantum sensor technology makes it possible to use less expensive devices. The aim of the study is to measure cardiac time intervals of healthy fetuses with a new technology, optically-pumped magnetometry (OPM), and compare these results with conventional SQUID-based fMCG and postnatal ECGs.
Methods: The recordings were made using an OPM-based fMCG system and a person-sized magnetic shield, established at TUM University, Munich, Germany. The subjects were 57 healthy women with uncomplicated singleton pregnancies, studied at a mean gestational age of 32.1± 3.7 weeks with an overall range of 25-40 weeks. The P, PR, QRS, QT, QTc, and RR intervals were measured and compared with published data from previous fMCG devices and postnatal ECG.
Results: The P, PR and QRS intervals increased with gestational age, but the QT and QTc intervals did not. The measured values of the OPM device were consistent with those from previously published data SQUID values. U-waves were seen in 17% of subjects. Eleven subjects were studied by fMCG after 30 weeks' gestation and by ECG within 17 weeks of birth. In this cohort, the P-wave duration, QRS duration, and QTc increased after birth, but the PR and QT intervals did not.
Conclusions: The results obtained with our innovative OPM-based fMCG system are comparable to previously available measurements obtained by other technologies. The data establish prediction intervals for OPM-based fMCG waveforms in normal fetuses,



which is essential for future clinical application. The technology can be used to recognize fetuses with rhythm or conduction abnormalities that might not be evident by echocardiography. To our knowledge, this is the first report comparing fetal cardiac time intervals measured by OPM-based fMCG with postnatal ECG. Lengthening of cardiac intervals consistent with increased chamber size were seen postnatally.



MP-074 / #360

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

KNOWLEDGE AND ATTITUDES OF PARENTS OF CHILDREN WITH CONGENITAL HEART DISEASE

Vasiliki Kontou[1], Christina Loukopoulou[1], Asimina Tsintoni[1], Stavros Georgiou[1], Dimitrios Kapnisis[1], Konstantinos Miliordos[1], Nikolaos Antonakopoulos[2], Ageliki Karatza[1]
[1]UNIVERSITY OF PATRAS MEDICAL SCHOOL, Paediatrics, RIO, PATRAS, Greece, [2]UNIVERSITY OF PATRAS MEDICAL SCHOOL, Department Of Faternomaternal Medicine, Rio, Patras, Greece

Background and Aim: Significant progress has been made in the last several decades in the diagnosis and treatment of congenital heart disease (CHD), however these defects stilll represent a major global health problem with significant morbidity and mortality. Several studies have shown that the understanding of tCHD by hthe child's caregivers remains far from ideal. The aim of the study was to investigate the knowledge and attitudes of parents regarding their child's CHD in various domains..
Methods: This is a prospective cross-sectional survey performed in children with CHD which are followed-up regularly at the University of Patras Medical school. Demographic data concerning the parents were obtained with personal interview during the child's visit at the clinic and children's data were collected from the medical records. Parental knowledge and attitudes were assessed using a structured questionnaire. Written informed concent was obtained by the child's parents,
Results: Over a period of 11 months a total of 101 children aged 4-18 years old were included in the study,56 boys and 45 girls. Haemodynamically significant heart disease was defined as the need for medical, surgical or interventional management in the first year of life and represented 51/101 (50 %) of the patients, Only 55/101 patients **(**54.4 %) knew the exact diagnosis of CHD in their child and only 41//101 (40.6%) of parents could identify the cardiac lesion on a picture of the normal heart. Also, only 41/101 (40.6 %) knew that CHD incresed risk of infective endocarditis in their chilf,. however, 77/101 parents (76.2%) were aware of the significance of oral hygine to protect the heart from infection. 53/101 (52.5%) of the parents wanted their child to be followed up at the Paediatric Cardiology clinic after the age of 18 years, whereas 48/101 (47.5%) of the parents opted for transfer of their child's care at the Adult Congenital Heart Disease service after reaching adulthood.
Conclusions: Identifying important knowledge gaps in parents of children with CHD will allow to improve parental education to achieve better understanding of their child's heart



disease aiming to contribute in the enhance the care of their child and increase compliance with medications, therapeutic interventions and outpatient visits.



MP-075 / #775

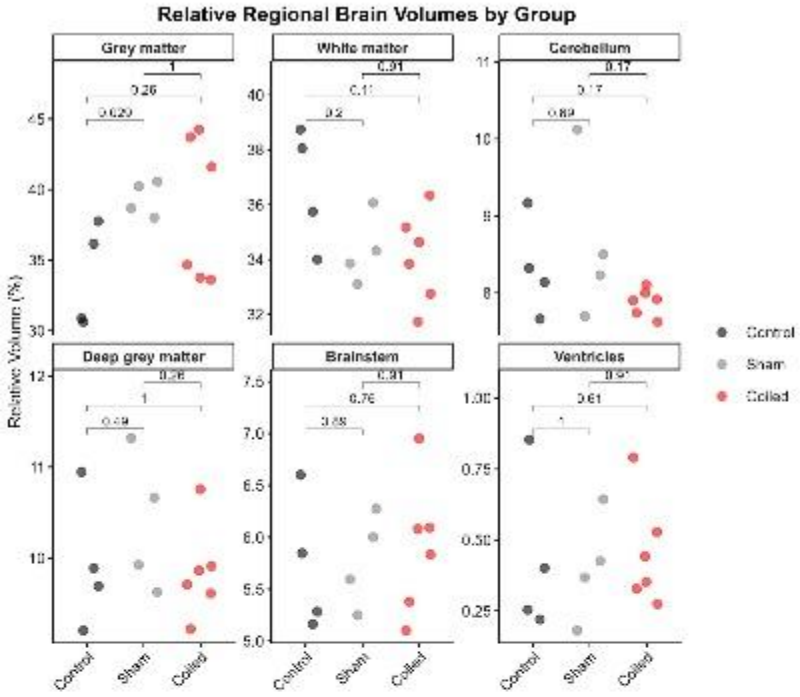
SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

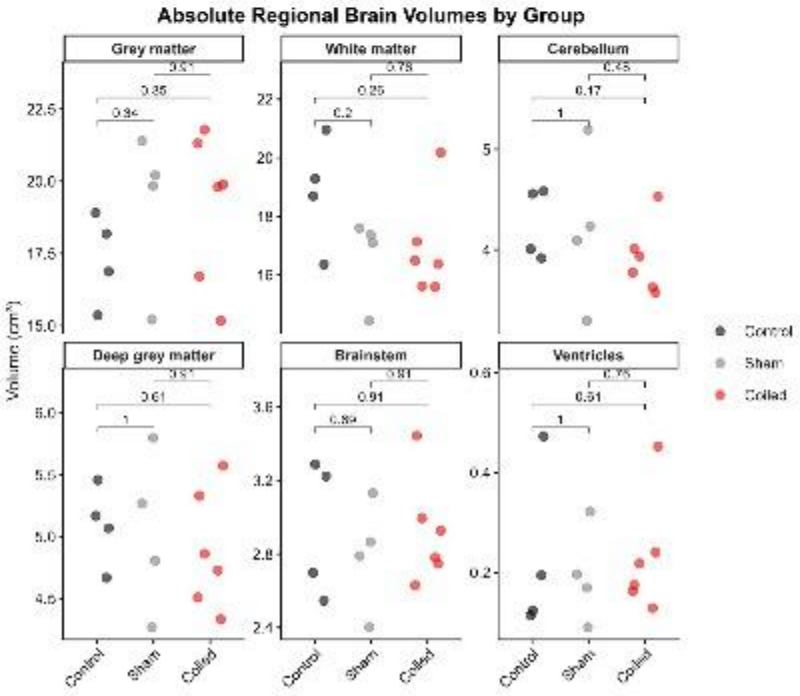
BRAIN VOLUME DEVELOPMENT AND AORTIC FLOW ALTERATIONS IN FETAL LAMBS WITH INDUCED HYPOPLASTIC LEFT HEART SYNDROME

Nina Odgaard[1,2,3], Kelly Payette[2,3], Christian Stoeck[4,5], Sophie Laeber[1,2,3], Ahmed Hassan[6], Rajiv Chaturvedi[6], Mike Seed[6], Edgar Jaeggi[6], Monique Haak[7], Miriam Weisskopf[5], Andras Jakab[2,3], Walter Knirsch[1,2]
[1]University Children's Hospital Zurich, Pediatric Heart Center, Pediatric Cardiology, Zurich, Switzerland, [2]University Children's Hospital, University of Zurich, Children's Research Center, Zurich, Switzerland, [3]University Children's Hospital, Center Of Mr Research, Zurich, Switzerland, [4]University and ETH Zurich, Institute Of Biomedical Engineering, Zurich, Switzerland, [5]University Hospital Zurich, Center For Preclinical Development, Zurich, Switzerland, [6]The Hospital of Sick Children, Cardiology, Paediatrics, Labatt Family Heart Centre, Toronto, Canada, [7]Leiden University, Obstetrics And Fetal Medicine, Medical Center, Leiden, Netherlands

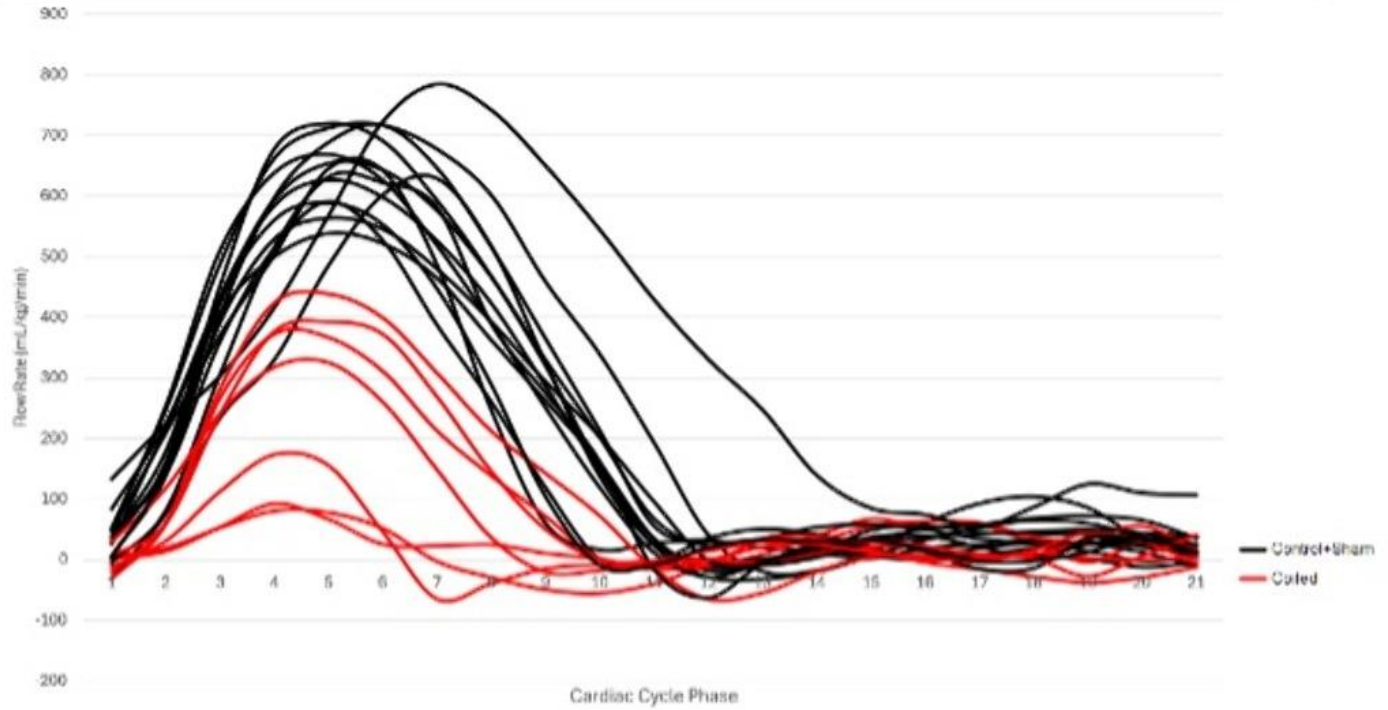
Background and Aim: Hypoplastic left heart syndrome (HLHS) is associated with neurodevelopmental abnormalities but underlying mechanisms remain unclear. Challenges in human in utero research make translational fetal models valuable alternatives. Thus, an ovine model of induced HLHS in fetal lambs was developed. The total and regional brain volumes were analyzed and compared to cardiac flow data.
Methods: 25 pregnant sheep were included (winter 2023-spring 2025). In utero, percutaneous mitral valve coiling was performed on 29 fetal lambs at gestational age ~75 days (dGA). At ~135 dGA, in utero cardiac MRI with flow measurements was performed (1.5 T Philips) after which fetuses were extracted by cesarean section. Fetal heads were formaldehyde-fixed and T2-weighted head MRI scans were obtained. Using 3D Slicer and the Michigan State University Sheep Brain Atlas, manual registration and annotations were made.
Results: 20 lambs were underwent cardiac flow measurements (7 controls, 6 shams, 7 coiled) and 14 underwent brain analysis (4 controls, 4 shams, 6 coiled) . Eight brain regions were annotated: total brain, intracranial, grey matter, white matter, ventricles, cerebellum, deep grey matter, and brainstem. Multivariate regression adjusted for weight showed no correlation in total brain volume between effective coiling and controls (including shams) (p=0.89, CI: -4.83-5.46). Regional brain volumes differed only in the relative grey matter between control and sham groups (p=0.029). Mean aortic flow was 194.2 (IQR: 163.5, 203.7) for controls, 177.5 (IQR: 163.5, 203.7) for sham and 75.3 (25.7, 97.0) for coiled.

Aortic output flow was reduced in the coiled group versus controls (p=0.0006) and shams (p=0.0011) (Figure aortic flow





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Conclusions: The fetal cardiac coiling successfully decreased the aortic output in multiple subjects. Similar total and regional brain volumes across the groups indicate macroscopically normal brain growth even in HLH fetuses. The grey matter difference between control and sham groups likely reflects statistical probability given the small sample size and overlapping confidence intervals. The small sample size (n=25) limits definitive conclusions and warrants validation in larger cohorts. More research is needed to investigate possible diffusion changes and cellular alterations.



MP-076 / #136

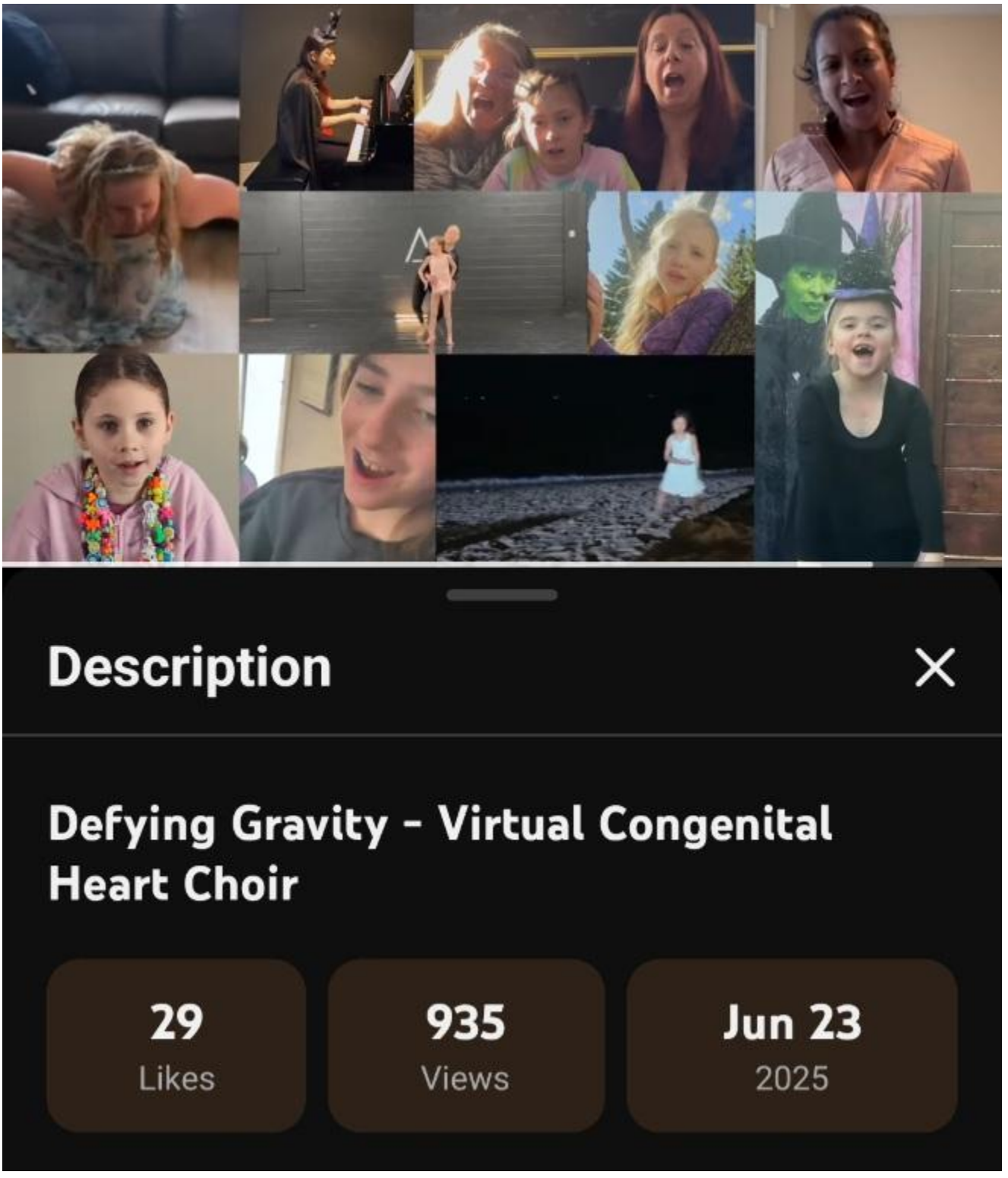
SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

ONLINE CHOIR OVERCOMES GEOGRAPHICAL BARRIERS AND FOSTERS CONNECTION AMONG CHILDREN WITH CONGENITAL HEART DISEASE

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Background and Aim: Online initiatives provide opportunities to overcome geographical limitations and connect children affected by congenital heart disease (CHD) with similar peers. We evaluated the impact of a 2nd annual online choir for families with CHD, through feedback and social media metrics.
Methods: Children with CHD and family members participated in 8 weekly, 1 hour Zoom rehearsals followed by a period of socialization. The song "Defying Gravity" was chosen as its message resonates with the resilience and strength of CHD survivors. Recordings were available for those unable to attend. Participants submitted vocal and video recordings along with photographs depicting their heart journey for inclusion in a final music video - https://www.youtube.com/watch?v=y9TFrJUWZk4. Post-choir feedback was collected via Google forms using a Likert scale as well as email and social media feedback. YouTube analytics assessed video reach via number of views over time.
Results: Participants included 5 children with CHD (5-10 years), 1 sibling (11-17 years) and 2 adults >50 years (parent and grandparent); located in Alberta (2), Ontario (4), Nova Scotia (1) and Prince Edward Island (1). Four children were returning participants. Additional contributors included a dance teacher and a student with CHD. The final video was released in June 2025, receiving 296 views in 24 hours, 566 views within 7 days, 726 views by 30 days, 836 views by 90 days, with a total of 935 views to date at 5 months; compared to the 2024 video which reached 1,000 views in 1 year. Of the 2 feedback surveys received, only 1 had participated and rated the experience as “the best”. Written feedback included *“Thank you for all your hard work. The video was awesome,”* and *“Love it so much, I'm so glad she got to be part of it this year.”* One parent reported that 2 choir members subsequently met at a local Summer heart camp and formed an immediate connection.
Conclusions: An online choir overcame geographical barriers, enabling Canadian children with CHD to connect with peers and form a social network. Dissemination of a music video via social media provides a scalable platform to raise awareness about CHD and promote community

engagement.


Description
Defying Gravity - Virtual Congenital Heart Choir
29
Likes
935
Views
Jun 23
2025



MP-077 / #202

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

WHEN HEARTS GET COMPLICATED: HOW CHD SEVERITY SHAPES EMOTION REGULATION BENEFITS IN YOUTH

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Background and Aim: Objectives. Youth with congenital heart disease (CHD) face elevated psychosocial risks. While adaptive emotion regulation (ER) is generally protective, its effectiveness may depend on CHD complexity. This study examined whether CHD complexity moderates the association between adaptive ER strategies and psychosocial outcomes across childhood and adolescence.
Methods: Methods. Participants were 96 children (8–11 years) and 119 adolescents (12–17 years) with CHD. Adaptive ER was assessed using the FEEL-KJ (questionnaire measuring emotion regulation strategies), prosocial behavior with the Strengths and Difficulties Questionnaire (SDQ), and self-esteem with the CBSK/A. CHD complexity was categorized according to Bethesda criteria. Moderation analyses were conducted using Hayes' PROCESS macro, based on self-, mother-, and father-reports.
Results: Results. CHD complexity moderated the relationship between adaptive ER and psychosocial outcomes, particularly in adolescence. Among adolescents, higher use of 'Forgetting' was associated with greater prosocial behavior specifically at higher CHD complexity. Similarly, 'Reevaluation' showed stronger associations with self-esteem in adolescents with more complex CHD. In children, adaptive ER was positively associated with self-esteem at moderate and high complexity levels, but not at low complexity. Parental reports largely corroborated self-reports, with trends suggesting complexity-dependent effects for additional strategies.
Conclusions: Conclusions. The psychosocial benefits of adaptive ER in youth with CHD depend on disease complexity, with effects most pronounced during adolescence. Specific strategies such as 'Forgetting' and 'Reevaluation' may be particularly beneficial for adolescents with more complex CHD. These findings highlight the importance of complexity-tailored psychosocial interventions that consider both developmental stage and cardiac severity.



MP-078 / #391

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

IDENTIFYING AUTONOMY-SUPPORTIVE COACHING BEHAVIORS IN AN EXECUTIVE FUNCTION INTERVENTION FOR CHILDREN WITH COMPLEX CONGENITAL HEART DISEASE: A QUALITATIVE ANALYSIS

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Background and Aim: Children with complex congenital heart disease (cCHD) are at increased risk for executive function (EF) difficulties. In a feasibility study of *E-Fit,* a multimodal EF intervention, combining computerized training, strategy coaching, and analog games, results showed high acceptability, practicality, and exploratory effectiveness. However, motivation during coaching sessions and adherence to the computerized training were only moderate. To address this, we want to enhance self-determination through more autonomy-supportive coaching. This study analyzes coach behaviors from previous *E-Fit* sessions to assess their autonomy-supportive qualities.
Methods: Video-recorded sessions from two *E-Fit* coaches were analysed using *Datavyu*. Based on an existing autonomy-supportive behavior scale, coach behaviours were coded as present/absent and categorized into eight dimensions, forming four opposite pairs; the first behavior reflecting an autonomy-supportive approach: (1) acceptance vs. change of negative affect, (2) informational vs. controlling language, (3) reference to intrinsic sources vs. extrinsic sources of motivation, and (4) provision vs. absence of explanatory rationale of the tasks,. Behavior counts were summed per dimension, and ratios between opposing pairs were calculated. Means (*M*) and standard deviation (*SD*) were computed (scores range from 0-1, with higher values indicating greater autonomy-supportive behaviors).
Results: Highest mean ratios were observed for acceptance of negative affect (*M*=0.86, *SD*=0.17) and utilization of informational language (*M*=0.84, *SD*=0.06), followed by reference to intrinsic sources (*M*=0.69, *SD*=0.05) and provision of explanatory rationale (*M*=0.57, *SD*=0.15).



Conclusions: Coaches consistently used informational language and accepted negative affect. However, the occasional use of extrinsic motivators and limited explanatory rationales suggest areas for improving strategies for future *E-Fit* coaches to better support adolescent autonomy in cCHD – hopefully leading to improved engagement and adherence in *E-Fit*.



MP-079 / #712

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

FEASIBILITY AND IMPACT OF A DIGITAL MATCHING TOOL FOR ONE TO ONE PEER SUPPORT FOR CAREGIVERS AND (YOUNG) ADULTS WITH CONGENITAL HEART DISEASE IN THE NETHERLANDS

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Background and Aim: People with congenital heart disease (CHD) must continuously adapt to living with a lifelong cardiac condition, which may lead to physical, psychosocial and societal impact. Patients with CHD and caregivers of a child with CHD frequently report a need for peer support. To address this, a digital matching tool—Buddy Matching (BM)—was developed to match individuals with peers who share similar experiences. This pilot study aimed to explore the feasibility of BM and assess its potential effects on psychosocial well-being in (young) adult patients and parents.
Methods: All (young) adults (≥16 years) with CHD and all caregivers of children with CHD in the Netherlands had access to the tool through the national patient organisation's website. Participants completed validated questionnaires assessing psychosocial well-being, including anxiety, depression, perceived social support, health education, self-efficacy and family empowerment, directly after matching (T0), after 3 months and 6 months (T1 & T2). At T1 and T2, participants also completed an evaluation form regarding their experience with BM. Quantitative data were analysed using descriptive and inferential statistics, and qualitative responses were analysed through thematic coding.
Results: Over 11 months, 112 individuals registered for BM, of whom 88 were matched (34 caregivers, 54 patients). At T0, 33% of patients reported symptoms of anxiety and 50% reported symptoms of depression. Among parents, 41% reported symptoms of anxiety and/or depression. While quantitative results are pending, at T1, preliminary data showed that 73% of participants would recommend BM to others. Qualitative findings indicated that patients and caregivers particularly valued peer support for recognition, validation and practical guidance
Conclusions: One-to-one peer support through the BM program appears feasible and is recommended by 73% of participants. Qualitative data suggest that BM may have a positive impact on psychosocial well-being for both patients and parents. These findings



offer valuable insights for the further development and implementation of digital matching tools for one-to-one peer support as an adjunct to standard care.



MP-080 / #37

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

PROGNOSTIC VALUE OF THE NEUTROPHIL-TO-LYMPHOCYTE RATIO AS A PERIOPERATIVE BIOMARKER IN PEDIATRIC CARDIAC SURGERY

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Background and Aim: Systemic inflammation following pediatric cardiac surgery contributes substantially to postoperative morbidity. The neutrophil-to-lymphocyte ratio (NLR) is an accessible marker of systemic inflammation, but its perioperative behaviour and prognostic value in this population remain poorly defined. The authors aimed to characterize perioperative NLR dynamics; comparing it with C-reactive protein (CRP); and assess their associations with surgical complexity, cardiopulmonary bypass (CBP) duration and early postoperative clinical outcomes.
Methods: This retrospective, single-center study included pediatric patients undergoing cardiac surgery between January and September 2025. Patients with missing data, active infection, hematologic/autoimmune disease, or chronic immunosuppression were excluded. Demographic, surgical, and laboratory data were collected. Outcomes included vasoactive-inotropic score (VIS), oxygenation parameters [central venous saturation ($ScvO_2$), arterial–venous oxygen saturation difference (SaO_2–$ScvO_2$)], acute kidney injury (AKI), and ICU stay.
Results: Fifty patients were included; no deaths occurred. NLR followed a characteristic perioperative pattern: baseline median 0.8, rising sharply at 1h (6.9), remaining elevated at 24h (6.4), and partially resolving by 48h (2.8). NLR at 48h increased progressively across RACHS-1 categories (p=0.011) and was significantly higher in patients with CBP duration>110 minutes (p=0.044), indicating greater inflammatory activation with higher procedural burden. Elevated NLR at 48h independently predicted cardiovascular and renal dysfunction, including VIS ≥10 (p=0.012; AUC 0.853, cut-off 3.08) and AKI (p=0.022; AUC 0.745, cut-off 2.90). Conversely, lower early NL—preoperatively and at 1h—was associated with impaired oxygen extraction: $ScvO_2$ <65% at 12h (p=0.042 and p=0.004) and SaO_2–$ScvO_2$ ≥30% at 6h and 12h (p=0.023 and p=0.007). CRP showed a slower, more gradual



rise, consistent with its delayed acute-phase behavior, and showed no association to impaired oxygenation, higher VIS, AKI, or prolonged ICU stay; however, higher CRP at 48h correlated with higher RACHS-1 categories (p=0.035).

Table 1. Cohort Characteristics

n	50
Demographic Characteristics	
Age, years – median (IQR)	2.5 (1.0-6.0)
Male – n (%)	29 (58)
Weight, kg – median (IQR)	11.8 (7.7-19.3)
Diagnosis – n	
Ventricular septal defect	11
Tetralogy of Fallot	8
Rheumatic valve disease	7
D-Transposition of the great arteries	6
Tricuspid atresia	3
Patent *ductus arteriosus* (embolized device)	2
Truncus arteriosus	2
Others (with n = 1)	11
Surgical Characteristics	
Aristotle Basic Complexity Soore – median (IQR)	7.5 (6.0-8.0)
Aristotle Basic Complexity Soore ≥ 3 – n (%)	19 (38)
RACHS-1 Category ≥ 3 – n (%)	21 (40)
Bypass time, min – median (IQR)	109.5 (80.5-185.5)
Aortic clamp time, min – median (IQR)	48.5 (0.0-68.0)
Key Outcomes	
NLR Preoperative – median (IQR)	0.8 (0.4-1.5)
NLR 1h post-surgery – median (IQR)	6.9 (3.8-9.6)
NLR 24h post-surgery – median (IQR)	6.4 (4.3-8.6)
NLR 48h post-surgery – median (IQR)	2.8 (1.9-4.7)
CRP Preoperative – median (IQR)	0.08 (0.03-0.25)
CRP 1h post-surgery – median (IQR)	0.17 (0.0-0.61)
CRP 24h post-surgery – median (IQR)	6.85 (4.69-8.58)
CRP 48h post-surgery – median (IQR)	10.76 (6.97-17.65)
Inotropic support – n (%)	38 (76)
Maximum VIS – median (IQR)	5.0 (0.8-6.0)
ScvO2 at admission to the ICU, % – median (IQR)	74.0 (63.2-80.0)
ScvO2 6h post-surgery, % – median (IQR)	64.3 (58.2-74.0)
ScvO2 12h post-surgery, % – median (IQR)	62.3 (52.8-70.1)
SaO2-ScvO2 at admission to the ICU, % – median (IQR)	20.8 (16.4-32.0)
SaO2-ScvO2 6h post-surgery, % – median (IQR)	30.7 (23.5-36.6)
SaO2-ScvO2 12h post-surgery, % – median (IQR)	33.9 (24.3-39.9)
AKI – n (%)	11 (22)
Hemodiafiltration – n (%)	0 (0)
ICU Length of Stay, days – median (IQR)	2.0 (2.0-3.0)

AKI: acute kidney injury; CRP: C-reactive protein; ICU: intensive care unit; IQR: interquartile range; NLR: neutrophil-lymphocyte ratio; RACHS: Risk Adjustment for Congenital Heart Surgery; SaO2-ScvO2: arterial-central venous oxygen saturation differential; ScvO2: central venous oxygen saturation; VIS: vasoactive-inotropic score



Table 2. Association Between Perioperative NLR and Postoperative Outcomes

Outcome	Preoperative NLR – median (IQR)	1h post-op NLR – median (IQR)	24h post-op NLR – median (IQR)	48h post-op NLR – median (IQR)
Maximum VIS <10 vs ≥10	0.8 [0.5-1.5] / 0.5 [0.3-1.2] (p=0.165)	6.8 [3.9-9.6] / 7.6 [2.7-11.8] (p=0.954)	6.4 [4.4-8.3] / 6.7 [3.2-12.4] (p=0.942)	**2.4 [1.9-2.6] / 5.1 [3.9-7-7] (p=0.012)**
$ScvO_2$ at admission to the ICU <65% vs ≥65%	0.8 [0.4-1.9] / 0.8 [0.5-1.4] (p=0.603)	4.4 [3.3-9.6] / 7.0 [4.0-9.7] (p=0.488)	6.6 [5.1-7.6] / 5.0 [3.9-9.3] (p=0.468)	3.8 [2.6-5.1] / 2.3 [1.9-3.3] (p=0.095)
$ScvO_2$ 6h post-op <65% vs ≥65%	0.8 [0.5-1.8] / 0.8 [0.4-1.4] (p=0.704)	4.6 [2.8-8.2] / 7.1 [4.5-9.9] (p=0.148)	6.4 [4.3-7.3] / 6.2 [4.3-9.4] (p=0.783)	2.8 [2.1-5.4] / 2.4 [1.9-3.4] (p=0.325)
$ScvO_2$ 12h post-op <65% vs ≥65%	**0.7 [0.4-1.0] / 1.3 [0.5-1.8] (p=0.042)**	**4.1 [3.0-7.6] / 8.8 [5.8-12.2] (p=0.004)**	6.4 [3.7-8.2] / 6.7 [4.7-9.6] (p=0.277)	2.8 [2.0-4.7] / 2.6 [1.9-4.7] (p=0.753)
SaO_2-ScvO2 at admission to the ICU <30% vs ≥30%	0.8 [0.5-1.4] / 0.8 [0.4-1.5] (p=0.435)	7.2 [4.2-11.4] / 4.2 [3.0-7.8] (p=0.074)	5.0 [4.2-8.8] / 6.4 [4.9-8.0] (p=0.684)	2.4 [1.9-3.8] / 3.0 [2.2-5.4] (p=0.330)
SaO_2-ScvO2 6h post-op <30% vs ≥30%	0.8 [0.4-1.3] / 0.8 [0.4-1.4] (p=0.826)	**7.7 [4.5-12.2] / 4.4 [2.7-7.6] (p=0.023)**	6.7 [4.4-9.3] / 5.7 [4.0-6.9] (p=0.399)	2.4 [1.9-4.4] / 2.8 [2.1-5.4] (p=0.384)
SaO_2-ScvO2 12h post-op <30% vs ≥30%	1.1 [0.5-1.5]/ 0.7 [0.4-1.5] (p=0.389)	**9.5 [5.7-13.0] / 4.2 [3.1-7.8] (p=0.007)**	6.7 [4.7-9.4] / 6.0 [3.6-8.3] (p=0.331)	2.2 [1.9-4.7] / 2.8 [2.2-4.8] (p=0.386)
ICU stay < 7days vs ≥ 7 days	0.8 [0.4-1.4] / 0.8 [0.7-1.6] (p=0.234)	6.3 [3.9-9.7] / 7.4 [2.0-9.6] (p=0.857)	6.0 [4.3-8.4] / 6.5 [4.0-17.6] (p=0.619)	2.7 [1.9-3.6] / 4.3 [2.2-7.5] (p=0.150)
AKI during ICU stay Presence vs absence	0.8 [0.4-1.4]/ 0.9 [0.4-1.8] (p=0.829)	5.6 [2.9-8.9] / 7.0 [3.9-10.0] (p=0.530)	7.9 [4.7-15.4] / 5.5 [4.3-7.3] (p=0.239)	**4.3 [2.8-5.9] / 2.4 [1.8-3.4] (p=0.022)**

AKI: acute kidney injury; ICU: intensive care unit; IQR: interquartile range; NLR: neutrophil-lymphocyte ratio; SaO_2-$ScvO_2$: arterial-central venous oxygen saturation differential; $ScvO_2$: central venous oxygen saturation; VIS: vasoactive-inotropic score

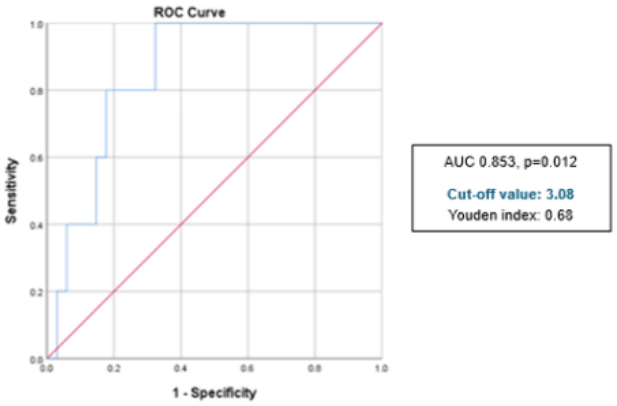


Figure 1. ROC curve with respective area under the curve of NLR 48h post-surgery in children who underwent heart surgery for prediction of a VIS superior to 10.

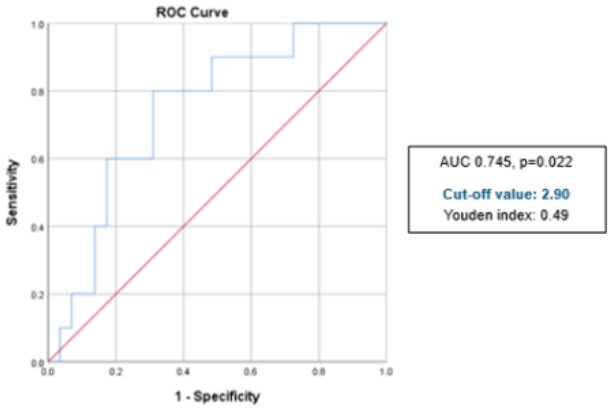


Figure 2. ROC curve with respective area under the curve of NLR 48h post-surgery in children who underwent heart surgery for prediction of AKI.

Conclusions: NLR is an inexpensive, rapidly responsive biomarker that outperforms CRP in predicting postoperative risk after pediatric cardiac surgery. Elevated NLR at 48h reflected higher surgical complexity, longer CBP, and cardiovascular and renal dysfunction, while paradoxically low early NLR was associated with impaired oxygen extraction, suggesting immune dysregulation or early immunosuppressive response that may contribute to microcirculatory dysfunction. These findings support NLR as a practical tool to guide timely interventions, including hemodynamic support adjustments and early hemofiltration.



MP-081 / #126

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

AN EXPLORATORY STUDY OF LANDIOLOL PLUS AMIODARONE VERSUS AMIODARONE MONOTHERAPY IN PAEDIATRIC JUNCTIONAL ECTOPIC TACHYCARDIA AFTER SURGERY.

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Background and Aim: Objective: To evaluate whether landiolol combined with amiodarone improves heart rate and rhythm control compared to amiodarone alone in paediatric patients with postoperative junctional ectopic tachycardia after surgery for congenital heart defect.
Methods: We retrospectively identified 24 cases of junctional ectopic tachycardia among 962 children who underwent surgery for congenital heart defects at the German Paediatric Heart Centre between January 2022 and June 2024. Patients received either amiodarone monotherapy or a
combination of landiolol and amiodarone. Time to heart rate control and rhythm normalisation, haemodynamic stability, and adverse events were assessed.
Results: Patients who received amiodarone and landiolol achieved faster heart rate control than patients who received amiodarone alone (median 6.7 vs. 14.7 h, p = 0.02, Cohen's d = 1.05; large effect). Among patients who received landiolol first, control was reached even earlier (2.4 vs. 8 h,
p = 0.05, Cohen's d = 1.49; very large effect). A significant heart rate reduction occurred within 40–120 min after landiolol initiation (mean difference: −23.7 bpm, 95% CI: −45.4 to −1.9, p = 0.04, r = 0.45; medium effect), while no significant effect was observed in patients who
received amiodarone alone. Haemodynamic parameters remained stable, although hypotension requiring discontinuation occurred in 11.1% of Landiolol-treated patients
Conclusions: In this retrospective analysis, combined landiolol and amiodarone therapy demonstrated a shorter time to heart rate control compared to amiodarone alone, especially when landiolol was initiated first. These findings require confirmation in prospective studies.



MP-082 / #430

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

ANGIOTENSIN II FOR RECALCITRANT VASOPLEGIA IN A POSTOPERATIVE NORWOOD NEONATE: EXAMINATION OF AT-II USE CASES IN THE CARDIAC ICU

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Background and Aim: Angiotensin II (AT-2) is a hormone known for its potent vasoconstrictive effects notably used in patients with refractory shock. Adult studies have demonstrated its potential use case in the cardiac surgical population. Little is known for its use in pediatric cardiac intensive care. We describe a successful use case of AT-II in a critically ill Norwood patient to facilitate VA-ECMO decannulation.
Methods: Term neonate with hypoplastic left heart (MA/AA) underwent the Norwood (5mm RV-PA conduit) procedure on DOL#7. PMH significant for 2Mb duplication Ch 15q13.2-13.3 (unknown significance). Operative course complicated by delayed sternal closure (POD#10). Patient developed episodic hypotensive crisis requiring temporary vasoactive infusions and low-dose epinephrine doses. POD#14 patient underwent eCPR to peripheral VA-ECMO. Infectious work-up negative, prior echo with good ventricular function and no evidence of obstruction. ECMO course complicated by seizures and renal failure requiring continuous renal replacement therapy (CRRT). Episodic hypotension persisted on ECMO. Stress dose hydrocortisone and pulse dose methylprednisolone initiated. Echocardiogram demonstrated myocardial recovery during clamp trials. Significant vasoactive requirement (epinephrine 0.1 mcg/kg/min, norepinephrine 0.08 mcg/kg/min, vasopressin 20 mU/kg/hr) to achieve hemodynamic stability during clamp trials. AT-II (60 ng/kg/min) initiated during ECMO decannulation (POD#33), vasopressin stopped. Plasma renin activity prior to decannulation was 700 ng/kg/hr (ref 1-4 ng/kg/hr).
Results: The first week post-AT-II initiation, epinephrine and norepinephrine infusions were gradually weaned. Methylprednisolone was discontinued with no complications. CRRT was discontinued the first week with robust urine output. Patient had intermittent hypotension related to CRRT circuit changes thus it was discontinued. Vasoactives discontinued with AT-II weaning over the next two weeks. Hydrocortisone was weaned to physiologic dosing and AT-II was ultimately discontinued by POD#53. Follow-up plasma renin activity was sent (pending).
Conclusions: We report a successful case of AT-II usage in a challenging post-operative Norwood patient with unexplained hypotensive crisis likely a consequence of endothelial



failure. Renin-Angiotensin System dysregulation is well described in patients with critical heart disease. AT-II typically utilized as salvage therapy in sepsis. AT-II is still largely unknown with regards to indications, timing, and specific substrates/populations which may benefit. We propose there are use cases in patients with critical congenital heart disease with RAS dysregulation.



MP-083 / #608

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

IS BEDSIDE ECHOGUIDED TRANSCATHETER PDA CLOSURE AN ACCEPTED THERAPY?

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Background and Aim: ***Background and Aim*** Patent ductus arteriosus (PDA) represents a major hemodynamic burden in preterm infants. Transcatheter PDA closure has proven to be safe, highly effective and suitable even for extremely small infants. In 2019 we established echo-guided bedside PDA closure at the intensive care unit (NICU) as a minimally invasive alternative for definitive closure in preterm infants. How accepted is this procedure in the treatment of the premature duct five years after introduction?
Methods: To estimate the current role of bedside PDA closure, we analysed demographic data of preterm birth rates in Bavaria and compared these data with our treatment frequency of bedside PDA closure in Bavaria and in the four largest NICU in Munich.
Results: Since 2019 we closed 92 PDA in preterm infants by our echo-guided bedside transcatheter approach in 25 different hospitals. From 2020 to 2024, annual mean procedure (proc) rates were 17.6 proc/year (13 to 24 proc/year). 77 of 92 infants had a weight at birth < 1250g, resulting in an annual procedure rate of 15.4/year for this subgroup. In Bavaria in 2024, a total of 729 prematures < 1250g were born and cared of in 26 different NICU. On the other hand, in 2024, only fourteen bedside, echo-guided procedures were performed, resulting in a procedure rate of 2%. If we compare the mean annual procedure rates of the four largest NICU in Munich with approx 35 infants/yr (39-32infants/yr) with <1250g birth weight,averaged over the time span from 2020 to 2024, the annual transcatheter closure rates/hospital are 0.5%; 0.6%, 3%, and 11% of all premature infants with birth weight < 1250g, respectively. S
Conclusions: Five years after successful introduction of echo-guided bedside transcatheter PDA closure on the NICU, there is still a need for further research about its clinical role in the treatment of preterm infants. Close collaboration of pediatric cardiologists and neonatologists are mandatory to set up suitable clinical studies.



MP-084 / #816

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

SINGLE CENTER OUTCOME OF PATIENTS UNDERGOING EXTRACORPORAL MEMBRANE OXYGENATION AFTER NEONATAL NORWOOD PROCEDURE

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Background and Aim: Although the Norwood procedure for newborns with hypoplastic left heart syndrome (HLHS) and its variants has been performed for many years, it remains associated with significant perioperative complications and mortality. We aim to assess the longterm outcome in children of our center supported by ECMO after Norwood procedure.
Methods: We reviewed retrospectively the patient records of all patients undergoing Norwood-procedure up tot the start of our ECMO program in 2006. Our primary endpoint was mortality after ECMO support, secondary endpoints were morbidity and palliation stages.
Results: From 2007 to 2024, 55 patients required ECMO support after undergoing the Norwood procedure. The indications for ECMO were failure to wean from cardiopulmonary bypass in 18/55 (33%), 26/55 (47%) patients had cardiac arrest requiring resuscitation. A total of 37/55 patients were successfully weaned from ECMO, and 18/55 (33%) survived to hospital discharge. There were 5/55 (9%) deaths between the Norwood and Glenn stages and 1/55 (2%) death following the Glenn procedure. The overall mortality after the Norwood procedure with ECMO support was 79%, occurring a median of 14 days (range 0–868 days) after ECMO implantation. The median follow-up among survivors was 5 years, with one patient lost to follow-up. Among the 11/55 (20%) long-term survivors, 7/11 (63%) underwent Fontan completion, 3 (27%) remained in the Glenn stage, and 1 patient was still in the Norwood stage receiving palliative care. Of the surviving cohort, 2 patients had severe and 2 patients had moderate neurological sequelae.
Conclusions: Although Fontan completion was achievable in a subset of patients, overall survival remains low and comorbidities among survivors are substantial. Therefore, careful



preoperative risk stratification is essential, and thorough counseling of parents regarding potential therapy limitations should be considered.



MP-085 / #1327

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

PREDICTORS FOR PROLONGED INTENSIVE CARE UNIT STAY FOLLOWING CARDIAC SURGERY AMONG PEDIATRIC PATIENTS WITH DOWN SYNDROME: A SINGLE-CENTRE EXPERIENCE

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Background and Aim: Background: Children with Down syndrome (DS) have a high prevalence of congenital heart disease and are at increased risk of postoperative complications due to associated comorbidities. Prolonged intensive care unit (ICU) stay is an essential indicator of postoperative complications and healthcare resource utilisation. However, data on predictors of prolonged ICU stay in this high-risk group remain limited, particularly in Malaysia. This study aimed to identify perioperative predictors of prolonged ICU stay among children with DS undergoing cardiac surgery at a tertiary centre.
Methods: Methods: This retrospective study included 226 children with DS who underwent cardiac surgery at Hospital Sultan Idris Shah between January 2013 and December 2023. Demographic data, comorbidities, operative variables, and postoperative outcomes were extracted from medical records. Prolonged ICU stay was defined as an ICU admission exceeding 5 days. Univariable and multivariable logistic regression analyses were performed to identify independent predictors.
Results: Results: The median age at surgery was 7.5 months (IQR 1.7-13.3), and more than half of the surgeries involved septal defect lesions. The median ICU stay was 6 days (IQR 1–11), with 55.8% (126/226) of patients requiring prolonged ICU care. On multivariable analysis, greater height (per cm; adjusted odds ratio [AOR] 0.65, 95% CI 0.54–0.79, $p<0.001$) and higher body mass index (per kg/m^2; AOR 0.73, 95% CI 0.54–0.98, $p=0.034$) were protective factors. Independent risk factors included preoperative mechanical ventilation (AOR 3.37, $p=0.002$), recurrent pneumonia (AOR 5.05, $p=0.019$), bronchomalacia (AOR 18.35, $p=0.037$), chronic lung disease (AOR 5.90, $p=0.010$), longer cardiopulmonary bypass time (per minute; AOR 1.05, $p=0.020$), longer aortic cross-clamp time (AOR 1.04, $p<0.001$), postoperative infection (AOR 24.70, $p<0.001$), low cardiac output syndrome (AOR 3.20, $p<0.001$), postoperative pulmonary hypertension (AOR 2.02, $p<0.001$), and longer duration of mechanical ventilation (per day; AOR 2.65, $p<0.001$).
Conclusions: Conclusion: About 55.8% of children with DS experienced prolonged ICU stay following cardiac surgery. Prolonged ICU admission was associated with preoperative



respiratory vulnerability, operative complexity, and early postoperative complications. Optimising respiratory and nutritional status, minimising bypass and cross-clamp durations, and strengthening infection prevention and early extubation strategies may reduce ICU burden in this vulnerable population.



MP-088 / #841

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

BODY & MIND: HOLISTIC SCREENING AND EARLY INTERVENTION PROGRAM FOR CHILDREN AND ADOLESCENTS WHO HAVE UNDERGONE CARDIAC SURGERY

Lisa Gebert[1], Sarah Sant'Unione[2], Stefan Hetterich[3], Robert Dalla Pozza[1], Constance Weismann[1]
[1]LMU, Ped. Cardiology, Munich, Germany, [2]Josefinum KJF, Child Psychiatry, Augsburg, Germany, [3]Stabilekids.com, Child Psychotherapist, Regensburg, Germany

Background and Aim: There is a link between lifestyle, physical and mental health (brain-heart-axis). Patients with congenital heart disease (CHD) are known to be at increased risk for mental health problems. It has been shown that patients with CHD have an increased risk of developing cardiovascular diseases later in adulthood, but data on lifestyle related risk factors in CHD patients are limited. Available data suggest that CHD patients are less physically active, have lower fitness levels and often have suboptimal dietary habits. Thus, a better understanding of modifiable risk factors for cardiovascular disease and mental health problems in this group is crucial. Therefore, this study aims to examine the lifestyle and mental health of children with CHD more closely in order to identify risks at an early stage and implement early preventive measures. We hypothesize that patients with CHD are less physically active, have less balanced nutrition and are at higher risk for subclinical mental health issues compared to controls.
Methods: This is an ongoing prospective cross-sectional longitudinal study which includes children and adolescents age 11-17 years who have undergone cardiac surgery as well as healthy age-matched controls. The study is based on an online survey with standardized questionnaires such as “Child and Adolescents Trauma Screen” (CATS), “Strength and Difficulties Questionnaire” (SDQ), “Pediatric Quality of Life Inventory” (PedsQL SF15), and additional targeted questionnaires about lifestyle, somatic and mental health. The evaluation shall be repeated anually for 5 years. The outcome variables will be compared between two groups (CHD group vs healthy control group). If a positive score is identified on teh CATS or SDQ screening questionnaires, patients and there families will be offered to participate in a 6-week online coaching program.
Results: Data collection is currently ongoing. Our findings will be ready to be presented at the 2026 AEPC annual meeting. Expected number of participants: 500.
Conclusions: As lifestyle patterns are shaped early in life, this study aims to identify risk factors for somatic and mental health issues in young CHD patients. Longitudinal



revaluation is expected to support the development of targeted strategies for prevention programmes to improve long-term health of CHD patients.



MP-089 / #304

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

MAJOR ADVERSE CARDIAC EVENTS IN A COHORT OF HIGH-RISK PREGNANT WOMEN WITH TETRALOGY OF FALLOT

Vito Casale[1], Nunzia Borrelli[2], Giovanni Domenico Ciriello[2], Pasquale Perna[1], Gabriella Gaudieri[1], Davide Sorice[1], Claudio Mastellone[1], Lorenzo De Luca[1], Rosaria Barracano[2], Nicola Grimaldi[2], Flavia Fusco[2], Valentina Gesuete[3], Gabriele Egidy Assenza[4], Giancarlo Scognamiglio[2], Berardo Sarubbi[2]
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Background and Aim: Managing pregnancy in women with repaired Tetralogy of Fallot (ToF) requires mitigating significant cardiovascular risks. These risks are known to be amplified by long-term sequelae like residual pulmonary regurgitation and a history of arrhythmias. This study aims to quantify the safety profile of pregnancy in a high-risk ToF cohort.
Methods: A retrospective, single-center analysis was conducted on 75 pregnancies in women with ToF followed between 2000 and 2025 at the Adult Congenital Heart Disease (ACHD) Unit of Monaldi Hospital, Naples, Italy. All patients received intensive outpatient cardiac monitoring during pregnancy (minimum 2 visits). Major Adverse Cardiac Events (MACE) incidence (defined as clinically relevant arrhythmia or heart failure) was the primary endpoint. Patient characteristics were assessed for their association with MACE using univariate analysis.
Results: The cohort presented a high-risk profile. Key risk factors included: severe pulmonary regurgitation (27 cases, 36.0%), a history of clinically relevant arrhythmia (15 cases, 20.0%), and the management of ToF in natural history (3 cases, 4.0%). Seven patients (9.3%) remained on continuous antiarrhythmic therapy (5 on beta-blockers, 1 on digoxin, 1 on beta-blockers + digoxin) throughout gestation. Maternal Outcome: A total of four MACE (5.3%) were observed, all manifesting as clinically relevant arrhythmias; no heart failure events were recorded. Univariate analysis suggested a significant association between the occurrence of MACE (arrhythmias) and history of arrhythmia ($p=0.02$), reduced TAPSE ($p<0.01$), and reduced LVEF ($p<0.01$). Perinatal Outcomes: Two perinatal deaths (2.6%) were recorded: one foetal demise due to placental abruption and one neonatal death related to renal malformations.



Conclusions: Our data demonstrate that, within a specialized ACHD management framework, the risk of major maternal cardiac complications can be effectively mitigated, even in the presence of established high-risk factors. The absence of heart failure events confirms the protective efficacy of an intensive outpatient monitoring. However, the persistent presence of arrhythmic events underscores the critical need for comprehensive arrhythmic risk stratification to optimize outcomes. An integrated obstetrics-cardiology approach remains also essential to address the significant perinatal risk.



MP-090 / #1458

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

PREDICTORS OF MORTALITY IN PATIENTS WITH CONGENITALLY CORRECTED TRANSPOSITION OF THE GREAT ARTERIES: A SINGLE-CENTER RETROSPECTIVE STUDY

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[1]hôpital Hedi Chaker de Sfax, Service De Cardiologie, Sfax, Tunisia, [2]Hedi Chaker Hospital, Cardiology, Sfax, Tunisia

Background and Aim: Congenitally corrected transposition of the great arteries (ccTGA) is a rare congenital heart disease characterized by atrioventricular and ventriculoarterial discordance. Over time, several complications may develop, adversely affecting survival. This study aimed to identify clinical and echocardiographic factors associated with an increased risk of mortality in patients with ccTGA.
Methods: This was a retrospective descriptive study conducted in the Cardiology Department of Hédi Chaker University Hospital, Sfax. Thirty-seven patients with ccTGA, followed between 2010 and 2024, were included. Epidemiological, clinical, echocardiographic, and follow-up data were analyzed to identify predictors of mortality.
Results: The median age of patients at the time of the study was 12 years (range: 0–71 years), with a male predominance (sex ratio: 1.31). Prenatal diagnosis was established in only 13.5% of cases, and 43% of patients were born from consanguineous marriages. Clinically, 73% of patients were symptomatic. The most common manifestations were dyspnea (70.2%), cyanosis (32.4%), and growth retardation (40.5%), with 13.5% of patients classified as New York Heart Association (NYHA) functional class IV. Oxygen saturation on room air below 95% was observed in 35.1% of cases.
The main associated cardiac anomalies were ventricular septal defect (51.4%), pulmonary stenosis (51.4%), and Ebstein-like malformation of the systemic atrioventricular valve (14%).
Systemic right ventricular dysfunction was present in 51.4% of patients, and severe systemic atrioventricular valve regurgitation in 13.5%. Overall mortality in this cohort was 18.9%.
Factors significantly associated with mortality were growth retardation ($p = 0.001$), cyanosis ($p = 0.033$), low oxygen saturation ($p = 0.007$), clinical signs of heart failure ($p = 0.044$), systemic right ventricular dysfunction ($p = 0.047$), and systemic atrioventricular valve regurgitation ($p = 0.016$).
Conclusions: In patients with ccTGA, mortality is closely associated with clinical and functional abnormalities reflecting advanced hemodynamic impairment, particularly



growth retardation, clinical heart failure, oxygen desaturation, as well as dysfunction of the systemic right ventricle and systemic atrioventricular valve. Early identification of these factors may improve risk stratification and optimize patient management.



MP-091 / #1472

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

MANAGEMENT AND OUTCOMES OF CONGENITALLY CORRECTED TRANSPOSITION OF THE GREAT ARTERIES: A SINGLE-CENTER EXPERIENCE

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Rabta teaching hospital, Pediatric Cardiology, Tunis, Tunisia

Background and Aim: Congenitally corrected transposition of the great arteries (CCTGA) is a rare, complex congenital heart disease where the morphologic right ventricle supports the systemic circulation, leading to unique long-term complications. Data from developing countries are scarce.
Methods: This retrospective, descriptive, single-center study analyzed 32 years of data (1990-2022) from CCTGA patients followed at La Rabta Hospital's Pediatric Cardiology Department. We collected extensive epidemiological, clinical, electrocardiographic, echocardiographic, therapeutic, and follow-up data, excluding those with univentricular physiology. A composite endpoint comprising major cardiac adverse outcomes (e.g., heart failure, severe systemic regurgitation, reintervention, death) was evaluated.
Results: Our cohort of 66 patients (median age: 12 years; range: 1 week–58 years; 1.64 male:female ratio) revealed prenatal diagnosis in only 13.6%. Associated cardiac anomalies were common (77.3%), mainly VSDs (56.1%) and pulmonary outflow tract obstruction (45%). Ebstein-like malformation of the systemic AV valve affected 19.7%. Surgical intervention was indicated in 63.6%, with 30 patients undergoing various repairs. Over a median 11-year follow-up, overall mortality was 18%, primarily from heart failure. Notably, severe systemic AV valve regurgitation at diagnosis strongly correlated with increased mortality ($p < 0.001$). Ebstein anomaly was associated with worse outcomes, while pulmonary stenosis appeared to offer protection.
Conclusions: CCTGA presents significant long-term morbidity and mortality. Our findings underscore that systemic atrioventricular valve regurgitation and systemic ventricular dysfunction are critical prognostic factors. The data from our developing country cohort emphasize the imperative for early diagnosis, rigorous longitudinal surveillance, and tailored management to enhance patient outcomes in this complex population.



MP-092 / #111

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

MR T1 AND T2 MAPPING OF THE HEART AND LIVER IN REPAIRED TETRALOGY OF FALLOT

Jacob Söderman[1], Anna Nyström[1], Frida Dangardt[2], Marie Bartos[2], Håkan Wåhlander[2], Pär-Arne Svensson[1], Jan Sunnegårdh[2], Mats Synnergren[2], Kerstin Lagerstrand[3], Charlotte De Lange[1]
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Background and Aim: Background and aim: Children with repaired Tetralogy of Fallot are at risk of developing myocardial and hepatic fibrosis. Aim: Can early signs of myocardial and hepatic fibrosis and/or edema be detected using non-invasive magnetic resonance imaging (MR) markers and be associated with cardiac function and blood flow?
Methods: Pediatric patients with repaired Tetralogy of Fallot (rTOF) were prospectively included for a 3T cardiovascular MR (CMR) standard free-breathing protocol including T1- and T2-mapping and 4D flow. Examinations were performed 10 years post-repair (Group 1, n=11), before pulmonary valve replacement (PVR) (Group 2, n=7), and 3-6 months after PVR (Group 3, n=5), and compared to a control group (n=26). T1 and T2 mapping were performed in the left ventricular (LV) septum, right ventricular (RV) wall, and liver, compared between the groups, and correlated to ventricular function and blood flow.
Results: Eighteen patients (23 CMR exams), with a median age of 11 (1.5-19) years, were younger than 26 controls, 15 (11.5-18) years ($p<0.01$). All patients had increased RV end-diastolic volumes, (111±31 ml/m^2); right end-systolic volume (60±19 ml/m^2), and reduced RV and LV ejection fraction (47±8% and 54±8% respectively). Only four patients had moderate tricuspid regurgitation. Septal T1 values were elevated in the overall cohort (1169ms±88, $p<0.01$), especially in group 1 (1171ms±91, $p<0.001$) and group 2 (1180ms±112, $p<0.01$) vs controls (1011ms±106). In addition hepatic T1 was increased in all patients 786±67ms vs controls 703±74 ms, $p< 0.01$. Septal T2 values were decreased (47±7 ms vs 52±6 ms, $p=0.03$) while hepatic T2 values were comparable to controls. Septal and hepatic T2 values correlated in patients ($R=0.5$, $p=0.02$) and controls ($R=0.8$, $p=0.03$). Hepatic T1 and T2 values correlated with LV end diastolic volume, stroke volume, and LV mass index ($R=-0.6$-0.6, $p=0.002$-0.3) and inversely correlated with flow ($R=-0.7$, $p=0.001$).
Conclusions: This pilot study in children with rTOF revealed impaired right ventricular



function and elevated CMR biomarkers as T1 mapping. The findings suggest early myocardial and hepatic fibrosis and a potential coupling in the heart-liver fibrosis/edema development.



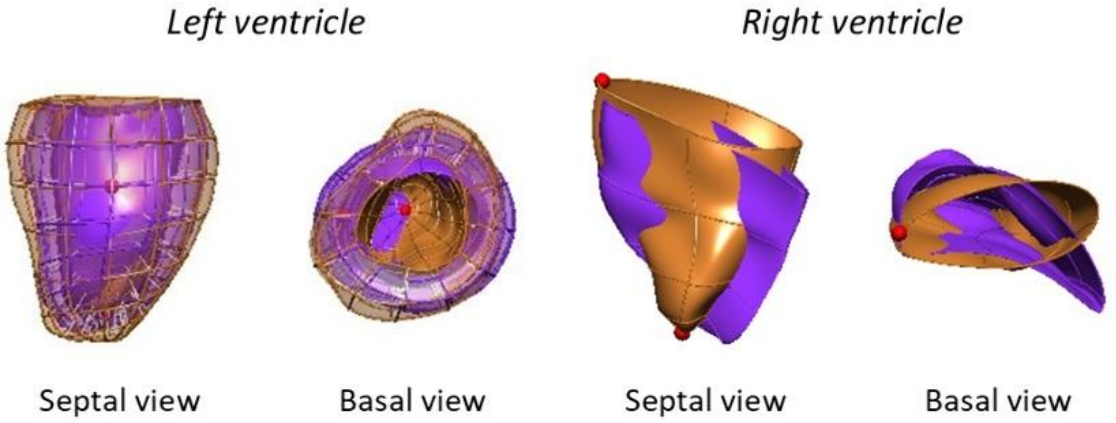
MP-093 / #287

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

A STUDY OF THE CARDIAC ANATOMICAL AND HEMODYNAMIC INTERPLAY IN A PORCINE MODEL OF REPAIRED TETRALOGY OF FALLOT

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[1]Erasmus MC - Sophia Children's Hospital, Pediatrics, Pediatric Cardiology, Rotterdam, Netherlands, [2]King's College London, Biomedical Engineering, London, United Kingdom

Background and Aim: Cardiac statistical shape models (SSM), derived from cardiovascular magnetic resonance (CMR) images, enable analyses of regional cardiac shape changes with potential to improve early risk stratification in repaired tetralogy of Fallot (rTOF). We aimed to assess the feasibility of cardiac SSM in a porcine model of rTOF and explore correlations between longitudinal shape changes and hemodynamic adaptation assessed with pressure-volume loops.
Methods: Neonatal pigs underwent pulmonary artery banding followed by band removal and transannular patch insertion four weeks later (rTOF pigs); controls received parallel sham surgeries. Right heart catheterization (RHC) and CMR were performed at 1 month (4 rTOF, 3 sham) and 4 months (6 rTOF, 4 sham) post-surgery. Left ventricular (LV) and right ventricular (RV) end-diastolic (ED) and end-systolic (ES) SSM were generated. Principal component analysis and linear discriminant analysis identified shape differences between sham and rTOF pigs. Linear regression quantified associations between shape changes and RHC/CMR data.
Results: SSM was feasible for the left ventricle (LV); the right ventricle (RV) required truncation of the outflow tract due to its elongated porcine anatomy. RV shape differences were primarily size-related; beyond size, rTOF pigs exhibited reduced horizontal and vertical curvature compared to shams. These curvature changes were moderately associated with a higher pulmonary regurgitation fraction ($r = -0.548$, $p = 0.01$) and RV viscous energy loss ($r = -0.545$, $p = 0.02$) at ED only. Additionally, LV shape showed increased overall size, septal flattening and greater eccentricity and conicity in rTOF pigs. These changes strongly correlated with a higher pulmonary regurgitation fraction (ED $r = 0.925$, $p < 0.0001$; ES $r = 0.869$, $p < 0.0001$), indexed pressure-volume area (ED $r = 0.753$, $p = 0.0005$; ES $r = 0.640$, $p = 0.006$), and RV viscous energy loss (ED $r = 0.816$, $p < 0.0001$; ES $r = 0.710$, $p = 0.001$).



Conclusions: Cardiac SSM is feasible in a porcine model of rToF and reveals biventricular shape changes consistent with human observations. Notably, LV remodelling reflects RV myocardial work, which may provide easier access to RV adaptational hemodynamics.



MP-094 / #1301

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

CMR-DERIVED LEFT ATRIAL FUNCTION IN CONGENITALLY CORRECTED TRANSPOSITION OF THE GREAT ARTERIES: A MARKER OF DIASTOLIC IMPAIRMENT

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Background and Aim: In congenitally corrected transposition of the great arteries (ccTGA), the morphologic right ventricle (sRV) supports the systemic circulation. Over time, the sRV may fail to sustain systemic pressures, potentially leading to heart failure (HF). Diastolic function is poorly understood. We evaluated left atrial (LA) morpho-functional parameters in ccTGA.
Methods: Cardiac Magnetic Resonance (CMR) studies from 33 ccTGA patients were analyzed. Patients were age- and sex-matched to healthy volunteers and hypertrophic cardiomyopathy (HCM) patients with preserved ejection fraction (HFpEF). LA morpho-functional parameters—volumes (length-area), ejection fraction (EF), and strain (reservoir εs, conduit εe, booster pump εa) by feature tracking—were compared among groups. All patients were in sinus rhythm during CMR.
Results: Compared to controls, ccTGA patients showed significant impairment in LA function (LA EF: 41.6 ± 15.1 % vs 63.9 ± 7.8 %, εs: 19.0 ± 8.3 % vs 38.0 ± 10.3 %, εe: 11.7 ± 5.9 % vs 21.1 ± 8.3 %, εa: 7.6 ± 4.1 % vs 16.8 ± 6.1 %, all $p < 0.001$). No significant differences were found between ccTGA and HCM patients (EF: 41.6 ± 15.1 % vs 42.0 ± 10.1 %, εs: 19.0 ± 8.3 % vs 22.6 ± 8.8 %, εe: 11.7 ± 5.9 % vs 12.6 ± 7.0 %, εa: 7.6 ± 4.1 % vs 10.0 ± 3.7 %). ccTGA patients had increased LA volumes compared to both controls and HCM patients. Among ccTGA patients, those with hospitalization for HF (HoHF) had higher left ventricular (LV) volumes (189 ± 136.2 ml vs 95.8 ± 57.2 ml, $p = 0.01$) and lower LA εs, εe, and EF (9.8 ± 4.9 %, 5.2 ± 6.6 %, 7.6 ± 10.2 %) compared to patients without HoHF (20.9 ±



7.8 %, 13.0 ± 5.1 %, 44.0 ± 14.6 %, all p ≤ 0.02).

Conclusions: Patients with ccTGA show increased LA volumes and impaired LA function, consistent with diastolic dysfunction. Greater LA impairment in HoHF patients suggests a role of diastolic dysfunction in sRV failure. Assessment of LA morpho-functional parameters by CMR provides clinical insights for ccTGA management.



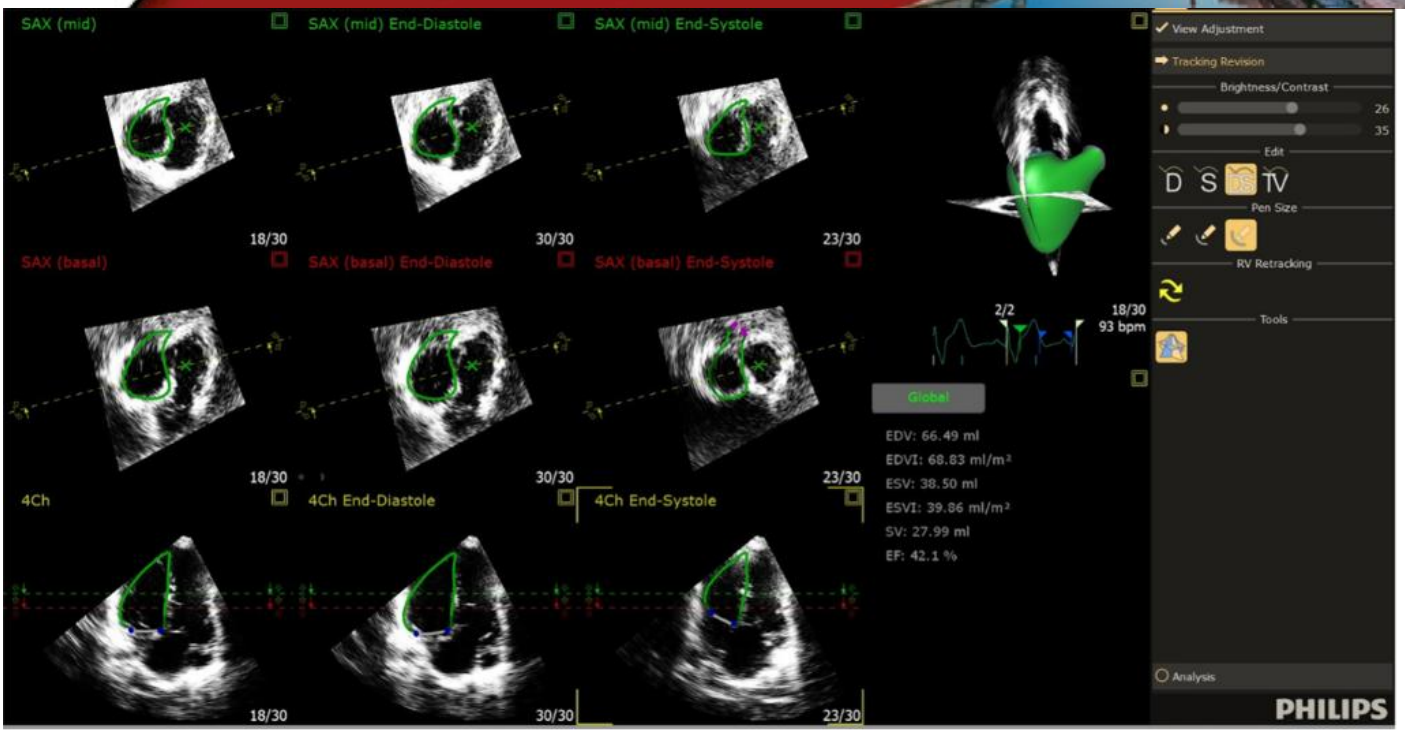
MP-095 / #1467

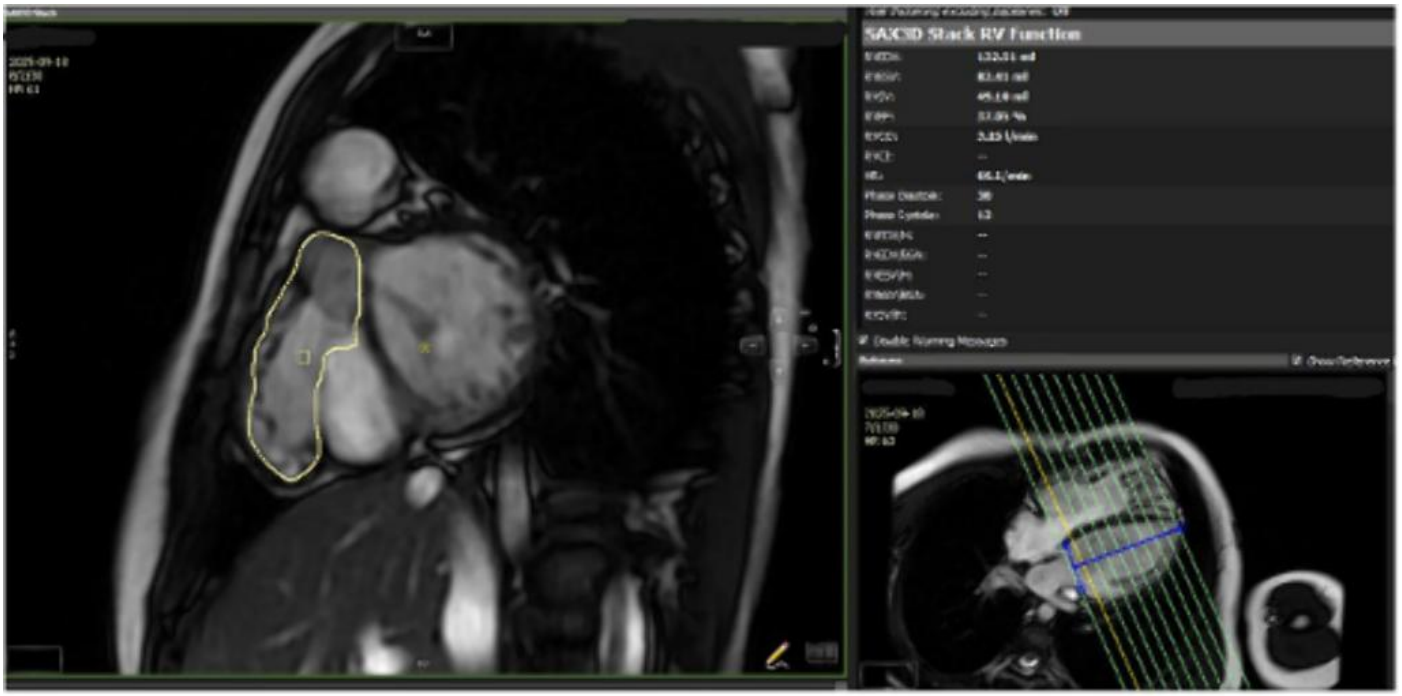
SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

A COMPARISON OF THREE-DIMENSIONAL ECHOCARDIOGRAPHY AND CARDIAC MAGNETIC RESONANCE IMAGING IN THE EVALUATION OF THE RIGHT VENTRİCLE IN PATIENTS WITH SURGICALLY REPAIRED TETRALOGY OF FALLOT

Boran Cakan[1,2], Ender Odemis[3], Mete Kizilkaya[3], Terman Gumus[4], Batigul Tas[3], Ruken Esmer[2]
[1]Koc University, School Of Medicine, Istanbul, Turkey, [2]Koc University, Graduate School Of Science And Engineering, Istanbul, Turkey, [3]Koc University, Pediatric Cardiology, Istanbul, Turkey, [4]American Hospital, Radiology Department, Istanbul, Turkey

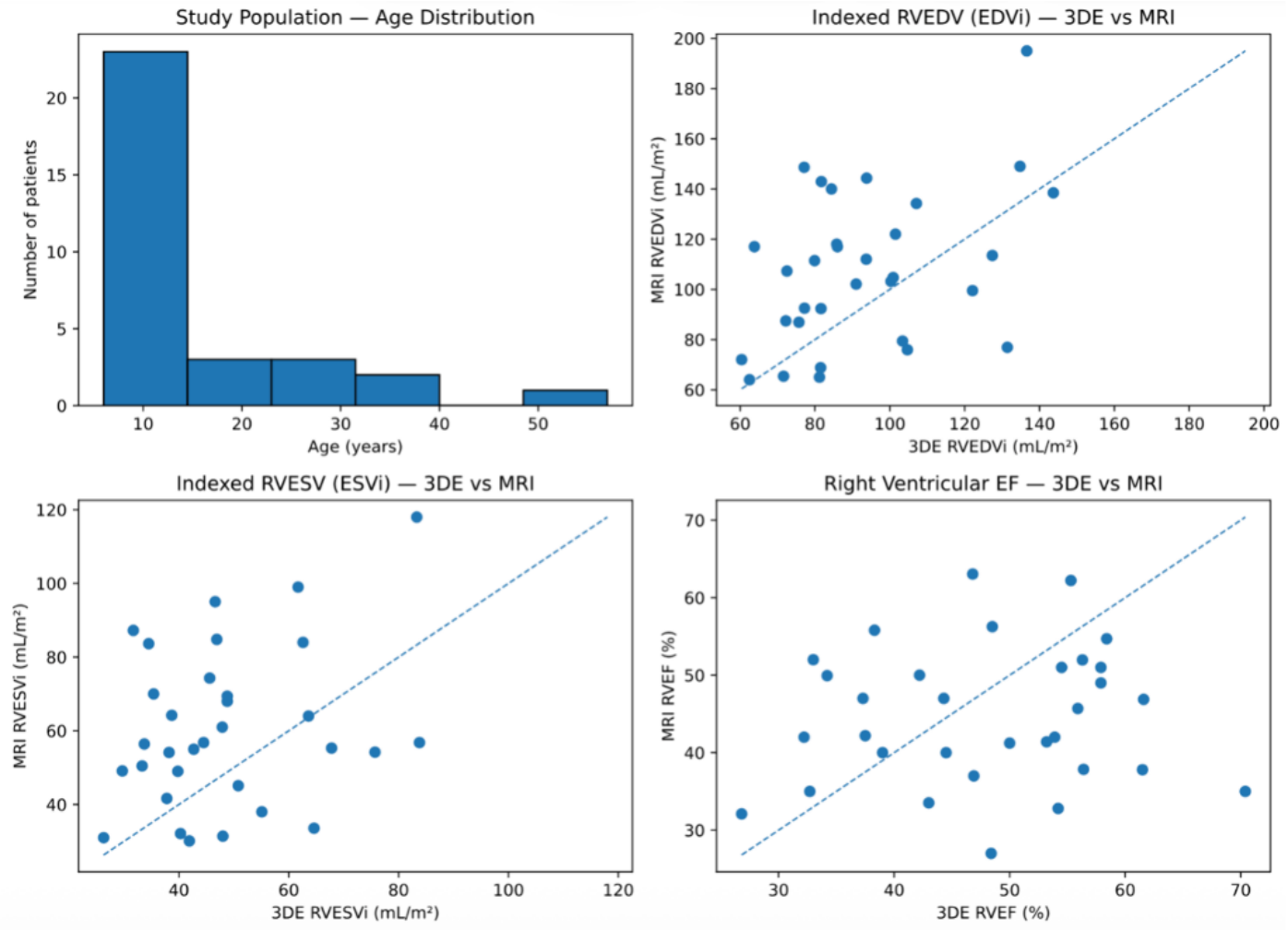
Background and Aim: Pulmonary regurgitation (PR) is a common complication of surgical repair of Tetralogy of Fallot (ToF) and can lead to long-term right ventricular dilatation and failure. Therefore, pulmonary valve replacement (PVR) is indicated at an appropriate time to eliminate PR. Although cardiac Magnetic Resonance Imaging (MRI) is the current gold standard for determining optimal timing, especially in asymptomatic patients, its limited availability and procedural requirements underscore the need for simpler, potentially applicable alternative imaging methods, such as three-dimensional echocardiography (3DE).
Methods: We examined 32 patients with surgically repaired ToF with moderate to severe PR who underwent 3DE and MRI within a 3-month period. We analyzed right ventricular end-diastolic volume (RVEDV), end-systolic volume (RVESV), ejection fraction (RVEF), and stroke volume (RVSV), along with their indexed-to-body-mass-index values (RVEDVI, RVESVI, RVSVI). For statistical analysis, normality assessment, paired testing, Pearson correlation, and Bland-Altman analysis were used. All 3DE and MRI images were obtained and interpreted by the same two physicians (E.O. and T.G., respectively).





Results: The mean RVEDVI and RVESVI values measured by 3DE were lower than those obtained by MRI (RVEDVI: 93.4 ± 22.9 vs. 107.8 ± 29.6 mL/m^2; RVESVI: 48.4 ± 15.0 vs. 60.7 ± 22.6 mL/m^2), with significant inter-modality differences. RVEF was comparable between 3DE and MRI (47.9 ± 10.5% vs. 46.3 ± 9.1%) without a significant difference. 3DE systematically underestimated indexed RV volumes, showing significant negative biases for RVEDVI (-14.36 mL/m^2, p=0.009) and RVESVI (-12.27 mL/m^2, p=0.005). In contrast,

differences between RVSV (p=0.190) and RVSVI (0.526) were not statistically significant. Although RVEF showed a small positive bias (+3.21%, p=0.179), the Bland–Altman analysis indicated wide limits of agreement, limiting individual-level interchangeability.



Conclusions: Three-dimensional echocardiography systematically underestimates RV volumes compared with cardiac MRI and shows limited agreement at the individual level. Despite these volumetric discrepancies, mean RVEF values are comparable between modalities, indicating preserved functional concordance. Although MRI remains the reference standard for clinical decision-making, particularly regarding the indication for PVR, 3DE offers a practical, widely accessible, and feasible alternative for longitudinal surveillance. Therefore, 3DE may be an appropriate modality for long-term monitoring in patients with repaired ToF, particularly in clinical settings where MRI is impractical.



MP-096 / #345

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

PULMONARY ATRESIA IN CONGENITAL HEART DEFECTS: CAN WE DEDUCE EMBRYOLOGICAL MECHANISMS FROM MORPHOLOGICAL PHENOTYPE?

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[1]Hôpital Necker Enfants Malades, Service De Cardiologie Congénitale Et Pédiatrique, Paris, France, [2]Hôpital Necker Enfants Malades, Service De Génétique - Unité De Foetopathologie, Paris, France

Background and Aim: Pulmonary atresia (PA) is usually classified in two groups, depending on the presence or the absence of a ventricular septal defect: tetralogy of Fallot with pulmonary atresia, (TOF-PA) and pulmonary atresia with intact ventricular septum (PA-IVS). It can also be part of more complex cardiac lesions. Our objective was, analyzing fetal and neonatal human heart specimens, to determine the anatomical and pathophysiological mechanisms responsible for the different phenotypes of this malformation.
Methods: We analyzed macroscopically 151 heart specimens from the anatomic collection of the French Reference Center for Complex Congenital Heart Defects. Measurements included the width of the subpulmonary atrium, the diameter of the tricuspid valve, the size and thickness of the subpulmonary ventricle, the location of the outlet septum, the nature of the PA (muscular or valvar), the diameter of the pulmonary arteries.
Results: Hearts with PA were classified in 5 groups: TOF-PA, 53 (35%); PA-IVS, 43 (28%), tricuspid anomalies, 17 (11%); anomalous ventriculo-arterial connections, 27 (18%); univentricular hearts, 11 (7%).Pulmonary atresia was more often valvar in tricuspid anomalies and PA-IVS and muscular in the other groups. The pulmonary trunk were larger in PA-IVS and tricuspid anomalies. The right ventricular wall was thicker in PA-IVS and thinner in tricuspid anomalies. Outlet septum was incorporated to ventricular septum in PA-IVS and tricuspid anomalies, malaligned in TOF-PA, variable in other groups. The right atrium and the tricuspid annulus was larger in tricuspid anomalies compared to all other groups.
Conclusions: The anatomical differences between the five groups of PA support the hypothesis of different mechanisms occurring at different stages of cardiac development. Larger pulmonary arteries, incorporated outlet septum and valvar atresia in PA-IVS and tricuspid anomalies may indicate a late phenomenon, compared to TOF-PA in which PA is



due to anterior malalignment of the outlet septum and occurs earlier in development. Increased right ventricle thickness in PA-IVS may impair transpulmonary blood flow, leading to late valvar atresia. A similar phenomenon could induce PA in tricuspid anomalies, secondary to another type of right ventricle myopathy with a thinner myocardium, and to tricuspid regurgitation.



MP-097 / #276

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

TETRALOGY OF FALLOT WITH ABNORMAL CORONARY ARTERY: SURGICAL MANAGEMENT AND LONG-TERM RESULTS

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Background and Aim: BACKGROUND : • Tetralogy of Fallot (ToF) is one of the most common congenital heart defects • It is associated with an abnormal coronary anatomy (ACA) in ***2 to 9% of cases*** • **Major coronary arteries crossing the right ventricular outflow tract (RVOT)** represents a technical challenge at the time of complete repair • Little data is available to determine what surgical option is best OBJECTIVES : • Describe the **incidence of abnormal coronary anatomy in ToF** • Evaluate the **early and long-term outcome**s of different surgical strategies • Identify **risk factors for mortality and reinterventions**
Methods: • Retrospective single-center study (**1984 – 2024**) • Early outcomes: occurring within 30 days after the surgical repair or during the hospital stay • Acute coronary events: clinical presentation associated with troponin elevation, with or without ST-segment elevation • Cardiac reinterventions included surgical and percutaneous reinterventions • Overall survival and freedom from events were calculated using the Kaplan–Meier method and comparison were achieved with the log-rank test
Results: - Pre-operative & operative data 1 per-operative coronary lesion Early mortality: **6%**
(n=3)



TABLE 1. Demographic data: preoperative data	(n=49)
Male sex, number of patients (%)	32 (65)
Age, months	29 (0,43 – 124)
Height, cm	71,5 (57 – 135)
Weight, kg	9,3 (4,8 – 28)
Genetic syndromes, number of patients (%)	7 (14)
Prior palliation, number of patients (%)	14 (29)

Data are shown as n (%) or median (range)

TABLE 2. Coronary artery and associated lesions

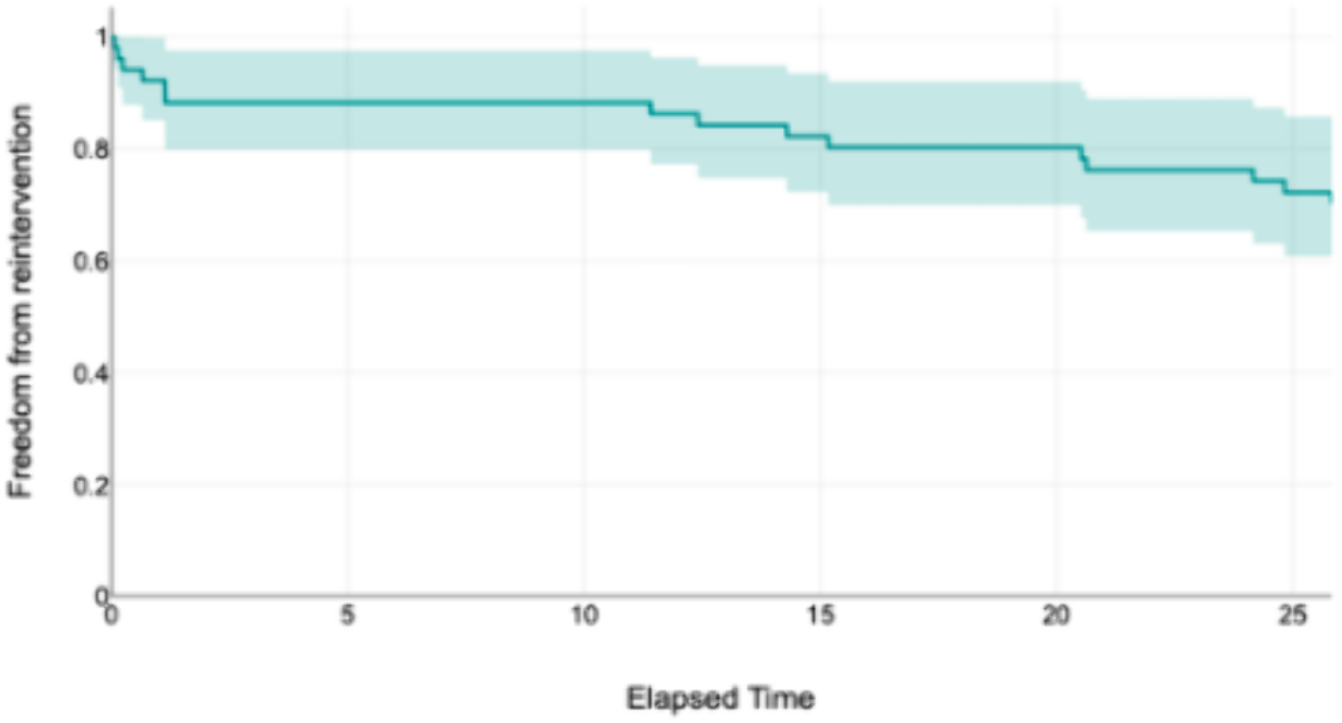
Types of abnormal coronary anatomy	Number of patients (%)
LAD from RCA	18 (37)
RCA from LAD	2 (4)
Major infundibular branch	17 (35)
Single LCA	1 (2)
Single RCA	1 (2)
RCA from the left coronary sinus	3 (6)
LAD from the right coronary sinus	3 (6)
Fistula between LCA and PA or RV	4 (8)

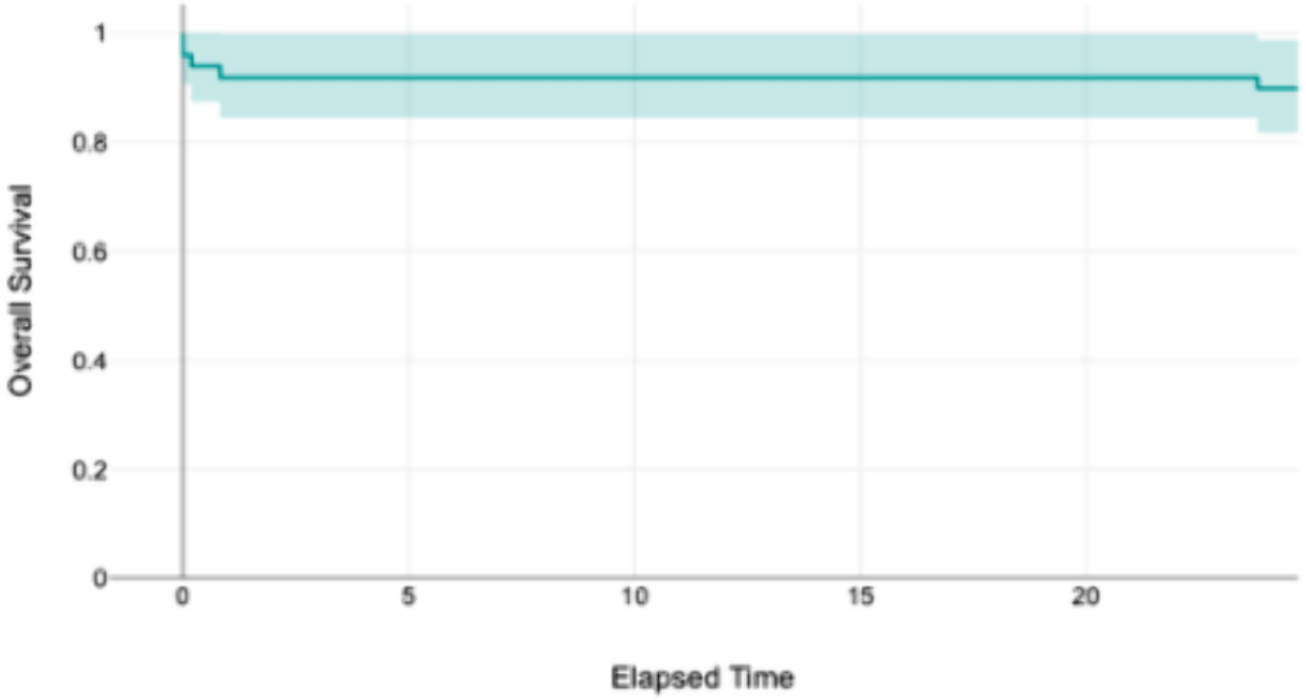


TABLE 3. Surgical technique for repair of ToF with abnormal coronary artery		
Tailored' right ventriculotomy and reconstruction by patch.	Transannular patch repair	15 (31)
	Single infundibular patch repair	14 (29)
	Double patch repair (infundibular + pulmonary trunk)	9 (18)
Right ventricle–pulmonary artery conduit		6 (12)
Transatrial ± transpulmonary technique		5 (10)
Total		49 (100)

Data are shown as n (%)

- Late mortality, morbidity and reinterventions Mean follow-up since complete repair: **11.5 years** No acute coronary syndrome Late cardiac-related mortality was **4% (n=2),** including one sudden death due to ventricular fibrillation Survival was **92% [85; 100]** at 10 years and 15 years Reintervention occurred in **16 patients (33%**), mainly due to RV–PA conduit stenosis. Freedom from reintervention was 88% [80-98] at 10 years and 79% [68-91]at 15 years No risk factor for mortality and reintervention was identified





Conclusions: Abnormal coronary anatomy in ToF is a challenge which should be **anticipated** through precise pre-operative diagnosis and adequate surgical planning Under such conditions, we have shown **early and late mortality rates** which compare to cohorts of Fallot patients without coronary anomalies The use of a RV-PA conduit should not be the preferred approach as it systematically results in reinterventions Other approaches result in satisfying results if they are adequately tailored to the patient's coronary and RVOT anatomy If the annulus cannot be preserved, a tailored transannular patch is feasible and safe



MP-098 / #597

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

EFFECT OF PRIOR BALLOON ATRIAL SEPTOSTOMY ON MORTALITY OUTCOMES IN NEONATES WITH D-TRANSPOSITION OF THE GREAT ARTERIES UNDERGOING ARTERIAL SWITCH SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background and Aim: Globally, d-transposition of the great arteries (d-TGA) accounts for approximately 4–5% of all congenital heart defects and has an incidence of approximately 2.3 – 4.7 per 10,000 live births , Without surgical intervention, d-TGA is typically fatal in neonates within the first few weeks of life because of inadequate oxygenation of the systemic circulation, Balloon atrial septostomy (BAS) has been a standard palliative procedure, This meta-analysis evaluated the impact of BAS on mortality, length of stay, and postoperative complications in d-TGA neonates.
Methods: Twenty-eight studies (1983-2024) with sample sizes ranging 8-8,681 were included. Two reviewers independently screened the studies, extracted the data, and assessed bias using ROBINS-I. Random-effects meta-analyses were performed alongside qualitative syntheses.
Results: Five studies (n=789) examined mortality as the primary outcome. BAS prior to ASO showed a 57% reduction in mortality odds (OR: 0.43, 95% CI: 0.16-1.17) but lacked statistical significance (p=0.099). Sensitivity analyses revealed that BAS was associated with higher intubation rates (OR: 13.37, 95% CI: 6.29-28.45, p<0.0001) and shorter hospital stays (SMD: -0.84, 95% CI: -0.92 to -0.75, p<0.0001).
Conclusions: BAS before ASO may improve survival and reduce hospital stay in select d-TGA neonates, although practice variation and study quality limitations necessitate standardized prospective research to define its modern surgical role.



MP-099 / #838

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

LONG-TERM OUTCOME OF AN ARTERIAL SWITCH OPERATION IN PATIENTS WITH TAUSSIG-BING ANOMALY

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Background and Aim: Taussig-Bing anomaly is the complex form of the transposition of the great arteries, usually with a large VSD, great arteries disproportion, high frequency of coronary and aortic arch anomalies. These additional defects increase the complexity of the arterial switch operation and may have an impact on postoperative outcomes. The aim of this study was to assess the long-term results of an arterial switch operation in relation to the other patients with transposition of the great arteries.
Methods: In this retrospective review, we consecutively enrolled all the patients who had undergone ASO for TGA between the years 1991 and 2022. The patients were divided into two groups: the first one included only those with Taussig-Bing anomaly (105 patients); the second group included the rest of the patients with simple and complex cases of transposition after arterial switch operation (779 patients). We analyzed the difference between those groups with regards to the early and late postoperative mortality, reinterventions (surgical and catheter-based procedures), significant neoaortic insufficiency and supravalvular pulmonary stenosis.
Results: A total of 884 patients with isolated and complex TGA were included in this study. The average follow-up was 10.4 years. The overall mortality was 7.4% without a significant difference between the two analyzed groups (p=0.208; log-rank test). Freedom from reoperations/catheter interventions at 31 years after arterial switch operation was 75.5%/78.7% for the patients with Taussig-Bing anomaly versus 94.2%/95.4% for the remaining patients (p<0.001; log-rank test). Supravalvular pulmonary stenosis (peak gradient over 25mmHg) was observed more frequently in patients with Taussig-Bing (31% versus 13%; p<0.001; chi-square test). Similarly, the presence of significant neoaortic regurgitation (moderate or severe) was also more frequently associated with Taussig-Bing anomaly (14.3% versus 5.4%; p<0.001; chi-square test).
Conclusions: Among the patients with transposition of the great arteries, patients with Taussig-Bing anomaly have the higher risk for reoperations and catheter interventions in



postoperative follow-up. In this group of patients, the common complications observed after arterial switch operation are more likely to occur, so careful follow-up is recommended.



MP-100 / #1514

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

ASSESSMENT OF SYSTEMIC RIGHT VENTRICULAR FUNCTION: SENNING PROCEDURE VERSUS CONGENITAL CORRECTED TRANSPOSITION OF THE GREAT ARTERIES.

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Background and Aim: The right ventricle functions as the systemic ventricle in patients with congenitally corrected transposition of the great arteries (ccTGA) and in patients with transposition of the great arteries (TGA) surgically repaired by atrial switch. Assessment of RV function by conventional echocardiographic methods has some limitations because of anatomical, volumetric and functional peculiarities. The aim of the study was to evaluate and compare systemic right ventricular function in a cohort of patients with systemic right ventricle due to atrial switch operation or congenitally corrected transposition of the great arteries
Methods: We made a review of 115 patients with mean age 17,7 ± 9, 25 years after Senning operation and 12 patients with CCTGA with men age 15.4 ± 8 years. All patients were assessed by the complex echocardiographic method of RV function evaluation and a cardiac MRI.
Results: According to echocardiography, all patients after Senning operation have an increase in the linear dimensions of the right ventricle and tricuspid regurgitation of varying degrees of severity. The TDI has demonstrated a certain dicreasing of the velocity scores of the right ventricle systolic function and absence of right ventricle diastolic dysfunction after the Senning operation. According to cardiac MRI the right ventricular ejection fraction after Senning operation was between 40-50% in most postoperative patients. Unlike patients after SO, according to the results of EchoCG and cardiac MRI, right ventricular dilatation was recorded in 76% of patients with CCTGA, tricuspid regurgitation in 78% of patients. Systemic RV contractility in the group of most patients with CCTGA remained in the range of 55-75%. No RV diastolic disorders were detected.
Conclusions: A low mortality rate is observed in patients who survived to adulthood with a systemic right ventricle and good functional condition. However, rhythm disturbances are more common in the SO group, which, along with systemic dysfunction of the right ventricle and systemic regurgitation of the atrioventricular valve, will probably become the main problem for this group of patients in future.



MP-101 / #532

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

,,FROM PRENATAL DIAGNOSIS TO HEART TRANSPLANTATION IN A 2-MONTH-OLD INFANT"

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Background and Aim: Double outlet right ventricle (DORV) with hypoplastic left ventricle and mitral valve atresia
is a rare, non-correctable congenital heart disease that ultimately requires heart transplantation in the infancy period. The aim of this study was to present a case of a newborn with prenatally diagnosed complex heart disease who underwent early heart transplantation.
Methods: Prenatal echocardiography in the second trimester of gestation revealed double outlet right ventricle (DORV), mitral valve atresia, dysplastic pulmonary valve, partial anomalous pulmonary venous connection (PAPVC), and right atrial isomerism (absent IVC with azygos continuation, visceral inversion). Immediately after birth the infant was transferred to a paediatric cardiac surgery centre. Postnatal echocardiography, angio-CT, and cardiac catheterisation confirmed the diagnosis. After that, balloon valvuloplasty of the
pulmonary valve was successfully performed, allowing withdrawal of prostaglandin infusion. Due to the non-correctable nature of the defect the patient was qualified for a heart transplantation. Orthotopic heart transplantation was performed at 2 months of age.
Results: Fifteen months after transplantation the child remains in good clinical condition, with normal weight gain and psychomotor development. Follow-up echocardiography shows normal systolic and diastolic ventricular function (LVEF 69%), without arrhythmias, and correct laboratory results.
Conclusions: Prenatal diagnosis of complex non-correctable congenital heart disease enabled immediate referral to a specialised centre, rapid confirmatory imaging, successful palliative transcatheter intervention, and timely heart transplantation. This case demonstrates the effectiveness of coordinated perinatal care and multidisciplinary



management in achieving excellent outcomes in the most severe forms of congenital heart disease.



MP-102 / #1334

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

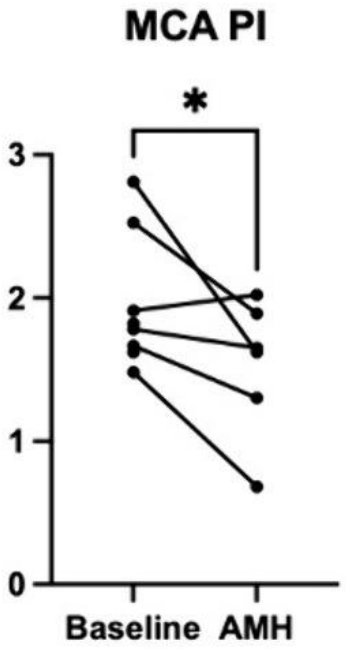
FETAL MRI AND ECHOCARDIOGRAPHIC CHANGES WITH ACUTE MATERNAL HYPEROXYGENATION IN TRANSPOSITION OF THE GREAT ARTERIES

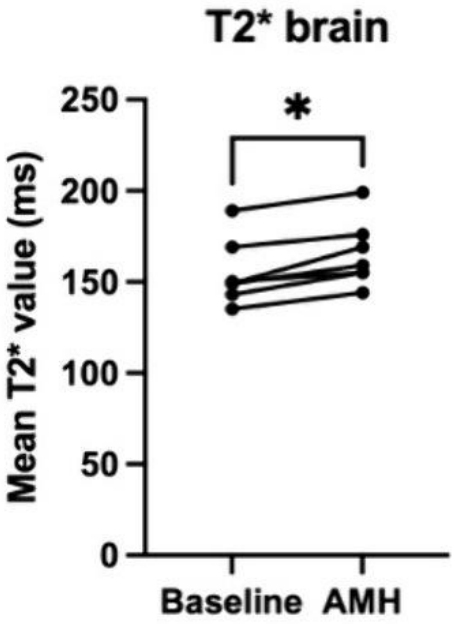
Sophie Duignan[1,2], Tomás Woodgate[1,2], Daniel West[3], Laurence Frei[1], Wendy Norman[1], Karolina Hall[2], Jana Hutter[1], Jordina Aviles Verdera[1], Anthony Price[1], John Simpson[2], Kuberan Pushparajah[1,2], Trisha Vigneswaran[2], David Lloyd[1,2]
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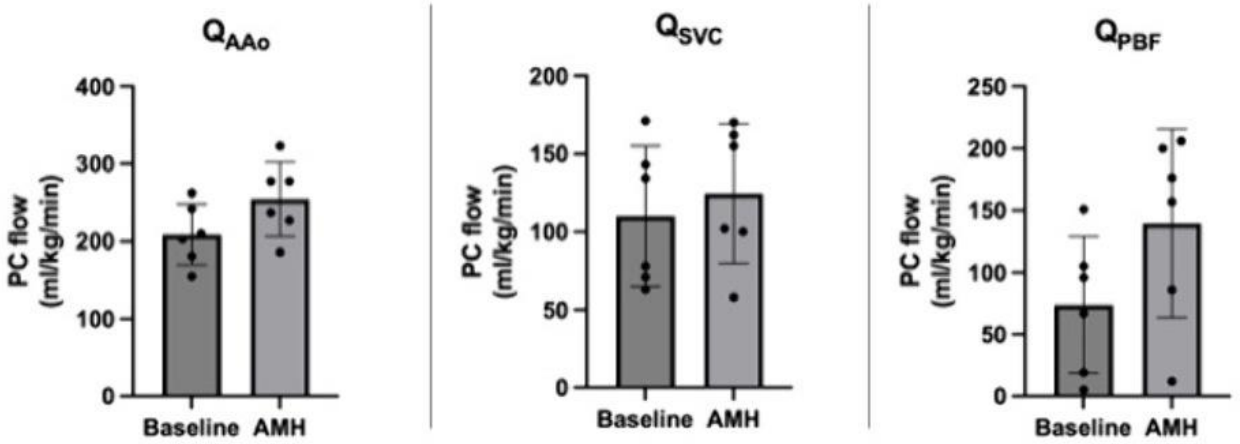
Background and Aim: In fetuses with transposition of the great arteries (TGA), failure to increase middle cerebral artery pulsatility index (MCA-PI) with acute maternal hyperoxygenation (AMH) is associated with impaired brain growth and injury(Taleb 2025), while a preserved cerebrovascular response might be a marker for the need for emergency balloon atrial septostomy (BAS) after birth(Vigneswaran 2025). We aimed to perform a detailed, multimodal evaluation of the haemodynamic and cerebrovascular response to AMH in fetuses with transposition of the great arteries (TGA) by combining paired ultrasound and novel fetal CMR measurements.
Methods: This prospective observational study included fetuses with TGA undergoing paired fetal ultrasound and CMR before and after AMH. Ultrasound assessment included acquisition of MCA and umbilical artery Doppler. The CMR protocol comprised phase-contrast flow measurements, T1 and T2 mapping to estimate blood pool oxygen saturation, and T2*-relaxometry to assess tissue oxygenation. Continuous variables are presented as mean ± SD. Paired pre- and post-AMH comparisons were performed using the Paired t test.
Results: Eight fetuses were studied at a median gestational age of 35.7 weeks; two had associated aortic coarctation. T1/T2 mapping showed highest saturations in the umbilical vein (mean 82% ± 3.1), followed by the left ventricle (mean 64%± 6.7), SVC (mean 57%± 7.2) and right ventricle (mean 56%± 3.5). AMH resulted in a statistically significant increase in placental and brain T2*, associated with a reduction in MCA-PI and cerebroplacental ratio (CPR) and a trend towards an increase in SVC flow (Table 1). Six fetuses (75%) required BAS within 24 hours of birth. There were no differences in baseline parameters or changes with AMH between those who required a BAS and those who did not in this small cohort.



Variable	PreO2 mean ± SD	PostO2 mean ± SD	Mean % change ± SD	p value (95% CI)
MCA PI	1.95 ± 0.5	1.53 ± 0.5	-24.2 ± 21.2	**0.048** (-0.9 to -0.1)
UA PI	0.93 ± 0.2	0.98 ± 0.1	+11.5 ± 26.2	0.46 (-0.1 to 0.3)
CPR	2.15 ± 0.6	1.56 ± 0.5	-29.5 ± 23.6	**0.02** (-1.3 to -0.2)
SVC flow (ml/kg/min)	110.0 ± 45.1	124.5 ± 44.6	4.7 ± 36.1	0.97 (-35 to 37)
Aortic flow (ml/kg/min)	208.9 ± 39.1	254.5 ± 47.9	26.0 ± 40.7	0.13 (18.4 to 109.7)
PBF (ml/kg/min)	73.8 ± 55.2	139.6 ± 75.9	481.8 ± 709.1	0.12 (-26.7 to 155.9)
UV flow (ml/kg/min)	101.3 ± 39.6	112.3 ± 42.5	8.4 ± 32.3	0.65 (-24.3 to 35.6)
RV SaO2 (%)	56.1 ± 3.5	61.3 ± 9.1	10.6 ± 17.6	0.20 (-4.5 to 15.8)
LV SaO2 (%)	64.4 ± 6.7	72 ± 13.5	12.9 ± 27.2	0.34 (-10.4 to 24.7)
UV SaO2 (%)	82.0 ± 3.1	85.3 ± 8.3	4.3 ± 11.5	0.42 (-6.5 to 13.2)
SVC SaO2 (%)	57.8 ± 7.2	60.8 ± 14.0	10.3 ± 36.4	0.68 (-20.7 to 28.7)
Placenta T2* (ms)	72.3 ± 9.3	89.7 ± 13.0	24.1 ± 6.4	**0.0002** (12.3 to 22.6)
Brain T2* (ms)	154.9 ± 18.2	165.3 ± 18.1	6.9 ± 3.4	**0.001** (6.0 to 14.8)







Conclusions: In this pilot study of fetuses with TGA, AMH was associated with increased T2*-derived cerebral oxygenation in association with decreased MCA-PI, suggesting a reversal of the AMH response seen in other groups(Taleb 2025). These findings were coupled with a trend towards increased SVC flow (≃cerebral blood flow), although this was not statistically significant. Further work in a larger cohort is needed to understand the physiological basis for these changes and their relationship to outcomes.



MP-103 / #1302

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

A RARE CASE OF TRANSIENT LEFT VENTRICULAR SYSTOLIC DYSFUNCTION AFTER PERCUTANEOUS VENUSP-VALVE IMPLANTATION IN A 14-YEAR-OLD BOY WITH TETRALOGY OF FALLOT

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Background and Aim: Progressive pulmonary regurgitation is a common complication after Tetralogy of Fallot (ToF) repair, resulting in progressive enlargement and dysfunction of the right ventricle. These changes are associated with an elevated risk of life-threatening arrhythmias, development of heart failure, and increased mortality. A recognized therapeutic approach for managing right ventricular outflow tract dysfunction is percutaneous pulmonary valve implantation (PPVI). The most common complications of the procedure include coronary artery compression, structural damage to the implanted valve and pulmonary artery injury related to wire perforation. We report a rare case of acute left ventricular systolic dysfunction after percutaneous self-expanding pulmonary valve implantation in a 14-year-old boy.
Methods: The data was collected retrospectively.
Results: A 14-year-old patient that had undergone ToF repair with transannular patch in infancy presented with severe pulmonary regurgitation and RV enlargement. MRI showed indexed RV volume of 171ml/m2. The patient was qualified for PPVI. The echocardiography on admission showed good systolic function of both ventricles, with left ventrucular ejection fraction (LVEF) above 60%. Cardiac catheterization was performed under general anaesthesia. Prior to the valve implantation a test with a 40x50mm PTS-X balloon (NuMed) catheter had been done and coronary compression excluded. Self expandable VenusP-Valve 32x25mm was selected and implanted in pulmonary position. Control angiography confirmed optimal valve position and showed good coronary arteries perfusion without any compression. On control echocardiography performed in the cath lab markedly decreased LV global systolic function was observed with LVEF around 40%. ECG showed no ischaemic changes and troponin-T was only mildly elevated (43,1 pg/ml), which could be related to the procedure itself. The patient was in stable condition and LV systolic function spontaneously recovered within the first day post procedure.
Conclusions: Acute left ventricular systolic dysfunction not related to coronary compressions is a rare complication after PPVI. The pathophysiologic mechanism may



include a rapid increase in left ventricular filling, with transient disturbances in the ventricle's adaptation to the new hemodynamic conditions. In our case the LV function spontanously recovered within first day post intervention.



MP-104 / #461

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

NEURODEVELOPMENT OUTCOMES ASSOCIATED WITH CHANGES IN OXYGENATION IN NEWBORNS WITH TRANSPOSITION OF THE GREAT ARTERIES

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Background and Aim: It is known that newborns with transposition of the great arteries (TGA) who undergo surgery present neurodevelopmental disorders. The hypoxic-hyperoxic changes they experience can trigger oxidative stress, and this may be related to the balloon atrial septostomy (BAS). This study aims to analyze oxygenation changes before and after BAS, and to describe the relationship with neurodevelopment outcomes (NO) at 2 years.
Methods: Neonates who underwent TGA surgery between 2018 and 2022 were included in this retrospective study. Perioperatively, isoprostanes (a biomarker of oxidative stress) were analyzed in urine samples and compared to NO at 2 years. Changes in oxygen saturation (SatO2), and arterial oxygen saturation (PaO_2) perioperatively, and before and after BAS were analized. NO was evaluated at two years using Bayley and Vineland tests.
Results: 39 infants with TGA were included(79.5% underwent BAS). 12.5% of patients presented abnormal NO in one domain, without differences between those patients whith or without BAS. BAS produced an **increase in** SatO2($p < 0.00001$). Preoperative SatO2, PaO_2, and isoprostane levels did not differ between patients with or without BAS.
A **negative correlation** was observed between the **change in** SatO2 **after BAS** and **cognitive outcomes**($p=0.03$). Higher **pre-BAS** SatO2 was also associated with better cognitive outcomes($p=0.04$), whereas preoperative SatO2 showed no relationship with NO. Presurgically, less changes in SatO2 were related with better NO(cognitive)($p= 0.03$). Intraoperatively, those patients with more changes in PaO_2 had better results in cognitive and language domains($p=0.046$). Isoprostane levels were not related with changes in oxygenation, nor with NO. Isoprostane levels showed no association with changes in SatO2 or PaO_2. However, 72-hour isoprostane concentrations were significantly higher in infants with abnormal NO($p = 0.03$).



Conclusions: Changes in oxygenation perioperatively in newborns with TGA are linked to poor NO, especially in cognitive and language domains. Isoprostane levels were not related with changes in oxygenation, nor with NO. In our cohort, BAS improved oxygenation but did not impact NO. Changes in SatO2 oxygenation perioperatively in newborns with TGA are linked to poor NO, especially in cognitive and language domains. These findings underscore the importance of perioperative oxygen stability and suggest that late postoperative oxidative stress may contribute to neurodevelopmental risk.



MP-106 / #573

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

PEDIATRIC AND ADOLESCENT ONSET RESUSCITATED SUDDEN CARDIAC ARREST (SCA) DUE TO VENTRICULAR FIBRILLATION IN PREVIOUSLY APPARENTLY HEALTHY PATIENTS: A 10-YEAR REVIEW FROM LATVIA

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Background and Aim: Sudden cardiac arrest (SCA) due to ventricular fibrillation (VF) is rare in children, with an estimated incidence ~ 0.7–10.1 per 100,000. It may be associated with unrecognized cardiovascular disease. Latvia has no pediatric cardiac arrest registry, the Children's Clinical University Hospital (CCUH) is the only national center where pediatric patients with arrhythmias, cardiac devices, and various cardiac conditions are treated.The aim of the study was to analize patients <18 years presenting to CCUH with resuscitated SCA/ VF without prior cardiovascular disease from 2014 to 2023.
Methods: Retrospective review of medical records of all patients <18 years presenting to CCUH with resuscitated SCA/documented VF without prior cardiovascular disease from 2014 to 2023 (clinical characteristics, genetic findings, outcomes).
Results: During the 10-year period, 10 pediatric patients with SCA/VF were identified: 6 males (60%), median age 15 years (IQR 10–17). Three arrests occurred during physical activity, four during sleep, and three during daily activities; 60% occurred at home. Median intensive care stay was 12.5 days (IQR 7.5–16), mechanical ventilation 3.5 days (IQR 2.8–6.3), total hospitalization 26 days (IQR 16.8–45.5). MRI revealed hypoxic brain injury in 50% of patients, with one resulting death (10%). Eight patients received an implantable cardioverter-defibrillator (ICD). Two did not because of severe neurological injury with family preference (1) or death (1). Genetic testing was performed in all patients: pathogenic variants were identified in three (LQTS1, LQTS3, and CPVT). Seven patients carried variants of uncertain significance, potentially consistent with their phenotypes (RYR2 in 3 cases; KCNE2, TNT, DES, and CACNA1G in one each). Cardiac MRI showed myocarditis in two patients. All patients received long-term medical therapy (8 on beta-blockers, 1 on flecainide). During a median follow-up of 7 years (range 2–11), one of eight ICD carriers experienced VT requiring appropriate ICD therapy. Family history of SCD was present in only one case (CPVT).
Conclusions: In Latvia approximately one hospitalized, resuscitated pediatric SCA case per year (~0.33 per 100,000 children) was observed , though true incidence may be higher,



some SCD events may be misattributed to other causes. Comprehensive evaluation, including genetic testing and cardiac MRI, can identify an underlying cause in most patients.



MP-107 / #786

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

LONGITUDINAL AGE-RELATED CHANGES IN SINUS TACHYCARDIA SEVERITY IN PEDIATRIC DUCHENNE MUSCULAR DYSTROPHY PATIENTS

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Background and Aim: Sinus tachycardia (ST) is one of the most common and earliest manifestations of cardiac involvement in Duchenne muscular dystrophy (DMD), with prevalence varying across age groups. This study aimed to assess the severity of ST, its longitudinal dynamics, and associated influencing factors in a paediatric DMD population.
Methods: Longitudinal Holter monitoring data from 141 patients (376 observations; 5 (2–12) observations/patient) were analysed using mixed-effects modelling, spline-based trajectory estimation, and derivative (instantaneous annual delta z-score) analysis to characterise age-related changes in heart-rate z-scores. All patients, aged 10.8 (3.6) y.o., had genetically confirmed DMD diagnosis. Recordings were obtained using Phillips DigiTrak XT with the Zymed algorithm analyzer as a part of a routine, annual screening, regardless of symptoms and systolic function, providing a selection-bias-free dataset. The data published by Salameh et al. was used as reference and for calculations of the standardized values (z-scores) of analyzed parameters. Statistical analyses were performed using Microsoft Excel, Wizard 2, and Python. Data are presented as mean (SD) or median (range).
Results: Average HR z-scores were elevated across the cohort (mean ~ +1.5 SD) and increased with age (β≈+0.08 z/year). A nonlinear trajectory revealed a turning point at ~13 years, where the curve flattened and subsequently declined. This inflection was confirmed by derivative analysis: instantaneous annual Δz was positive in younger children, crossed zero at ~13 years, and became slightly negative thereafter. Minimum HR z-scores showed similar patterns (baseline +0.9 SD; slope ≈ +0.07 z/year). Higher baseline average HR z-scores were associated with smaller annualised patient-level Δz values (Coeff -0,26; p < 0,001). No significant association was observed between HR z-scores and



pharmacological treatment (β-blockers, ACEi/ARB, MRA, steroids); however, analyses were underpowered owing to the small number of patients receiving β-blockers. Annualised patient-level Δz values showed wide heterogeneity between the patients and no strong association with baseline age.

Conclusions: Holter-derived heart rate abnormalities in DMD exhibit an age-related trajectory with a reproducible physiological transition around early adolescence (~13 years). Before this point, tachycardia progressively increases; afterwards, the rate of rise attenuates or reverses. To our knowledge, this age-related shift demonstrated in a longitudinal framework has not been previously reported.



MP-108 / #818

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

CARDIAC MAGNETIC RESONANCE T1 MAPPING AND LATE GADOLINIUM ENHANCEMENT VERSUS CIRCULATING FIBROSIS BIOMARKERS IN PATIENTS WITH DUCHENNE / BECKER MUSCULAR DYSTRPOPHY

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Background and Aim: Patients with Duchenne / Becker muscular dystrophy (DMD / BMD) suffer from a gradual decline in cardiac function due to fibrous degeneration of the myocardium. This can be visualized with cardiac magnetic resonance (CMR) T1 mapping or late gadolinium enhancement (LGE). We sought to determine if serum fibrosis or myocardial injury biomarkers correlate with the imaging findings in these patients.
Methods: Patients with DMD / BMD were prospectively recruited and underwent both CMR and a blood draw within a 4-week interval. CMR included cine images for ventricular function, T1 mapping pre- and post-contrast (MOLLI sequence) with calculation of extracellular volume (ECV) using same-day hemoglobin, as well as late gadolinium enhancement (LGE). The serum concentrations of the following substances were measured: Troponin T, N-terminal proBNP, GDF-15, CITP, PIIINP, Galectin-3, Pref-1/DLK-1, IGFBP-7, MMP7, FABP-3.
Results: 18 boys (median [IQR] = 13.2 [11.5-16.3] years) with DMD (n=12) or BMD were examined. Biventricular function was overall preserved (LVEF 58 [53.3-61.3]%, RVEF 57 [53.8-61.3]%). Mid-ventricular myocardial T1 (1004 [986-1046] ms) and ECV (27.7 [21-31.5]%) were normal. 8 (44.4%) patients had inferolateral LGE. In the total population, none of the biomarkers correlated with myocardial T1 or with ECV. No differences in the biomarkers were found depending on LGE presence. MMP7 correlated with RVEF (r=0.876; p=0.022). In the DMD group, Galectin-3 and Troponin T were correlated with ECV (ρ=-0.833; p=0.005 / r=-0.668; p=0.049), GDF-15 with LVEF (ρ=-0.842; p=0.001). Troponin T and Pref-1/DLK1 were correlated with T1 (r=-0.781; p=0.003 / r=-1; p=0.018). Pref-1/DLK1 was correlated with LVEF (r=-0.998; p=0.044).
Conclusions: In a cohort of boys with DMD/BMD, no correlation between circulating



fibrosis biomarkers and imaging T1 or LGE was found, possibly due to small sample size. However, in DMD patients specifically, Troponin T, Galectin-3 and Pref-1/DLK1 showed correlations with imaging markers of fibrosis, and Pref-1/DLK1 was correlated with left ventricular function. Circulating fibrosis biomarkers could become useful to monitor disease progression.



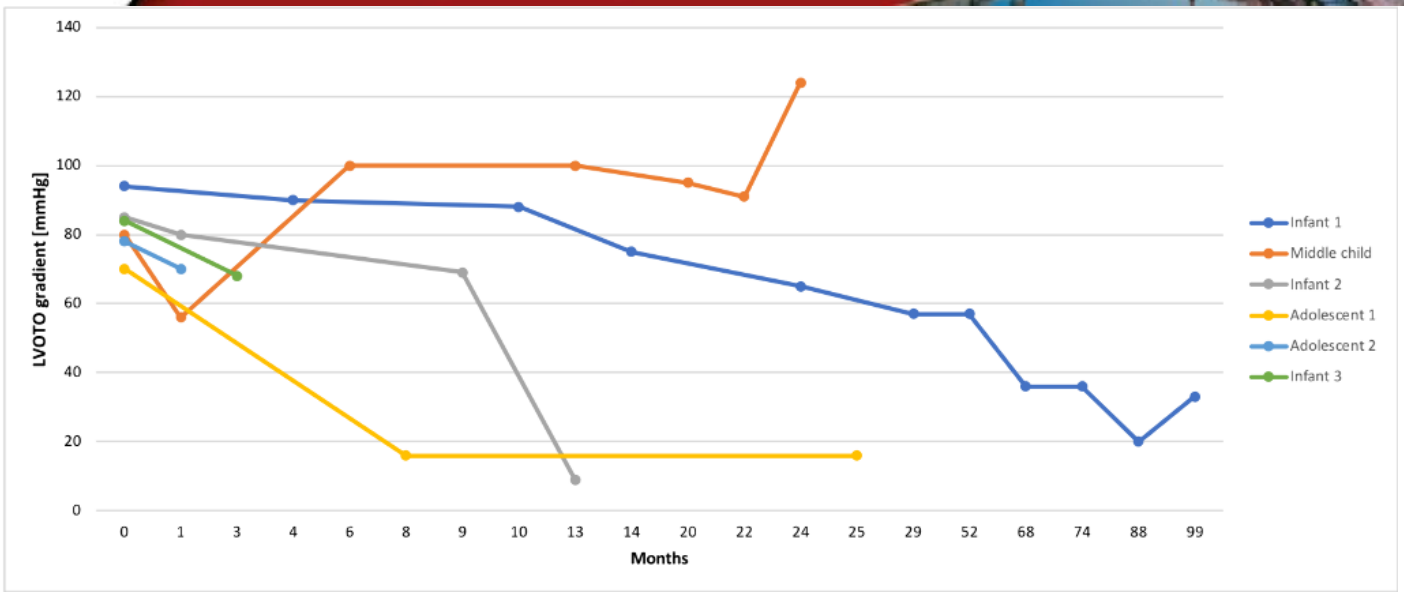
MP-109 / #311

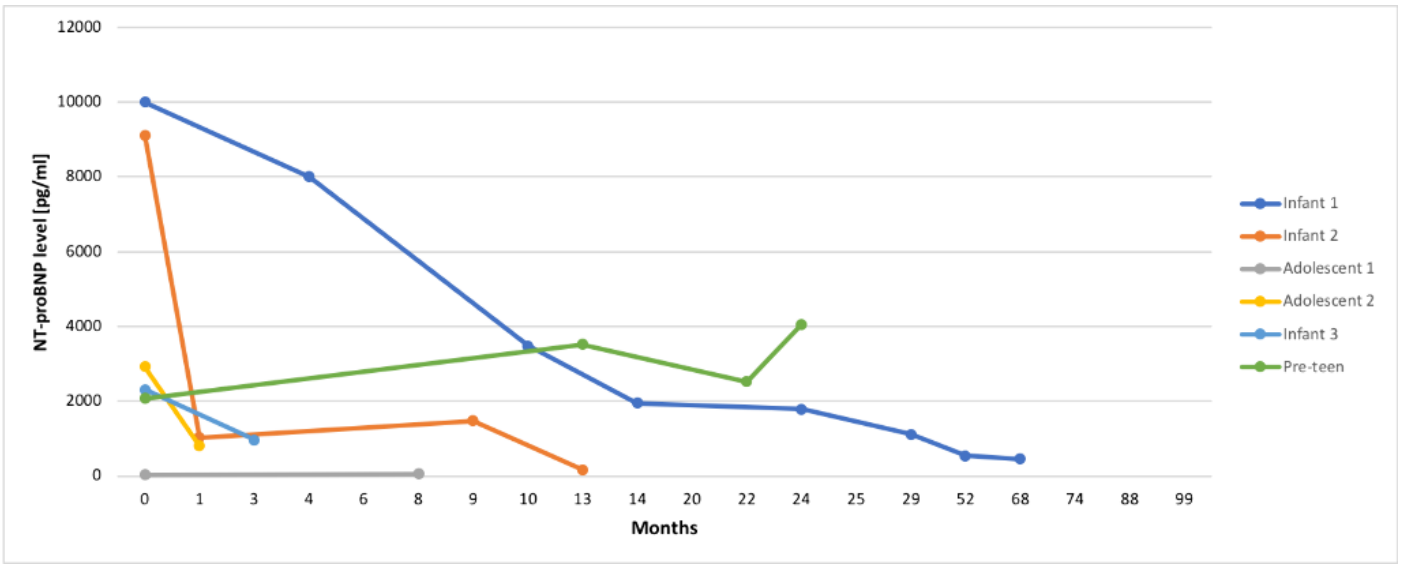
SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

THE THERAPEUTIC EFFECT OF DISOPYRAMIDE IN CHILDREN WITH OBSTRUCTIVE HYPERTROPHIC CARDIOMYOPATHY: A SINGLE-CENTER EXPERIENCE.

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Children's Memorial Health Institute, Pediatric Cardiology, Warsaw, Poland

Background and Aim: Hypertrophic cardiomyopathy (HCM) is a genetically determined disease, and left ventricular outflow tract obstruction (LVOTO) is present in approximately one third of pediatric patients. Disopyramide, a class 1a antiarrhythmic agent, has been shown to reduce the LVOTO gradient. The aim of this study was to summarize the therapeutic effect of disopyramide in a cohort of six patients with HCM and LVOTO.
Methods: The impact of disopyramide therapy on resting LVOTO gradients measured by echocardiography and plasma NT-proBNP concentrations was assessed in all six patients, aged 9 months to 16 years. Changes in resting LVOTO gradient and NT-proBNP levels during the treatment period were evaluated.
Results: At the time disopyramide therapy was initiated, all patients were already receiving beta-blocker treatment, and one patient had previously undergone surgical septal myomectomy. Disopyramide therapy was started during infancy in three patients, while the other three began treatment between the ages of 9 and 15 years. In all cases, treatment was initiated with a resting LVOTO gradient exceeding 70 mmHg. At baseline, all patients exhibited elevated plasma NT-proBNP concentrations. During follow-up, three patients showed a modest reduction in LVOTO gradient accompanied by a significant decrease in NT-proBNP levels. In one infant, LVOTO completely resolved after one year of therapy, with a substantial drop in NT-proBNP. Conversely, the patient with prior surgical myomectomy experienced increases in both LVOTO gradient and NT-proBNP levels after one year of disopyramide treatment. Changes in resting LVOTO gradient and NT-proBNP concentrations for all patients are shown in Figure 1 and Figure 2, respectively.





Conclusions: The study suggests disopyramide may effectively reduce LVOTO gradients and lower NT-proBNP levels in pediatric HCM patients, indicating improved cardiac function. Its use could delay or even avoid surgical myomectomy, particularly valuable in infants. However, variability in response, especially post-myomectomy, highlights the need for individualized treatment plans. Clinically, these findings support incorporating disopyramide into earlier stages of managing pediatric HCM with LVOTO. Long-term follow-up is essential to confirm sustained benefits and safety in pediatric population.



MP-110 / #458

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

ARRHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY IN CHILDREN: A REVIEW OF THE CURRENT LITERATURE.

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Background and Aim: ARVC is a rare genetic disease characterized by the fibroadipose replacement of the myocardium, predisposing individuals to potentially fatal ventricular arrhythmias. Although it is most frequently diagnosed in adulthood, ARVC can also manifest in pediatric age, with heterogeneous clinical presentations. The scientific literature on pediatric ARVC is limited, and current diagnostic and therapeutic guidelines are primarily derived from adult studies. We make a review of the literature on ARVC licterature aiming to identify the main characteristics of the disease in the pediatric population.
Methods: A search was conducted in the PubMed database from October 2019 to March 2025 using the keywords: arrhythmogenic right ventricular dysplasia, arrhythmogenic right ventricular cardiomyopathy, or ARVD/C, and children or pediatric, identifying 33 articles. We include all reports detailing the following characteristics: age at diagnosis, presentation patterns, ECG findings, echocardiography and magnetic resonance imaging (MRI) results, as well as genetic analysis, family history, and disease outcomes. Five articles were excluded. 28 articles were included for analysis.
Results: 28 studies includes 698 pediatric patients (2.5–18 years): 13% were asymptomatic at diagnosis, in symptomatic cases, clinical presentations included palpitations, syncope, chest pain, heart failure, in 4–25% of cases, sudden cardiac arrest as the first manifestation. A family history of ARVC was found in about 70% of cases. The ECG frequently showed T-wave inversions in the precordial leads (beyond V3 and/or beyond age 11).Holter monitoring was performed in most patients and proved useful for identifying non-sustained or complex ventricular arrhythmias. Echocardiography displayed low sensitivity, revealing significant alterations only in advanced cases, cardiac magnetic resonance (CMR) detecting regional dyskinesia of the RV and LGE. Genetic testing, performed in 86% of studies, revealed mutations in desmosomal genes (most frequently PKP2, DSG2, DSP, JUP), with some cases of biallelic mutations. Implantable cardioverter-



defibrillators (ICDs) were indicated in about 10% of patients, reserved for cases with documented arrhythmias or survivors of cardiac arrest.

Conclusions: The diagnosis and management of ARVC in pediatric patients remain a significant clinical challenge, requiring a multidisciplinary and highly individualized approach and personnel dedicated to arrhythmic risk management. Developing specific pediatric guidelines could enhance early identification and personalized treatment of this potentially life-threatening condition.



MP-111 / #535

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

ASSESSMENT OF THE ECG MARKERS IN CHILDREN TREATED FOR ACUTE LYMPHOBLASTIC LEUKEMIA PRESENTING SIGNIFICANTLY LOWERED LEFT VENTRICLE GLOBAL LONGITUDINAL STRAIN IN ECHOCARDIOGRAPHY – PRELIMINARY RESULTS.

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Background and Aim: Acute lymphoblastic leukemia(ALL) treatment is a risk for Cancer Therapy-Related Cardiac Dysfunction(CTRCD). ECG variables were determined to be predictive of subsequent CTRCD in adult oncological patients. The literature on specific ECG markers for CTRCD in children, as well as other cardiac assessment methods is scarce. We have assessed consecutive children during ALL therapy for subclinical cardiac dysfunction in strain echocardiography and hypothesized that baseline ECG markers for CTRCD described in adults could present in this population. We aimed to assess predictive ECG markers for CTRCD in children treated for ALL with significantly lowered left ventricle 2D Global Longitudinal strain(2D-LV-GLS).
Methods: For this preliminary prospective single-center study consecutive children diagnosed with ALL were enrolled. Strain echocardiography and 12-lead ECG was performed before the treatment initiation (1st assessment) and after induction and intensification phase of the therapy (2nd assessment). ECG assessment was performed and analyzed, QTc was calculated according to Bazett formula. Next, possible ECG markers for CTRCD were assessed: Q amplitude in aVL, R amplitude in I and II, maximal S amplitude in V1, mid ST in V5, end ST in II, maximal mid ST amplitude measured in V5 or V6 and T amplitude in V5.
Results: The study group consisted of 20 children (8 females, 12 males) aged 1-16 years old(mean 5±4). The diagnosis was ALL type C in 17(85%) and all children were treated with AIEOP-BFM-2017 protocol. The mean time between 1st and 2nd assessment was 217 days(~6 months). The mean anthracycline equivalent dosage was 102±39mg/m^2. The mean 2D-LV-GLS was -24.3±3.5% at 1st and -20.2±2.9% at 2nd assessment ($p<0.001$). The statistically significant ECG changes 1st vs 2nd assessment were observed in Q amplitude in



aVL(33±58μV vs 97±109μV,p=0.017), end ST amplitude in II (27±31μV vs 58±39μV,p-0.018) and maximal mid ST amplitude in V5/or V6 (94±31μV vs 123±56μV,p=0.003). Remaining markers were not significantly different. ECG records were assessed by 2 blinded pediatric cardiologists, and the level of the assessment agreement was >96%.

Conclusions: Q wave as well as ST segment amplitude may be markers for CTRCD in children treated for ALL presenting with lowered 2D-LV-GLS, but further studies are needed.



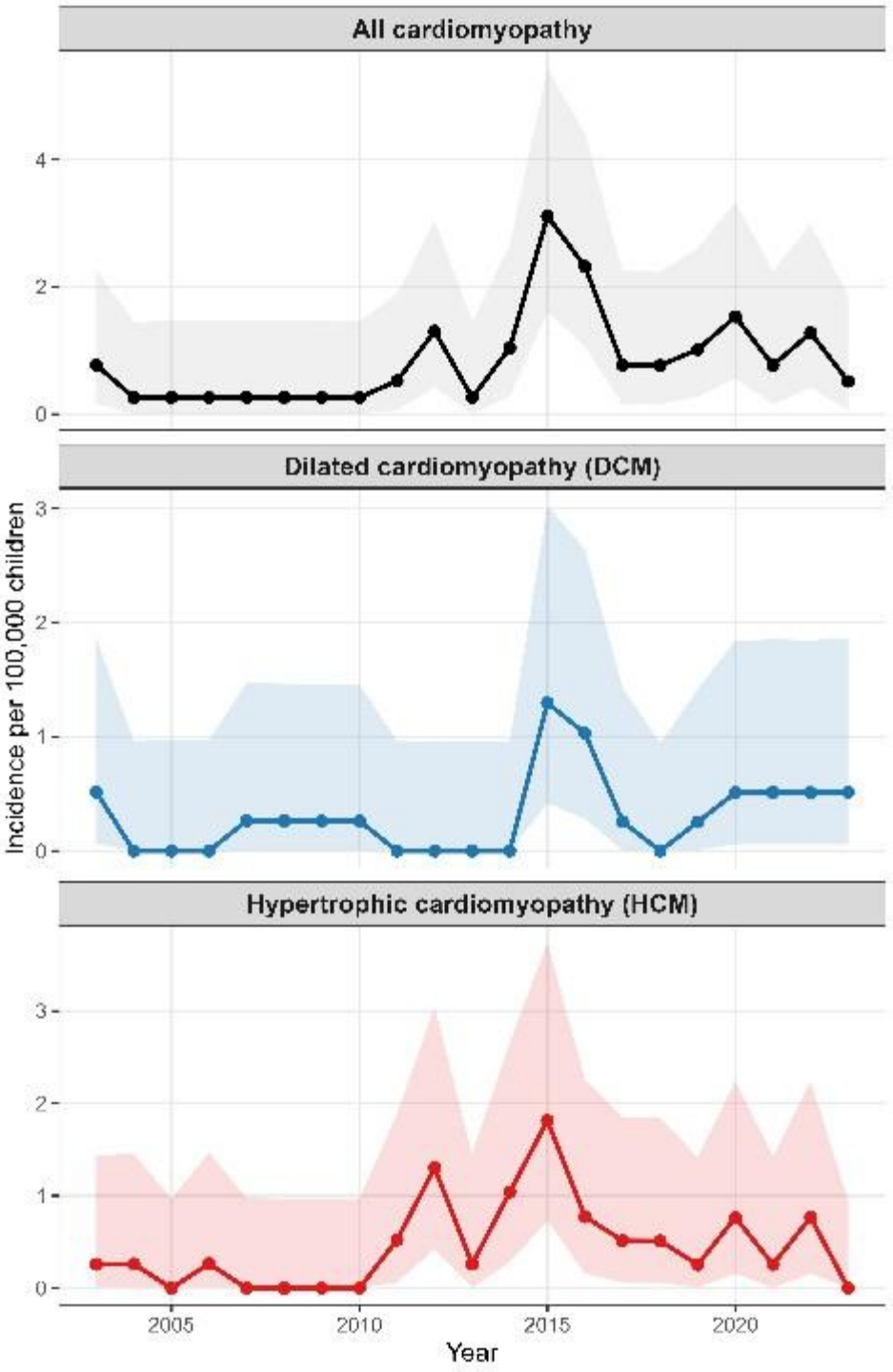
MP-112 / #394

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

PAEDIATRIC CARDIOMYOPATHIES INCIDENCE IN NORTHERN IRELAND, A NATIONAL RETROSPECTIVE COHORT STUDY

Scott Kendall[1], Shannon Scott[1], Joy Mccance[2], Peter Mcclung[2], Terence Prendiville[3], Pascal Mckeown[1], Frank Casey[1]
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Background and Aim: Paediatric cardiomyopathies are rare but important causes of heart failure, transplantation, and sudden cardiac death. Previous estimates suggest an incidence of approximately 1 per 100,000 children. We aimed to determine the incidence and temporal trends of paediatric cardiomyopathy—including dilated (DCM) and hypertrophic cardiomyopathy (HCM)—in Northern Ireland over the past two decades.
Methods: Regional paediatric cardiology case ascertainment (retrospective chart review) was combined with annual population denominators for 2003–2023. Annual incidence rates per 100,000 children were calculated with exact Poisson 95% confidence intervals. Temporal trends were assessed using quasi-Poisson and negative binomial regression models with population offsets. Children aged 0-15 with clinical cardiomyopathy (Phenotype positive) identified during the study period were included.
Results: Sixty-two cases of paediatric cardiomyopathy were identified (mean annual incidence 0.9 per 100,000). Of these, 24 (39%) were DCM and 38 (61%) were HCM. Annual incidence varied from 0.26 to 3.11 per 100,000. There was borderline evidence of an increasing overall incidence trend (quasi-Poisson $p \approx 0.058$). Subtype analyses showed no statistically significant trends for DCM ($p = 0.126$) or HCM ($p = 0.192$), although both demonstrated higher incidence values in later


All cardiomyopathy
Dilated cardiomyopathy (DCM)
Hypertrophic cardiomyopathy (HCM)
Incidence per 100,000 children
Year
2005
2010
2015
2020

years.

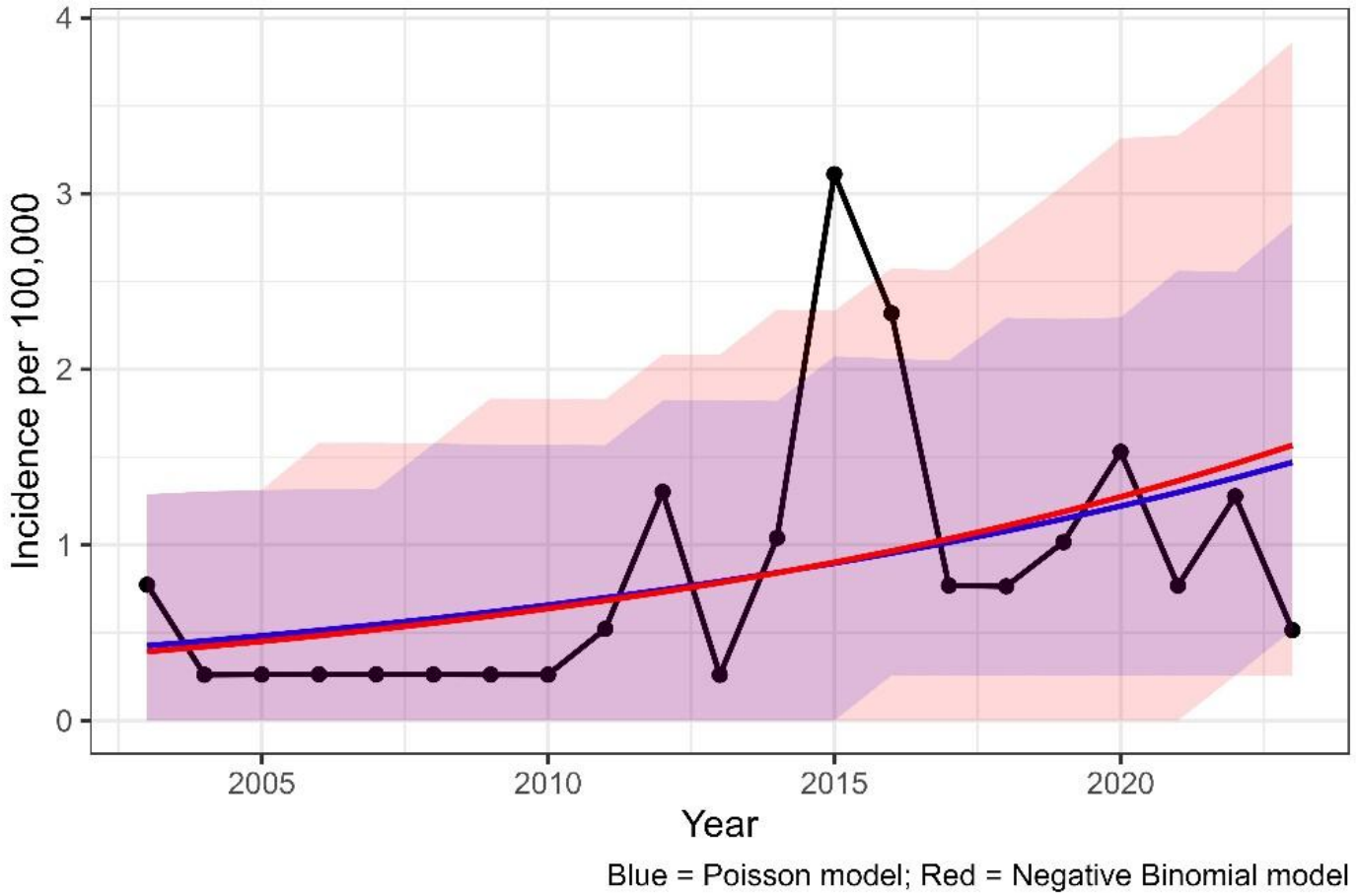


Figure 2: All Cause paediatric cardiomuopathy compared to possion and negative binomal distribution modelling with 95% confidence intervals (95% CIs)

Conclusions: Paediatric cardiomyopathy remains rare in Northern Ireland but may be increasing over time. This trend may reflect enhanced case detection through improved genetic testing and cascade screening, underscoring the need for ongoing surveillance.



MP-113 / #655

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

ALLELIC SARCOMERIC VARIANTS AND CLINICAL RISK IN HYPERTROPHIC CARDIOMYOPATHY

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Background and Aim: Hypertrophic cardiomyopathy (HCM) is the most common genetic cardiomyopathy and exhibits wide variability in both phenotype and prognosis. Despite the data produced by large HCM cohorts, the impact of individual allelic variants on clinical outcomes is still poorly understood. Here, we examined the association between specific sarcomeric allelic variants and adverse events during long-term follow-up in HCM.
Methods: 382 individuals with sarcomeric mutations were identified. Exomic sequencing was performed to assess frequency of sarcomeric gene variants. Patient records were reviewed for the current clinical phenotype and for adverse clinical endpoints. The genetic variants were classified for known significance and tested for association with clinical endpoints.
Results: Altogether, 272 HCM patients and 104 phenotype negative carriers were identified, mostly adult patients (Table). During the follow-up of median 9 years, 84/272 (31%) of HCM patients experienced an adverse outcome: death in 40/84 (48%), heart transplantation in 13/84 (15%), implantation of secondary preventive ICD in 14/84 (17%) and heart failure in 60/84 (71%). In genetic analyses, 278 individual variants were found, of which 46 were previously uncharacterized. Over 90% were in MYH7, MYBPC3, and TPM1 genes. Twenty eight percent of the variants were observed in patients with adverse outcomes (Figure). Four missense variants in MYH7 (Figure B) and one in TPM1 (Figure C) were nominally associated with the risk heart transplantation ($p<0.05$, indicated with blue star). Three additional splice site variants indicate nominal association to heart transplant risk. These associations did not remain significant after correction for multiple testing, yet their biological relevance warrants exploration in larger
cohorts.



Table 1: Baseline table

Variable	Whole cohort (n=376)	Pediatric (< 16 yrs) (n=27)	Adults (≥ 16 yrs) (n=349)	p-value
Gender, female n (%)	183 (49)	10 (37)	173 (50)	0.209*
CMP type, n (%)				0.004*
HCM[1]	272 (72)	13 (48)	259 (74)	
Carrier	104 (28)	14 (52)	90 (26)	
Sarcomere variant, n (%)				0.009*
MYH7	134 (36)	15 (56)	119 (34)	
MYBPC3	188 (50)	5 (19)	183 (52)	
Other	59 (16)	7 (26)	52 (15)	
NYHA III-IV, n (%)	47 (13)	0 (0)	47 (14)	0.048*
Index, n (%)	146 (39)	5 (19)	141 (40)	0.026*
Follow-up duration median (Q1, Q3)	9 (4, 18)	5 (3, 10)	9 (5, 18)	0.048**
Endpoint n (%)	84 (22)	2 (7)	82 (23)	0.086***
Heart failure	60 (71)	2 (100)	59 (72)	0.284***
Secondary prev. ICD	14 (17)	0 (0)	14 (17)	0.329***
HTX[2], LVAD[3], listed for HTX[2]	13 (15)	2 (100)	11 (13)	0.238***
Exitus	40 (48)	0 (0)	40 (49)	0.096***
> 1 endpoint	39 (46)	2 (100)	37 (45)	1.000***

1) HCM = Hypertrophic Cardiomyopathy
2) HTX = Heart transplantation
3) LVAD = Left Ventricular Assist Device

*) Chi-Square test

**) Wilcoxon Rank sum test

***) Fisher's exact test

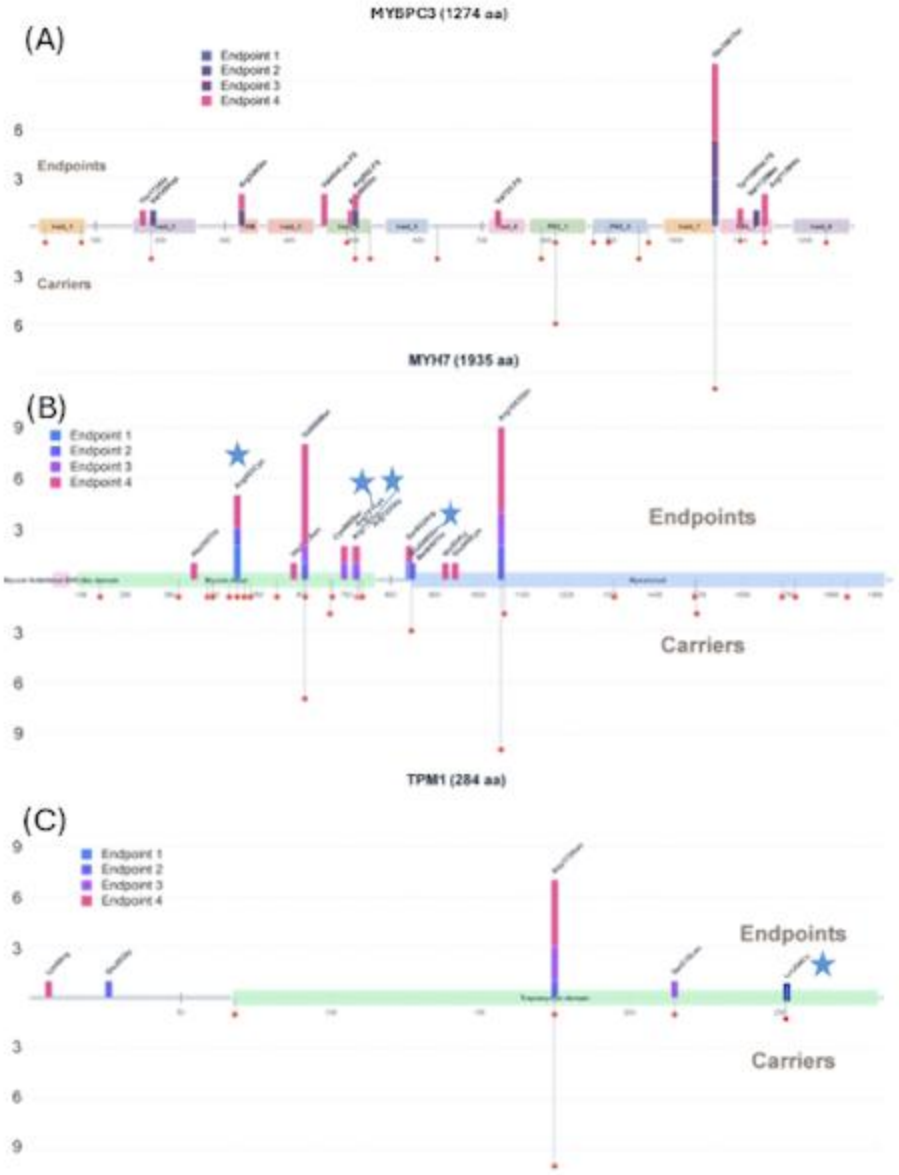


Figure legend
The missense variants in these genes are shown in Figure A-C with counts of endpoints above the protein domain axis and carriers indicated below. Endpoint 1 – Heart transplantation, endpoint 2 – secondary preventive ICD, endpoint 3- death, endpoint 4- clinical heart failure.

Conclusions: This study raises the possibility that specific allelic variants in sarcomeric genes may influence clinical endpoints. Because only a small number of patients carried these variants, the findings should be interpreted cautiously. Nevertheless, they underscore the promise of genotype-guided risk stratification in HCM—a goal that will



require larger, dedicated studies before follow-up can truly be personalized on a genetic basis.



MP-114 / #687

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

GM1 GANGLIOSIDOSIS PRESENTING WITH HYPERTROPHIC CARDIOMYOPATHY IN EARLY INFANCY: A DIAGNOSTIC PATHWAY THROUGH METABOLIC RED FLAGS

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Background and Aim: Infantile GM1 gangliosidosis is a rare lysosomal storage disorder caused by biallelic pathogenic variants in GLB1, typically presenting with developmental delay, dysmorphism, hepatosplenomegaly and progressive multisystem disease. Cardiac involvement—most commonly hypertrophic cardiomyopathy (HCM)—is variably reported and may precede neurological manifestations. The aim of this case report is to illustrate how early phenotypic and metabolic red flags guided the diagnostic pathway towards identifying GM1 gangliosidosis in an infant initially evaluated for an isolated heart murmur.
Methods: A 10-week-old male infant was referred for evaluation of a systolic murmur. Clinical examination revealed subtly coarse facial features, axial hypotonia and mild peripheral edema, without hepatosplenomegaly. Echocardiography demonstrated non-obstructive hypertrophic cardiomyopathy. Initial laboratory tests showed normal transaminases, which progressively increased during follow-up. Alkaline phosphatase was markedly elevated with normal gamma-glutamyl transferase.
Results: Enzymatic analysis revealed severely reduced beta-galactosidase activity, and targeted sequencing identified homozygosity for the pathogenic GLB1 c.481T>G (p.Trp161Gly) variant, confirming infantile GM1 gangliosidosis. Parents were heterozygous carriers. Cardiac function remained preserved at subsequent follow-up evaluations; however, hepatomegaly (3–4 cm below the right costal margin) and progressive transaminase elevation emerged over time, along with increasingly apparent neuromotor delay. Early diagnosis enabled referral for assessment within an ongoing European investigational therapeutic trial.
Conclusions: This case demonstrates that hypertrophic cardiomyopathy may serve as an early sentinel manifestation of infantile GM1 gangliosidosis, prior to the emergence of clear neurological or visceral involvement. Although alkaline phosphatase can be physiologically elevated in infancy, a disproportionate increase with normal gamma-glutamyl transferase, together with subtle multisystemic findings such as hypotonia, edema and emerging



dysmorphism should raise suspicion for an underlying lysosomal storage disorder. Recognizing such metabolic red flags early is essential not only for achieving a timely and accurate diagnosis, but also for guiding appropriate counselling and anticipating the substantial long-term burden this disorder places on affected families. Early identification additionally enables access to emerging disease-modifying therapies, including timely enrolment in investigational therapeutic trials.



MP-115 / #877

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

ASSESSING DYSFUNCTIONAL MITOCHONDRIA IN CONGENITAL CARDIOMYOPATHY

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Background and Aim: Dysfunctional mitochondria play a crucial role in congenital cardiomyopathy (CCM) by impairing the heart's energy supply through defective oxidative phosphorylation. This dysfunction leads to a decrease in ATP production, an increase in harmful reactive oxygen species (ROS), and disrupted calcium handling, ultimately resulting in cell death (apoptosis) and heart failure. These mitochondrial issues are often linked to genetic mutations in mitochondrial DNA (mtDNA) or nuclear DNA (nDNA) and can be exacerbated by conditions such as chronic hypoxia, particularly in cyanotic heart defects. The structural consequences of these dysfunctions manifest as hypertrophic or dilated cardiomyopathy, significantly affecting high-energy tissues like the heart and leading to severe clinical outcomes. Furthermore, dysfunctional mitochondria can initiate programmed cell death and hinder the removal of damaged mitochondria, exacerbating heart failure.
Methods: Clinical evaluation and diagnostics for heart defects and mitochondrial disease begin with comprehensive clinical assessments to determine the presence and severity of conditions. Non-invasive tools such as echocardiograms and electrocardiograms are employed to evaluate heart structure, function, and electrical activity, aiding in the diagnosis of congenital defects and related issues like arrhythmias or heart failure. Cardiopulmonary exercise testing (CPET) assesses exercise capacity and oxygen utilization, revealing signs of mitochondrial dysfunction, such as reduced peak oxygen consumption and early lactic acidosis. Biochemical screening through blood and urine tests identifies biomarkers indicative of impaired mitochondrial function, while imaging techniques like cardiac MRI and PET provide detailed insights into heart structure and mitochondrial metabolism.
Results: When mitochondrial function is compromised, it results in an energy deficit critical for maintaining cardiac function. Additionally, the imbalance in ROS production leads to oxidative stress, damaging heart cells, while disrupted calcium regulation impairs heart muscle function.
Clinically, congenital cardiomyopathy can present in various forms, including hypertrophic, dilated, restrictive, or left ventricular non-compaction cardiomyopathy, often accompanied by arrhythmias and a spectrum of outcomes from asymptomatic conditions to severe heart



failure and sudden cardiac death.

Conclusions: Emerging therapeutic strategies are focusing on targeting mitochondrial ROS, enhancing metabolic processes, and exploring mitochondrial transplantation, which may offer new avenues for diagnosis and treatment in congenital cardiomyopathy.



MP-116 / #1290

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

PEDIATRIC CARDIOMYOPATHIES: A RETROSPECTIVE CLINICAL AND ETIOLOGICAL ANALYSIS WITH PROGNOSTIC IMPLICATIONS BY PHENOTYPE AND AGE OF ONSET

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ASST Grande Ospedale Metropolitano Niguarda, Pediatric Cardiology, Milano, Italy

Background and Aim: Cardiomyopathies are rare but severe conditions in children, being the leading cause of heart failure and transplantation. This study aimed to characterize the pediatric population with cardiomyopathies through clinical and etiological description, diagnostic process, and prognosis, also comparing cardiomyopathy phenotypes and age at onset.
Methods: A retrospective observational study was conducted, including patients diagnosed with either primary cardiomyopathy or miocarditis before 18 years at our institution over the last 20 years. Secondary forms were excluded. Patients were classified by phenotype following recent guidelines, including dilated, hypertrophic, restrictive, arrhythmogenic right ventricular, and recently introduced non-dilated left ventricular cardiomyopathy.
Results: The study included 192 patients; 62% were male. Average age at diagnosis was 6 years, and the follow-up age was 11 years. The most frequent phenotypes were dilated (45%) and non-dilated left ventricular (36%), while hypertrophic (15%), arrhythmogenic (4%), and restrictive (1%) forms were less common. Four distinct age groups were identified: within the first year (29%), preschool (20%), school age (23%), and transition age (28%). The most common cause was acute myocarditis (47%), followed by idiopathic (27%) and genetic forms (25%). Acute myocarditis mainly caused dilated and non-dilated phenotypes, while genetic diseases, both familial and phenocopies, were more common in hypertrophic forms. Age of onset correlated with the etiology and phenotype, with metabolic and mitochondrial diseases influencing early life, while acute myocarditis became more prominent with older ages. The diagnostic pathway included myocardial biopsy in 23 (12%) patients, magnetic resonance in 120 (62%) and genetic analysis in 93 (48%). The prognosis was severe, with an 8% mortality rate and 6% transplantation rate. However, almost half of the patients recovered cardiac function with therapy. Survival was significantly better for acute myocarditis cases, with higher transplant-free survival in non-dilated left ventricular cardiomyopathy and worse outcomes in arrhythmogenic and restrictive phenotypes. Earlier onset correlated with worse survival.



Conclusions: In conclusion, this study highlights the correlation between age at onset and cardiomyopathy phenotype, emphasizing the need for specialized, multidisciplinary diagnostic and therapeutic pathways for affected children.



MP-117 / #1304

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

FROM CARDIAC RHABDOMYOMAS TO ARRHYTHMIAS: CARDIOVASCULAR MANIFESTATIONS OF TUBEROUS SCLEROSIS COMPLEX IN CHILDREN

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Background and Aim: Tuberous sclerosis complex (TSC) is an autosomal dominant multisystem disorder characterized by benign tumors affecting the brain, heart, kidneys and eyes, caused by inactivating mutations in the *TSC1* or *TSC2* genes. Cardiac rhabdomyomas are the most common cardiovascular manifestation and can be an early diagnostic marker, occasionally detected prenatally. Although usually benign, they can be associated with arrhythmias or conduction abnormalities, emphasizing the importance of systematic cardiologic follow-up. The aim of this study is to describe the spectrum of cardiovascular manifestations in 11 pediatric patients with TSC.
Methods: Eleven pediatric patients diagnosed with TSC underwent cardiologic evaluation, including echocardiography, electrocardiography (ECG) and ECG Holter monitoring. Cardiac rhabdomyomas (number, size, location), the presence of arrhythmic events and clinical course were analyzed.
Results: Among the 11 pediatric patients with TSC, five were diagnosed prenatally with cardiac rhabdomyomas, detected by fetal ultrasound. In the remaining six patients, the mean age at symptom onset (neurologic manifestations or arrhythmic events) was six months. Genetic analysis identified TSC1 mutations in four patients and TSC2 mutations in two. Cardiac rhabdomyomas were present in all patients, predominantly multiple and located in the ventricles (left, right or both), with three patients also presenting left atrial involvement; two patients had a solitary lesion. None of the cases showed significant hemodynamic dysfunction. All patients underwent regular cardiologic follow-up, allowing close monitoring of tumor size. ECG abnormalities occurred in three patients, including pre-excitation, repolarization disturbances and premature ventricular beats; two required antiarrhythmic therapy. Extracardiac manifestations included cutaneous (n=11), renal



(n=6), neurologic (n=11), psychiatric (n=4) and ophthalmologic (n=3) involvement. Nine patients experienced seizures during the first months of life and received antiepileptic treatment. During follow-up, most rhabdomyomas decreased in size and arrhythmic events resolved, demonstrating the clinical benefit of systematic cardiologic care.

Conclusions: Cardiovascular manifestations are common in pediatric TSC and early detection supports accurate diagnosis and coordinated multidisciplinary care. In our series, regular cardiologic follow-up allowed early recognition and management of arrhythmic events, with most rhabdomyomas decreasing in size over time and patients showing favorable outcomes. Despite their generally benign course, cardiac rhabdomyomas require regular echocardiographic and ECG monitoring to prevent potential complications.



MP-118 / #1551

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

EPIDEMIOLOGICAL TRENDS IN PEDIATRIC ACUTE MYOCARDITIS BEFORE, DURING, AND AFTER THE COVID-19 PANDEMIC

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Background and Aim: To record the epidemiological characteristics of pediatric patients admitted to the intensive care unit (ICU) with acute myocarditis and to compare these data across the pre-pandemic, pandemic, and post-pandemic COVID-19 periods.
Methods: A retrospective review was conducted of ICU admissions with acute myocarditis from 01/01/2018 to 01/08/2025. The study period was divided into three equal intervals: pre-pandemic (01/01/2018–10/03/2020), pandemic (11/03/2020–05/05/2023), and post-pandemic (06/05/2023–01/08/2025).
Results: A total of 45 patients were admitted during the study period, with a mean age of 11.5 years and a predominance of males (64.4%). A significant increase in incidence was observed during the pandemic, a trend that appears to persist (figure 1.). At presentation, chest pain, tachycardia, and fever were present in more than half of the patients, while a substantial proportion exhibited hypotension and signs of respiratory distress (figure 2.). Four patients (8.8%) presented with cardiogenic shock. Based on the available patient data, ECG abnormalities were observed in 81% of cases and arrhythmias in 17.8%. Additionally, 33.3% of patients presented with valvular disease, most commonly affecting the mitral valve. Left ventricular systolic function was impaired (ejection fraction < 50%) in 33.3% of patients, one-third of whom had severe dysfunction (figure 3.). Median hs-TnI at admission was 949.55 ng/mL (mean: 5960.18 ng/mL). In terms of therapeutic management, 13.3% required mechanical ventilation, 31.1% received inotropic/vasopressor support, and 2 patients were placed on ECMO. Furthermore, 60% of patients were started on ACE inhibitors, while 44.4% received a β-blocker. Association with SARS-CoV-2 was identified in 22.2% of patients: two with active infection, six in the context of multisystem hyperinflammatory syndrome following infection, and two as an adverse event following
vaccination.

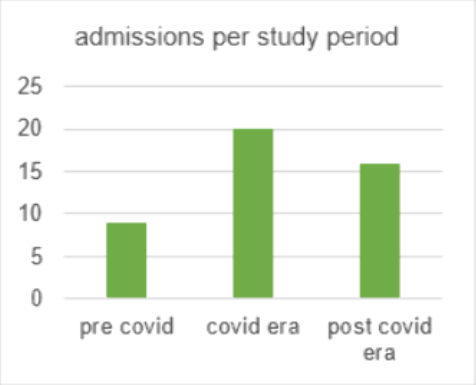


Figure 1. ICU admissions by study time period

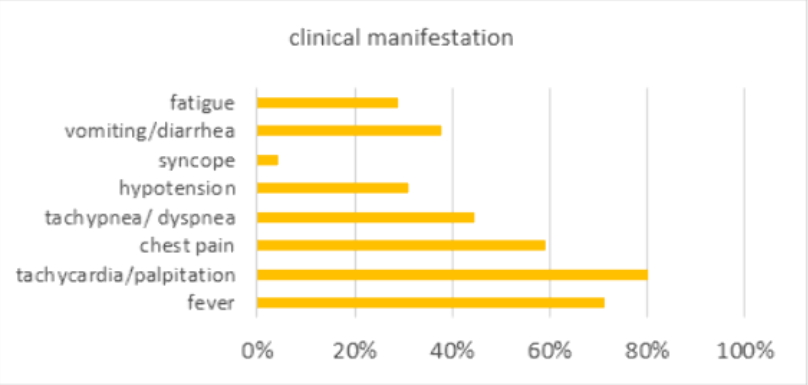


Figure 2. Clinical signs and symptoms at admission

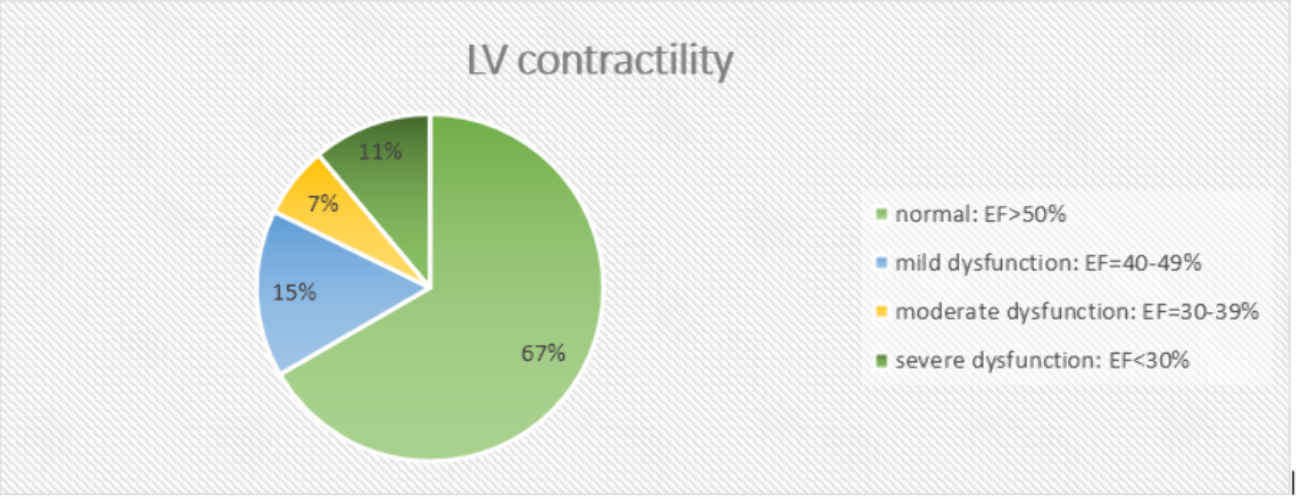


Figure 3. Left ventricular systolic function on admission echocardiography

Conclusions: Since the onset of the COVID-19 pandemic, an increased incidence of acute myocarditis in children has been observed, with SARS-CoV-2 emerging as an additional etiological factor.



MP-119 / #1218

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

RETROSPECTIVE ANALYSIS OF GENERAL ANAESTHETIC RISK IN DILATED CARDIOMYOPATHY PATIENTS

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Background and Aim: Children with dilated cardiomyopathy (DCM) have historically been considered high-risk candidates for general anaesthesia (GA), but there is currently a paucity of evidence regarding the safety of anaesthesia and perioperative outcomes in this population.
Methods: A single-centre retrospective study of paediatric patients with formal DCM diagnosis undergoing GA. Procedure requiring cardiopulmonary-bypass or no contemporary Echocardiography(<6 months) were excluded. Major complications include perioperative mortality, myocardial infarction, new congestive cardiac failure or stroke; while minor complications involved respiratory-distress, unstable blood pressure, arrhythmia (that required treatment) or unplanned admission to intensive-care.
Results: 53 patients with varied aetiology were gathered, underwent 113 procedures of which 38(33.6%) were unplanned. GA's were commonly performed for central line insertion(n=34;30%), orthopaedic surgery(n=19;16.8%), cross-sectional imaging(n=17;15%), ENT procedures (n=8,7.1%), Gastro-intestinal surgery(n=7,6.2%), lumbar puncture(n=6,5.3%), ICD implant(n=5, 4.4%). 33 procedures involved patients with NYHA>1(NYHA 2=15,13.3%; NHYA 3=2,1.8%; NHYA 4=16,14.2%). 83 were on cardiac medications (ACE-I n=60,72.3%; Beta-Blockers n=44,53%; Aldosterone-Antagonist n=41,49.4%; Diuretics n=34,41%). The median LVEF was 51.5%(interquartile-range:29.5%), 25(22.1%) with moderately-impaired function(LVEF20-40%) and 7(6.2%) with severely-impaired function(LVEF<20%). 37(32.7%) had perioperative Holter with 2(5.4%)Atrial-Arrhythmia, 3(8.1%)AV-block and 3(8.1%)NSVT. There were no recorded mortality and no major complication. 7(6.2%) patients developed minor-perioperative complication (respiratory-distress n=1, hypotension n=4, tachycardia n=1, NSVT n=1, moderate-to-severely impaired LV function n=1). There were other cardiac-unrelated complications such



as difficult airway(n=1), hypertension(n=2), aortic thrombus(n=1), hypoglycaemia(n=1) and pyrexial(n=1). Besides moderate-severely impaired LVEF, patients with NHYA of 2-and-above were associated with complications risk (p=0.012). There were 34 planned-CICU admission. Planned-procedures patients were discharged within a day while those with complications required a median stay of 12.5 days(most discharged within 2 days).
Conclusions: In an expert centre, this series demonstrates that DCM patients with at least moderately impaired LVEF and NHYA of 2-and-above were associated with complications risk (p=0.012). Otherwise, DCM patients can be anaesthetised with relatively low minor complications prevalence (6.2%) in-comparison to patients with. Planned procedures were associated with shorter admission.



MP-120 / #1240

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

MITRAL VALVE REPAIR IN PEDIATRIC DILATED CARDIOMYOPATHY WITH SEVERE MITRAL VALVE REGURGITATION: A PROMISING BRIDGE TO HEART TRANSPLANT

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Background and Aim: New strategies are needed for pediatric patients with end-stage heart failure due to the limited availability of suitable pediatric donors. In patients with progressing dilated cardiomyopathy (DCM) often leads to clinical destabilization and decompensated heart failure. This study evaluated the role of mitral valve repair/replacement as a bridge to heart transplantation in this population.
Methods: Retrospective cohort analysis was conducted at a single tertiary care center, King Faisal Specialist Hospital& Research Centre, Riyadh, in pediatric patients (≤14 years, per Saudi definition) with DCM who underwent surgical intervention for moderate-to-severe functional MR between 2011 and 2025. Patients with congenital, metabolic or connective tissue disorders were excluded. We analyzed medical records for clinical presentation, echocardiographic parameters, natriuretic peptide levels (NT-proBNP) and outcomes.
Results: 11 pediatric patients with DCM and moderate to severe functional MR were included. Age at mitral valve intervention ranged from 1 to13 years (mean: 6.2 years). All patients were listed for heart transplantation preoperatively. Median LVEF was 32% with markedly dilated LV (median LVEDD Z-score: +7.8; median LVESD Z-scores +11). Mitral valve repair was performed in most cases, while mitral valve replacement was required in two cases. Postoperatively, MR severity improved in the majority of patients. Early mortality occurred in two patients within the first two months of surgery, due to infection, and one improved initially, then deteriorated and died at another institution. The remaining 8 patients demonstrated clinical and echocardiographic improvement over a mean follow-up of four years and were successfully delisted from the heart transplant list, with improved quality of life and reduced heart failure medication requirements. Among survivors, seven showed significant improvement; LVEF improved to 40–53% (median: 46.7%). One recently operated patient (May 2025) showed improvement in LV-EF from 20% to 29% with marked



clinical stabilization. Median LVEDD Z-score improved to + 3.3, and median LVESD Z-score to +4.9. Functional class improved from NYHA III–IV to I. NT-proBNP decreased from a mean of 19,050 pg/mL pre-surgery to 320 pg/mL postoperatively.

Conclusions: Mitral valve repair/replacement in selected pediatric DCM with severe functional MR can offer meaningful ventricular recovery, clinical stabilization, biochemical improvements, delaying or even obviating the need for transplantation.



MP-121 / #681

SESSION 7 - CARDIOMYOPATHIES
15-05-2026 13:15 - 14:15

MYBPC3 VARIANT IN PEDIATRIC HCM: ATHLETE CASE INSIGHTS

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Background and Aim: Hypertrophic cardiomyopathy (HCM) is a primary genetic cardiomyopathy and a leading cause of sudden cardiac death in young athletes, with MYBPC3 variants among the most frequent sarcomeric causes. This case describes an asymptomatic adolescent elite athlete with non-obstructive HCM identified at routine sportive medical screening and carrying a pathogenic MYBPC3 mutation.
Methods: A 16-year-old male competitive athlete was referred after abnormal findings on a routine sports medical evaluation. Clinical examination was unremarkable and the patient denied any cardiac symptoms or exercise intolerance. Baseline electrocardiogram showed minimal ST-segment depression and T-wave inversion in inferior leads (D2, D3, aVF). Transthoracic echocardiography revealed asymmetric, non-obstructive septal and inferior left ventricular hypertrophy with preserved systolic and diastolic function.
Twenty-four-hour Holter monitoring documented no ventricular arrhythmias and only rare isolated supraventricular extrasystoles (<1% burden). Cardiomyopathy gene panel testing identified a pathogenic MYBPC3 mutation. Cardiac magnetic resonance and cardiopulmonary exercise testing were performed to refine risk stratification.
Results: Cardiac magnetic resonance confirmed hypertrophy of the inferoseptal and mid-ventricular left ventricular segments without regional wall-motion abnormalities or systolic dysfunction. Cardiopulmonary exercise testing demonstrated a peak oxygen consumption at the lower limit of normal, with preserved ventilatory function, consistent with mildly reduced maximal aerobic capacity and possible early subclinical diastolic impairment related to HCM. Given the absence of symptoms, lack of documented arrhythmias and non-obstructive physiology, no beta-blocker therapy was needed and the patient entered a structured follow-up programme with tailored recommendations for sports participation.
Conclusions: This case highlights the marked phenotypic variability associated with MYBPC3 mutations, particularly across age groups. Only a limited number of paediatric



cases carrying this MYBPC3 variant have been reported so far, which further increases the uncertainty regarding long-term arrhythmic risk and optimal management in this age group. Adult carriers often exhibit lower penetrance, delayed disease expression and a comparatively longer life expectancy, underscoring the importance of early identification, age-tailored risk stratification and close follow-up in children and adolescents. In contrast, in paediatric patients, this genotype has been linked to a more severe clinical course, with higher rates of ventricular arrhythmias, frequent need for device implantation and sudden cardiac arrest, translating into a guarded prognosis.



MP-122 / #583

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

HEART FAILURE IN ADULTS WITH CONGENITAL HEART DISEASE: CLINICAL FEATURES AND PROGNOSTIC RISK FACTORS

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Background and Aim: Heart failure (HF) represents one of the most frequent causes of mortality in adults with congenital heart disease (ACHD), although clinical features and prognostic factors remain poorly characterized. This study aimed to analyse the clinical presentations and features associated with adverse outcome in patients with ACHD and HF.
Methods: Consecutive patients with congenital heart disease and biventricular circulation who were admitted for HF at the age of ≥ 16 years old were retrospectively enrolled. Clinical and echocardiographic variables were extracted from hospital databases. Cumulative incidence of the composite outcome of recurrent HF hospitalization and cardiovascular death was estimated using the Kaplan-Meier method. Cox proportional hazards regression was used to assess the associations between quantitative parameters or clinical factors and the composite outcomes.
Results: The study included 257 patients. Of them, the majority had a reduced systolic function of the sub-pulmonary ventricle (n = 179, 70%) and a preserved systolic function of the systemic ventricle (n = 146, 57%). Over a median follow-up of 9.3 years, 45 patients experienced the study composite endpoint. No significant difference was observed in event-free survival according to the ventricular systolic function, although patients with reduced systolic function of the sub-pulmonary ventricle showed a trend towards a worse outcome as compared to those who had it preserved (p = 0.09). Prognostic markers significantly associated with the composite endpoint included age (p = 0,013), arterial hypertension (p = 0,029), diabetes mellitus (p = 0,046), Tricuspid Annular Plane Systolic Excursion (p = 0,001), elevated N-terminal pro-B-type Natriuretic Peptide (p<0,001).



Conclusions: The study results highlight the pivotal role of the systolic sub-pulmonary ventricular function in HF-ACHD clinical presentation and outcome. Common risk factors generally encountered in adult population were shown to be associated with adverse outcome, thus highlighting the importance of monitoring strategy of acquired conditions while treating HF- ACHD.



MP-124 / #316

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

SYSTOLIC DYSFUNCTION IN PEDIATRIC PATIENTS WITH CONGESTIVE HEART FAILURE SECONDARY TO RHEUMATIC HEART DISEASE IN MANITOBA, CANADA

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Background and Aim: Although Canada's classification as a high-income nation with an advanced healthcare system, the incidence of acute rheumatic fever (ARF) and Rheumatic Heart Disease (RHD) persists among certain populations. Heart failure frequently arises as a complication of severe RHD, contributing to considerable premature morbidity and mortality. The role of active rheumatic myocarditis as a primary etiological factor for heart failure remains a contentious issue within the medical literature. This study aims to identify patients with acute clinical RHD and seeks to detect individuals exhibiting systolic dysfunction as evidenced by echocardiography.
Methods: This study conducted a retrospective review of all cases of ARF and RHD in children aged 0–18 years in the Province of Manitoba, Canada, from January 2022 to October 2025. The diagnosis was established based on the modified Johns criteria and echocardiographic assessments, while the severity of the disease was evaluated using both clinical and echocardiographic methods.
Results: The study involved 30 patients diagnosed with ARF, with a mean age of 10 years (ranging from 1.8 to 17.2 years). Among these patients, 9 presented with moderate RHD, while 6 exhibited severe RHD. Notably, only one patient was identified with systolic dysfunction, who demonstrated some improvement following valve replacement. It is noteworthy that the cardiac MRI did not reveal any indications of myocardial injury.
Conclusions: Active rheumatic myocarditis as a primary cause of heart failure has been a topic of considerable debate. In severe cases of RHD, acute valvular regurgitation, which is secondary to annular dilation and chordal elongation of the anterior leaflet, rather than rheumatic myocarditis, is associated with the development of heart failure[1]. The significant improvement often observed following surgical intervention supports this hypothesis. Furthermore, the absence of myocyte necrosis in right ventricular biopsy specimens has been documented[2]. A study conducted on pediatric patients with active RHD, utilizing cTnT levels as an indicator of myocardial damage, revealed that cTnT levels



did not exhibit a significant increase, suggesting a minor effect on the myocytes. Nevertheless, it is widely accepted that myocarditis, in the absence of valvular disease, is unlikely to have a rheumatic etiology.



MP-125 / #384

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

DEUBIQUITINATING ENZYMES ARE A NEW THERAPEUTIC TARGET FOR THE CORRECTION OF ISCHEMIC-REPERFUSION MYOCARDIAL INJURY.

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Background and Aim: Background. The development of drugs targeting the ubiquitinating system is a promising area of cardiac pharmacology. However, studies of USP expression have been conducted in vivo using coronary artery ligation models to simulate myocardial infarction, which, in turn, is incrementally linked to the influence of endogenous factors on the autoregulation of deubiquitinating enzymes.
The aim of this study was to evaluate the role of USP-40 and USP-28 expression in an isolated rat heart model.
Methods: The study was approved by the Ethical Committee of the Bashkir State Medical University (protocol N1 dated 01/30/2024). All experimental work was performed on 90 labrats using the isolated heart model according to the Langendorff method. The animals were divided into 3 groups: an intact group, a study group (ischemia-reperfusion modeling without therapy), and a group receiving metoprolol 1 mg/kg intravenously. The ischemia period lasted 40 minutes, the reperfusion period - 2 hours. Immunohistochemical study was performed using antibodies to desmin (clone DE-R-11, Ventana Medical Systems Inc., USA), antibodies to ubiquitin (clone 6G6, huabio, China), USP40 / USP28 (polyclonal, biorbyt, China).
Results: When assessing the loss of expression to desmin in the control group, 12.7% ($p<0.05$) of the total area was detected, while after ischemia, the foci accounted for 22.7% ($p<0.05$). In addition, in the ischemia group, ubiquintin is intensively expressed throughout the section, with the exception of the subendocardial localization of the left ventricle. This is confirmed by reverse staining for desmin, in which areas of subendocardial localization are well expressed. Loss of expression (early ischemic contracture lesions) is observed mainly in the subepicardial zone of the left ventricle. When staining for USP40, single expression substitutions are observed on cells perivascularly and in the interstitial space.
Conclusions: The development of pharmacological agents that affect the ubiquitinating system is a promising direction in the development of modern cardiometabolic drugs. This



study was supported by the Russian Science Foundation ("The role of deubiquitinating enzymes in ischemic reperfusion injury of the myocardium and the discovery of leading compounds" 24-45-00071 to A.S.) and the National Natural Science Foundation of China (82361138563 to Y.W.).



MP-126 / #390

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

WHEN GENETICS SHAPES THE FATE: NEONATAL FATAL CASES OF PRIMARY PULMONARY HYPERTENSION

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Background and Aim: Persistent pulmonary hypertension of the newborn (PPHN) is a serious condition often presenting as the first clinical manifestation of genetic disorders related to lung development. While PPHN occurs in 1 to 2 per 1,000 live births, genetic causes of paediatric pulmonary hypertension are rare, with an estimated incidence of 1 to 10 per million. These conditions can be refractory to standard treatments, including prolonged extracorporeal membrane oxygenation (ECMO). Early recognition of the genetic causes of PPHN is essential for accurate diagnosis, appropriate management, family counselling, and advancing research. This report aims to present two cases of severe PPHN associated with rare genetic disorders, highlighting the importance of early recognition and the critical role of genetic testing in diagnosing and managing these complex cases.
Methods: We report two cases of severe neonatal PPHN linked to rare genetic findings.
Results: A full-term neonate (41^{+1}) developed cyanosis and hypoxemia (80% oxygen saturation) within 24 hours of life. Echocardiography showed severe pulmonary hypertension with right heart dilation. Despite intubation, inhaled nitric oxide, and escalation of pulmonary hypertension therapies, the infant progressed to shock, refractory hypoxemia, and right ventricular failure. After ruling out structural heart disease, infection, and lung pathology, she was transferred for ECMO. Despite 8 days on ECMO and balloon atrial septostomy, her condition worsened. Genetic testing revealed a heterozygous likely pathogenic variant in the FOXF1 gene, associated with alveolo-capillary dysplasia, with misalignment of pulmonary veins, and she died on day 33 after hemodynamic collapse and cardiopulmonary resuscitation (CPR). A late preterm neonate (36+2 weeks) with severe intrauterine growth restriction was diagnosed with aortic arch hypoplasia and other congenital anomalies. Echocardiography revealed a significant patent ductus arteriosus and severe pulmonary hypertension. Despite surgery to address ductal closure, he



developed refractory pulmonary hypertension and multiorgan failure. Genetic analysis revealed two pathogenic variants: a 5q duplication associated with congenital heart defects and aortic arch anomalies, and a 20p deletion. After redirecting care, the infant died at 3 months.

Conclusions: Genetic testing is vital for identifying underlying causes, guiding treatment, and determining prognosis in neonates with severe and refractory PPHN. **Timely genetic diagnosis** informs treatment and family counselling decisions.



MP-127 / #196

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

SINGLE CENTRE CLINICAL EXPERIENCE WITH SODIUM-GLUCOSE CONTRANSPORTER-2 INHIBITORS IN PAEDIATRIC HEART FAILURE

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Background and Aim: Sodium–glucose cotransporter-2 inhibitors (SGLT2i), originally developed as antidiabetic agents, are now well established in adult heart failure (HF) management due to demonstrated benefit across the HF spectrum. In paediatrics, their approved use is limited to type 2 diabetes in children ≥10 years, and evidence regarding their role in paediatric HF remains limited. This study aimed to describe real-world, single-centre clinical experience with SGLT2i in children with HF of various aetiologies.
Methods: We performed retrospective review of paediatric patients treated with SGLT2i between 2023 and 2025 at a tertiary paediatric cardiac centre. Six patients were identified (median age 15.5 years; range 3–16). Treatment duration had a median of 10 months. Four patients received dapagliflozin and two received empagliflozin. The cohort included both heart failure with reduced ejection fraction (HFrEF) , heart failure with preserved ejection fraction (HFpEF), and children with congenital heart dissease (CHD). Clinical response, renal function, and adverse effects were evaluated.
Results: The standard initial dose used was 0.1 mg/kg per day. Among patients with HFrEF at baseline, four demonstrated improvement in systolic function during follow-up. NT-proBNP levels decreased in 4 of 6 patients, with notable reductions . Two patients experienced increases, corresponding to their underlying disease trajectory rather than drug intolerance. All patients demonstrated glycosuria as expected with SGLT2 inhibition. A mild decrease in estimated glomerular filtration rate (eGFR) of approximately 0.16 ml/kg/min was observed in three patients. No serious adverse events occurred. Reported side effects were consistent with known safety data with a low incidence of mild adverse events (~10%) and rare severe events (<1%), most commonly urinary tract infections. Overall tolerance was good, and no patient required discontinuation.
Conclusions: In this small cohort, SGLT2 inhibitors were safe and associated with clinically meaningful improvements in NYHA class, systolic ventricular function, and NT-proBNP in a majority of treated children. The therapy was well tolerated with no serious adverse events. These findings support the potential role of SGLT2i as adjunctive therapy in paediatric HF; however, larger prospective studies are required to confirm efficacy and



assess long-term safety. Use should be avoided in patients with type 1 diabetes or severe renal dysfunction.



MP-128 / #281

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

13 YEARS OF LİFE WİTH AN L-VAD: A RARE CASE SUCCESSFULLY BRİDGED TO HEART TRANSPLANTATİON AFTER AN EXTREMELY LONG WAİTİNG PERİOD

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Background and Aim: Long-term L-VAD (Left Ventricular Assist Device) support in pediatric patients is uncommon, and transition to adulthood with continuous mechanical circulatory support is rarely reported. We present a unique case of a patient who received an L-VAD in childhood and remained on support for 13 years before undergoing a successful heart transplantation. The aim of this report is to describe the exceptional clinical course and to emphasize the challenges and key considerations in long-term L-VAD management from childhood to adulthood.
Methods: Clinical records of a patient with childhood-onset L-VAD support for 13 years were retrospectively reviewed, focusing on follow-up data, complications, and outcomes after adult heart transplantation.
Results: A 7-year-old girl with dilated cardiomyopathy developed progressive, treatment-refractory heart failure and underwent implantation of a L-VAD in 2012 as a bridge to transplantation. Early postoperative pneumonia and pleural effusion were promptly resolved with appropriate therapy, allowing stable long-term follow-up under oral anticoagulation. Over 13 years of L-VAD support, the patient experienced 24 driveline infections, all successfully managed with targeted antibiotic therapy. Two transient ischemic attacks and two episodes of pump thrombosis occurred, each resolving without permanent sequelae and without the need for surgical intervention. This prolonged course highlights both the durability of L-VAD therapy and the intensive follow-up required when initiated in childhood. After 13 years of continious L-VAD therapy, the patient presented with abdominal pain and underwent surgery for a left ovarian endometrioma and associated endometriotic lesions. On postoperative day three, a suitable donor became available, and orthotopic heart transplantation was performed. The postoperative course was uneventful, and the patient was discharged on day 35. She remains clinically stable at 8 months post-transplant.



Conclusions: This case demonstrates that L-VAD support initiated in childhood can remain effective for more than a decade, even in the presence of recurrent infections and thromboembolic events. Despite the extraordinary duration of support, careful multidisciplinary management preserved transplant eligibility and enabled an excellent post-transplant outcome. This exceptional clinical course highlights the true durability of modern L-VAD therapy and its potential to safely bridge pediatric patients to adult heart transplantation.



MP-129 / #353

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

THYMECTOMY DURING IINFANCY IS ASSOCIATED WITH A HIGHER BURDEN OF INFECTIONS – A RETROSPECTIVE COHORT STUDY AMONG HEART TRANSPALNTED CHILDREN.

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Background and Aim: Congenital heart surgery requires partial or total thymectomy. Previous studies have shown that thymectomy increases the risk of PTLD and is associated with unfavorable immune laboratory findings. However, its clinical impact on infection risk remains unclear. The aim of the present study was to explore whether thymectomy in infancy was associated with a susceptibility for infections.
Methods: We conducted a retrospective cohort study of patients who underwent heart transplantation during childhood, between 2001 and 2024 in our center, and divided them into two groups; 1 children who had undergone sternotomy including thymectomy before one year of age and 2 children undergoing sternotomy including thymectomy after one year of age. Medical reports were scrutinized regarding infections from the date of transplantation to December 1,2025 or until the date of death, if applicable. We analyzed both recurrent infection episodes and individual events (≥1 episode per patient). Incidence rates were calculated per person-year, and comparisons between groups were performed using Poisson rate ratios (RR) with 95% confidence intervals (CI) and two-sample Poisson tests.
Results: A total of 81 subjects were analyzed; 40 underwent thymectomy under one year of age (total follow up 436.31 person-years) and 41 underwent thymectomy after one year of (total follow up 288.08 person-years). Patients who underwent thymectomy before one year of age had longer follow-up (mean follow-up time 3886 days vs 2592 days) and significantly higher incidence of sepsis (RR:7.26, $p < 0.05$), RS virus (RR=7.26, $p < 0.05$), Influenza/parainfluenza (RR:6.6, $p < 0.05$) and Calicivirus(RR=3.3, $p < 0.05$). Other outcomes, such as upper respiratory infections and skin/soft tissue infections, showed no significant differences between the groups.
Conclusions: Thymectomy during infancy was associated with an increased risk for severe infections such as sepsis and certain viral infections among heart transplanted children. These findings complement the previous evidence about the association between early



thymectomy and higher risk for PTLD and suggest a broader impact of immune incompetence after thymectomy in infancy.



MP-130 / #357

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

ECHOCARDIOGRAPHIC RIGHT VENTRICULAR WALL TENSION IN EXTREMELY PRETERM INFANTS WITH BRONCHOPULMONARY DYSPLASIA-ASSOCIATED PULMONARY HYPERTENSION

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Background and Aim: Echocardiographic determination of right ventricular wall tension (RVWTe) is a novel parameter for assessing pulmonary hypertension (PH). We aimed to investigate RVWTe in extremely preterm infants with and without bronchopulmonary dysplasia-associated PH (BPD-PH).
Methods: Echocardiographic analysis was performed in extremely preterm infants (<26 weeks' gestation) with and without BPD-PH at a chronological age of three and twelve months (n=32).
Results: BPD-PH was diagnosed in 15/32 at three months and resolved in 9/15 following PH-targeted therapy after 12 months of chronological age. RVWTe values were significantly higher in infants with BPD-PH compared to those without BPD-PH ($p<0.001$). In addition, RVWTe significantly correlated with other echocardiographic variables of RV pressure load/remodelling (e.g. left ventricular eccentricity index, RV/LV dimension ratio, and pulmonary artery acceleration time), but not with markers of RV systolic function (e.g. tricuspid annular plane systolic excursion).
Conclusions: RVWTe appears to be a feasible and promising bedside marker of RV remodelling and dilatation. Its potential role in monitoring BPD-PH and clinical decision-making warrants further investigation.



MP-131 / #375

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

VARS2-RELATED MITOCHONDRIAL CARDIOMYOPATHY WITH SEVERE PULMONARY HYPERTENSION: RECOVERY FOLLOWING VALINE THERAPY

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Background and Aim: Mitochondrial diseases are a rare cause of cardiomyopathy and most frequently manifest as hypertrophic cardiomyopathy. The *VARS2* gene encodes a mitochondrial valyl-transfer RNA synthetase which is essential for mitochondrial translation. This case illustrates the beneficial effects of valine supplementation in *VARS2*-related mitochondrial cardiomyopathy.
Methods: We describe a male infant with profound hypertrophic cardiomyopathy and pulmonary hypertension associated with *VARS2* missense variants of uncertain significance.
Results: The patient was the second child of non-consanguineous healthy Chinese parents. The family history was notable for an elder sibling who died at 4 months from cardiac failure with hypertrophic cardiomyopathy, pulmonary hypertension, and suspected mitochondrial disease. Early postnatal echocardiography demonstrated moderate pulmonary hypertension with right heart dilation, prompting initiation of sildenafil. By 3 months, he developed refractory pulmonary hypertension requiring transfer for advanced management. Echocardiography revealed severe biventricular hypertrophy and systemic right ventricular pressures. Metabolic work-up showed elevated plasma lactate and alanine. His plasma acylcarnitine profile showed mild elevations of malonylcarnitine (C3DC)/3-hydroxy-butyrylcarnitine (C4OH) and decanoylcarnitine (C10). At 4 months, he suffered recurrent pulmonary hypertensive crises culminating in cardiopulmonary arrest and veno-arterial extracorporeal membrane oxygenation (ECMO) support for one week. Cardiac catheterization confirmed pre-capillary pulmonary hypertension with a mean pulmonary artery pressure of 45 mmHg. Despite successful ECMO decannulation, he remained ventilator-dependent, required high-dose inotropic support, and was treated with maximal pulmonary vasodilator therapy including sildenafil, bosentan, selexipag, and



inhaled nitric oxide. Whole-exome sequencing identified compound heterozygous *VARS2* missense variants of uncertain significance (c.1940C>T; p.Thr647Met and c.763A>G; p.Lys255Glu), inherited from parents. Fibroblast oxygen consumption rate analysis demonstrated normalization of mitochondrial respiration with valine supplementation. Valine therapy (100 mg/kg/day) was initiated at 4 months; however, significant enteral intolerance precluded sustained dosing initially. Gastrointestinal tolerance improved at 11 months, allowing titration to 160 mg/kg/day by 12 months. Subsequently, he showed marked improvement in pulmonary hypertension and favourable ventricular remodelling, enabling discontinuation of inhaled nitric oxide, successful extubation and weaning of pulmonary vasodilator therapy at 1 year of age.

Conclusions: Functional metabolic assays may provide mechanistic insights and offer potential precision therapy for mitochondrial cardiomyopathy. This case highlights the targeted use of valine supplementation, which contributed to reversal of the cardiac phenotype.



MP-132 / #482

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

DISTINCT CLINICAL PHENOTYPIC PRESENTATION OF HEART FAILURE ACROSS AGE IN PEDIATRIC MYOCARDITIS

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Background and Aim: Pediatric myocarditis is a rare but clinically significant condition with a heterogeneous presentation. Heart failure (HF) may range from preserved ejection fraction (HFpEF) to severe systolic dysfunction (HFrEF) and cardiogenic shock. The widespread adoption of cardiac MRI (cMRI) has greatly improved diagnostic accuracy, particularly in patients with HFpEF. We retrospectively evaluated HF presentation in our pediatric cohort according to the diagnostic pathway, namely endomyocardial biopsy (EMB) and cMRI.
Methods: We retrospectively reviewed all paediatric patients (aged 0–18 years) admitted to our center with acute myocarditis between 1988 and 2024. For each case, we evaluated age, diagnostic modality (EMB vs cMRI) and mechanical cardiac support (MCS) requirement (ECMO and/or VAD). Age was analysed in prespecified groups (<2 years, 2–11 years, ≥12 years) and as a continuous variable (year-by-year). Diagnostic modality and MCS use were compared across age categories.
Results: A total of 279 patients (mean age 9.3±7.8 years; 66% male) were included. EMB was performed in 141 patients (51%), while 137 (49%) underwent CMR. Twenty-three patients (8%) required MCS. Diagnostic strategy showed a strong age-dependent distribution • <2 years (n=66): EMB in 65/66 (98.5%); CMR in 1/66 (1.5%); MCS in 13.6%.
• 2–11 years (n=86): EMB in 56/86 (65.1%); CMR in 30/86 (34.9%); MCS in 8.1%.
• ≥12 years (n=127): EMB in 20/127 (15.7%); CMR in 106/127 (83.5%); MCS in 5.5%. Year-



by-year analysis confirmed a continuous trend. EMB predominated in early childhood, peaking at age 1 (45 EMB vs 1 cMRI), and declined progressively with age. In adolescence, cMRI became predominant and eventually the exclusive diagnostic tool. All MCS cases occurred in patients diagnosed through EMB, consistent with more severe clinical presentation.

Conclusions: Age strongly influenced clinical presentation, diagnostic and therapeutic approach in paediatric myocarditis. Infants and young children exhibited a high-risk phenotype characterized by severe ventricular dysfunction and cardiogenic shock, leading to predominant EMB use and higher MCS requirements. Adolescents showed a lower-risk profile, with widespread CMR utilization and reduced MCS need. These findings support age-tailored diagnostic strategies and may reflect underlying biological differences in disease expression across pediatric age groups.



MP-133 / #833

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

IRON DEFICIENCY IN PAEDIATRIC PATIENTS WITH HEART FAILURE – PRELIMINARY STUDY

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Background and Aim: Iron deficiency is a common problem in the adult heart failure population, but remains understudied in paediatric patients. As an independent risk factor, it is associated with adverse outcomes, such as a greater risk of death or heart transplantation. Our study aims to evaluate the prevalence of iron deficiency and the risk factors among paediatric patients.
Methods: This is a single-center, cross-sectional study of patients aged 1-17 years hospitalized with heart failure in our department from 06.2025 to 11.2025. Serum iron studies were performed along with routine blood tests. Iron deficiency was defined as transferrin saturation (TSAT) <20%, a novel threshold proposed by Packer et al. for the heart failure population. In our study, we compared patients with iron deficiency to those without iron deficiency. A linear regression model was used to investigate determinants of TSAT level among heart failure patients. The model was adjusted for age.
Results: Of the 38 subjects, iron deficiency was present in 38.6% patients (N=14). Demographic and etiologic factors of heart failure were not associated with iron deficiency. 18.4% of patients (N=7) had anemia. Iron deficiency was not associated with a higher prevalence of anemia (21.4% vs 16.7%, p=0.516), and groups didn't differ in hematological parameters. Patients with iron deficiency had significantly lower ferrum concentration (43.6±4 µg/dl vs 99±6 µg/dl, p<0.001), no significantly lower ferritin concentration (38.7 ng/ml [IQR 14.8-71.3] vs 63.5 ng/ml [IQR 33.2-88], p=0.131), and no significantly higher total iron binding capacity (TIBC) (343.6±19.5 µg/dl vs 318±12.2 µg/dl, p=0.131). Clinical factors, including N-terminal pro-B-type natriuretic peptide (NT-proBNP), impaired systolic function, and single-ventricle circulation, entered the multivariable model for TSAT level. The model had a moderate goodness of fit (R^2 = 0.31, adjusted R^2 = 0.26). Higher NT-proBNP [β=-3.35; 95%CI -5.96 to -0.76, p=0.013], single-ventricle circulation [β=-9.16;



95%CI -16.95 to -1.38, p=0.022] are associated with lower TSAT.

Conclusions: Iron deficiency is a frequent issue in paediatric heart failure population with a prevalence of 38.6% in our study. Nevertheless, it is not frequently coexisting with anemia in our findings. Higher NT-proBNP levels and single-ventricle circulation are associated with lower TSAT levels.



MP-134 / #935

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

DEVELOPMENT OF A FLOW-INDUCED FEMALE PULMONARY ARTERIAL HYPERTENSION MODEL AS A PLATFORM FOR STUDYING SEX-SPECIFIC DISEASE MECHANISMS

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Background and Aim: Pulmonary arterial hypertension (PAH) is a rare, progressive, and fatal disease. Animal models are developed to investigate disease mechanisms and identify new therapeutic targets, but are predominantly based on males. Females are less prone to clinical heart failure compared to males, which highlights the importance of studying both sexes. We aimed to develop a female flow-induced PAH animal model to study the impact of sex on disease development and heart failure.
Methods: Twelve female rats received 60 mg/kg monocrotaline on day 1 to induce endothelial dysfunction, followed by aortocaval shunt surgery on day 8, similar to our established male flow-induced PAH model. Eight female controls received saline injection and sham surgery. Echocardiography and right heart catheterization were performed on day 28, corresponding to end-stage PAH in our male model. Data were compared to previously reported day 28 male control (n=3) and PAH (n=5) rats.
Results: Both female and male PAH rats show significantly increased ($p<0.0001$) systolic right ventricular pressure (24 ± 3 to 56 ± 6 mmHg), systolic pulmonary artery pressure (24 ± 1 to 51 ± 10 mmHg), and mean pulmonary artery pressure (18 ± 1 to 35 ± 5 mmHg) compared to controls. Mean right atrial pressure was also significantly elevated in female PAH rats compared to female controls (1 ± 2 to 6 ± 4 mmHg, adjusted $p=0.0302$), which was not seen in males. The right ventricular to left ventricular andseptal weight ratio indicated hypertrophy in both sexes. Interestingly, liver wet/dry ratio, a marker for liver oedema and congestive right ventricular failure, were higher in females than in males for both the control (adjusted $p=0.0051$) and PAH (adjusted $p=0.0170$) group. However there was no significant difference between female control and PAH rats.
Conclusions: Using 60 mg/kg monocrotaline with an aortocaval shunt, PAH can be induced in female rats with pressure increases similar to those observed in males. Future



research allows to characterize female pulmonary vascular remodelling (e.g., muscularization, neo-intimal formation) and explore sex-specific differences in disease characterization and progression. These findings may help identify new targets for sex-tailored PAH therapies.



MP-135 / #1237

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

SACUBITRIL/VALSARTAN IN PAEDIATRIC HEART FAILURE: EARLY UK SINGLE-CENTRE EXPERIENCE

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Background and Aim: Sacubitril/valsartan, an angiotensin receptor–neprilysin inhibitor (ARNI), is increasingly used in paediatric heart failure. Published data are largely limited to the PANORAMA-HF trial and small non-UK single-centre studies. We report, to our knowledge, the first UK single-centre experience of ARNI therapy in a tertiary-paediatric cardiology centre.
Methods: Retrospective review of all patients issued sacubitril/valsartan, January 2023–August 2025. Electronic records reviewed for baseline and follow-up clinical, laboratory, and echocardiographic data. Data are presented descriptively due to small heterogeneous cohort.
Results: Nine patients (6=male, 3=female; age 0.6–17.1y, mean 5.4y) commenced ARNI therapy; 6/9 were on an active transplant list. Diagnoses included dilated (n=5) and restrictive (n=1) cardiomyopathy, post-chemotherapy cardiomyopathy (n=1), and complex congenital heart disease with single-ventricle physiology (n=2). Most started ARNI to aid weaning from intravenous milrinone (n=8) and were on optimised concomitant heart failure therapy. Baseline LV function was severely impaired in most (median fractional shortening (FS) 9%); one patient had preserved systolic function. Therapy duration ranged 2 days–18.5 months (median ~4.5 months); three remained on therapy at latest follow-up. Six discontinued due to transplant (n=3), LVAD (n=1), post-operative intervention (n=1), or hypotension (n=1). Target dose was achieved in 4/9 (44%), with dose increases limited by high urea (n=3) or hypotension (n=1). Table 1 shows laboratory values were generally stable; rises in urea, creatinine, and BNP are confounded by acute deterioration in some patients. Blood pressure remained predominantly within age-appropriate ranges. Post-ARNI FS remained stable (median 15%), with minor improvements; heterogeneity and operator variability limit conclusions. IV milrinone was successfully weaned in 5 patients (55%), permitting hospital discharge. **Table 1. Mean laboratory values and blood-pressure range pre- and post-ARNI***

Parameter	Pre-ARNI	Post-ARNI*



Haemoglobin (g/L)	118	109
Creatinine (µmol/L)	33	53
Urea (mmol/L)	5.0	7.4
NT-proBNP (ng/L)	7,242	7,716
Potassium (mmol/L)	3.9	4.2
BP Systolic/Diastolic (mmHg)	114-68 / 76-24	97-67 / 53-24

*Post-ARNI values represent most recent clinical encounter whilst on ARNI.

Conclusions: ARNI therapy was generally safe and tolerated. Dose optimisation was sometimes limited by renal function or hypotension, but most patients could wean from IV medications, enabling discharge. Further UK-wide review is recommended to support structured titration plans and standardised monitoring for safe, efficient dose escalation.



MP-137 / #1378

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

CARDIAC MAGNETIC RESONANCE–DERIVED MYOCARDIAL STRAIN IN CLINICALLY STABLE PEDIATRIC HEART TRANSPLANT RECIPIENTS

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Background and Aim: In heart transplant (HT) recipients, rejection remains a major cause of morbidity and mortality, and current surveillance strategies rely on endomyocardial biopsy. However, asymptomatic rejection is difficult to identify using non-invasive techniques. While myocardial strain assessment by echocardiography has shown utility, the role of cardiac magnetic resonance (CMR)–derived strain has not been fully explored. This study evaluated CMR-based myocardial strain in clinically stable pediatric HT recipients as a potential non-invasive marker of rejection.
Methods: We conducted a prospective 4-year study (January 2021–December 2024) including asymptomatic pediatric HT recipients (NYHA class I) more than two years post-transplantation, with age- and sex-matched healthy controls included at a 2:1 ratio. The CMR protocol included cine imaging, post-contrast sequences, and T1/T2 mapping, with global longitudinal (GLS), circumferential (GCS), and radial strain (GRS) derived using feature tracking. All CMR analyses were performed by a radiologist blinded to clinical and histological data. CMR findings were compared with routine biopsy results graded according to ISHLT criteria for acute cellular (0R–3R) and antibody-mediated rejection (pAMR 0–3).
Results: Thirty-two HT recipients (65.6% male) and 64 controls were included. Median age was 11 years [IQR 9–11], and median time since transplantation was 7 years [3.25–11.5]. All patients had preserved systolic function (LVEF 69.5% [65–71.75]). Compared with controls, LVEF did not differ, while HT recipients showed significantly higher native T1, extracellular volume, and T2 values and significantly reduced GLS, GCS, and GRS (all $p<0.05$). Late gadolinium enhancement was present in 3 patients. Strain parameters were not associated with ischemic or extracorporeal circulation times but correlated with the need for post-



operative mechanical circulatory support (p=0.048). No association was observed between tissue mapping or strain parameters and rejection status, in a cohort in which all rejection episodes were limited to mild acute cellular rejection (1R) and no antibody-mediated rejection was identified.

Conclusions: In clinically stable HT recipients with preserved function, CMR reveals subtle myocardial abnormalities, including impaired strain and altered tissue mappings. While the limited sample size and the absence of moderate/severe rejection prevented demonstrating an association with acute rejection, these findings support the role of CMR-derived strain as a potential marker.



MP-138 / #1512

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

EXTENDED MACHINE LEARNING PREDICTION OF RECURRENT VASOVAGAL SYNCOPE IN CHILDREN: INCORPORATING HEMODYNAMIC PARAMETERS

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Background and Aim: Vasovagal syncope (VVS) affects approximately 17% of children, significantly impairing their quality of life. Our pilot study demonstrated that machine learning models utilizing anthropometric data and heart rate variability (HRV) could predict VVS recurrence with 71.0% accuracy and 76.3% sensitivity, even without continuous blood pressure monitoring. This extended study assessed whether adding hemodynamic parameters could improve predictive accuracy.
Methods: We analyzed a cohort (n=87, 65.5% female) with a mean age of 14.5±2.5 years and a BMI of 20.2±3.2 kg/m^2. Three progressive feature sets were tested using AdaBoost with stratified 10-fold cross-validation: (1) a baseline model using anthropometric data and HRV from 5-minute ECG recordings taken while supine and standing (n=87); (2) an extended model that included blood pressure variability (BPV) parameters for systolic and diastolic pressures, such as time-domain indices (average, standard deviation, coefficient of variation, average real variability, range, peak, trough) and frequency-domain measures (very low frequency, low frequency, high frequency, total power, LF/HF ratio, normalized LF and HF) from both postures (n=86, 66.3% female); and (3) a comprehensive model that added stroke volume, cardiac output, and total peripheral resistance parameters (mean and standard deviation) in a reduced cohort (n=62, 69.7% female, age 14.6±2.6 years, BMI 20.3±3.2 kg/m^2). SHAP analysis was used to determine feature importance.
Results: The baseline anthropometric-HRV model achieved 72.9±8.9% accuracy, 77.4±13.9% sensitivity, 67.5±33.4% specificity, balanced accuracy 72.5±12.6%, F1 0.74±0.11, and AUC 0.74. Adding BPV parameters (n=86) resulted in 68.1±13.1% accuracy, 75.3±22.7% sensitivity, 66.7±26.4% specificity, balanced accuracy 71.0±14.1%, F1 0.71±0.16, and AUC 0.62. The comprehensive model (n=62) exhibited similar metrics without significant improvement. SHAP analysis showed that BPV parameters did not significantly improve discriminative power beyond baseline HRV and anthropometric features. Weight remained the most significant predictor. Blood pressure standard



deviation and coefficient of variation had moderate importance, while frequency-domain indices offered additional autonomic information. Cardiac output and TPR variability contributed modestly without providing clinically meaningful improvements.

	Accuracy	Recall	Specificity	Precision	Balanced Accuracy	F1	AUC
HRV+BPV	72.9 ± 8.9	77.4 ± 19.3	67.5 ± 33.4	79.6 ± 21.7	72.5 ± 12.6	0.74 ± 0.11	0.74
HRV+BPV+CO+SV+TPR	68.1 ± 13.1	75.3 ± 22.7	66.7 ± 26.4	73.5 ± 22.1	71.0 ± 14.1	0.71 ± 0.16	0.62

Conclusions: Adding hemodynamic parameters didn't significantly improve pediatric VVS prediction over the baseline anthropometric-HRV model. HRV-derived autonomic indices with anthropometric data capture key features, with limited benefit from hemodynamics. This supports using an HRV-only approach in pediatric settings.



MP-139 / #103

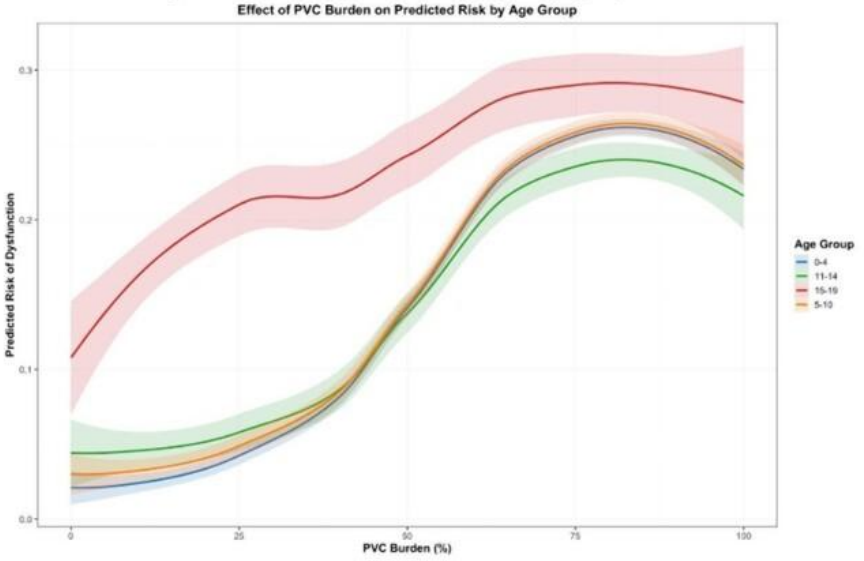
SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

CLINICAL CHARACTERISTICS AND OUTCOMES OF IDIOPATHIC VENTRICULAR ARRHYTHMIAS IN PAEDIATRIC PATIENTS: A RETROSPECTIVE ANALYSIS

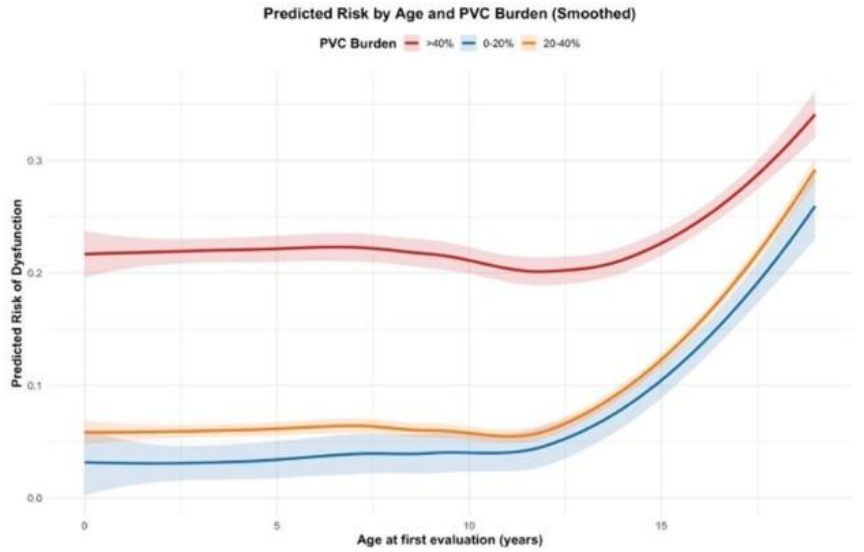
Marianna Cicenia, Michele Lioncino, Pietro Tamborrino, Daniele Garozzo, Francesco Flore, Marta Campisi, Marta Unolt, Vincenzo Pazzano, Aurelio Secinaro, Massimo Silvetti, Fabrizio Drago
Bambino Gesù Children Hospital, rome, Italy

Background and Aim: Background: Ventricular arrhythmias (VAs) are frequently encountered in paediatric patients with structurally normal hearts. The association between VAs, left ventricular (LV) dysfunction and clinical outcomes is poorly understood. **Aim:** This study aims to assess the characteristics, outcomes and evolution of idiopathic VAs in children and adolescents and the predictors of LV dysfunction. **Methods: Methods:** We retrospectively enrolled paediatric patients (< 18 y.o.) diagnosed in our Institution with idiopathic VAs. Cardiomyopathies, channelopathies, metabolic or neuromuscular diseases, complex congenital heart diseases were excluded. Logistic regression model, a time-varying Cox model and machine learning methods were applied. **Results: Results:** 418 patients (43.8% females) were included. Median age at first assessment was 11.3 y.o. LV dysfunction was observed in 5.5% of cases. High premature ventricular complex (PVC) burden and older age at evaluation were predictors of LV dysfunction at multivariate analysis [2.35 (1.59–3.48), p<0.0001]; [6.3 (2.48–16), p=0.0001]. The LASSO model showed better discrimination compared with Random Forest, identifying age at evaluation, PVC burden and QRS duration as the most influential predictors. In an exploratory analysis according to the Random Forest model, patients older than 15 y.o were at higher risk of LV dysfunction. This risk was also elevated when PVC burden exceeded 40% even in youngest ages. PVC regression occurred in 56% of children but no significant predictor of PVC regression was identified at logistic regression model.

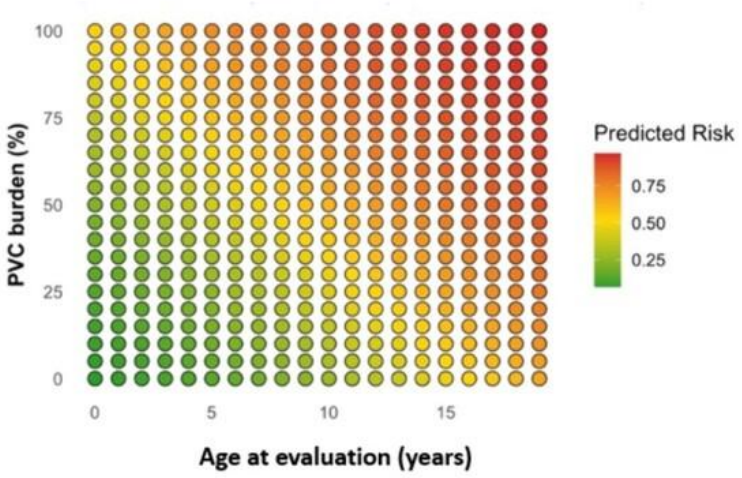
Predicted risk of PVC-induced dysfunction according to age group in RSF model



Predicted risk of PVC-induced dysfunction according to burden group in RSF model



Heatmap of predicted LV dysfunction risk generated from the LASSO model



Conclusions: Conclusions: In paediatric patients with idiopathic VAs, development of LV dysfunction is uncommon. Older age and elevated PVC burden are strong predictors of LV dysfunction. A more tailored follow-up strategy amy be desirable in selected patients despite structurally normal hearts, especially in those older than 15 y.o. and with a PVC burden >40-50%, even if it is impossible to precisely determine which of them will develop dysfunction. No factors can be predictive of persistence or regression over the time.



MP-140 / #185

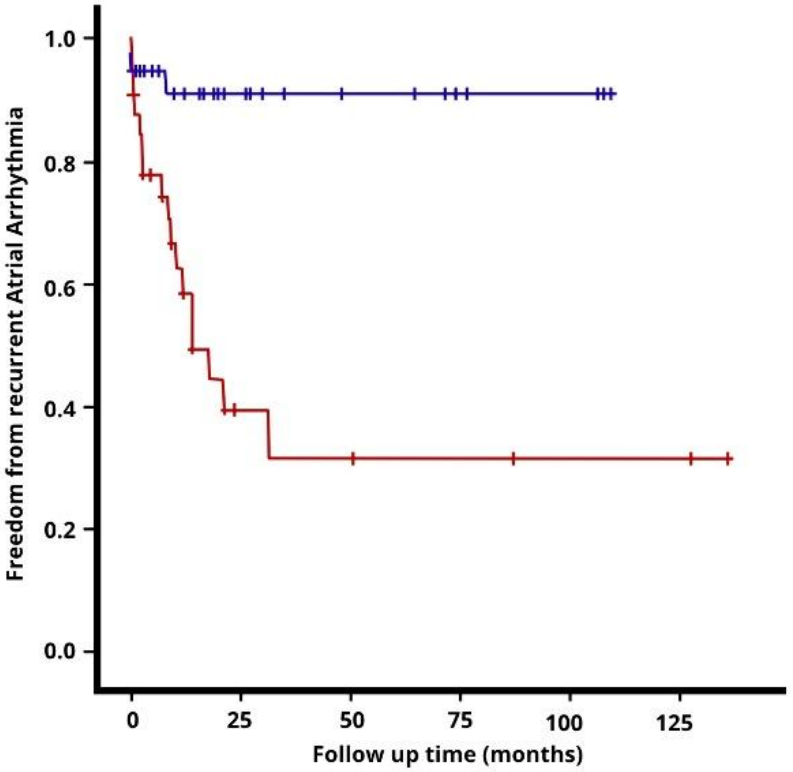
SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

CLINICAL OUTCOMES OF CATHETER ABLATION FOR ATRIAL ARRHYTHMIAS IN ADULT CONGENITAL HEART DISEASE PATIENTS

Giulia Simi[1], Gianluca Mirizzi[2], Rossi Andrea[2], Lamia Ait-Ali[3], Luca Panchetti[2], Silvia Garibaldi[2], Umberto Startari[2], Martina Nesti[2], Marcello Piacenti[2], Giuseppe Santoro[3,4], Marrone Chiara[3], Pierluigi Festa[3], Alberto Giannoni[5]
[1]Università di Pisa, Pisa, Italy, [2]FTGM, Electrophysiology, PISA, Italy, [3]FTGM, Pediatric Cardiology And Achd Unit, Massa, Italy, [4]FTGM Ospedale del Cuore Gaetano Pasquinucci, Massa, Italy, [5]Scuola Superiore Sant'Anna, pisa, Italy

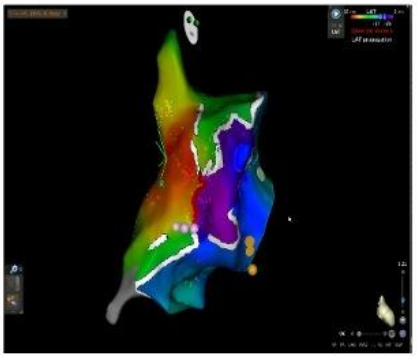
Background and Aim: Adult congenital heart disease (ACHD) patients frequently develop atrial tachyarrhythmias (AT) due to abnormal cardiac anatomy, surgical scarring and residual hemodynamic defects. Although radiofrequency catheter ablation (RFCA) is an effective treatment, yet recurrence rate remains significant. This study aimed to identify predictors of arrhythmic recurrence after RFCA in ACHD patients.
Methods: We retrospectively analyzed ACHD patients undergoing RFCA for AT at our Institution between 2007 and 2025. Clinical, electrocardiographic, procedural, therapeutic and imaging parameters (echocardiography and/or cardiac magnetic resonance-CMR) were evaluated as potential predictors of recurrences. These were defined as any documented AT following the first RFCA. Follow-up was censored at the first recurrence, subsequent surgical/ percutaneous intervention, last clinic visit or last available follow-up data.
Results: Eighty ACHD patients (mean age 45.6 ± 16.3 years; 50% female) underwent 105 procedures. Congenital defects were mild (21.3%), moderate (75.0%) or severe (3.8%) complexity. Underlying defects included atrial septal defect/anomalous pulmonary vein return (21.3%), atrioventricular canal defect (8.8%), Fallot/ventricular septal defect/pulmonary stenosis (61.3%), Fontan palliation (2.5%) and others (6.3%). The first documented AT was macroreentrant atrial tachycardia (MRAT) in 56 patients (70%, 32 peritricuspidal, 17 scar-related, 7 both), followed by focal AT in 10 (13%), atrioventricular reentrant tachycardia in 7 (9%) and atrial fibrillation in 6 (8%). During a median follow-up time of 12.3 months (IQR 2.9–27.2), 23 (29%) patients presented AT recurrence. Twenty-one patients (26%) required at least one RFCA redo, in 16 cases (76%) for recurrence of the same AT. Patients with recurrence were older (52.5 ± 14.0 vs 42.5 ± 16.0 years, p=0.01), had lower ejection fraction at the CMR (52.0 ± 8.2% vs 58.7 ± 6.7%, p=0.002) and more frequently showed left atrial dilatation (85% vs 30% p<0.001). Neither defect complexity

nor arrhythmia mechanism influenced outcomes. Kaplan–Meier analysis confirmed a significantly lower arrhythmia-free survival in patients with left atrial dilatation ($\chi^2 = 14.6$, $p<0.001$).

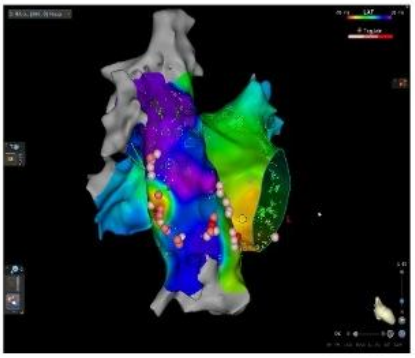


Conclusions: RFCA is an effective strategy in ACHD patients, yet recurrence remains common. Left atrial dilatation and systemic ventricular dysfunction emerged as independent predictors of recurrence, emphasizing the importance of comprehensive pre-procedural morpho-functional assessment and personalized approach to optimize long-term results of RFCA in

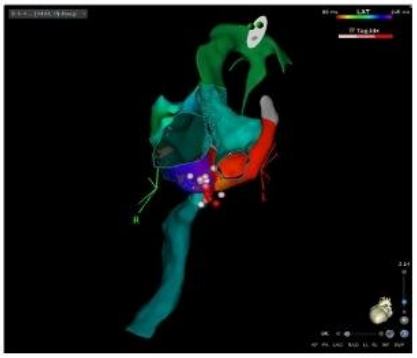
ACHD.



MRAT in Tetralogy of Fallot



FAT in lateral tunnel Fontan



MRAT in TGA after atrial switch



MP-141 / #366

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

SINUS RHYTHM PROPAGATION AND LOW-VOLTAGE BRIDGE IN KOCH'S TRIANGLE: HOW THEY RELATE IN CRYOABLATION OF ATRIOVENTRICULAR REENTRY TACHYCARDIA IN CHILDREN

Francesco Flore, Pietro Paolo Tamborrino, Ilaria Cazzoli, Vincenzo Pazzano, Cristina Raimondo, Massimo Silvetti, Fabrizio Drago
Bambino Gesù Children Hospital, rome, Italy

Background and Aim: Transcatheter ablation assisted by three-dimensional (3D) electroanatomical mapping (EAM) is nowadays the elective treatment for atrio-ventricular nodal reentrant tachycardia (AVNRT) in children and adolescents. In this particular setting of patients, the most frequently employed EAM strategies are the low voltage bridge (LVB) strategy and the Sinus Rhythm Propagation Mapping (SRPM), identifying Wave Collision Areas (WCA) or Pivot Points (PP). However, the exact pathophysiology and anatomy of the AVNRT reentrant circuits are still poorly understood. The aim of this study was to investigate the relationship between SRPM and LVB and to shed light on nodal physiology in children and adolescents affected by AVNRT.
Methods: We retrospectively collected data on paediatric patients who underwent cryoablation for AVNRT assisted by high-density 3D EAM by using the LVB strategy; maps were reviewed by two independent electrophysiologists and the SRPM was described. SRPM was defined as typical when only one WCA/PP was identified, atypical whenever either none or ≥2 WCAs/PPs were localized.
Results: Twenty-eight consecutive patients (42.8% males, mean age 11.3±3.3 years), between October 2024 and February 2025 were enrolled. All procedures were acutely successful. Overall, atypical SRPM was present in 10 patients (35.7%). However, it did not correlate with the presence of multiple SPs; moreover, in case of double WCA/PP, one of them co-localized with the LVB and the effective cryoablation spot, whereas the other was located superiorly, closer to the His bundle. In case of typical SRPM, WCA/PP and LVB co-localized in 10/18 (55%) patients. When SRPM and LVB were mapped in different locations, the LVB identified the effective cryoablation site more consistently than the SRPM (4/8, 50% vs. 1/8, 12.5%; mean distance from the effective cryoablation spot 1.09 mm ± 1.4 mm vs 2.3 mm ± 2.3 mm), even though it did not reach a statistical difference.
Conclusions: In conclusion, atypical Sinus Rhythm Propagation in the Koch's triangle is a frequent finding in paediatric AVNRT patients. LVB depiction on EAM appears to be a more reliable strategy for slow pathway (SP) effective modulation in children.



MP-142 / #477

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

PACING THERAPY IN INFANTS, SMALL CHILDREN AND ADOLECENTS

Lena Kipfmüller[1], Antonia Schulz[1], Ridvan Dryana[1], Raoul Arnold[2], Matthias Gorenflo[2], Tsvetomir Loukanov[1,3], Mina Farag[1]
[1]Universität Heidelberg, Congenital Heart Surgery, Heidelberg, Germany, [2]Universität Heidelberg, Pediatric Cardiology, Heidelberg, Germany, [3]Heidelberg University Hospital, Heidelberg, Germany

Background and Aim: To evaluate the survival and device-associated complications after pacemaker implantation in infants, children and adolescents.
Methods: In this retrospective analysis, 210 patients underwent pacemaker implantation between 1996 and 2023. Patients were divided into epicardial (EPI) and transvenous (TRA) group. The mean follow-up time was 9.6±7.7 years. Primary outcomes were overall freedom from reoperation or need for lead revision.
Results: The median age at implantation was 3 years (10 months EPI vs. 12.0 years TRA, p<0.05). Median weight was 12.9 kg (7.2 EPI vs. 43.3 kg TRA, p<0.05). The primary indication was high grade AV-block in 146 (70%). Congenital heart malformations were present in 137(65%). Congenital arrhythmia leading to treatment occurred in 49(46%); 79(38%) patients required pacing therapy perioperatively. Further 34(16%) developed late indication for pacing after surgery (>3 months). Reoperation was needed in 132 patients (63%, 90 EPI and 42 TRA, p=0.193). Over the follow-up period transvenous leads showed significantly lower pacing thresholds, thus reducing the risk of reoperation by half (HR=0.458, p=0.008, 95% CI=0.258–0.814), due to earlier battery depletion in patients with epicardial leads (Median EPI: 4.6 vs. TRA: 7.4 years, p < 0.05). However early lead failure (<1 year) did not differ significantly between groups (12 in EPI (7%) vs. 3 in TRA (4%), p=0.398). Main reason for lead revision was increased pacing threshold for epicardial leads (n=22; 47%), exit block for transvenous leads (n=8; 42%). Kaplan-Meyer analysis for lead survival showed comparable results (log-rank p=0.15). No risk factors for lead revision could be identified. Other adverse events included wound infections (2.4% in the EPI vs. 1.5% in the TRA group). Thirteen patients (6.2%) presented with tricuspid regurgitation, 2 (1%) with lead traction, and one (0.5%) with venous thrombosis in the TRA group. Unsuccessful lead extraction occurred 8 times (3.8%). Of the initial 161 single chamber ventricular pacing devices, 106 remained VVI at the time of last follow-up, while 46 patients were upgraded to dual chamber therapy and 9 devices were explanted.
Conclusions: Epicardial pacing remains the standard of care for infants and small



children. Despite higher lead thresholds the need for revisions are comparable with transvenous implantation, deferring potential intracardiac complications.



MP-143 / #586

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

ACCURACY OF THE SMART WATCH IECG FOR DOCUMENTATION OF SUPRAVENTRICULAR TACHYCARDIAS IN CHILDREN

Debora Schulz, Roman Gebauer, Ingo Dähnert, Christian Paech, Sophia Klehs
University of Leipzig - Heart Center, Department For Pediatric Cardiology, Leipzig, Germany

Background and Aim: The documentation of supraventricular tachycardia (SVT) often presents a diagnostic challenge, due to its paroxysmal character. Smart Watches enable patients to record an immediate single-lead-ECG (iECG) whenever symptoms occur. We report our data on accuracy of iECG in comparison to 12-lead ECG during SVT.
Methods: All pediatric patients with sustained SVT undergoing electrophysiological study (EPS) were included prospectively between March 2023 and December 2024 (n=40). 12-lead ECG and iECG were recorded simultaneously as SVT episodes occurred (spontaneously or induced) during EPS. Comparative measurements based on time intervals and amplitudes in lead I (Einthoven) of the 12-lead ECGs (as gold standard) and single lead iECG were performed.
Results: 40 ECGs of SVT during EPS in 39 patients (one repeat EPS) were recorded (5-17 yrs, 24-95 kg), thereof 21 recordings with atrioventricular reentrant tachycardia and 19 recordings with atrioventricular nodal reentrant tachycardia. Comparison of the measurements between lead I of the 12-lead ECGs and the iECGs showed very high correlation (Pearson Correlation of intervals: RR (r=0.99), QRS (r=0.81), QT (r=0.86), heart rate (r=0.98) and amplitudes: QRS (r=0.94), T-wave (r=0.92)) and no significant difference of the mean for RR- and QT- intervals as well as heart rate (p=0.42, 0.11 and 0.54 respectively). Mean differences of the other values were small (QRS-interval 3.2 ms, QRS amplitude 0,12 mV and T amplitude 0.03 mV). The HR values of the smart watch algorithm showed a weaker correlation (r=0.79) than the measured ones. The smart watch algorithm classified 39 of 40 iECGs correctly as high heart rate (if HR was < 150 bpm) and no signs of atrial fibrillation or heart rate above 150 bpm (no testing of atrial fibrillation by the algorithm). One iECG with a HR of 250 bpm was falsely classified by the algorithm as 126 bpm.
Conclusions: Even during SVT episodes with extremely high heart rates, single lead iECGs, captured by the smart watch, provide comparable results with lead I (Einthoven) ECG recordings. However, the iECG must be measured and evaluated, since the algorithm's heart rate output is less reliable than the iECG values derived from it, and the algorithm is not capable of detecting SVT.



MP-144 / #625

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

CASE OF SUCCESSFUL THORACOSCOPIC RIGHT ATRIAL APPENDAGE RESECTION AS AN ALTERNATIVE SURGICAL METHOD OF INCESSANT ATRIAL ECTOPIC TACHYCARDIA TREATMENT

Vitali Kadachkin, Alyaksandar Makhlin, Yury Linnik, Alena Zasim, Volga Yarmolina, Konstantin Drozdovski
Belarusian National Center for Pediatric Surgery, Cathlab, Minsk, Belarus

Background and Aim: Atrial ectopic tachycardia (AET) originating from the right atrial appendage is rare localization of atrial tachyarrhythmia. It is often characterized by resistance to pharmacological antiarrhythmic therapy and difficulty in achieving a stable effect of radiofrequency ablation. In cases of ineffective treatment, it can lead to tachycardia-mediated cardiomyopathy (TMC). We present a case of successful thoracoscopic resection of the right atrial appendage as an alternative treatment method for incessant AET when standard treatment has failed.
Methods: 13-year-old girl, had been under observation since the age of 7 with incessant AET (the average daily heart rate was 122-143 bpm with her age norm of 84-89 bpm). Several attempts of multiply antiarrhythmic therapy, including combinations with amiodarone failed. Using electroanatomical mapping (NavX Precision), a focus of atrial ectopic activity was identified in the right atrial appendage with an earliest activation time -15 ms before the P wave. Two attempts of radiofrequency ablation of the arrhythmia substrate were performed using an irrigated catheter with contact force sensing (TactiCath) - power 30-35 W, pressure 20-25 g/cm^2, irrigation 17 ml/min. After both interventions, AET recurred with the same characteristics within 1-2 weeks. Our team decided to perform a thoracoscopic resection of the right atrial appendage due to the potential risk of TMC in the setting of persistent AET. Right-sided thoracoscopy was performed under one-lung intubation. Using the "Harmonic" electrosurgical device and ultrasound scissors, pericardial fenestration was performed over the projection of the right atrial appendage. An endoscopic linear stapler with a 3.5*45 mm cartridge was then applied to the right atrial appendage, which was cross-stapled and transected. The postoperative period was uneventful.
Results: No cardiac arrhythmias were registered on postoperative Holter ECG monitoring, transthoracic echocardiography revealed no pericardial effusion. Follow-up Holter ECG monitoring at 3 and 6 months showed no atrial ectopic activity. Antiarrhythmic medication is currently not required.



Conclusions: The right atrial appendage is a rare location for atrial ectopic tachycardia, which can be associated with ineffectiveness of pharmacological and standard interventional treatment. Thoracoscopic resection of the right atrial appendage can be considered as an alternative to standard treatment methods when they are ineffective.



MP-146 / #704

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

SEDATION VERSUS GENERAL ANESTHESIA: OPTIMIZING ELECTROPHYSIOLOGICAL STUDY OUTCOMES IN PEDIATRIC PATIENTS

Hakan Kucuker[1], Abdusselam Genc[2], Fahrettin Uysal[1], Selcan Akesen[3]
[1]Bursa Uludag University, Pediatric Cardiology, Bursa, Turkey, [2]Bursa City Hospital, Pediatric Cardiology, Bursa, Turkey, [3]Bursa Uludag University, Anesthesiology And Reanimation, Bursa, Turkey

Background and Aim: The choice of anesthesia during pediatric electrophysiological studies (EPS) may influence tachycardia inducibility and measured electrophysiological parameters. Although supraventricular tachycardia (SVT) ablation in children is routinely performed under general anesthesia, the diagnostic EPS phase is often conducted under sedation. Evidence comparing these two conditions within the same patient is lacking. This study aimed to evaluate the effects of sedation and general anesthesia on SVT inducibility and key electrophysiological parameters in a paired, within-patient design.
Methods: Fifty-one pediatric patients undergoing EPS for documented SVT were prospectively evaluated. Each patient underwent electrophysiological assessment first under sedation and subsequently under general anesthesia with a laryngeal mask airway. Atrial and ventricular effective refractory periods (AERP, VERP), AV nodal Wenckebach point, jump, echo, VA block interval, and accessory pathway refractory periods (APERP) were recorded in both conditions. SVT inducibility was assessed with and without isoproterenol infusion when necessary.
Results: Overall SVT inducibility was significantly higher under sedation compared with general anesthesia (73.1% vs. 53.8%, $p = 0.007$). No significant differences were observed between the two anesthesia states in AERP, VERP, AV nodal Wenckebach point, jump, echo interval, or VA block duration (all $p > 0.05$).
In the AVNRT subgroup ($n = 25$), inducibility tended to be higher under sedation, although not reaching statistical significance ($p = 0.109$). AV nodal Wenckebach, jump, and echo intervals similarly showed no significant differences between conditions.
In patients with WPW syndrome or AVRT ($n = 26$), inducibility again tended to decrease under general anesthesia ($p = 0.063$). Notably, APERP measured by the extrastimulus method was significantly prolonged under general anesthesia ($p = 0.018$), suggesting an inhibitory effect on accessory pathway conduction. APERP measured by overdrive pacing showed no significant change ($p = 0.320$).
Conclusions: General anesthesia reduces SVT inducibility and prolongs accessory



pathway refractoriness in pediatric EPS, whereas most other electrophysiological parameters remain unchanged. These findings support performing the diagnostic phase under sedation—where arrhythmia mechanisms are more readily demonstrable—and transitioning to general anesthesia for ablation, where procedural stability and airway control are required. The paired design of this study provides robust evidence for optimizing anesthesia strategy in pediatric EPS.



MP-147 / #738

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

IMPACT OF EXERCISE TESTING ON SCREENING ELIGIBILITY AND VECTOR QUALITY FOR THE SUBCUTANEOUS IMPLANTABLE CARDIOVERTER-DEFIBRILLATOR (S-ICD) IN A PEDIATRIC POPULATION: A RETROSPECTIVE STUDY

Ferran Prats-Domenech[1], Aitor Toledo Silva[2], Ferran Roses-Noguer[1]
[1]Vall d'Hebron Barcelona Hospital Campus, Paediatric Cardiology Department, Barcelona, Spain, [2]Boston Scientific, Customer Relationship Management, Madrid, Spain

Background and Aim: Electrocardiographic screening is mandatory to establish eligibility for Subcutaneous Implantable Cardioverter-Defibrillators (S-ICD). However, pediatric patients present unique challenges due to high physical activity levels, raising concerns regarding T-wave oversensing during exertion. While standard protocols assess signal quality in supine and standing positions, the necessity of systematically including exercise testing remains debated. This study aimed to determine if exercise significantly affects vector eligibility, safety margins, and signal quality.
Methods: We conducted a retrospective analysis including all patients from a tertiary pediatric hospital with an ICD for whom screening data were available (n=21, median age 13.2 years). Three sensing vectors were analyzed, simulating left (Left) and right (Right) parasternal implant positions. We compared suitable vectors (score >100) between the Standard Protocol (supine/standing) and the Strict Protocol (adding exercise) using the Wilcoxon test. The clinical significance of eligibility loss was evaluated via the McNemar test, using safety criteria of passing ≥ 1, 2, or 3 functional vectors in all positions. Additionally, score variation was analyzed to quantify signal quality degradation.
Results: The inclusion of exercise significantly reduced the number of suitable vectors for both Left (*p=0.0196*) and Right (*p=0.0040*) positions. This reduction was clinically significant in the Right position: when requiring a safety margin of ≥2 vectors, eligibility decreased from 100% (18/18) in the Standard Protocol to 55% (10/18) with exercise (*p=0.008*). In the Left position, eligibility dropped from 78% to 61% for those with ≥2 vectors, though this did not reach statistical significance (*p=0.250*). Notably, exercise caused substantial signal degradation, with median scores dropping by 320.65 points on the Right (*p=0.002*) and 71.10 points on the Left (*p=0.059*).

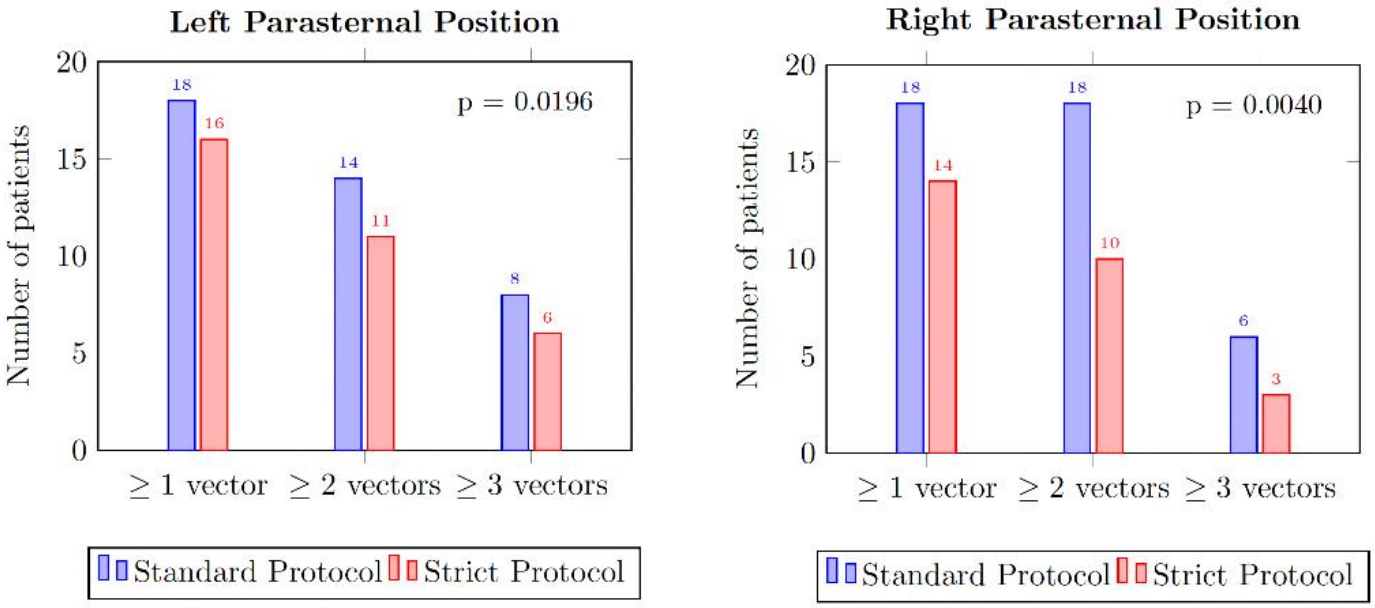


Figure 1: Comparison of vectors passing screening: Standard vs. Strict Protocol

Conclusions: These results suggest that exercise testing provides crucial data regarding vector suitability during high-intensity activity. While exertion impacts signal quality generally, standard Left-sided implants appear clinically robust, maintaining high eligibility rates even under strict testing protocols. Conversely, Right-sided implants carry significantly higher risks of screening failure during exercise. Therefore, systematic exercise testing may be advisable to ensure safety margins are met and to minimize the risk of inappropriate shocks. Future longitudinal studies are needed to correlate these findings with clinical outcomes.



MP-148 / #747

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

VALIDATION, LEAD OPTIMIZATION, AND DIAGNOSTIC YIELD OF A STERNAL SINGLE-LEAD MINI-HOLTER IN PEDIATRIC PATIENTS: A PROSPECTIVE STUDY.

Florian Gross, Laleh Ghaeni, Natalie Timme, Victoria Lorenzen, Joachim Will, Felix Berger, Bjoern Peters, Peter Kramer
Deutsches Herzzentrum der Charité, Department Of Congenital Heart Disease - Pediatric Cardiology, Berlin, Germany

Background and Aim: Standard pediatric Holter monitoring is often limited by cable-related artifacts and short recording durations, due to technical limitations or patient tolerance. We evaluated a miniaturized single-lead Holter (Bittium Faros™, Bittium Corporation, Oulu, Finnland) regarding optimal lead placement, signal quality, and diagnostic yield compared to standard multi-lead device.
Methods: This prospective study investigated the applicability in children in two phases. Phase 1 tested various electrode configurations and vectors in infants to identify the vector with the best signal amplitudes for different age and weight groups. Phase 2 involved a head-to-head comparison: patients underwent simultaneous recording with a standard 5-lead Holter (24h) and the single-lead Mini-Holter (7 days) using the optimized configuration. We analyzed signal quality, artifact burden, and arrhythmia detection rates. The parents, and if applicable to the children themselves, were then asked to rate the comfort and tolerance for each device individually.
Results: A total of 82 patients were enrolled in two weight groups (group 1: mean 10.4 ± 3.3 kg, group 2: mean 24.9 ± 7.3 kg). Phase 1 identified the sternal orientation as the optimal lead configuration for both weight groups that outperformed alternative positions in paired analyses for p-wave amplitude (p=0.01). In Phase 2, the single-lead Mini-Holter demonstrated significantly less artifact burden and superior signal quality during the simultaneous 24h recording compared to the standard Holter. Crucially, the extended 7-day monitoring detected 20-25% more clinically relevant arrhythmias that were missed during the initial 24 hours. Furthermore, patient comfort was also rated as superior for the Mini-Holter.
Conclusions: Miniaturized single-lead Holter monitoring offers superior signal quality and patient comfort in pediatric patients. With optimized sternal lead placement, it ensures reliable P-wave detection and seem in particular suited for evaluating atrial arrythmias, which is especially relevant in a pediatric population. Extending the recording period to 7



days significantly increases diagnostic yield, supporting its use as a new standard for pediatric arrhythmia diagnostics.



MP-149 / #1377

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

NEONATAL TACHYARRHYTHMIAS IN A RESOURCE-LIMITED SETTING: A CASE SERIES WITH ECHOCARDIOGRAPHIC CORRELATION FROM IBADAN, NIGERIA

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Background and Aim: Neonatal arrhythmias comprise a broad spectrum of rhythm disturbances, ranging from transient ectopic beats to sustained tachyarrhythmias that may result in significant morbidity or mortality if not promptly recognized and treated. Evidence from low- and middle-income countries is limited; therefore, case series remain valuable for illustrating pragmatic diagnostic and management strategies in resource-constrained settings. This report describes the clinical presentation, echocardiographic findings, management, and outcomes of neonates with significant tachyarrhythmias managed in a tertiary hospital in Nigeria.
Methods: Two neonates with sustained supraventricular tachyarrhythmias managed at the University College Hospital, Ibadan, were reviewed. Clinical features, electrocardiographic and echocardiographic findings, therapeutic interventions, and outcomes were analysed.
Results: Case 1 was a 14-day-old male who presented with recurrent abrupt-onset tachycardia and tachypnoea from birth. Examination revealed a heart rate of 250 beats per minute. Electrocardiography showed a narrow-complex supraventricular tachycardia, while echocardiography demonstrated an aneurysmal atrial septum with a 6-mm secundum atrial septal defect. Hyperkalaemia was also identified. Sinus rhythm was restored using intravenous adenosine and electrolyte correction, followed by maintenance therapy with amiodarone and propranolol. The infant remained stable, and antiarrhythmic therapy was discontinued after one year. Case 2 was a term female neonate delivered by emergency caesarean section due to persistent foetal tachycardia. On day four of life, she had a sustained heart rate of 220 beats per minute. Electrocardiography confirmed narrow-complex supraventricular tachycardia. Echocardiography revealed a patent foramen ovale with an aneurysmal atrial septum. Vagal manoeuvres and pharmacologic cardioversion were unsuccessful; however, sinus rhythm was achieved with synchronised direct current cardioversion. She remained haemodynamically stable on oral propranolol and amiodarone with no recurrence.
Conclusions: Neonatal tachyarrhythmias may be associated with structural cardiac



abnormalities and metabolic derangements. Timely electrocardiographic diagnosis, echocardiographic assessment, and context-appropriate management can result in favourable outcomes, even in resource-limited settings.



MP-150 / #429

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

GENETIC FORMS OF SHORT PR INTERVAL – CASE SERIES

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Background and Aim: Short PR interval was described in a variety of diseases, but the association with ventricular hypertrophy is found in different inherited forms of cardiac diseases causing enhanced atrioventricular nodal conduction. We present herein three patients with variable genetic causes of short PR interval.
Methods: Complete physical examinatin, biochemical tests, ECG, Holter ECG monitoring, echocardiography and genetic testing were eefectuated.
Results: Case 1. In a 2.5-years-old male hospitalized for increased values of hepatic enzymes, elevated values of CK and LDH were found. The patient presented mild difficulty climbing stairs, so muscular dystrophy was suspected, which was excluded by genetic testing. ECG revealed short PR interval. Holter ECG monitoring detected rare ventricular ectopic beats. Echocardiography revealed hypertrophic cardiomyopathy. Analysis of whole exome sequence showed that the patient was hemizygous for *LAMP2* mutation, affecting the fusion between autophagic vacuoles and lysosomes and causing Danon disease. Case 2. A 5-weeks-old female, antenatally diagnosed with numerous cardiac rhabdomyoma was hospitalized for complete cardiologic evaluation. The patients presented numerous hypomelanotic macules and angiofibroma. ECG revealed preexcitation and echocardiography detected multiple, echogenic, nodular masses embedded in the ventricular myocardium. Holter ECG monitoring did not detect arrhythmia. Tuberous sclerosis was suspected, and genetic testing detected a pathogenic heterozygous mutation of the *TSC1* gene encoding hamartin protein production. Clinical course consisted in seizures, mild developmental delay and partial spontaneously regression of the cardiac rhabdomyoma. Case 3. A 1-month-old male patient who was born prematurely presented facial dysmorphic features, marked respiratory distress and persistent lactic acidosis during the perinatally period. He was sent to our department for complete cardiac evaluation, and a hypertrophic cardiomyopathy was detected. ECG revealed short PR



interval. Holter ECG monitoring detected rare ventricular ectopic beats. Genetic testing revealed a homozygous pathogenic mutation of the *THEM70* gene causing ATP synthase deficiency. The clinical course revealed reduced growth, mild psychomotor retardation, and metabolic crisis during respiratory infections.

Conclusions: Association of short PR interval and myocardium changes raises suspicion for inherited forms of cardiomyopathies.



MP-151 / #139

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

BROMPTON HEALTHY HEARTS - A PHYSIOTHERAPY LED EXERCISE SERVICE FOR CHILDREN AND YOUNG PEOPLE WITH ARRHYTHMIA AND CARDIAC DEVICES

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Background and Aim: It is known over 50% of healthy children do not reach the recommended weekly physical activity levels. This is reflected and magnified in patients with cardiac disease. Children with arrhythmias are not exercising to their full potential and leading sedentary lifestyles. Living with an implanted device further complicates these issues. Often due to their own or parental anxiety leading to reduced participation in physical activity and unnecessary deconditioning.
Methods: A physiotherapy led exercise service for children and young people under the electrophysiology service was set up for those who met the following inclusion criteria: Not meeting national exercise recommendations (60 minutes of moderate intensity exercise per day) Reduced confidence exercising Deconditioned Poor perception of symptoms on exercise Following risk stratification patients were offered a 12-session supervised virtual fitness programme. Inpatients were offered 2-3 times per week fitness sessions. The programme consisted of cardio, strength, balance, and flexibility exercises. Progression was gradually increased using the FITT (frequency, intensity, time, type) principles. Questionnaires were completed on quality of life, physical activity levels, physical literacy, and confidence around exercise.
Results: 12 patients were recruited to the programme. 5 female and 7 male, aged 8-16 years old. Improvements were recorded in many of the physical parameters as well as in confidence exercising (see table). Self-reported activity levels post intervention were varied. There were no serious adverse events recorded.

Case Study - 15 yo boy with ICD awaiting heart transplant.	**Initial**	**Post intervention**
Physical Activity (PROMIS Physical Activity SF8a)	8	14
Physical Literacy/Mindset	0 +ve	3+ve



Exercise test – 6 min walk	495m	600m
Strength - Wall sit	19s	44s
Balance – Single leg stand	L leg 30s R leg 60s	L leg 60s
Flexibility - modified stand and reach	- 34cm	-34cm

Conclusions: This small group of patients has demonstrated feasibility and safety in a physiotherapy led fitness programme for patients with arrhythmias and cardiac devices. Patients reported enjoyment and improvement in confidence. Some patients did not see an improvement in the self-reported level of physical activity questionnaire. This may be due to difficulty in measuring this using a self-reporting tool and warrants further evaluation.



MP-152 / #365

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

CLINICAL RELEVANCE OF A CACNA1C VARIANT IN A PEDIATRIC ATHLETE WITH QT PROLONGATION: IMPLICATIONS FOR RISK STRATIFICATION

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Background and Aim: Distinguishing physiological electrocardiographic changes in trained pediatric athletes from abnormalities linked to inherited arrhythmia syndromes is challenging. Persistent QTc prolongation and T-wave inversion can indicate congenital Long QT syndrome (LQTS), even without symptoms. Because LQTS shows wide and variable expression, a structured multidisciplinary evaluation is essential to differentiate benign athletic remodeling from potentially dangerous channelopathies and to guide decisions on competitive sports participation.
Methods: A 14-year-old competitive handball player with six years of intensive training was found on routine electrocardiogram (ECG) to have longstanding T-wave inversions in leads II, III, aVF, V5–V6 and a prolonged QTc of 520 ms. He was asymptomatic with excellent exercise tolerance. Evaluation included repeat ECGs, blood tests, chest X-ray, echocardiography, cardiac MRI, 24-hour Holter monitoring, cardiopulmonary exercise testing (CPET), and an extended genetic panel for channelopathies and cardiomyopathies.
Results: Biomarkers of myocardial injury and heart failure were normal. ECGs consistently showed inferolateral T-wave inversion (II, III, aVF, V5–V6) and a QTc of 520 ms. Echocardiography showed a structurally normal heart with ejection fraction (EF) 60%. Cardiac MRI revealed upper-normal left ventricle size with mildly reduced EF. CPET demonstrated QTc shortening to 420 ms during exercise and mildly reduced capacity (VO_2peak 65% predicted), supporting a physiological rather than pathological adaptation. Holter monitoring showed no arrhythmias. Genetic testing identified a heterozygous CACNA1C variant, and family screening found the same variant in the patient's mother and sister, both with normal ECGs, indicating incomplete penetrance. Despite no symptoms and normal exercise repolarization, the risk of sudden cardiac arrest and malignant ventricular arrhythmias was significant. Competitive sports were discouraged. Beta-



blockers were prescribed, with annual follow-ups: echocardiography, holter monitoring, and exercise testing.

Conclusions: This case emphasizes using ECG, imaging, exercise testing, genetics, and family evaluation to assess QT prolongation in pediatric athletes. Despite incomplete penetrance of the CACNA1C variant, the patient's repolarization abnormalities justified a risk-minimizing management approach. Restricting sports, starting beta-blocker prophylaxis, and ensuring annual follow-ups highlight the importance of personalized risk management in various forms of long QT syndrome.



MP-153 / #180

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

CULTURE-NEGATIVE ENDOCARDITIS UNMASKED BY SEVERE DENTAL CARIES: RAPID MITRAL VALVE DESTRUCTION IN A CHILD

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Background and Aim: Infective endocarditis (IE) in children is a rare but potentially life-threatening condition. The clinical presentation is often subtle, which may delay recognition while the infection progressively damages cardiac structures. Rapid deterioration of valve integrity can lead to severe regurgitation, heart failure, and the need for urgent surgical intervention.
Methods: The history, clinical course, diagnosis, and treatment were analyzed from medical records.
Results: A 7-year-old healthy girl was evaluated by a general practitioner because of days of weakness and dry cough without fever. She was treated for presumed pharyngitis with amoxicillin–clavulanate, without improvement. Persistent tachycardia led to pediatric cardiology referral, where transthoracic echocardiography revealed left ventricular and atrial enlargement with moderate mitral regurgitation, prompting hospital admission.
On admission, she was pale and tachycardic (up to 150/min), with blood pressure 113/69 mmHg but preserved hemodynamic stability. A loud systolic murmur was audible, and extensive dental caries were noted. Laboratory results showed elevated inflammatory markers (CRP 46 mg/L, ESR 71 mm/h), leukocytosis (14,000/µl), and anemia (Hb 9.5 g/dl). Chest radiography demonstrated cardiomegaly. Transthoracic and transesophageal echocardiography confirmed severe mitral regurgitation with leaflet destruction and left-sided chamber enlargement, with a picture suggestive of infective endocarditis. Blood cultures remained negative. Empirical intravenous antibiotic therapy (ampicillin, cloxacillin, gentamicin) was initiated after cultures were taken, and clarithromycin was continued due to positive *Mycoplasma pneumoniae* serology. Following admission, heart failure treatment was introduced, including furosemide, spironolactone, propranolol and enalapril. Because of severe regurgitation and echocardiographic evidence of structural valve injury suggestive of IE, the patient was qualified for urgent surgery. Comprehensive dental sanitation was performed before the procedure. She underwent mitral valve replacement with a mechanical prosthesis. The postoperative course was uncomplicated,



and follow-up echocardiography showed proper prosthetic valve function. At one-year follow-up, she remained in excellent clinical condition.

Conclusions: Infective endocarditis should be considered in children with detected or progressive valvular dysfunction, even when symptoms are mild. Echocardiography, transesophageal imaging, is essential for recognising structural injury. Negative blood cultures do not exclude IE. Early initiation of therapy and timely surgical intervention improve outcomes. Good oral health is crucial, as dental disease remains an underestimated source of bacteremia in pediatric IE.



MP-154 / #274

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

THE EFFECTIVENESS OF WARFARIN HOME MONITORING FOR PEDIATRIC PATIENTS WITH SINGLE VENTRICLE PHYSIOLOGY AND THOSE WITH PROSTHETIC HEART VALVES: A SINGLE CENTRE RETROSPECTIVE STUDY

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Background and Aim: Single ventricle physiology, and mechanical heart valves are commonly encountered indications for warfarin use by paediatric cardiology teams. Drug dosing in children is challenging due to medicine formulations, bioavailability, co-morbidities and adherence. Thus, resulting in non-therapeutic dosing.This study aimed to estimate the proportion of treatment days patients from both groups spent within their therapeutic International Normalised Ratio (INR) range.
Methods: 28 patients' charts were reviewed extricating data from August 30th, 2017 to June 30th, 2025. Outcomes included estimated Time in Therapeutic Range (TTR) comparing prosthetic valve and single ventricle patients, sex, and age group (5-10 and 11-18). Within each group, data was collected regarding: 1) Number of patients in range, 2) Proportion of study period in range, 3) Average dose of warfarin, 4) Range of measured INR 5) Range of warfarin doses. The INR target varied by condition and adverse events were recorded. A target of therapeutic INR>75% of the time was chosen. Fisher's exact testing assessed any significant differences between groups. Estimated time "in range" was based upon those tests falling within the therapeutic range for each individual.
Results: A total of 3254 results were reviewed; 58% were in range. The median TTR was 57.14% (Q1 49.89% Q3 62.6%). 17 out of 28 patients were male and median age was 7.5 years (Q1 6 Q3 11.25). There were 22 patients with single ventricle physiology and 6 patients had prosthetic valves. Time on warfarin therapy ranged from 0.08-6.45 years (median 2). One patient (3.5%) met the target of therapeutic INR>75% of the time, whereas 21 patients (75%) had a therapeutic INR>50% of the time. The average warfarin dose was 2.48 mg (Q1 1.89 Q3 3.29). There was no significant TTR differences found between the groups listed above and no deaths or thromboembolic events occurred.
Conclusions: The standards were not met for most patients. 75% may be an unrealistic



target for clinical practice and a lower threshold, such as 60%, may be more practical. A cost-benefit analysis of a clinical messaging system for INR reporting and dose guidance may be advantageous. In problematic cases aspirin may be considered long-term.



MP-156 / #547

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

DISTINGUISHING SEVERE FROM NON-SEVERE AORTIC VALVE REGURGITATION IN PATIENTS WITH CONGENITAL AORTIC VALVE DISEASE: IDENTIFYING DISCRIMINATIVE VARIABLES AND DEVELOPMENT OF A NOVEL SCORING SYSTEM

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Background and Aim: Assessing aortic valve regurgitation (AR) in patients with congenital heart defects can be challenging due to altered anatomy and atypical flow patterns. Cardiac magnetic resonance imaging (MRI) is considered the gold standard for quantifying AR but is not widely available. Reliable parameters in transthoracic echocardiography (TTE) are needed to support clinical decision-making. Beyond quantification, parameters reflecting hemodynamic consequences may improve severity assessment. The aim of this study is to identify which TTE variables—including (semi-)quantitative, volumetric/functional, and deformative parameters—best discriminate severe from non-severe AR.
Methods: In this pilot study, 25 patients (age 7–33 years) with congenital aortic valve disease were analyzed retrospectively. Severe AR was defined as MRI regurgitation fraction > 40%. TTE variables included: (1) (semi-)quantitative (proximal isovelocity surface area, effective regurgitant orifice area (EROA), vena contracta (VC), pressure half time, jet to left ventricular outflow tract ratio), (2) volumetric/functional (left ventricular (LV) end-systolic, end-diastolic and stroke volume, diastolic internal diameter, diastolic mass, left atrial (LA) volume, all indexed to BSA, and ejection fraction), and (3) deformative parameters (LA, LV global longitudinal strain (GLS)). ROC analysis identified cutoffs for severe AR. Based on the analysis, a simple dichotomous scoring system was developed to distinguish between mild/moderate and severe AR.
Results: Severe AR was observed in 28% of patients. ROC analysis showed excellent discrimination for the semi-quantitative parameters VC (cutoff 4.9 mm, AUC 0.87, $p < 0.001$) and EROA (cutoff 0.51 cm^2, AUC 1, $p < 0.001$), as well as for the left ventricular myocardial deformation LV-GLS (cutoff -16.8%, AUC 0.89, $p < 0.001$). Some volumetric parameters showed good discrimination but did not significantly improve diagnostic value. The AI score derived from the three top-performing parameters showed an excellent



discrimination between severe and non-severe AR with an AUC of 0.85 ($p < 0.001$), with ≥ 1/3 criteria achieving a sensitivity of 100% and a specificity of 77%.

Conclusions: In this exploratory study, VC, EROA, and LV-GLS were excellent parameters for distinguishing high-risk patients with severe aortic valve regurgitation from those with mild/moderate regurgitation. A simple dichotomous scoring system integrating these variables demonstrated their combined diagnostic value and may aid risk stratification and clinical decision-making.



MP-157 / #611

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

LONG-TERM FOLLOW-UP AND NATURAL HISTORY OF BICUSPID AORTIC VALVE IN CHILDREN: A SINGLE-CENTER EXPERIENCE

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Background and Aim: Bicuspid aortic valve (BAV) is the most frequent congenital cardiac valve anomaly, affecting approximately 1.3% of the population. Its natural history is heterogeneous, ranging from early significant aortic stenosis in childhood to asymptomatic disease in adulthood. This study aimed to evaluate the long-term natural course of BAV in children and young adults and to identify factors that may influence disease progression.
Methods: This single-center retrospective cohort included patients diagnosed with BAV between April 2008 and August 2025. Individuals with congenital aortic anomalies, significant additional cardiac disease, or known genetic syndromes were excluded. Demographic characteristics, BAV morphotype, associated cardiac abnormalities, medication use, follow-up duration, aortic diameter Z-scores, severity and progression of AS and AR, and presence and type of aortic dilation were analyzed.
Results: Among the 252 evaluated patients, 201 were male (79.8%). The median age at diagnosis was 6.4 years. In 22.3% of patients, no fusion was observed at any level, and these were classified as true BAV. At the time of diagnosis, 55.5% had aortic stenosis (AS), 53.6% had aortic regurgitation (AR), and 32.5% had no dysfunction. A total of 209 patients were followed for 2 months to 17 years 3 months (median 4.8 years).
Of 209 patients with longitudinal follow-up, new valvular dysfunction developed in 45.2% of patients who had no dysfunction at baseline. Aortic stenosis developed in 28.3%, and aortic regurgitation developed in 24.5%. In the follow-up, 25.3% of patients showed progression in AS severity, and 23.4% showed progression in AR severity. Ascending aortic dilation was initially present in 59.4% of 120 patients; after an average follow-up of 3.3 years, dilation was observed in 57.2% (22% type 1, 26.4% type 2, 8.8% type 3). In 19% of patients developed new dilation after an average follow-up of 3.1 years.
Conclusions: In this cohort, both aortic stenosis and aortic regurgitation showed progressive courses over long-term follow-up. Aortopathy also progressed irrespective of valve morphotype. Ascending aortic dilation was more common in the presence of aortic stenosis, consistent with planimetric findings. These data support routine, long-term surveillance for all children with BAV, including those with no dysfunction at initial diagnosis.



MP-158 / #647

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

ECHOCARDIOGRAPHY-GUIDED BALLOON VALVULOPLASTY OF SEVERE NEONATAL AORTIC STENOSIS WITHOUT FLUOROSCOPY

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Background and Aim: Congenital aortic valve stenosis is among the most relevant obstructive cardiac lesions in the neonatal period and, due to the rapidly increasing left ventricular pressure load, can quickly progress to critical hemodynamic instability. The gold-standard treatment, catheter-based balloon valvuloplasty, is usually performed under fluoroscopic guidance with the use of contrast agents. In contrast to this, purely echocardiography-guided approaches, which eliminate radiation and contrast exposure, have been reported only infrequently and have not yet gained broad clinical adoption
Methods: We report the case of a 14-day-old neonate with severe congenital aortic valve stenosis and marked left ventricular hypertrophy, presented with feeding difficulties and signs of heart failure. The patient underwent a catheter-based, echocardiography-guided balloon aortic valvuloplasty. Pre-interventional echocardiography revealed a peak transvalvular pressure gradient of 90 mmHg and a mean gradient of 46 mmHg, consistent with severe obstruction.
Results: The catheterization was performed under conscious sedation. Under continuous echocardiographic guidance, a 4F right coronary Judkins catheter was advanced into the ascending aorta and directed to the aortic valve. The aortic valve annulus measured 8 mm in diameter. The 4F Pigtail catheter was successfully passed across the stenotic aortic valve into the left ventricle. Echocardiography provided clear visualization of the 0.035-inch standard guidewire, enabling precise and controlled advancement into the left ventricle. The invasively measured pressure peak-to-peak gradient across the aortic valve at this point was 74 mmHg. Subsequently, the wire was exchanged for a 0.021-inch guidewire, and



balloon dilatation was performed using a 7×30 mm Tyshak II Balloon. Post-dilatation measurement revealed a peak-to-peak pressure gradient of 37 mmHg. The entire procedure was performed without radiation or contrast administration. On the next day, the echocardiography demonstrated a residual mean transvalvular gradient of 27 mmHg with only mild aortic valve regurgitation. No complications occurred, and the patient was discharged the next day.

Conclusions: Our case demonstrates that solely echocardiography-guided balloon aortic valvuloplasty for congenital aortic valve stenosis is achievable and associated with minimal procedural burden in neonates when performed by operators proficient in echocardiographic imaging. This approach may represent a viable therapeutic alternative in selected patients, as it can provide guidance to fluoroscopy and may allow for a shorter intervention time.



MP-159 / #782

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

NORMATIVE MITRAL VALVE OPENING SURFACE AREA IN HEALTHY NEONATES AND INFANTS AND COMPARISON WITH AGE-MATCHED PATIENTS WITH LEFT-TO-RIGHT SHUNT LESIONS

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Background and Aim: Direct planimetry of the mitral valve opening surface area (MVOSA) provides a load-independent assessment of mitral valve size. This might be specifically relevant for neonates and infants with their significant growth potential. However, normative reference values for early infancy are lacking and the effect of left-to-right shunt lesions on MVOSA has not been evaluated.
Methods: This prospective study includes 300 healthy neonates and infants (0–12 months) and 30 age-matched infants with shunt lesions such as atrial septal defect (ASD), ventricular septal defect (VSD) or patent ductus arteriosus (PDA**)**. MVOSA is measured in the parasternal short-axis view at the leaflet-tip level using 2D planimetry. Percentile curves are generated for age and body surface area (BSA). Correlations with age, weight, and BSA are evaluated and multivariate regression is used to identify independent predictors. At time of abstract submission, the first 100 healthy infants have been analyzed. Full results for all 300 infants will be presented at the AEPC meeting.
Results: Preliminary data: In 100 healthy infants, the mean MVOSA was 1.05 ± 0.28 cm^2, with values ranging from 0.42 to 1.76 cm^2. MVOSA demonstrated a strong positive correlation with BSA ($r = 0.84$, $p < 0.05$). Preliminary data indicate that infants with ASD, VSD, or PDA have larger MVOSA values compared with age-matched healthy controls, consistent with chronic volume loading. Full statistical results will be available after completion of the study.
Conclusions: Our preliminary data demonstrate that MVOSA evolves in parallel with infant body growth and may be enlarged in infants with left-to-right shunts. In the final stage this study will provide the first normal reference values for MVOSA in neonatal and infant age group.



MP-160 / #804

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

COMPUTATIONAL MODELLING OF BALLOON VALVULOPLASTY IN INFANT AORTIC STENOSIS: LINKING STRESS DISTRIBUTION TO DIVERGENT CLINICAL OUTCOMES

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Background and Aim: Balloon aortic valvuloplasty (BAV) is frequently used as initial therapy for congenital aortic stenosis (AS) in neonates and infants. However, commissural and non-commissural cusp tears remain unpredictable and may result in significant aortic regurgitation (AR). At present, no reliable method exists to forecast how balloon-generated forces will be distributed across the cusps, a key factor governing both the likelihood of successful gradient reduction and the risk of cusp tearing with subsequent AR. Computational models capable of estimating balloon-related leaflet stress (the localized mechanical load transmitted to valve tissue during inflation) may help predict procedural risk.
Methods: Valve geometries were reconstructed from echocardiography. Finite-element models incorporated leaflet elasticity, cohesive zones for fused commissures, and gradual balloon dilatation across the valve. Balloon tilt was defined as angulation of the balloon relative to the valve axis (0°–20°). Two neonatal cases of critical aortic valve stenosis treated with BAV at the Children's Heart Centre in Lund, Sweden, were analysed: (1) an infant with a good clinical result; (2) an infant who developed significant AR following BAV. Simulations explored balloon size and tilt effects on stress distribution.
Results: Case 1 (favourable result): Modelling showed relatively symmetric stress along the fused commissure. Clinically, controlled commissural splitting occurred and AR remained trivial, consistent with the model. **Case 2 (complicated outcome):** Simulations showed that upsizing the balloon from 5 to 6 mm—as performed clinically—markedly increased both global and focal leaflet stress. When balloon tilt, which was also present in this case, was introduced, the force vector shifted toward the non-commissural portion of the cusp, creating a high-stress region that corresponded precisely to the actual tear site and the resulting AR. Although tilt produced only modest changes in overall stress magnitude, it substantially altered the *location* of peak stress, thereby explaining the



unexpected cusp injury observed clinically.

Conclusions: Patient-specific modelling closely reflected real procedural behaviour and clarified why anatomically similar infants experienced opposite outcomes. By identifying high-risk stress zones influenced by balloon size and tilt, digital simulation may support pre-procedural strategy and reduce unpredictable cusp injury. Further validation in larger cohorts is warranted.



MP-161 / #820

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

SUCCESSFUL PERINATAL TREATMENT OF CIRCULAR SHUNT IN FETUS WITH TRICUSPID VALVE DYSPLASIA

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Background and Aim: Background and Aim: *Congenital tricuspid valve dysplasia (TVD)* is a rare malformation characterized by irregular thickening of the leaflet tissue with myxoid connective tissue in an otherwise normally delaminated tricuspid valve, without septal leaflet displacement and without atrialization of the right ventricle. When associated with moderate or severe pulmonary valve regurgitation, it may lead to the development of a *circular shunt*, resulting in fetal hydrops, reduced systemic perfusion, and, in severe cases, intrauterine demise. Maternal administration of indomethacin may decrease the diameter of the fetal ductus arteriosus, thereby reducing the hemodynamic burden of the circular shunt in utero. The aim of this report is to present a clinical case of antenatal management of a circular shunt in a fetus with TVD.
Methods: Material and Methods: The fetus was from a second pregnancy at 32 weeks' gestation, presenting with TVD and severe tricuspid regurgitation, retrograde flow across the ductus arteriosus, and moderate pulmonary valve regurgitation. A mild amount of fluid was noted in both pleural cavities. The *fetal cardiovascular profile score* was 5. Given the high risk of intrauterine demise, a decision was made to administer maternal (transplacental) indomethacin to reduce the diameter of the ductus arteriosus. Indomethacin was initiated at 50 mg every 8 hours on day 1, followed by gradual escalation to 75 mg every 6 hours over the subsequent 6 days.
Results: After 72–96 hours of therapy, serial fetal echocardiography showed a marked reduction of the ductus arteriosus diameter from 7 mm to 3 mm and normalization of ductus venosus flow. Indomethacin was switched to ibuprofen (200 mg three times daily) for prolonged conservative treatment. By 35 weeks,fetal hydrothorax resolved. The infant was delivered by cesarean section at 39 weeks (3.0 kg). Early postnatal course was stable: spontaneous breathing, oxygen saturation 90% on supplemental O_2. After ductal closure, saturation increased to 97% with restored antegrade pulmonary valve flow, although severe tricuspid regurgitation persisted. Discharge occurred on day 22 of life.
Conclusions: Fetal TVD with severe regurgitation and pulmonary valve insufficiency may cause a circular shunt with hydrops. Transplacental NSAID enabling controlled ductal constriction can reduce shunting, improve venous return and perfusion.



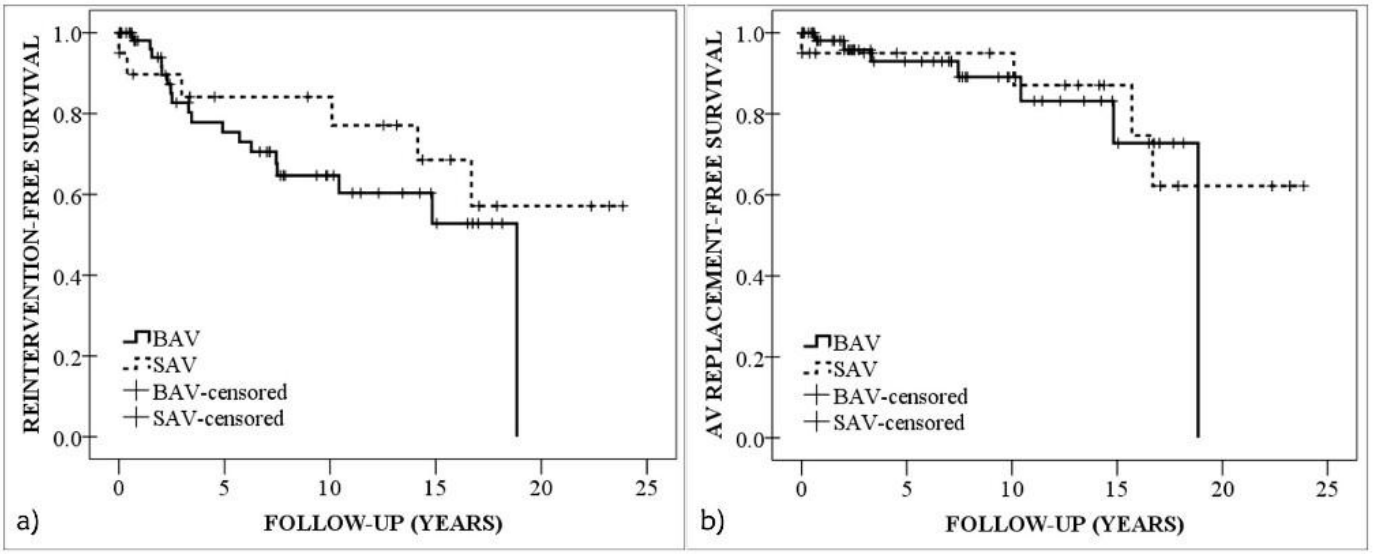
MP-162 / #834

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

PERCUTANEOUS TRANSLUMINAL BALLOON VALVOPLASTY AND SURGICAL VALVOTOMY COMPARATIVE ANALYSIS IN CONGENITAL NON-CRITICAL AORTIC VALVE STENOSIS

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Background and Aim: Non-critical congenital aortic valve stenosis in one third of patients requires intervention, transcatheter percutaneous balloon aortic valvoplasty (BAV) or surgical aortic valvotomy (SAV). This study was performed to review post-intervention results.
Methods: The study conducted at Mother and Child Health Institute of Serbia reflected 33-year period (from 1992 to 2025), including 90 interventions (67 BAVs and 23 SAVs).
Results: Mean age of patients for BAV and SAV was 7.1 ± 5.5 and 2.5 ± 4.2 years, respectively. Optimal immediate outcome was registered in 62/67 BAVs and 20/23 SAVs, with three early postsurgical deaths. Baloon to aortic valve diameter ratio was 0.9 ± 0.1. Peak to peak PG decreased significantly after BAV (63.5 ± 26.6 mmHg vs. 25.9 ± 15.5 mmHg, p<0.001). Peak instantaneous PG significant reduction (p<0.001) was similar in BAV (78.1 ± 18.5 mmHg vs. 42.4 ± 13,4 mmHg) and SAV group (87.2 ± 19.7 mmHg vs. 41.6 ± 10.7 mmHg), with similar AR before (p=0.082) (0.0+ (IQR 0.0-1.0) and 0.0+ (IQR 0.0-0.0)) and after intervention (p=0.368) (1.0+ (IQR 0.0-1.125) and 1.0+ (IQR 0.0-2.0)). Mild intervention-related AR increment was noted in both groups (BAV 0.25+ (IQR 0–1), SAV 1+ (IQR 0–1.5)). Follow up period was 6.5 ± 5.7 years in BAV and 11.1 ± 8.1 years in SAV group. Follow-up echocardiographic PG slightly rose in both groups, BAV (51.7 ± 24.6 mmHg, p<0.001) and SAV (50.1 ± 23.8 mmHg, p<0.001). Significant AR progression was registered in both groups, BAV (to 1.0+ (IQR 1.0-2.0), p<0.001) and SAV (to 1.5+ (IQR 0.5-2.5), p=0.014). Reintervention-free survival was 12.9 years (95% CI 10.6–15.1) after BAV and 17.6 years (95% CI 13.5–21.7) after SAV (p=0.311), and survival without aortic valve replacement was 16.3 (95% CI 14.3–18.3) and 19.7 (95% CI 16.2–23.1) years, respectively (p=0.713) (Figure 1).



Conclusions: Successful BAV and SAV in patients with non-critical congenital aortic stenosis are very comparable in both early and late follow-ups. BAV is less invasive, with minor early complications, shorter hospitalization and avoided thoracotomy. However, long-term results are discreetly better after surgery, with somewhat prolonged reintervention and aortic valve replacement free survival period.



MP-163 / #1238

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

PREDICTORS OF MORTALITY IN EBSTEIN'S ANOMALY: A 34-YEAR SINGLE-CENTER EXPERIENCE

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Background and Aim: Ebstein's anomaly is a rare congenital heart malformation with highly variable clinical presentation and prognosis. Despite advances in medical and surgical management, mortality remains significant, particularly in neonatal and severe forms. The identification of reliable prognostic factors is crucial for clinical decision-making and family counseling.
Methods: We conducted a retrospective, single-center study of 62 patients with Ebstein's anomaly admitted between June 1990 and March 2024. Clinical, echocardiographic, and therapeutic data were analyzed to identify predictors of mortality. Univariate and multivariate analyses were performed using logistic regression. Survival analysis was conducted using Kaplan-Meier curves.
Results: The overall mortality rate was 30.6% (19 patients) with a median age at death of 11 months (range: 2 days to 30 years). Neonatal mortality reached 42.9%, with 100% mortality in patients with GOSE score grade IV. Preoperative mortality accounted for 73.7% of deaths, while postoperative mortality was 13%. Univariate analysis identified multiple predictors including cyanosis ($p<0.001$), Carpentier type D ($p<0.001$), oxygen saturation <80% ($p<0.001$), GOSE grade IV ($p<0.001$), age <2 years ($p=0.001$), and wall-to-wall heart on chest radiography ($p=0.001$). Multivariate analysis revealed two independent predictors: oxygen saturation <80% (OR=1.72, $p=0.045$) and presenting cyanosis (OR=2.13, $p=0.01$). Actuarial survival at 1, 10, and 20 years was 79%, 71.5%, and 65% respectively.
Conclusions: Ebstein's anomaly carries significant mortality risk, particularly in the first two years of life. Oxygen saturation below 80% and presenting cyanosis are independent predictors of death, representing simple clinical parameters for risk stratification. The high preoperative mortality emphasizes the need for earlier surgical intervention in selected cases. These findings provide valuable prognostic information for clinical decision-making and parental counseling.



MP-164 / #1251

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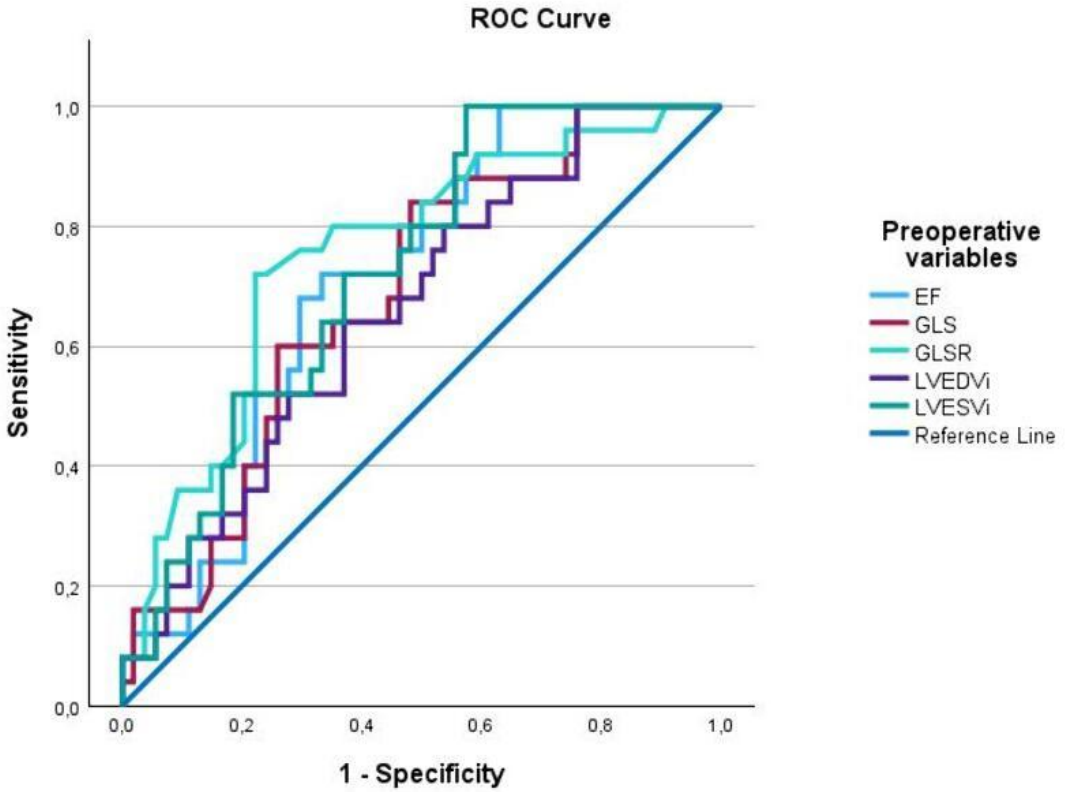
PREDICTION OF CHRONIC LEFT VENTRICULAR DYSFUNCTION AFTER SURGERY FOR SEVERE PEDIATRIC AORTIC REGURGITATION

Thomas Salaets[1], Cesar Gonzalez De Alba[2], Ana Alexandra Oliveira[3], Pablo López[4], Piet Claus[3], Mark Friedberg[5]
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Background and Aim: Chronic aortic regurgitation (AR) induces subclinical myocardial dysfunction, that may become irreversible if surgery is delayed. Adult indications for surgery in chronic aortic regurgitation are based on observational evidence, demonstrating associations between preoperative echocardiographic parameters and post-operative impaired left ventricular (LV) function. Pediatric data are lacking, and it is unclear how adult echocardiographic indications should be translated to the pediatric population.
Methods: This retrospective 2-center study included 79 children (<18y) with severe AR. All underwent transthoracic echocardiography before aortic valve surgery and at 1-year follow-up (FU). Blood pressure, LV diameters, wall thickness and Simpson's biplane volumes were measured in systole and diastole. Fractional shortening (FS) and LV ejection fraction (EF) were calculated and global longitudinal strain (GLS) and strain rate (GLSR) were measured. Preoperative echo parameters were compared between those with and without dysfunction (EF<55%) at FU using either t- or Mann-Whitney-U-tests. ROC curves were constructed and area under the curve calculated (AUC) for parameters with a significant association.
Results: Patients had a median age of 12.5 years (IQR 6.75-15) at surgery. One year after surgery, 25 patients (31.6%) had an EF <55%. While preoperative end-diastolic and end-systolic diameters (respectively, LVEDD and LVESD z-score) were not associated to LV dysfunction at FU, indexed end-diastolic and end-systolic volume (resp. LVEDVi and LVESVi) and EF were (Table 1). GLS and GLSR were also significantly associated to LV dysfunction at FU (Table 1). The AUC was highest for GLSR (0.755); however, all echocardiographic parameters had only modest discriminative value (Table and Figure 1). Relevant cut-offs are GLSR ≥-1.00 s^{-1} (sensitivity 72%; specificity 78%) and LVESVi ≥32.4ml/m^2 (sensitivity 100%; specificity 43%) for LV dysfunction at

FU.

preop parameter	EF <55% at 1y FU (n=25)	EF>55% at 1y FU (n=54)	P-value	AUC
LV geometry				
LVEDD z-score	2.45 (1.64)	2.75 [2.08;3.30]	0.348	/
LVESD z-score	2.03 (1.61)	1.86 [0.79;2.75]	0.720	/
LVEDVi (ml/m^2)	109.7 (25.4)	95.1 (25.4)	0.022	0.661
LVESVi (ml/m^2)	46.6 [36.4;53.8]	37.3 (11.9)	0.001	0.725
LV function				
LV FS (%)	37.6 [31.9;41.5]	39.5 (7.6)	0.095	/
LV EF (%)	57.2 [54.7;61.4]	61.6 [57.5;64.3]	0.003	0.707
GLS (%)	-17.7 [-19.6;-16.0]	-19.9 (3.5)	0.008	0.672
GLSR (s^{-1})	-0.94 (0.26)	-1.20 (0.31)	<0.001	0.755



Conclusions: One-year after surgery for AR , 31.6% of pediatric patients had persistent LV



dysfunction as defined by EF<55%. Preoperative LV volumes, EF, GLS and GLSR were associated with LV dysfunction at 1-year FU, with GLSR having the highest discriminative value. Consequently, in addition to LV volumes, pre-operative evaluation of LV strain and strain rate may improve identification of patients at risk of chronic post-operative LV dysfunction.

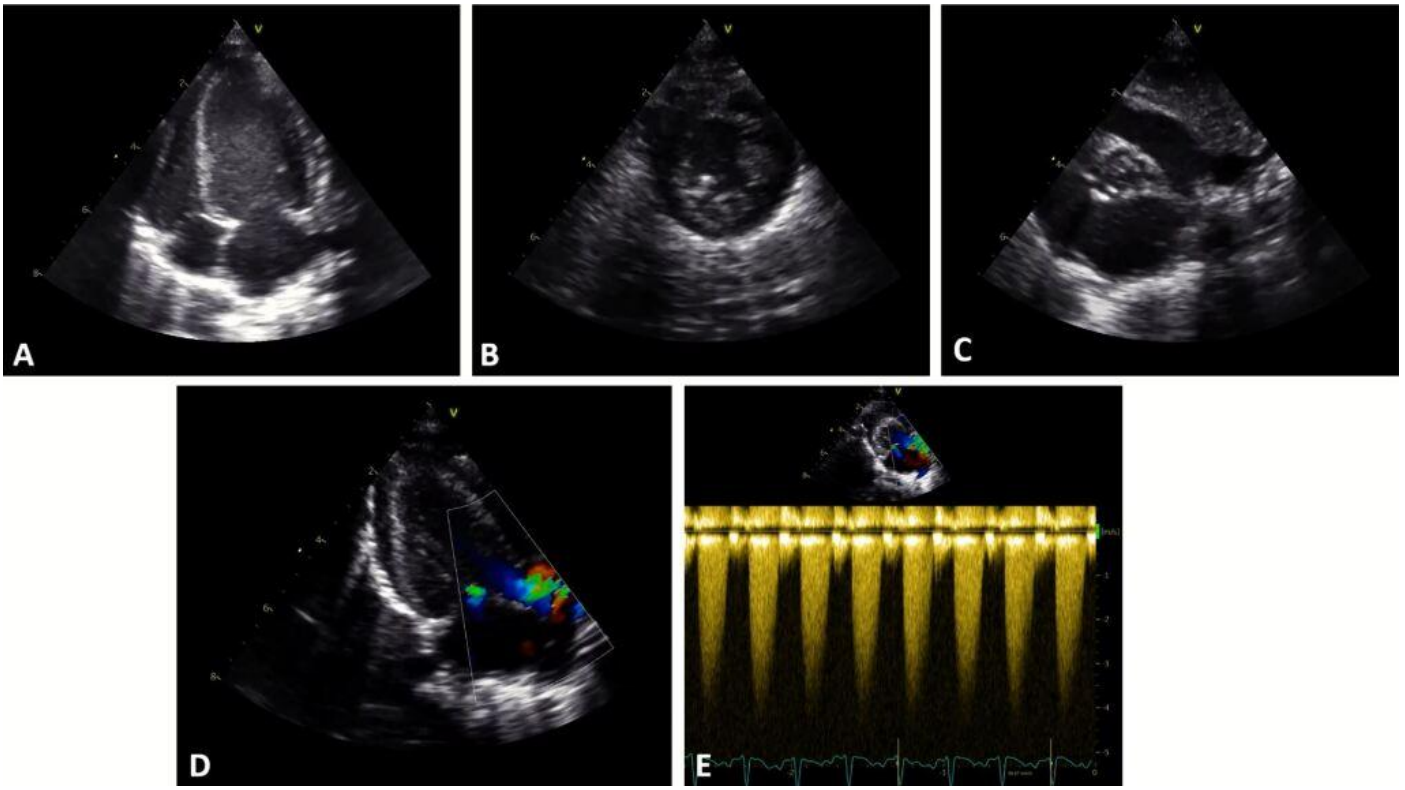
MP-165 / #1279

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

CRITICAL AORTIC STENOSIS, BALLOON VALVULOTOMY AND EXTRACORPOREAL MEMBRANE OXYGENATION

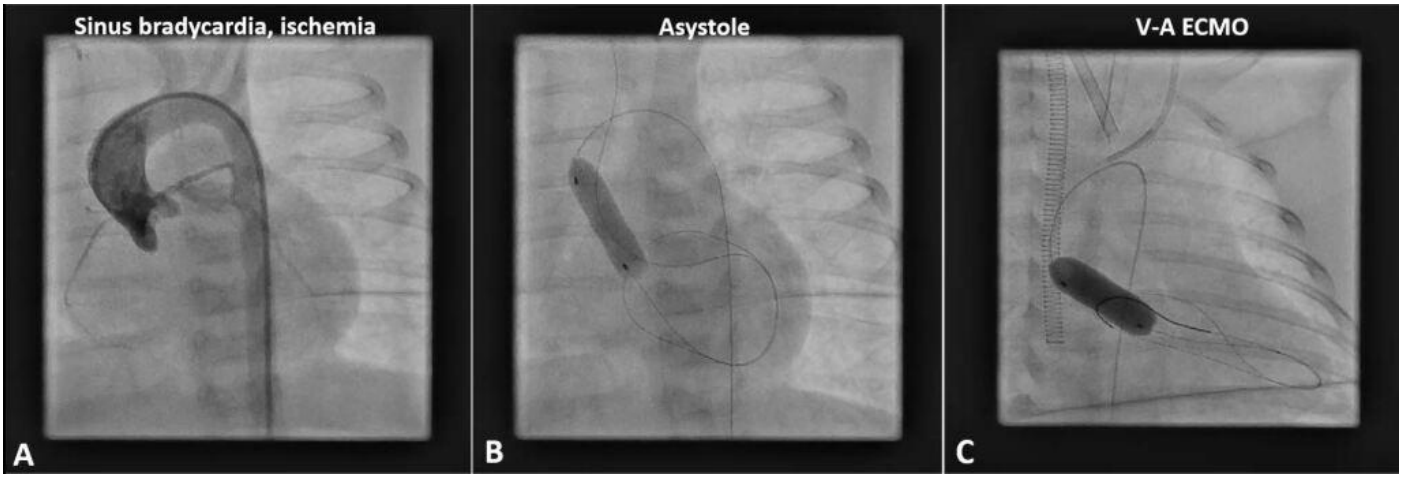
Nathan Hahurij[1], Nico Blom[1], Robin Bertels[1], Bart Straver[2], Mark Hazekamp[3], Regina Bökenkamp[1]
[1]Leiden University Medical Center, Pediatric Cardiology, Leiden, Netherlands, [2]Amsterdam University Medical Center, Pediatric Cardiology, Amsterdam, Netherlands, [3]Leiden University Medical Center, Cardiothoracic Surgery, Leiden, Netherlands

Background and Aim: A 1-month-old boy (4kg) was diagnosed with severe aortic stenosis (AoS) of a dysplastic bicuspid valve (meanPG 60–80mmHg/maxPG 90–120mmHg). Echocardiography revealed a dilated and hypertrophic left ventricle (LV) with reasonably preserved systolic function, there was no arterial duct (Figure 1A-E).



Methods: The child was referred to the catheterization laboratory for balloon valvulotomy.
Results: During induction of anesthesia, the patient developed bradycardia and ischemic changes on ECG, progressing to ventricular fibrillation. After defibrillation there was slow sinus rhythm with persistent ST-segment abnormalities. A 4Fr sheath was rapidly

introduced into the right femoral artery, followed by aortic root angiography (4Fr NIH), which revealed an aortic annulus diameter of approximately 7mm (Figure 2A). A coronary wire (BMW) was advanced through the aortic valve into the LV, and balloon dilatation was performed (6x20mm Tyshak; 3.5atm; Figure 2B). During dilatation, the patient again developed bradycardia, necessitating cardiopulmonary resuscitation. Return of spontaneous circulation was achieved after 15 minutes, although the patient required high-dose inotropic support. Echocardiography at this point showed a residual peak gradient of 87mmHg across the aortic valve and no AR. Given the unstable clinical condition and high residual gradient, the surgical team was consulted for veno-arterial extracorporeal membrane oxygenation (ECMO). Cannulation was performed via the right carotid artery (8Fr) and right internal jugular vein (12Fr). Once hemodynamically stabilized on ECMO (flow 2L/min/m2), a second balloon dilatation was performed (7x20mm Tyshak; 4atm; Figure 2C). Following this intervention, the pressure gradient was reduced to 20mmHg (albeit on ECMO support), with only mild AR on echocardiography. The patient was subsequently transferred to the PICU and was successfully decannulated the following day. Echocardiography demonstrated good LV systolic function, a mild residual gradient across the aortic valve (meanPG 36mmHg/maxPG 50mmHg), and mild AR.



Conclusions: Balloon valvulotomy in infants with severe AoS presents significant challenges. Induction of anaesthesia alone may lead to bradycardia, myocardial ischemia, and life-threatening arrhythmias, necessitating close collaboration between the pediatric cardiologist, anaesthesiologist and congenital cardiac surgeon. Especially the availability of surgical backup for an emergency Ross procedure, as well as access to ECMO support, is essential to ensure the safe management of these high-risk cases.



MP-166 / #1384

SESSION 10 - VALVULAR DISEASES
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PERSONALIZING WARFARIN DOSE ADJUSTMENT IN PEDIATRIC CARDIOLOGY USING MACHINE LEARNING

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Background and Aim: Warfarin adjustment in pediatric cardiology is particularly challenging and requires frequent, individualized modifications based on international normalized ratio (INR) monitoring. While some patients are autonomous, most pediatric patients depend on caregivers and frequently contact their cardiologist to report INR values and adequate Warfarin dosage adjustment. Although rule-based dosing algorithms are available, clinicians often rely on experience, as these tools insufficiently account for inter- and intra-patient variability, including dietary changes, inflammatory status, and genetic factors. We hypothesized that a machine learning (ML) model could learn from individual longitudinal INR monitoring data to personalize and fine-tune rule-based dose adjustment strategies at the patient level, thereby approximating clinician-driven decision-making in pediatric anticoagulation management.
Methods: Monitoring data, including INR values, warfarin doses, and clinician dose adjustment decisions, from patients under 18 years of age receiving oral anticoagulation and followed at La Timone Hospital (Marseille) will be analyzed. Clinician dose adjustment decisions will serve as the gold standard. The existing rule-based algorithm will be reproduced and evaluated. ML models will be developed and optimized to predict dose adjustments using longitudinal patient data. Model performance will be compared with the existing algorithm, and feature importance analyses will be conducted to identify key determinants of dose modification. An interactive clinical decision-support application is planned to assist clinicians and, following evaluation and validation, to support patient self-monitoring and self-management.
Results: ML models are expected to match or outperform the rule-based algorithm in predicting clinician dose adjustment decisions. By integrating patient-specific historical, demographic, and clinical patterns, ML approaches may enable more personalized dosing



recommendations, supporting safer and more efficient anticoagulation management.
Conclusions: The use of an interactive application could further improve treatment adherence among vitamin K antagonist–treated pediatric patients enrolled in self-monitoring and self-management programs, potentially reducing healthcare costs and unnecessary clinical interventions.



MP-167 / #1495

SESSION 10 - VALVULAR DISEASES
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TRICUSPID VALVE REGURGITATION IN CHILDREN WITH CONGENITAL CORRECTED TRANSPOSITION OF THE GREAT ARTERIES: EXPERIENCE OF TREATMENT

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Background and Aim: TV abnormalities in CCTGA occur in 14-56% of cases and tend to increase with age. Severe TV regurgitation (TR) worsens right ventricle (RV) function. Severe TR in CCTGA in childhood in some patients requires surgical correction to reduce it and prevent development of systemic RV dysfunction. To assess TR in pediatric patients with CCTGA and the need for its treatment and its results.
Methods: From 2001 to 2024 years 151 pediatric patients with CCTGA there was investigated. 15 (9,9%) patients had severe TR . In 2 patients diagnosis of TR significant was established prenatally. Seven patients are being monitored by cardiologists. Eight patients (5,3%) with TR severe were treated at the age from 5 to 129 months . The follow - up period is from 9 to 240 months. Patients were assessed by transthoracic and trasaesoaphageal echocardiography.
Results: The patients had TR as a result of TV dysplasia - displacement of the leaflets, chordal shortening, thickening and shortening of the papillary muscles, leaflets thickening and reduced mobility. All patients had dilatation of the TV and enlargement of the RV and LA. Three patients had previous surgical procedures - one for coarctation of the aorte (CoA), two for pulmonary artery banding (PAB). In two patients valvuloplasty was performed during double-switch operation, in two - during PAB, one of them had a 28 mm Medtronic ring. In one patient valvuloplasty performed during CoA surgery and PAB . In one patient TV prosthesis was performed. Valvuloplasty results were assessed intraoperativ and after surgery. Five patients had a good outcome of valvuloplasty by TEE. Two patients had a decrease in regurgitation compared to preoperative values, but it was characterized as moderate, despite the valvuloplasty. One patient died on the 5th day after surgery. One patient died after 5 months after surgery.
Conclusions: The frequency of TR severe in children with CCTGA is not the same as in adults. Some of them require treatment during childhood. TV plasty in pediatric has satisfactory results, but requires observation of TV and RV function in follow-up.



MP-168 / #526

SESSION 11 - IMAGING
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CHATBOTS VS. AUTOMATED FUNCTIONAL SOFTWARE VS. HUMAN ASSESSMENT OF LEFT VENTRICULAR EJECTION FRACTION

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Background and Aim: Accurate estimation of left ventricular ejection fraction (LVEF) is essential for diagnosing and monitoring systolic dysfunction. Traditional echocardiographic methods such as M-mode and automated EF software are widely used but remain susceptible to operator dependency, geometric assumptions, and image-quality limitations. With recent advances in multimodal artificial intelligence, large vision–language models (chatbots) may offer a novel, accessible approach to functional cardiac assessment. This study evaluates and compares the diagnostic performance, reproducibility, and inter-method agreement of human-derived M-mode EF, automated EF software, and a general-purpose AI chatbot in analyzing echocardiographic cine loops.
Methods: Anonymized echocardiographic datasets, including M-mode, apical two-chamber, and apical four-chamber cine loops, were analyzed using three independent methods: (1) human-obtained M-mode EF, (2) the GE E95 Auto-EF algorithm, and (3) EF estimates generated by a non-trained AI chatbot. Two operators performed all measurements in a blinded fashion. Inter-rater and inter-method agreement were assessed using Spearman rank correlation, intraclass correlation coefficients ICC(2,1) for absolute agreement, and Bland–Altman analyses to evaluate bias and limits of agreement.
Results: All three modalities demonstrated excellent inter-rater reproducibility, with ICC values of 0.992 for M-mode, 0.986 for Auto-EF, and 0.988 for chatbot-derived EF. Inter-method comparisons showed strong concordance across all pairs, with chatbot-derived EF achieving notably high agreement with Auto-EF (ICC 0.930 and 0.909 for Operators 1 and 2), exceeding the agreement between Auto-EF and M-mode (ICC 0.838 for both operators). Bland–Altman analyses revealed minimal mean bias and no proportional error across EF ranges, confirming stable performance and interchangeability of chatbot-derived EF with established methods.
Conclusions: A general-purpose multimodal AI chatbot can estimate LVEF with accuracy and reproducibility comparable to traditional and automated echocardiographic methods. Its strong agreement with Auto-EF and robust inter-rater consistency underscore its potential role as an adjunct tool for rapid, accessible systolic function assessment. These



findings highlight the promise of vision–language models in supporting clinical workflows, telemedicine applications, and point-of-care cardiac imaging, marking an emerging paradigm in AI-assisted echocardiography.



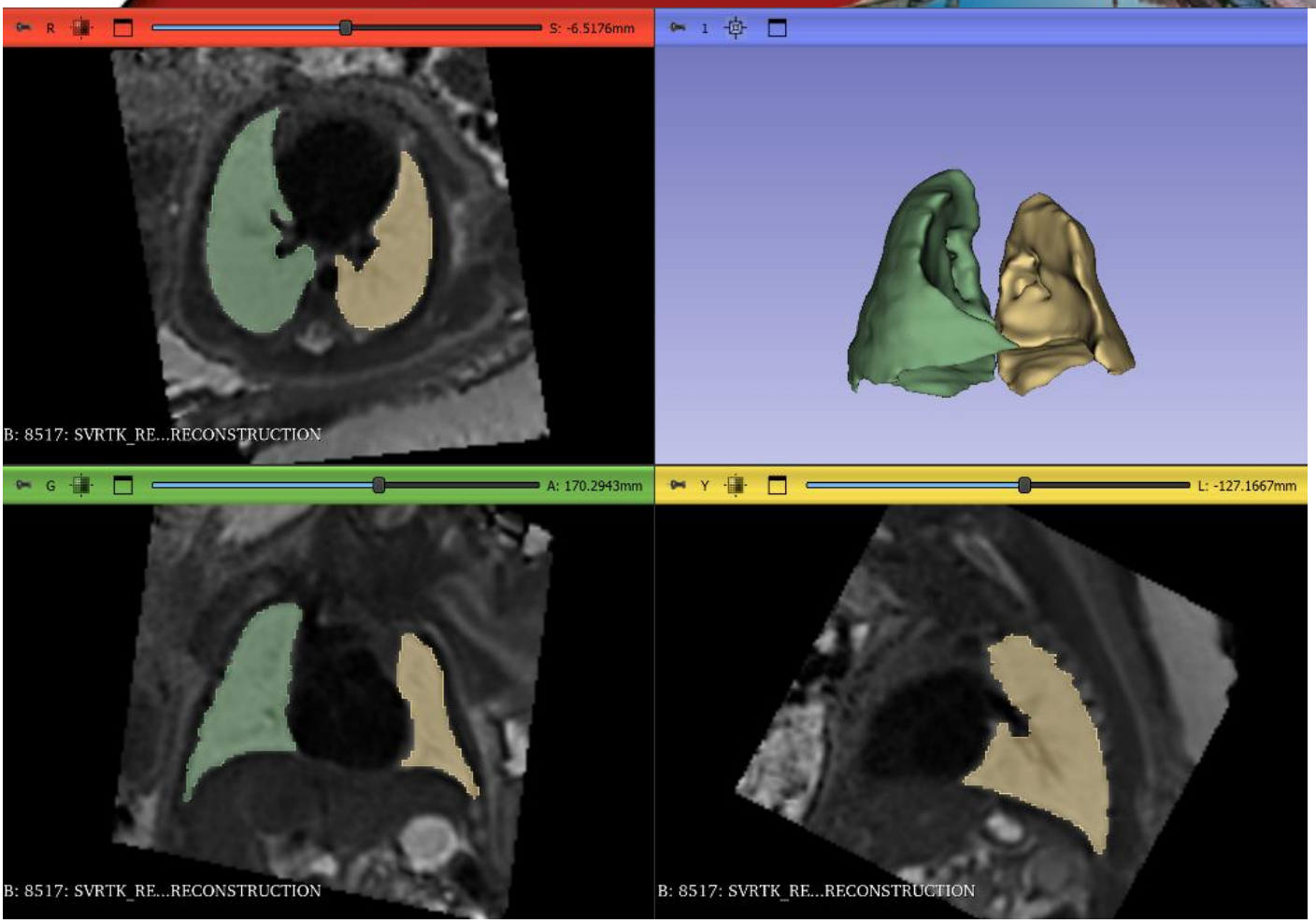
MP-169 / #25

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

COMPARISON BETWEEN 2D AND 3D, MANUAL AND AUTOMATED SEGMENTATION OF FETAL MAGNETIC RESONANCE IMAGING FOR FETAL LUNG VOLUME QUANTIFICATION

Paola Franceschi[1,2], Rawan Abuzinadah[3,4], David Broadbent[5], Sven Plein[6], Luigi Lovato[1], Malenka Bissell[6,7]
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Background and Aim: Quantifying fetal lung volume (FLV) is important for evaluating pulmonary development and predicting outcomes in fetuses with congenital heart disease (CHD). In MRI, the gold standard is the manual segmentation of volumetric reconstructions generated with Deformable Slice-to-Volume Registration (DSVR) from ten T2-weighted black-blood (T2w-BB) stacks (ALL-BB-DSVRm)(Fig.1). However, this method is limited by long acquisition, reconstruction, and segmentation times. Automated segmentation tools are emerging but remain under validation. This study aims to evaluate the accuracy and time efficiency of alternative manual and automated methods for FLV quantification on 2D and 3D image
stacks.



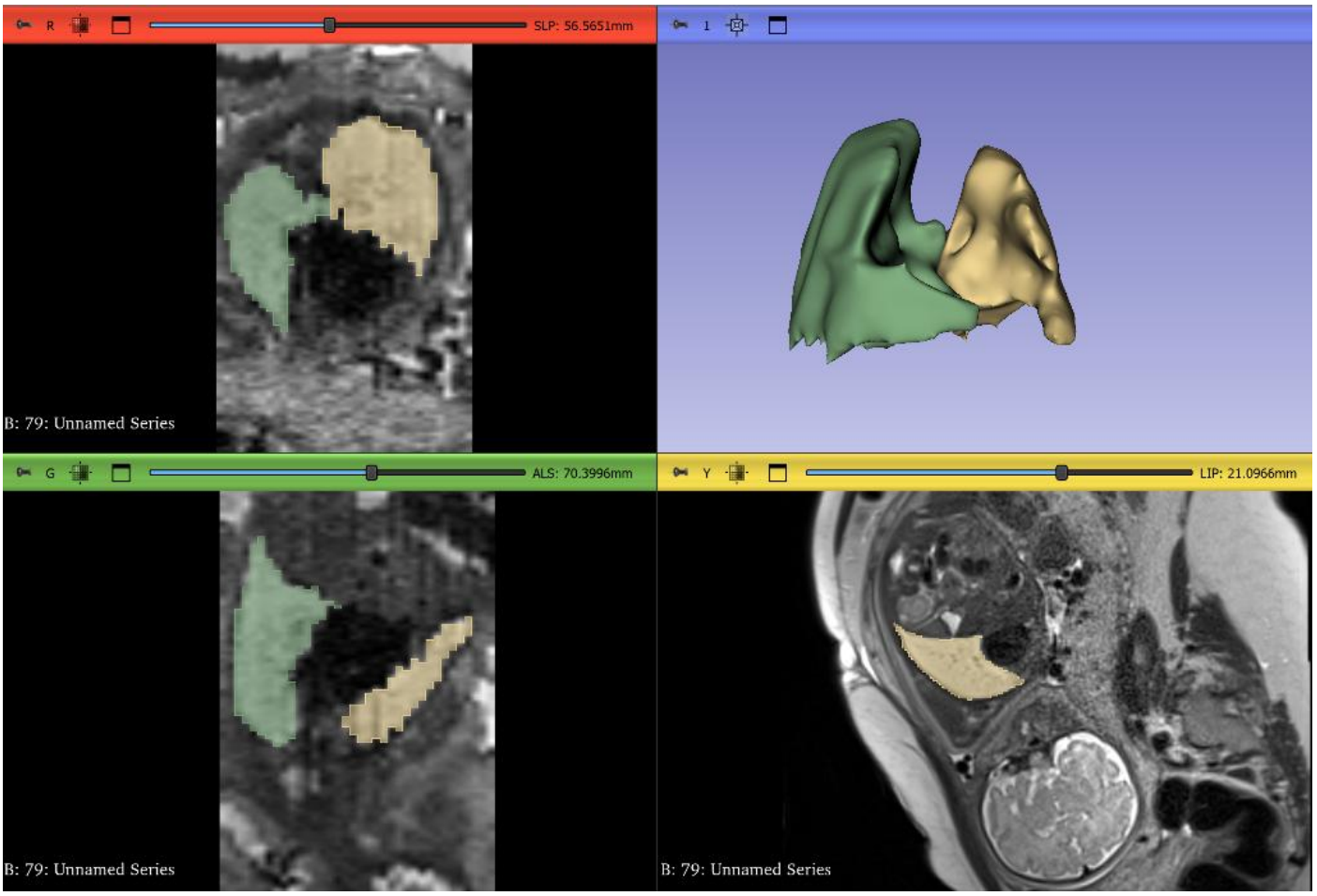
Methods: This retrospective, single-centre study included 38 third-trimester fetuses undergoing fetal MRI at 1.5T. The cohort comprised both healthy volunteers and fetuses with CHD, diagnosed or suspected on fetal echocardiography and referred for further evaluation (Table 1). Manual segmentation of single T2w-BB sagittal, coronal, and transverse stacks, manual segmentation of a 3-stack DSVR reconstruction (3-BB-DSVRm), and segmentation of ALL-BB-DSVR and 3-BB-DSVR using an automated pipeline (north medical) were compared to ALL-BB-DSVRm, in terms of accuracy and time efficiency.



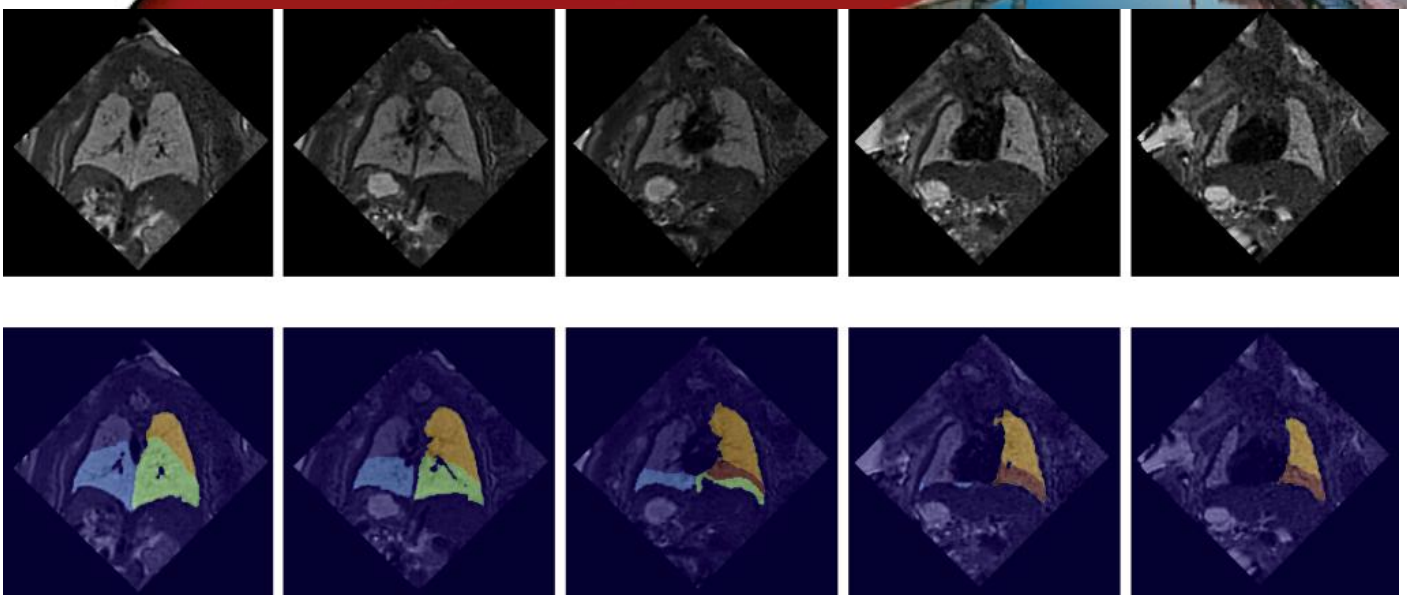
	Value
No. of fetuses	38
Gestational age (weeks)	33 (32-34)
Estimated fetal weight (kg)	2.19 (1.95-2.50)
Total no. of right lungs	37 ¥
Total no. of left lungs	37 µ
No. of singleton pregnancies	37 (97%) §
No. of healthy pregnancies	5 (13%)
Postnatal diagnosis	
CoA	10 (26%)
Surgical CoA	5 (13%)
Non-surgical CoA	5 (13%)
TGA	6 (16%)
HLHS	6 (16%)
Double aortic arch	1 (3%)
RAA	1 (3%)
Pulmonary stenosis/atresia	2 (5%)
TV anomalies (Ebstein, severe TR)	3 (8%)
Miscellaneous (APVD, single lung agenesis)	4 (11%)

Results: All manual methods correlated strongly with ALL-BB-DSVRm (r_s>0.90, p<.001) while significantly reducing quantification time. Single sagittal stacks and 3-BB-DSVRm achieved the highest correlations, with median total quantification times of 6 minutes for single sagittal stacks (only one stack required, no DSVR needed)(Fig.2), and 29 minutes for 3-BB-DSVRm vs. 66 minutes for ALL-BB-DSVRm (p<.001; Table 2). Automated segmentation of ALL-BB-DSVR also correlated strongly with ALL-BB-DSVRm (r_s>0.90, p<.001). For 3-BB-DSVR, automated segmentation showed good correlation for the right

lung (r_s=0.81) and moderate for the left lung (r_s=0.60), both p<.001. Automated methods eliminated manual segmentation time, reducing FLV quantification times to 9 vs. 29 minutes for 3-BB-DSVR and 45 vs. 66 minutes for ALL-BB-DSVR (p<.001)(Fig.3).



	RL volume (ml)	r_s	p-value	LL volume (ml)	r_s	p-value	Segmentation time (min)	p-value	DSVR time (min)	p-value
ALL BB SVR manual	43.1 (32.4–57.7)			36.2 (24.4–42.1)			21 (18–25)		20 (18–21)	
3 BB SVR manual	43.3 (32.4–57.7)	0.991	<.001	34.7 (24.9–42.7)	0.976	<.001	20 (18–24)	0.076	6 (5–6)	<.001
ALL BB SVR automated	47.6 (37.9–61.2)	0.979	<.001	39.0 (29.7–46.8)	0.977	<.001	0	<.001	20 (18–21)	
Single sagittal	44.1 (31.6–57.8)	0.979	<.001	36.2 (26.9–43.7)	0.966	<.001	5 (4–6)	<.001		
Single coronal	44.3 (31.8–55.2)	0.967	<.001	37.0 (25.9–42.7)	0.932	<.001	6 (5–8)	<.001		
Single transverse	42.9 (34.3–56.7)	0.950	<.001	35.3 (27.8–43.2)	0.911	<.001	7 (5–9)	<.001		
3 BB SVR automated	43.3 (29.4–50.9)	0.813	<.001	34.3 (26.1–42.4)	0.600	<.001	0	<.001	6 (5–6)	<.001



Conclusions: Manual segmentation of a single sagittal T2w-BB stack or 3-BB-DSVR offers accurate, rapid alternatives to ALL-BB-DSVR for fetal lung volume assessment. Automated tools excel on high-quality 3D stacks but show reduced accuracy with lower-quality data, especially for the left lung. Employing the most suitable strategy for each case ensures reliable results, streamlines clinical workflow, and enhances the sustainability of MRI procedures.



MP-170 / #166

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

STRESS PERFUSION CARDIAC MAGNETIC RESONANCE IMAGING FOLLOWING CONGENITAL HEART SURGERY WITH CORONARY ARTERY REIMPLANTATION

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Background and Aim: Coronary artery (CA) reimplantation is an essential component of many congenital heart disease (CHD) surgeries. Post-operative proximal coronary artery narrowing increases the risk of myocardial ischemia. While computed tomography angiography (CTA) and invasive angiography provide anatomic coronary evaluation, stress perfusion cardiac magnetic resonance (spCMR) identifies inducible perfusion defects. Given the limited literature on spCMR in this population, we aimed to evaluate its clinical utility in CHD patients with prior CA reimplantation.
Methods: We conducted a single-center, retrospective longitudinal study of patients with previous CHD surgery involving CA reimplantation who subsequently underwent a regadenoson spCMR between April 2014 and January 2025. Patients with anomalous aortic origin of a CA were excluded. Demographic and clinical data, including medical management and CA revascularization following spCMR, were obtained through chart review. CA narrowing was defined as ≥50% luminal change on CT or invasive angiography. Major cardiac events (MCEs) included new myocardial ischemia/infarction, CA-related heart failure, ventricular arrhythmias or mortality. Descriptive analyses and group comparisons between normal and abnormal spCMR findings were performed.
Results: Eighty-four patients (73.8% male, n=62) underwent spCMR at a median age of 16 years (IQR 13-19) with a follow-up time of 5.2 years (IQR 2.8-7.1). Inducible perfusion defects were present in 15/84 (17.9%) patients overall, including 2/10 (20.0%) who were evaluated for suspected CA narrowing, 7/10 (70.0%) evaluated for exertional chest pain/syncope or ventricular dysfunction, and 6/64 (9.4%) evaluated for asymptomatic surveillance. CA imaging confirmed CA narrowing in 5/15 (33.3%) patients with abnormal spCMR - medical therapy was optimized in 4 and 1 underwent CA revascularization. During follow-up, CA-related MCE occurred in 1/5 patients with both abnormal spCMR and CA narrowing; no events occurred in patients with normal spCMR or without CA narrowing

(Figure 1).

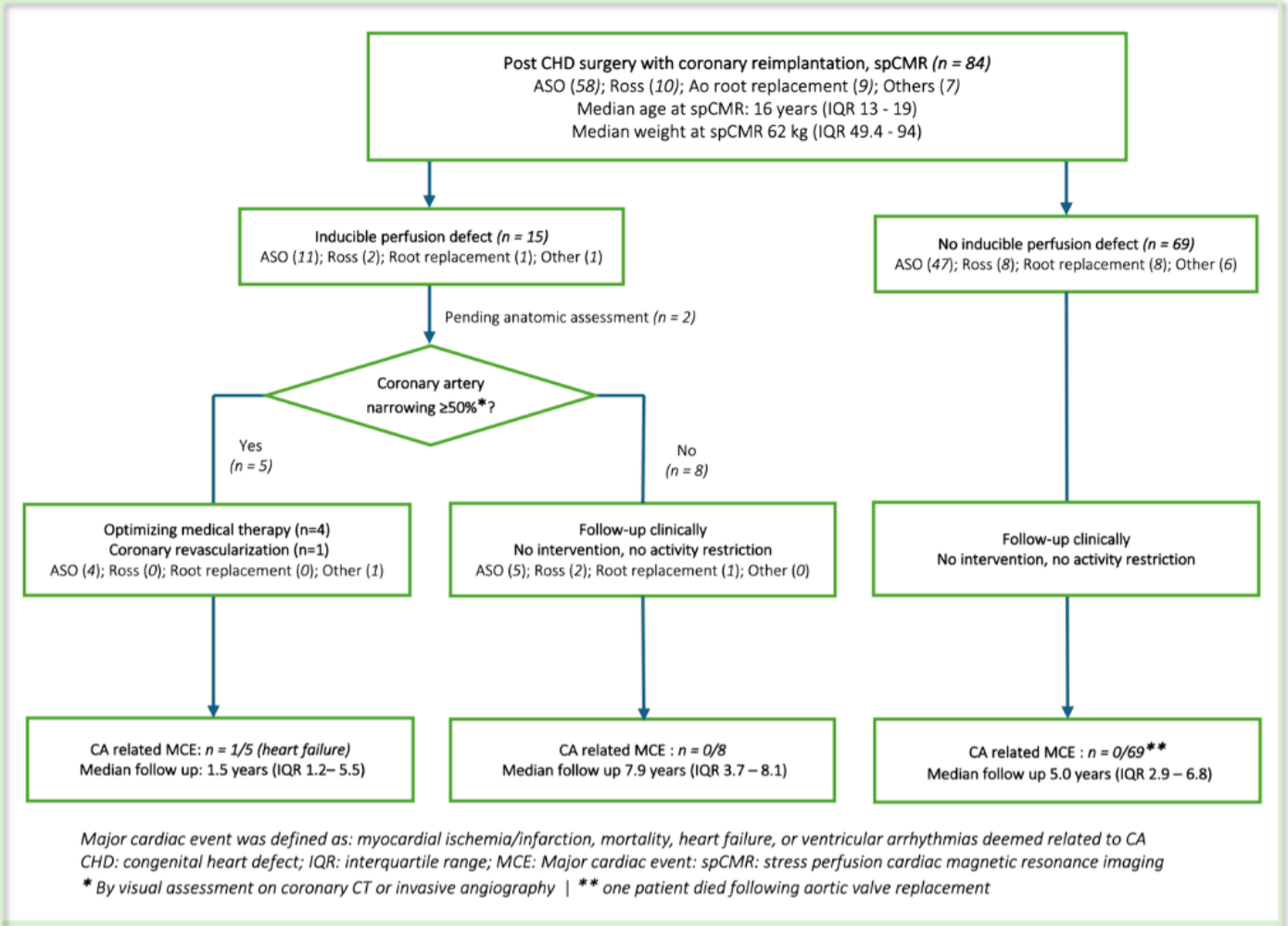


Figure 1: Clinical Decision Tree in Patients with Prior CHD Repair with Coronary Reimplantation Undergoing spCMR

Conclusions: Regadenoson spCMR offers a clinically meaningful perfusion assessment after CHD operations with CA reimplantation and informs subsequent diagnostic and therapeutic decisions. The absence of CA-related MCE in patients with negative spCMR suggests a reassuring prognostic value in surveillance and supports incorporating spCMR alongside CTA or invasive angiography. Prospective studies are needed to define optimal timing and integration of spCMR in follow-up algorithms for surgically repaired CHD.



MP-171 / #350

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

PREVALENCE AND DETERMINANTS OF CORONARY MICROVASCULAR DYSFUNCTION IN ADOLESCENTS AFTER ARTERIAL SWITCH SURGERY

Andrija Pavlović[1], Milorad Tesic[2], Milan Djukic[1], Jasna Kalanj[3], Milica Kuzmanovic[1], Maja Trkulja[1], Dusan Andric[1], Vladimir Milovanovic[4], Dejan Bisenic[4], Miroslav Elek[4], Tatjana Zecevic[4], Jelena Pjevalica[4], Igor Stefanovic[1], Vojislav Parezanovic[1]
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Background and Aim: Coronary microvascular dysfunction represents a potential long-term complication after neonatal arterial switch operation (ASO). This study evaluated the prevalence of impaired coronary flow reserve (CFR) and explored echocardiographic and clinical determinants in adolescents operated for simple D-transposition of the great arteries (D-TGA).
Methods: In this single-center cross-sectional study, patients who underwent neonatal ASO between 1998 and 2013 were evaluated using echocardiography, including global longitudinal strain (GLS), and cardiac catheterization with coronary angiography. Supravalvular aortic or pulmonary stenosis and pulmonary artery branch stenosis were assessed by angiography and invasive pressure measurements; mild pulmonary artery branch stenosis was defined as a peak systolic gradient <20 mmHg. CFR was measured non-invasively by transthoracic Doppler interrogation of the left anterior descending artery during adenosine-induced hyperemia. Patients were categorized into impaired (<2.5) and preserved (≥2.5) CFR groups. Independent predictors of impaired CFR were analyzed using binary logistic regression.
Results: Fifty-one patients (median age 16 years, range 13–23; 69% male) were included. Impaired CFR was detected in 22 patients (44%). Compared with those with preserved CFR, patients with impaired CFR exhibited lower tricuspid annular plane systolic excursion (TAPSE), higher left-ventricular end-systolic dimension Z-scores, and elevated mean pulmonary artery pressure (mPAP). Age, perioperative characteristics, and GLS did not differ between groups. On univariable analysis, mild pulmonary artery branch stenosis, reduced TAPSE, and mPAP ≥20 mmHg were associated with impaired CFR. In multivariable analysis, reduced TAPSE remained the only independent predictor (OR 4.41, 95% CI 1.14–17.05; p=0.031).



Conclusions: Impaired CFR is a frequent finding in adolescents following neonatal ASO and is independently associated with reduced right-ventricular systolic function, suggesting a close interaction between pulmonary hemodynamics, right-ventricular performance, and coronary microcirculation during long-term follow-up.



MP-172 / #408

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

ARTIFICIAL INTELLIGENCE SHORTENS ACQUISITION TIMES IN MAGNETIC RESONANCE FOR VENTRICULAR VOLUME MEASUREMENTS IN CONGENITAL HEART DISEASE WITHOUT LOSS OF QUALITY AND ACCURACY.

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Background and Aim: Conventional segmented cine imaging of right- (RV) and left-ventricular (LV) volumes requires multiple breath-holds and several minutes of acquisition, and is challenging in the presence of arrhythmia. Accelerated single-shot techniques using compressed sensing (CS), enhanced by artificial intelligence (AI), offer substantially shorter acquisition times, but their accuracy in congenital heart disease remains insufficiently validated.
Methods: In 24 patients (median age 29.3 years; range 12.3–54.8) with diverse congenital heart defects, LV and RV end-systolic (ESV) and end-diastolic volumes (EDV) were assessed. Conventional segmented SSFP was compared with a single-shot SSFP CS sequence (acceleration factor 5.6) incorporating AI reconstruction on a Philips 3T system. Short-axis acquisitions were analyzed with AI-assisted contouring (n = 8), while other orientations were contoured manually (n = 16). Agreement between methods was evaluated using Bland–Altman analysis.
Results: Mean differences between single shot AI-CS and conventional imaging were −0.5 mL for LV ESV and −1.75 mL for LV EDV. The 95% limits of agreement were −8.0 to 4.5 mL (LV ESV) and −15.2 to 14.2 mL (LV EDV). For the RV, mean differences were 3.9 mL (EDV) and −1.5 mL (ESV), with limits of agreement of −16.9 to 24.6 mL (RV EDV) and −14.9 to 11.8 mL (RV ESV). Differences in ejection fraction were small: 1.0% for the LV and 2.1% for the RV. CS-AI sequences yielded an average of 8.8 ± 1.5 acquired cardiac phases, interpolated to 15–18 phases per cycle. Acquisition time to cover both ventricles averaged 10.7 ± 2.3 seconds, opposed to 1.7 minutes in conventional imaging. AI-assisted segmentation in the short axis significantly improved RV volumetry ($p < 0.05$), while no improvement was seen for LV volumes.
Conclusions: AI-assisted CS cardiac MRI provides near–real-time ventricular volume



assessment with deviations from conventional SSFP within typical interobserver variability. Occasional outliers occur due to the 100-ms shot duration and associated lower temporal resolution, but overall accuracy for clinical use—particularly for RV analysis in short axis—is high.



MP-175 / #734

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

MATERNAL MEDICATION USE PATTERNS BEFORE AND DURING PREGNANCY AND CARDIAC OUTCOMES IN NEWBORNS

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Background and Aim: The impact of real-world, time-varying patterns of maternal medication use on neonatal cardiac outcomes is unclear. We examined associations between maternal medication-use patterns and neonatal transthoracic echocardiographic (TTE) parameters and minor congenital heart defects (CHDs).
Methods: In the population-based Copenhagen Baby Heart Study, 24,245 term newborns underwent TTE within 60 days of birth. Maternal prescriptions from three months before conception through delivery were obtained from the Danish National Prescription Registry. Agglomerative hierarchical clustering grouped newborns exposed into distinct clusters based on medication type (Anatomical Therapeutic Classification code), timing, and number of medications. TTE parameters were analysed using linear regression for mean differences and quantile regression to examine associations at different points of each measure's distribution (quantiles). Risks of atrial septal defect (ASD), ventricular septal defect (VSD), and bicuspid aortic valve (BAV) with logistic regression. Models were adjusted for maternal and neonatal covariates, with Bonferroni correction for multiple testing.
Results: Overall, 60.7% of newborns were exposed to at least one prescription medication.



Eight distinct clusters were identified. Most clusters were not associated with systematic differences in cardiac structure or function, and none were linked to ASD, VSD, or BAV. One profile, characterised by sustained use of selective serotonin reuptake inhibitors (SSRIs) and analgesics, was associated with small differences that were most evident among newborns with lower values of the cardiac measures, including larger left ventricular internal diameter in diastole (0.23 mm; 95% confidence interval [CI] 0.04, 0.42), larger left ventricular end-diastolic volume (0.36 mL; 95% CI 0.06, 0.67), and shorter mitral deceleration time (-5.08 ms; 95% CI -7.29, -2.88).

Conclusions: Common maternal medication-use patterns before and during pregnancy were not associated with clinically meaningful differences in neonatal cardiac structure or function or with increased risk of minor CHDs. Longitudinal follow-up is warranted to determine whether these small differences, particularly among newborns with lower cardiac measurements in one SSRI and analgesic pattern, persist or have prognostic significance.



MP-176 / #982

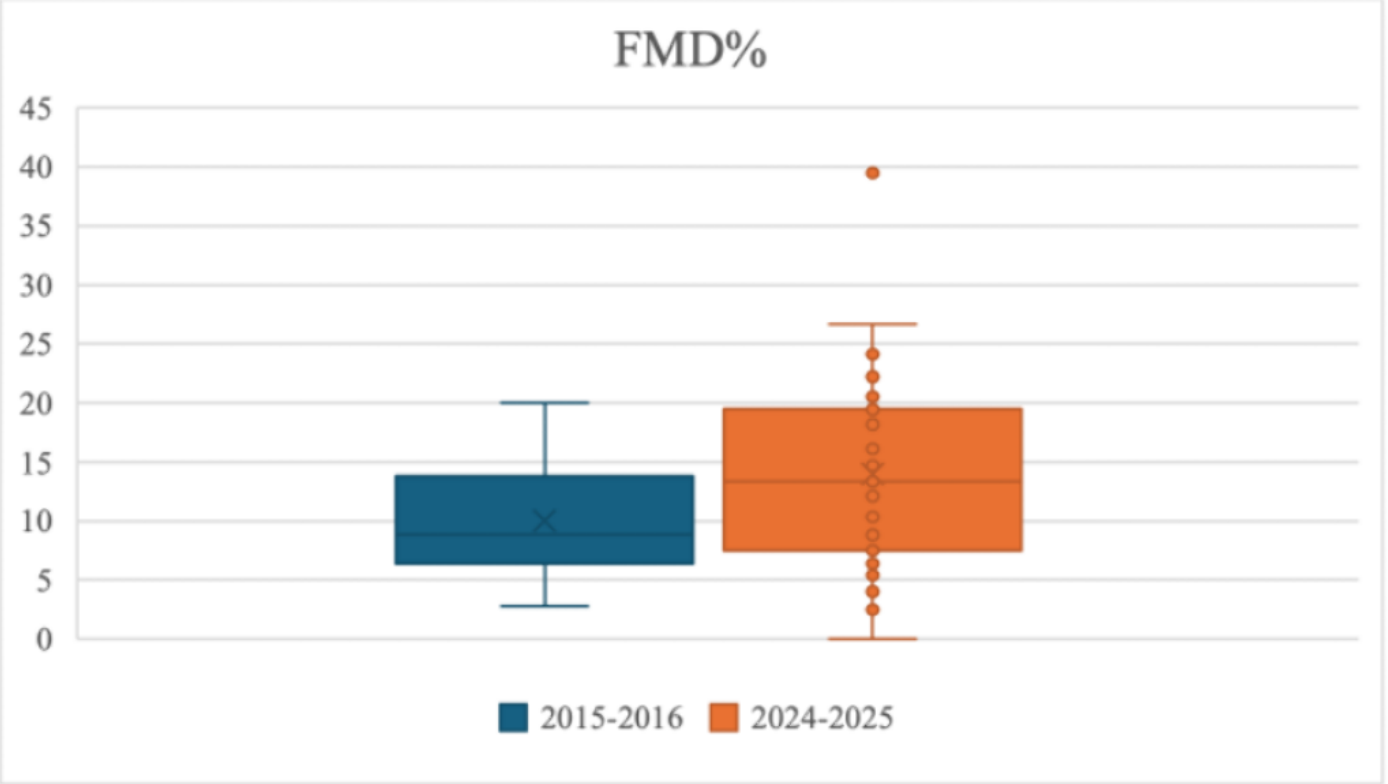
SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

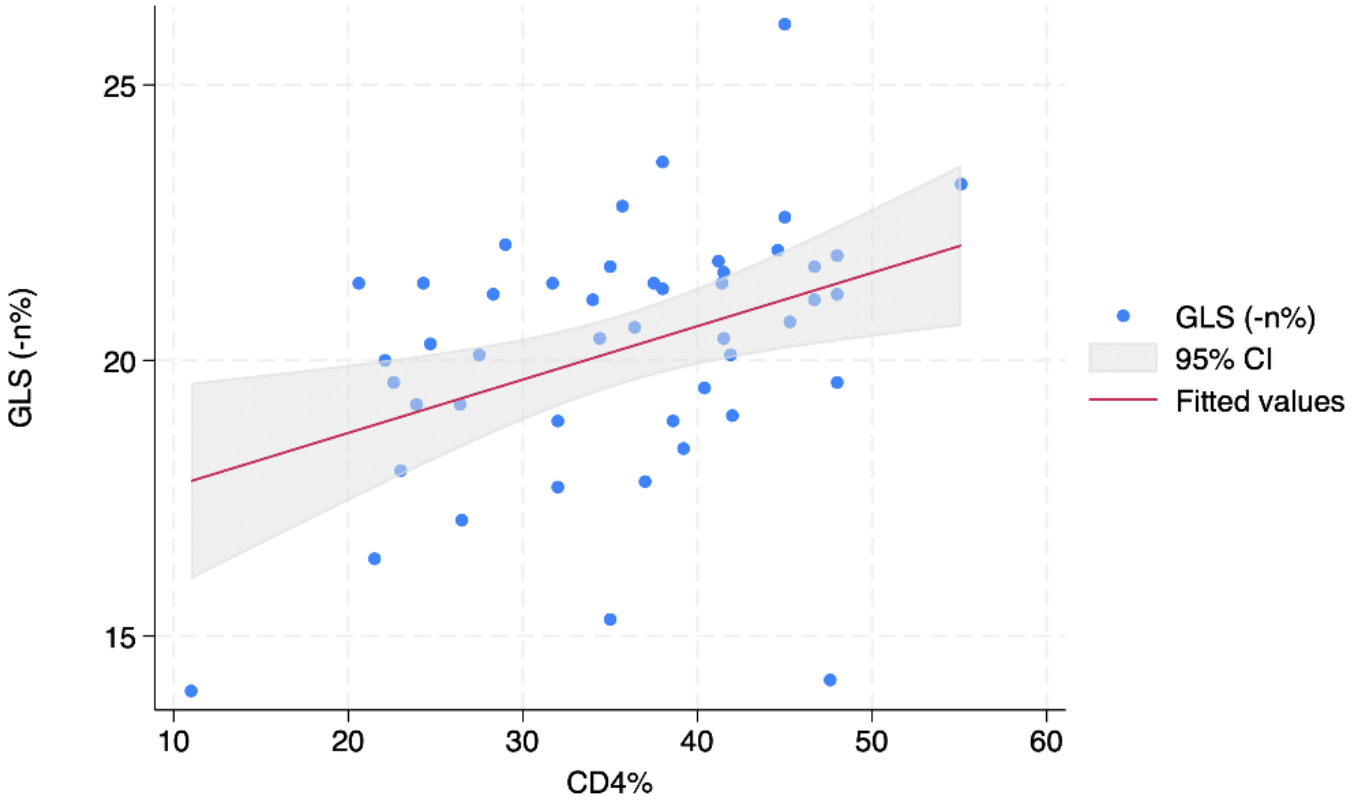
MULTIPARAMETRIC EVALUATION OF VASCULAR HEALTH AND MYOCARDIAL PERFORMANCE IN VERTICALLY HIV-INFECTED CHILDREN, ADOLESCENTS AND YOUNG ADULTS ON CART

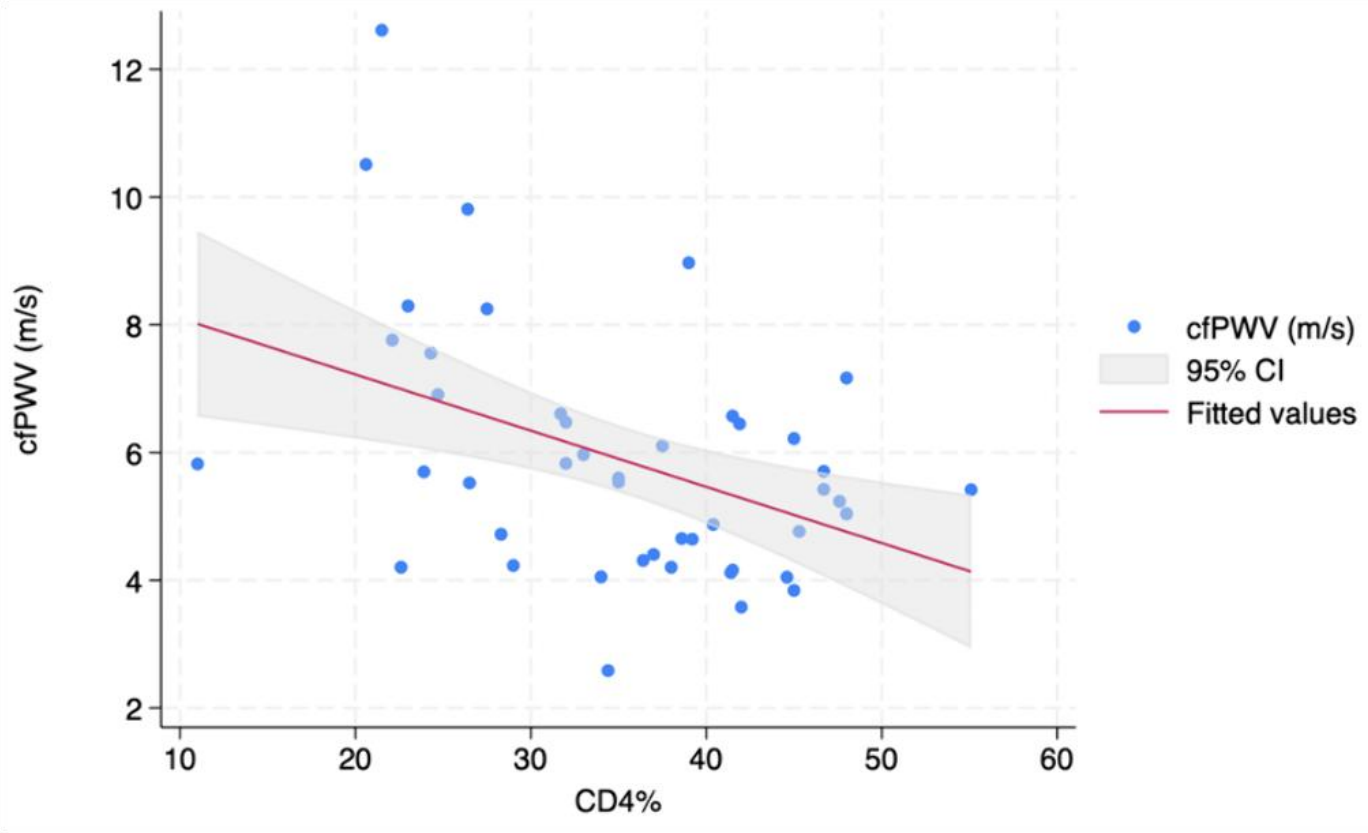
Mirco Cuccu[1], Alice Pozza[1], Luca Zanella[2], Osvalda Rampon[3], Daniele Dona'[3], Carlo Giaquinto[3], Biagio Castaldi[1], Giovanni Di Salvo[1]
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Background and Aim: Vertical human immunodeficiency virus (HIV) infection represents a chronic cardiovascular risk factor. The study investigated early subclinical cardiac and vascular alterations in vertically HIV-infected children on combination antiretroviral therapy (cART) using advanced echocardiography and vascular ultrasound.
Methods: Single-centre cross-sectional study (June 2024- June 2025). Data were compared with those from the same cohort in previous years (2015-2016). Patients underwent advanced transthoracic echocardiography and vascular ultrasound. Immunological evaluation included CD4 count, CD4%, CD4/CD8 ratio. Cardiac imaging assessed systolic function with 2D and 3D left ventricular (LV) ejection fraction (EF), LV deformation (GLS), myocardial work (MW). Vascular assessment included carotid intima-media thickness (cIMT), carotid-femoral pulse wave velocity (cfPWV), flow-mediated dilation (FMD). Normality assessed by Shapiro-Wilk test. Continuous variables correlated using Spearman's test. Multivariate analysis used quantile multivariate Hall-Sheather method. Paired comparisons used t-test or Wilcoxon test appropriately.
Results: We included 49 patients (mean age 27.39±7.05, 61.2% females). Elevated cIMT was reported in 30.6%, pathological cfPWV in 4.08%, impaired FMD in 6.12%, and 14.3% had GLS >-18. Longitudinal changes between 2015 and 2025 showed decreased 2D and 3D EF ($p=0.003$ and $p<0.001$, respectively), indicating cardiac function decline despite cART. Conversely, FMD increased ($p=0.02$, figure 1), reflecting improved endothelial function. GLS positively correlated with CD4% (rho=0.37, $p=0.01$, figure 2), even after adjustment for sex, body mass index, EF and diastolic function, linking immunological status to cardiac dysfunction. Global constructive work (GCW) inversely correlated with LV end diastolic diameter (rho=-0.4, $p=0.01$), suggesting early alterations in LV geometry and function. Global work index (GWI) inversely correlated with FMD (rho=0.34, $p=0.03$), suggesting

interplay between myocardial work and endothelial function. cfPWV inversely correlated with CD4% (rho=-0.39, p<0.001, figure 3). Sex-related differences emerged: Global wasted work (GWW) and Global work efficiency (GWE) were worse in males (p=0.04 both).







Conclusions: This is the first study investigating MW in vertically HIV-infected



children. Subclinical cardiac and vascular dysfunctions are detectable despite chronic cART. GLS is worse in patients with low CD4%. MW and vascular ultrasound should be integrated into cardiovascular assessment of this high-risk population, and preventive strategies implemented to reduce long-term complications.



MP-177 / #1401

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

OPTIMIZING PREDICTORS OF LATERAL AND SEPTAL MAPSE FOR PEDIATRIC CARDIAC ASSESSMENT

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Background and Aim: Mitral annular plane systolic excursion (MAPSE) is widely used to assess left ventricular (LV) longitudinal contractility. This study aims to identify the best singular predictor for Lateral MAPSE (LatMAPSE) and Septal MAPSE (SepMAPSE) in a pediatric population.
Methods: We conducted a retrospective review for previously recorded echo studies. The inclusion criteria were patients aged 1-18 years, normal result by specialist judgement and appropriate 2D and MM images necessary for the analysis. We used the standard, recommended M-mode method for MAPSE measurements and LV long axis were measured in 2D and M-Mode. Statistical analysis was performed using Wizard 2 software with the level of significance set at $p<0.005$. The values presented as mean +- SD (normal notation) or median(Q1-Q3) depending on the distribution. Predictor Performance analysis was based on a series of simple linear regression analyses to evaluate the predictive performance(R2) of various clinical and echocardiographic parameters on LatMAPSE and SepMAPSE. The predictors included age, height, weight, BMI, LV major axis dimensions (septal, mid, and lateral), and M-mode LV major axis measurements (septal and lateral).
Results: There were 111 previously archived recordings eligible for the analysis. The mean MAPSE was 15.26 ± 3.24 mm, with a median value of 15.1 mm (Q1-Q3: 13.4-17.3). The best predictor for LatMAPSE was **M-Mode LV Major Lateral measurement** with an R2 value of 0.514. For SepMAPSE, the strongest predictor was **Age**, with an R2 value of 0.483. Other predictors **(Height, Weight, BMI)** are weaker predictors, suggesting that body size alone does not strongly influence MAPSE values.
Conclusions: This analysis provides insights into the most effective singular predictors of LatMAPSE and SepMAPSE, contributing to the establishment of normative values. Such findings are essential for optimizing measurement techniques, particularly in adjusting for patient size and age in pediatric echocardiographic assessments.



MP-178 / #1500

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

NTRACARDIAC FLOW VORTEX ANALYSIS IN HEALTHY CHILDREN: A MULTICENTER PEDIATRIC STUDY

Rosalba De Sarro[1], Isabella Leo[2], Giuseppe Antonio Mazza[2], Eleonora Malara[3], Samoa Torrisi[3], Irene Cattapan[4], Alice Pozza[5], Daria Lauretta[6], Marco Maglione[7], Fabio Troilo[7], Daniele Torella[1], Salvatore De Rosa[1], Giovanni Di Salvo[4], Jolanda Sabatino[8]
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Background and Aim: Intracardiac flow fluid dynamics analysis is an innovative color Doppler–based echocardiographic technique that enables a non-invasive assessment of myocardial performance and blood flow dynamics within the cardiac chambers. While its clinical applicability has been demonstrated in adults, reference data in the pediatric population are still limited. **Aims:**
This study aims to define age-specific reference values for key intracardiac flow vortex-related parameters and energy fluctuation indices in healthy pediatric subjects.
Methods: Methods:
All participants underwent transthoracic echocardiography followed by left ventricular fluid dynamic analysis using apical three-chamber views. Evaluated parameters included vortex area, length, depth and intensity; average kinetic energy; fluctuations of vorticity, kinetic energy and shear stress; and vectorial force (magnitude and angle). Subjects were stratified into three age groups (0–5, 6–12 and 13–18 years).
Results: Results Significant age-related differences were observed in vortex morphology across pediatric groups. Vortex area showed a progressive reduction with increasing age, decreasing from 27.17 (25.58–29.11) in children aged 0–5 years to 24.65 (22.38–26.14) in adolescents (p = 0.0089). A similar age-dependent trend was observed for vortex intensity, which significantly decreased across age groups (–0.30 [–0.33 to –0.26] vs –0.25 [–0.29 to –0.22], p = 0.0275). Vortex length also differed significantly among age groups, with higher values in younger children and lower values in older subjects (p = 0.0402), whereas vortex



depth did not show significant age-related variations ($p = 0.232$). No significant differences were observed across age groups for kinetic energy or for fluctuations in vorticity, kinetic energy and shear stress (all $p > 0.05$). Vectorial force magnitude and direction remained stable throughout childhood and adolescence.

Conclusions: Conclusions:

This study provides age-specific reference intervals for key intracardiac flow vortex parameters in a cohort of healthy pediatric subjects. These data support the potential role of intracardiac fluid dynamic analysis as a complementary tool in the pediatric echocardiographic evaluation of ventricular function.



MP-179 / #60

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

EXPLORING LEARNER EXPERIENCE TO INFORM FUTURE IMPROVEMENTS IN PAEDIATRIC ECHOCARDIOGRAPHY SIMULATION TRAINING FOR NOVICE LEARNERS: A QUALITATIVE, SERVICE EVALUATION PROJECT

Daniel Geer
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Background and Aim: Echocardiography is a valuable skill among paediatric cardiologists, neonatologists and paediatricians to diagnose and monitor cardiac conditions. Paediatric transthoracic echocardiography (TTE) training for novice learners at Great Ormond Street Hospital (GOSH) includes the use of simulation training, however it is not clear how best to carry out this training to optimize learner experience and learning. This service evaluation explored novice learner experiences of paediatric TTE simulation training at GOSH to identify potential improvements which could allow for further optimization of learner experience and learning for future sessions.
Methods: Five echocardiography novices attended a paediatric TTE simulation training session at GOSH following which they were asked to share their experiences of the training session and discuss potential improvements during a semi-structured interview. The interview data were then analysed using reflexive thematic analysis.
Results: All five participants described the paediatric TTE simulation training session at GOSH as a positive experience and reported a positive impact on their learning from the session. Paediatric TTE simulation training was felt to be a valuable educational tool for novices by all the participants and was considered preferable to either learning in a classroom session or learning with a real patient/volunteer. The participants suggested utilizing a flipped classroom approach and including an optional formative assessment to further improve the session.
Conclusions: Paediatric TTE simulation training at GOSH is a valuable educational tool for novice learners which could be further improved by integrating a flipped classroom approach and including a formative assessment. Further qualitative studies are needed in other settings and learner groups to assess the generalizability of these findings.



MP-180 / #1537

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

ECHOCARDIOGRAPHY BASED LEFT VENTRICULAR DIMENSION AND SYSTOLIC FUNCTION AMONG SEVERELY MALNOURISHED CHILDREN WHEN COMPARED WITH NORMAL CHILDREN

Demeke Mekonnen
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Background and Aim: Malnutrition is one of the leading problems in developing countries with basic stance for majority of common childhood problems. One of the most important organs involved- cardiac muscle was studied in this paper. The objective of this study was to compare the degree of cardiac muscle involvement among severely malnourished children in comparison with age and sex matched anthropometrically normal controls.
Methods: *This is a cross-sectional comparative study in Ethiopia. A convenient sampling was used to identify thirty children with severe acute malnutrition (15 children with edematous and 15 children non-edematous severe acute malnutrition) and age and sex matched fifteen control groups. A written consent was taken from each participant in the study. Children in the control group were selected with anthropometric measurement between ±2SD. All the results were expressed as means ± standard error of means and considered statistically significant if $p < 0.05$.*
Results: The mean ages for the cases and controls were 2.4±1.7 and 3.3±1.8 years respectively. Left ventricular posterior free wall thickness and left ventricular mass were reduced significantly in the group with severe acute malnutrition whereas left ventricular mass index and systolic functions (Ejection Fraction and Fractional Shortening) were not found to be statistically significant. The lowest mean value for EF and FS was found among children with edematous severe acute malnutrition.

Function	SAM (n=30)	Control(n=15)	p-value
Left ventricular mass (LVM)	29.2±13.9gm	44.4±13.4gm	**0.0001**
LVM indexed	69±20.9	75.7±10.4	0.2498
LV dimension during systole	16.2±4.4mm	17.6±3.3mm	0.2833
LV dimension during diastole	22.9±5.5mm	27.5±4.6mm	0.0079



LVPW dimension during diastole	5.9±1.7mm	9.4±1.5mm	**0.0001**
Fractional shortening	34.5±6.6	35.9±4.0	0.4557
Ejection fraction	65.5±9.3%	67.1±5.6%	0.5443

Conclusions: *There was reduction of cardiac mass without significant* impairment of *systolic* function. The study did not analyze changes during and after treatment. It is a good indicator for further more detailed study incorporating biochemical markers.



MP-181 / #1387

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

EARLY DETECTION AND MONITORING OF CHEMOTHERAPY-INDUCED CARDIOTOXICITY IN PEDIATRIC PATIENTS USING GLS AND STANDARD ECHOCARDIOGRAPHY PARAMETERS: A SINGLE CENTER RETROSPECTIVE STUDY

Sara Pavesi[1], Alice Pozza[1], Francesco Prati[1], Marco Basile[2], Martina Avesani[1], Roberta Biffanti[3], Elena Reffo[3], Elettra Pomiato[3], Biagio Castaldi[1], Giovanni Di Salvo[1]
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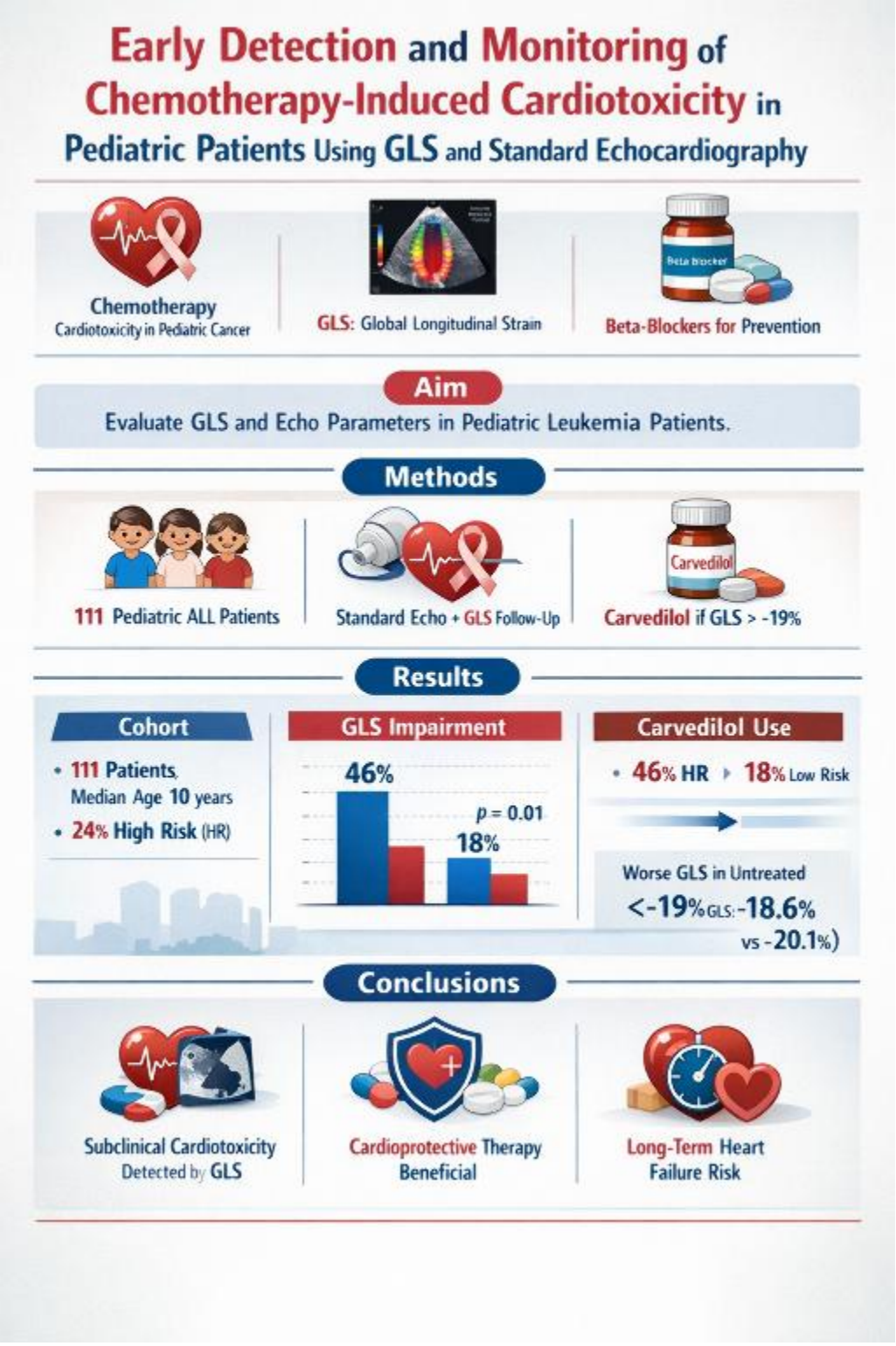
Background and Aim: Cardiovascular complications are a major cause of morbidity and mortality in pediatric cancer patients. Early detection of cardiotoxicity is essential, and transthoracic echocardiography remains the primary surveillance tool. Among echocardiographic parameters, Global Longitudinal Strain (GLS) is currently recommended for the early identification of subclinical myocardial dysfunction in patients receiving cardiotoxic therapies. However, primary prevention strategies in high-risk pediatric patients remain heterogeneous and not standardized. Beta-blockers have shown promising cardioprotective effects, although further evidence is needed. This study aims to evaluate the relationship between GLS and conventional echocardiographic parameters for the early detection and prevention of chemotherapy-induced cardiotoxicity in children with acute leukemia.
Methods: We conducted a retrospective study in pediatric patients with acute lymphoblastic leukemia treated with cardiotoxic chemotherapy. Standard echocardiographic parameters and GLS were systematically assessed during the recommended in-therapy follow-up. Carvedilol was considered as a primary prevention strategy in patients presenting with GLS >−19% during follow-up.
Results: A total of 111 patients (median age 10 years, 46% females) were included, 27 (24%) classified as high risk (HR). HR patients showed a higher prevalence of GLS impairment compared with low-risk patients (46% vs 18%, p=0.01). Baseline LVEF and GLS were comparable between groups (LVEF: 66.3±4.7% vs 65.4±6.7%; GLS: −21.4±2.6% vs −21.1±2.3%). During treatment, HR patients demonstrated an increased risk of GLS impairment despite preserved ejection fraction (LVEF: 63.0±5.3% vs 67.0±6.6%; GLS: −18.1±2.1% vs −19.6±2.2%; p <0.01). Carvedilol was initiated in 46% of HR patients and in



18% of low-risk patients. At the end of oncologic treatment, LVEF and GLS were similar between groups (LVEF: 65.8±4.6% vs 66.6±5.0%; GLS: −20.1±2.4% vs −20.2±1.5%). Sixteen patients with GLS <−19% did not receive carvedilol; compared with treated patients, no baseline or nadir differences were observed, although GLS at end-of-therapy was significantly lower (−18.6±2.3% vs −20.1±1.8%, p = 0.03).

Conclusions: Despite normal LVEF, anthracyclines may exert subclinical cardiotoxic effects. Although treatment discontinuation due to cardiotoxicity is uncommon in pediatric settings, the long-term risk of heart failure remains relevant. The use of cardioprotective medications in selected patients may represent a valuable strategy to mitigate

chemotherapy-induced cardiac dysfunction.

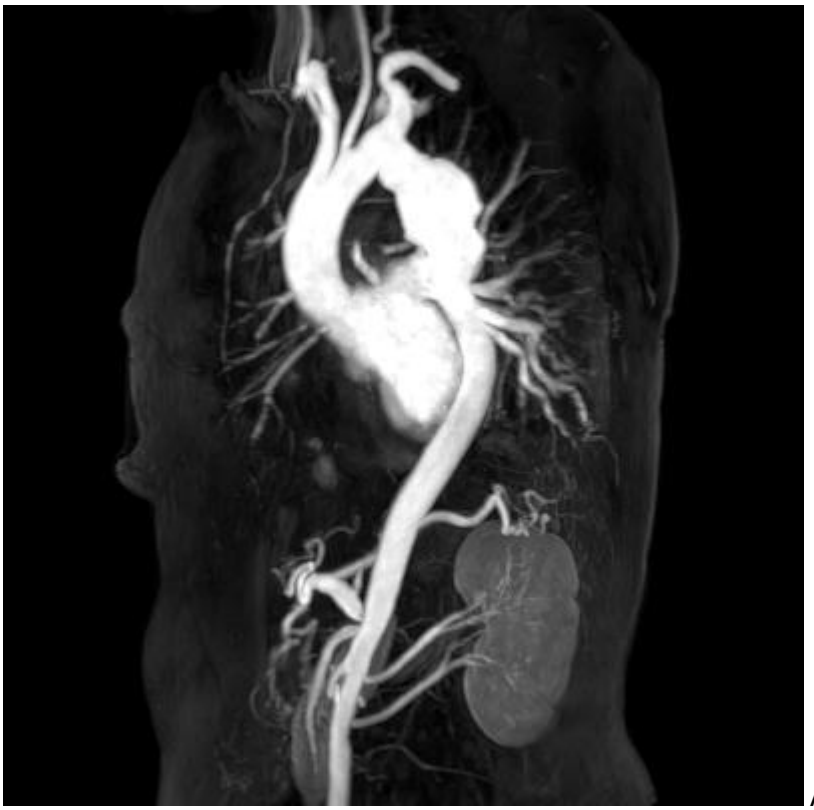


MP-183 / #729

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

A NEAR-MISS CATASTROPHE IN AN ADULT LONG AFTER COARCTATION REPAIR

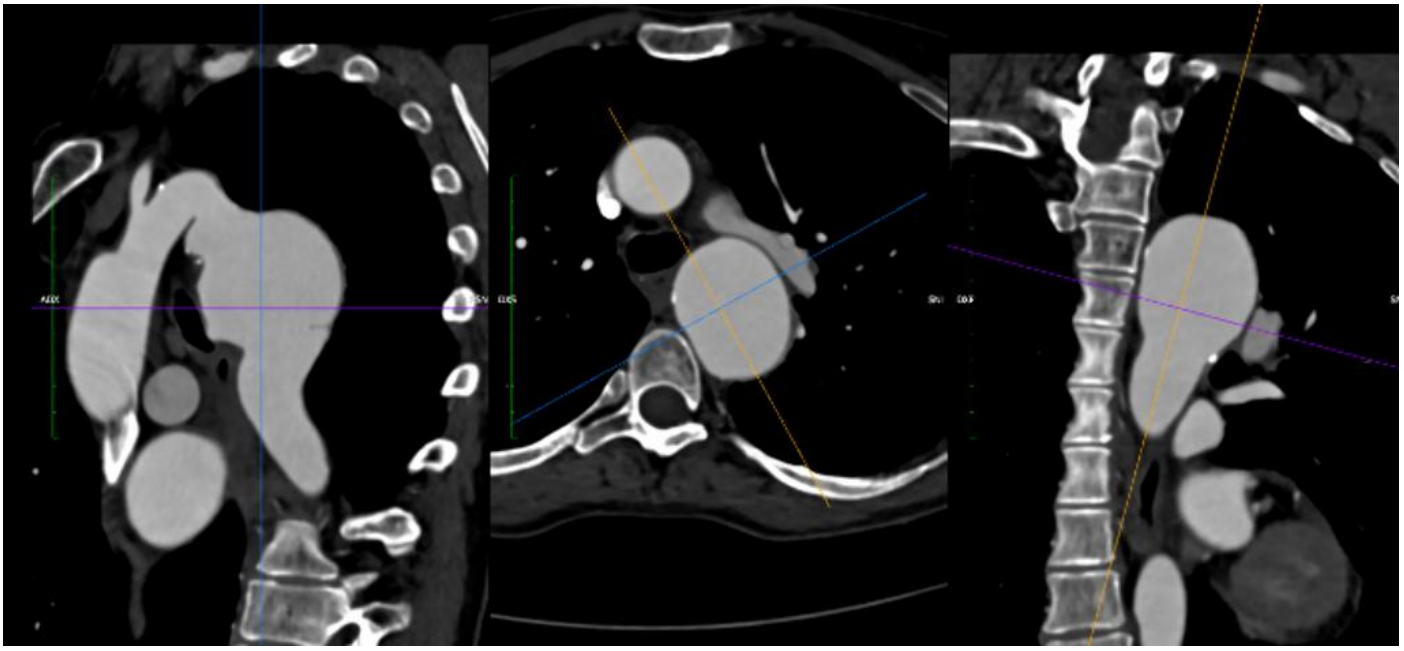
Flavia Fusco[1], Giancarlo Scognamiglio[1], Giovanni Dialetto[2], Federica Romano[3], Ippolita Altobelli[1], Vito Casale[1], Giovanni Domenico Ciriello[1], Giovanni Papaccioli[1], Michela Palma[1], Diego Colonna[1], Anna Correra[1], Nunzia Borrelli[1], Rosaria Barracano[1], Nicola Grimaldi[1], Berardo Sarubbi[1]
[1]Monaldi Hospital, Achd Unit, Naples, Italy, [2]Monaldi Hospital, Cardiac Surgery Department, NAPOLI, Italy, [3]Monaldi Hospital, Radiology Unit, NAPOLI, Italy



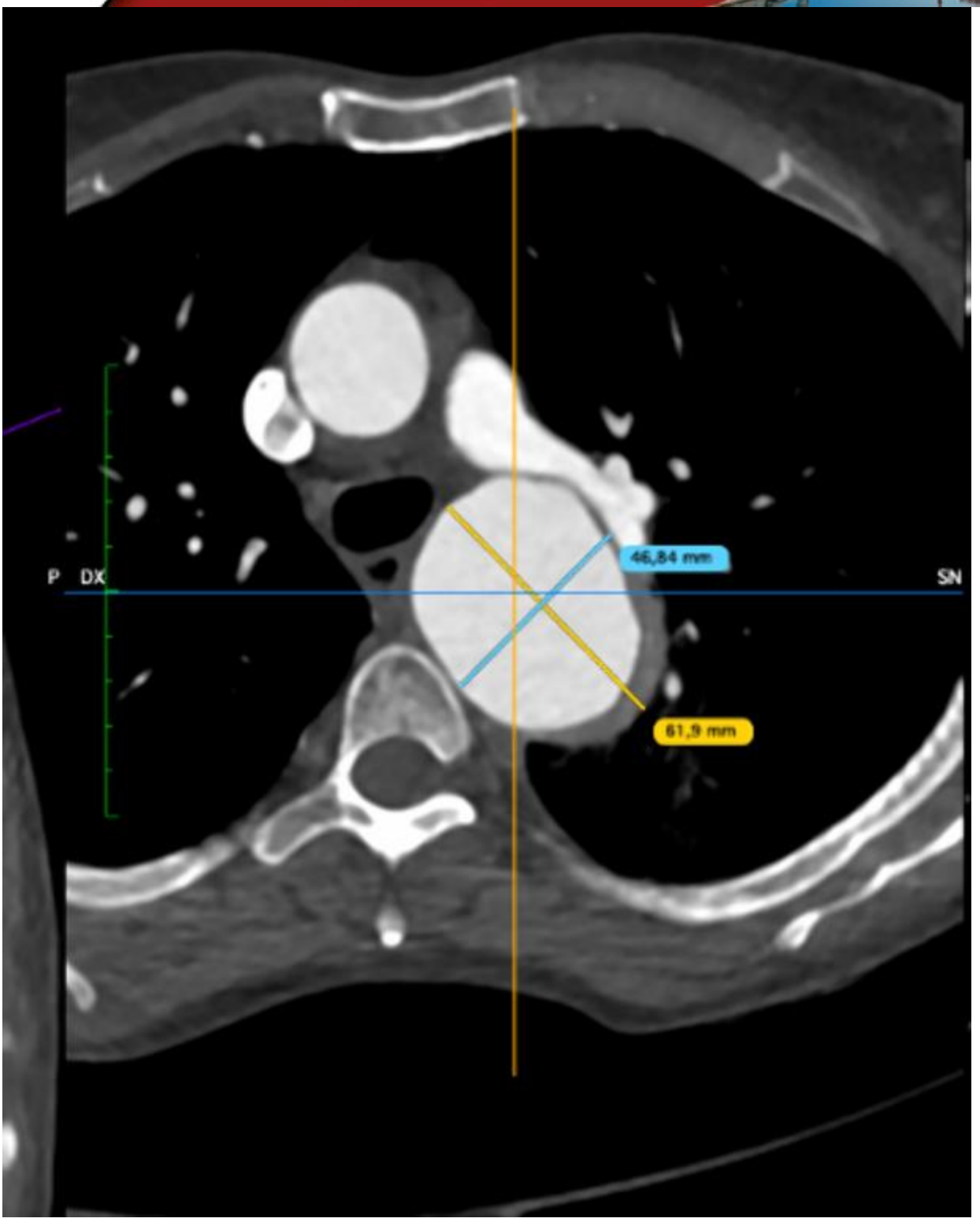
Background and Aim: A 54-year-old woman with a history of juvenile hypertension and late-diagnosed aortic coarctation, surgically repaired at age 21 with resection and implantation of a 16-mm Dacron tube graft, presented to the emergency department with hemoptysis. She had been under regular follow-up, and recent imaging had shown no residual obstruction but progressive dilation of the descending thoracic aorta distal to the graft, reaching 54 mm (previously 40 mm two years earlier) - FIgure 1. A multidisciplinary team had already indicated the need of treatment with ACEi, which the patient did not take due to symptomatic hypotension, and she was scheduled for elective vascular surgery with a

customized endoprosthesis.

Methods: On admission, she was hemodynamically stable with mild anemia. CT imaging demonstrated bilateral pulmonary infiltrates in resolution, consistent with pneumonia or alveolar hemorrhage, and a markedly dilated descending thoracic aorta measuring 54×44 mm over a 49-mm segment (Figure 2). After completing antibiotic therapy, she remained stable, asymptomatic, without further hemoptysis, and with normal–low blood pressure values off medications. Given the known aortic aneurysm, she was kept hospitalized while awaiting the customized endovascular prosthesis.



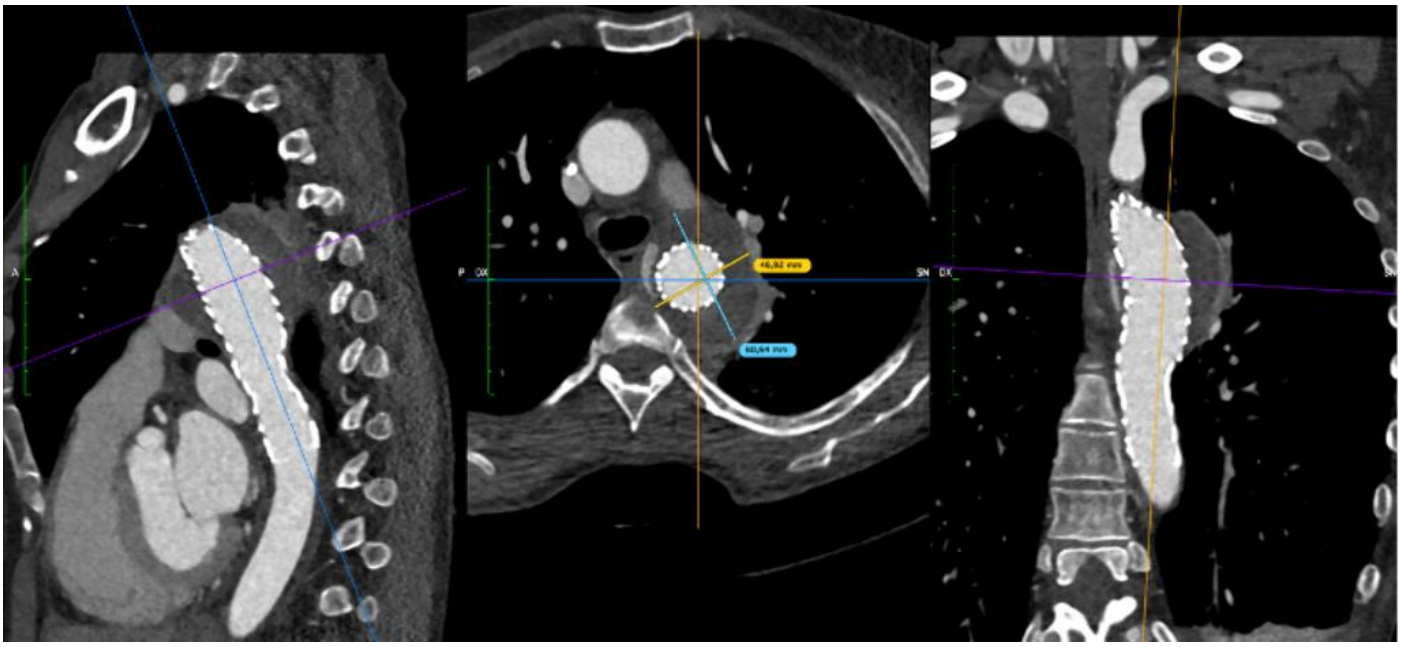
Results:



Two weeks after admission, she suddenly developed a new episode of hemoptysis, this time not self-limiting, accompanied by interscapular chest pain. Urgent angio-CT revealed rapid aneurysm expansion to 62×46 mm, with intramural hematoma and signs of alveolar hemorrhage due to adjacent pulmonary involvement and bronchial obliteration, with

evidence of active extravasation (Figure 3). She underwent emergency endovascular repair with implantation of a 28-mm Gore thoracic endoprosthesis, achieving complete exclusion of the aneurysmal sac.

Conclusions:



The postoperative course was uneventful. Follow-up CT scans confirmed stable exclusion of the aneurysm, resolution of endoleak, and progressive improvement of alveolar hemorrhage and pulmonary consolidations (Figure 4). At discharge, the patient was asymptomatic, hemodynamically stable on low dose ACEi and an outpatient follow-up was scheduled with repeat thoracic–abdominal CT at six months.



MP-184 / #17

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

MEDIASTINAL HEMANGIOMA ENCASING THE AORTIC ARCH IN AN INFANT WITH COARCTATION OF THE AORTA: A CASE REPORT

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Background and Aim: Coarctation of the aorta (CoA) represents 5–8% of congenital heart defects and is potentially life-threatening if undiagnosed. Infantile hemangiomas are common benign vascular tumors, but mediastinal hemangiomas are rare (≈0.5%) and may compress vital structures. The coexistence of CoA and mediastinal hemangioma has scarcely been reported. We aim to present a rare clinical case, describe diagnostic and therapeutic challenges, and emphasize the importance of comprehensive evaluation in infants with large or atypical hemangiomas.
Methods: A case report was prepared based on clinical examination, echocardiography, computed tomography (CT) angiography, and interventional management in a tertiary pediatric cardiac center. Relevant literature was reviewed to contextualize the findings.
Results:



A one-month-old female infant, born at 35 weeks (IVF twin, 2300 g), was referred for propranolol therapy of a large anterior chest hemangioma. On examination, a systolic murmur (grade 3/6) and diminished femoral pulses were noted. Echocardiography revealed CoA with a pressure gradient of 50–59 mmHg and a hypoplastic aortic arch. CT angiography demonstrated a mediastinal hemangioma measuring 9.5×5.5 cm, extending to the neck, axilla, paravertebral and pleural regions, and encasing the left carotid and subclavian arteries, aortic arch, descending aorta, trachea, and esophagus, without critical airway or vascular obstruction. Radical surgical correction was contraindicated due to the vascular mass. Balloon angioplasty was performed, reducing the gradient to 42-44 mmHg. The patient was discharged on beta-blocker therapy for hemangioma, with a plan for delayed surgical repair after tumor regression.

Conclusions: This case highlights the importance of comprehensive evaluation in infants with hemangiomas of any localization. Large chest wall lesions may indicate deeper mediastinal involvement and should prompt detailed imaging to rule out intrathoracic extension and associated anomalies such as aortic arch pathology or PHACES syndrome. Mediastinal hemangiomas, though rare, can encase major vessels and complicate surgical repair of congenital heart defects, necessitating a stepwise or staged approach. Infants with extensive hemangiomas therefore require multidisciplinary management including



cardiology, cardiac surgery, radiology, and dermatology teams. Careful follow-up and individualized treatment planning are essential to balance timely intervention for coarctation of the aorta with the risks posed by a large vascular mass.



MP-185 / #87

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

THE EFFECT OF ANTENATAL SCREENING ON THE DIAGNOSIS AND MANAGEMENT OF AORTIC ARCH ANOMALIES

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University of Glasgow, School Of Medicine, Glasgow, United Kingdom

Background and Aim: To identify all children (0–16 years of age) with aortic arch anomalies (AAAs) and to evaluate predictors of surgical requirement in these children. Additionally, we sought to determine the appropriate follow-up of these children, particularly in the context of the routine introduction of the three-vessel and trachea (3VT) view in mid trimester screening fetal anomaly screening from 2015.
Methods: We conducted a retrospective cohort study of children diagnosed with an AAA at the Royal Hospital for Children, Glasgow, between 1st January 2011 and 31st December 2022. Data were collected from electronic medical records on antenatal detection, postnatal presentation and symptoms, imaging findings, associated anomalies, and surgical interventions. Cases were stratified by antenatal versus postnatal diagnosis, and by pre- and post-3VT screening introduction. Comparisons were made regarding timing of diagnosis, indications for surgery, and clinical outcomes.
Results: Among 121 children diagnosed with AAAs, 68 (56.2%) were identified antenatally. The proportion of antenatal diagnoses increased significantly after 2015, following the introduction of 3VT screening ($p < 0.05$). The presence of a double aortic arch variant ($p = 0.000$), significant tracheal compression on CT ($p = 0.004$), and a high symptom burden ($p = 0.000$) were predictive of the need for surgery in our cohort. Overall, 45 (37.2%) patients underwent surgery. In postnatally diagnosed children, the majority (86.8%) presented by age 6 years. Beyond this age, it was uncommon to develop symptoms and require surgical intervention. Death occurred in 3 children within the study period, all due to complex cardiac causes.
Conclusions: The introduction of 3VT screening has markedly improved antenatal detection of AAAs. In vascular rings (VRs), symptom development beyond age 6 is uncommon; therefore, clinical review until age 6 is advised, with discharge and worsening advice thereafter. Longitudinal studies are required to assess the risk of unrepaired VRs in childhood.



MP-186 / #560

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

AORTA MEASURMENTS IN DIFFERENT IMAGING MODALITIES – ARE THE VIRTUAL REALITY SOFTWARE MEASURMENTS ACCURATE?

Michal Kapalka, Michal Galeczka, Elzbieta Siudmak, Aleksandra Skawinska, Roland Fiszer
Medical University of Silesia, Silesian Centre For Heart Diseases, Department Of Paediatric Cardiology And Congenital Heart Defects, Zabrze, Poland

Background and Aim: Computed tomography (CT) is a standard imaging modality for evaluating coarctation of aorta (CoA) morphology. Three-dimensional reconstructions using extended reality, based on CT or MRI studies, are gaining popularity in the imaging of congenital heart defects. Precision and clinical utility of these reconstructions remain uncertain. The aim of this study was to assess the accuracy of aortic anatomical measurements obtained from angiography, CT, and virtual reality (VR) reconstructions.
Methods: This study included all patients with CoA who underwent sequential elective angio-CT followed by a cardiac catheterization with angiography within a six-month interval between 2016 and 2024. A total of 56 patients were enrolled (median age: 14.8 years, IQR 8.2–17.6; 26.7% adults), with 65 pairs of CT + angiography studies performed. Aortic diameter was measured at sinotubular junction (STJ), proximal (PA) and distal aortic arch (DA), and at aortic isthmus narrowing (CoA) in angio-CT, aortography (the largest diameter - systolic), and CT-based VR reconstructions. Each measurement was performed twice and independently by four investigators.
Results: Differences between VR vs. CT measurements were: +0.02±2.4 mm at STJ (+0.4%), -0.5±2.3 mm at PA (-3.5%), -0.26±2.6 mm at DA (-3.2%), and +0.1±1.5 mm at CoA (+0.8%) (all with $p>0.05$). Differences between angiography vs. CT measurements were: +2.7±1.9 mm at PA (+23%), +1.8±2.5 mm at DA (+17%), and +0.5±1.9 mm at CoA (+5.5%) (all but latter with $p<0.05$). Differences between angiography vs. VR measurements were: +3.3±2.7 mm at PA (+27%), +1.6±2.6 mm at DA (+16%), and +0.16±2.3 mm at CoA (+1.2%) (all but latter with $p<0.05$).
Conclusions: Aortic measurements in VR reconstructions are highly comparable to those obtained in CT. CT exhibited a tendency to underestimate aortic dimensions compared to angiography. VR can serve as a complementary imaging method with great potential in planning interventional treatment of CoA.

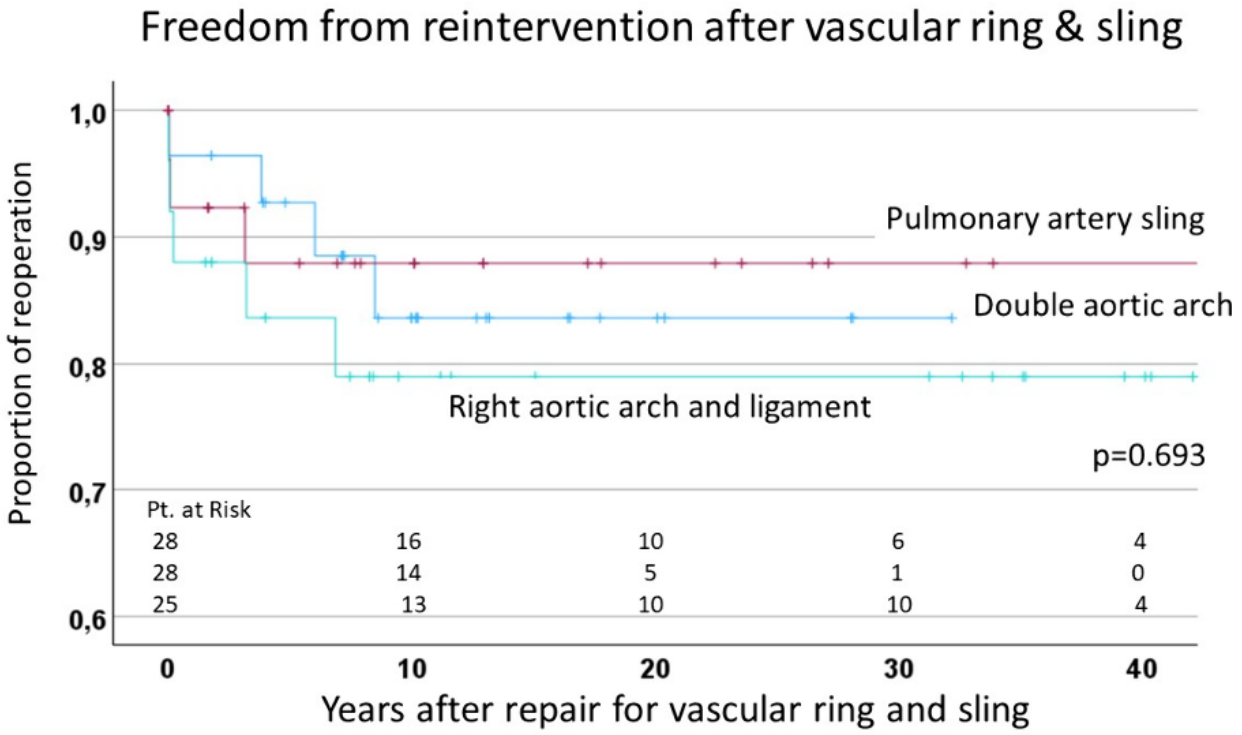
MP-188 / #259

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

OUTCOMES OF SURGERY FOR VASCULAR RINGS AND SLINGS: A 50-YEAR SINGLE-CENTRE EXPERIENCE

Veronica Danco[1], Muneaki Matsubara[1], Thibault Schaeffer[1], Jonas Palm[2], Christoph Röhling[2], Paul Philipp Heinisch[1], Alfred Hager[2], Jürgen Hörer[1], Masamichi Ono[1]
[1]TUM University Hospital, German Heart Centre, Department of Congenital and Pediatric Heart Surgery, Munich, Germany, Munich, Germany, [2]TUM University Hospital, German Heart Centre, Department of Congenital Heart Disease and Pediatric Cardiology, Munich, Germany, Munich, Germany

Background and Aim: Vascular ring and sling are rare congenital heart diseases, commonly associated with tracheobronchial and esophageal stenosis. This study aimed to investigate the surgical outcomes following repair of the vascular ring and sling.
Methods: All patients undergoing repair of vascular rings and slings between 1975 and 2024 were reviewed. Outcomes, including mortality, reintervention for tracheoesophageal and pulmonary artery (PA) stenosis, were collected and analyzed.
Results:





Diagnosis of 81 patients included double aortic arch (DAA) in 28, right aortic arch (RAA) with left ligament in 28, and PA sling in 25. Associated intracardiac defects included 16 VSDs, 12 ASDs, 2 AVSD/DORVs, and 1 TAPVC. The median age at repair was 6.9 (IQR: 3.4-17.9) months, and 76 patients had a symptom, including a respiratory symptom in 73 and an esophageal symptom in 14. The surgical repair was performed through thoracotomy (left in 45, right in 2) or median sternotomy with cardiopulmonary bypass in 34. Procedures included division of a hypoplastic arch segment for double aortic arch (27 left-sided, 1 right-sided), division of the ligamentum arteriosum for right aortic arch with a left ligamentum, and LPA reimplantation for PA sling. Tracheoplasty was done concomitantly in 2 patients and separately in 3; intracardiac defects were repaired simultaneously in 10. Postoperatively, there were 2 hospital deaths in the early era in 1978 and 1981, and no late deaths with the median follow-up of 13.3 (IQR: 8.2-32.0, Max 49.1) years. Survival at 30 years was 97.5%. Reintervention was needed in 12 (14.8%) patients with a median period of 1.7 years (IQR: 0.6-5.5). Procedure included 3 tracheoplasties, 3 aortopexies, and 3 re-divisions of the ligament, and 1 resection of Kommerell diverticulum for tracheal and esophageal restenosis, 2 left PA patch enlargements, and 1 stent implantation in the left PA for the left PA stenosis. Freedom from reoperation at 30 years was 83.5%, without a difference in the primary diagnosis (p=0.693, Figure).

Conclusions: Repair of vascular rings and slings now carries negligible early and late mortality. In selected patients, concomitant intracardiac repair is feasible and should be considered, though a minority still require reintervention for recurrent symptoms.



MP-189 / #874

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

BIODEGRADABLE AORTIC ROOT SUPPORT FOR REINFORCED ROSS PROCEDURE IN PEDIATRIC PATIENTS

Andrea Roberto Calore[1], Alvise Guariento[1], Arben Dedja[1], Cecilia Avventi[1], Lorenzo Moroni[2], Stefania Rizzo[1], Piero Pavan[3], Cristina Basso[1], Vladimiro Vida[1]
[1]University of Padova, Department Of Cardiac, Thoracic, Vascular Sciences And Public Health, Padova, Italy, [2]Maastricht University, Merln Institute For Technology-inspired Regenerative Medicine, Maastricht, Netherlands, [3]University of Padova, Department Of Industrial Engineering, Padova, Italy

Background and Aim: Congenital aortic valve malformations are among the most common birth defects, often presenting life-threatening symptoms right after birth. Among the available surgical techniques, the Ross procedure has been widely adopted. This procedure involves replacing the defective aortic valve with the patient's own pulmonary valve (pulmonary autograft), preserving the autologous pulmonary valve growth potential. However, clinical data show that the neo-aortic root tends to undergo progressive dilation, leading to valvular insufficiency and requiring further interventions. In this study, we developed 3D-printed bioresorbable extravascular supports for the containment of the pulmonary autograft while preserving its growth capacity.
Methods: The native tissues underwent tensile testing to determine the mechanical requirements for the implants, ensuring sufficient extravascular support while preserving physiological deformation and tissue growth. Multiple designs were developed to achieve the desired mechanical response, and subsequently fabricated via a 3D-printing technique, melt electrowriting, with a bioresorbable polymer. The manufacturing was carefully optimized, and uniaxial tensile tests were performed to extract the implants' constitutive parameters. The mechanical parameters of both tissues and implants were employed to develop a Finite-Element model simulating the response of a reinforced autograft under systemic pressures. The results were validated against pressure-diameter data from insufflation tests on native tissues. Supports approximating the behavior of the aorta were later implanted into 96 rodents to assess the biocompatibility of the devices.
Results: The manufacturing optimization phase produced reproducible supports with a highly fibrous structure made of 10-μm-thick fibers and exhibiting a morphology consistent with the designed models. Supports based on a sinusoidal pattern exhibited stiffness comparable with the aorta (respectively, 0.58 ± 0.05 MPa and 0.56 ± 0.5 MPa) and a yield strain of about 50%, aligning with physiological deformation. The Finite Element model was



successfully derived, as confirmed by validation with the insufflation test results. The simulations preliminarily indicated that 200-μm-thick implants could effectively support the autograft in vivo. Biocompatibility assessments suggested that, despite mild inflammation, the supports were adequately integrated by the host tissues.
Conclusions: Overall, the results suggest that the developed 3D-printed resorbable supports can be tested in the future as an autograft temporary containment strategy following the Ross procedure.



MP-190 / #1418

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

OUTCOMES OF VASCULAR RING RESECTION WITHOUT SURGICAL INTERVENTION ON KOMMERELL'S DIVERTICULUM.

Steven Bibevski, Mark Ruzmetov, John Dentel, Frank Scholl
Joe DiMaggio Children's Hospital, The Heart Institute, Hollywood, United States of America

Background and Aim: Vascular rings are rare congenital anomalies that can cause tracheoesophageal compression. An associated anomaly is Kommerell's diverticulum (KD) which is an enlargement of the base of the subclavian artery/aortic junction that itself can cause compression after division of a vascular ring. The indications for operative intervention and surgical are still controversial. We aim to assess the long-term outcomes of complete vascular ring division without addressing KD.
Methods: All patients (n=84) who underwent surgical division of a vascular ring between 2012 and 2025 were identified from the hospital database and retrospectively reviewed. Measurements of the KD were taken preoperatively and at last follow up. Clinical findings, surgical procedure, complications, and follow-up data were retrospectively analyzed.
Results: Vascular rings consisted of a double aortic arch (n=22), right aortic arch with an aberrant subclavian artery and left ligamentum arteriosum (n=54), left aortic arch with right descending aorta and right ligamentum arteriosum (n =3), and a left pulmonary artery sling (n=5). KD was identified in 73% of patients by echo and CT. Preoperative tracheomalacia was identified via bronchoscopy in 29 patients. Concomitant tracheal reconstruction was performed in 2 patients. KD was not resected in any patient. There were no hospital or late deaths. The overall survival rate was 100% at 10 years. Postoperatively, persistent tracheal compression was reported in 2 (2%) patients, and tracheomalacia in 6 (7%) patients. The rate of freedom from reoperation was 100% at 10 years. No patient required tracheal or KD surgery during the follow-up period. Follow-up was 90% (75/84) complete, with a median follow-up of 3.6 years (range 40 days to 13 years).
Conclusions: Outcomes of division of a complete vascular ring are excellent. Tracheomalacia often improves following division of the vascular ring. Respiratory symptoms following complete vascular ring division are uncommon. During the follow-up period reported, there was no consequence to leaving a KD without surgical intervention.



MP-191 / #401

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

TAKAYASU ARTERITIS PRESENTING AS PROGRESSIVE ASCENDING AORTA DILATION IN A 12-YEARS-OLD GIRL

Desislava Kibarova-Hristova[1], Katia Temelkova[1], Teodor Vasilev[1], Denitsa Francheshkova[1], Iva Chervenlieva[1], Ana Vuchkova[1], Zdravka Stoyanova[1], Dimiter Pechilkov[2]
[1]University children hospital, Pediatric Rheumatology, Sofia, Bulgaria, [2]National heart Hospital, Sofia, Bulgaria

Background and Aim: Takayasu arteritis is a rare, potentially life-threatening large-vessel vasculitis. Up to 30% of the cases are with childhood onset. It is characterized by granulomatous inflamation and significant vessel damage: stenosis, occlusion, dilatation, aneurysm formation, ischemia. The mainly involved are aorta and its major branches. The clinical presentation is non-specific, resulting in delay of the diagnosis. Timely and prompt treatment are crutial for reduction of morbidity and mortality. **Aim:** To present a case of Takayasu arteritis in which echocardiography played a crucial diagnostic role—the detection of ascending-aortic dilation served as an important clue to the diagnosis.
Methods: Retrospective analysis of the medical files of the patient.
Results: A previously healthy 12-year-old girl presented with low-grade fever, malaise, anorexia, and sore throat. Laboratory work-up revealed Coombs-positive anemia, thrombocytosis, markedly elevated CRP, ESR, and ferritin, and positive COVID-19 IgM. Imaging showed hepatomegaly, fibrinous pericarditis, and mitral valve prolapse with mild regurgitation. Broad-spectrum antibiotics produced modest clinical improvement but did not lower inflammatory markers. Chest CT and abdominal MRI were nondiagnostic. Genetic testing identified a pathogenic K695R variant in the *MEFV* gene, leading to a provisional diagnosis of FMF; colchicine therapy was ineffective. Over the ensuing months the patient developed headache, photopsia, and paresthesia. Recurrent pericarditis and progressive dilation of the ascending aorta (Z-score + 4) were noted. CT-aortography confirmed dilation of the ascending aorta, thickened walls of the aortic arch and its major branches, and involvement of the thoracic and abdominal aorta down to the bifurcation, including the renal arteries. One year after symptom onset, the cumulative findings fulfilled the EULAR criteria for Takayasu arteritis type V. Treatment with methylprednisolone, tocilizumab, and methotrexate normalized hematologic abnormalities and led to clinical remission, although residual aortic dilatation persisted.
Conclusions: Takayasu arteritis is a rare disease with a vague clinical presentation, requiring a high index of suspicion and multidisciplinary teamwork to establish the



diagnosis. While echocardiography is essential for initial and serial assessment, definitive confirmation of the vasculitis is obtained through CT and MR aortography. Early recognition of large-vessel vasculitis and prompt initiation of immunosuppressive treatment can achieve disease control, even in the presence of extensive arterial involvement.



MP-192 / #663

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

LOEYS-DIETZ SYNDROME: CARDIAC PATTERNS AND OUTCOMES, SINGLE CENTRE EXPERIENCE

Ashish Chikermane[1], Ahmed Elsaoudi[1], Leah Day[1], Shubhangini Chikermane[2], Rufiyda Ali[1], Jade Hobday[1], Esther Poole[1]
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Background and Aim: Loeys-Dietz syndrome (LDS), an autosomal dominant condition is a connective tissue disorder which presents with myriad of clinical presentations due to its multi-system involvement. First identified in 2005[i],[ii] and characterised by a triad of aortic aneurysm, generalised arterial tortuosity and bifid/broad uvula/cleft palate abnormalities. Our aim was to assess cardiac management and outcomes of children with LDS in a single tertiary paediatric centre. The study starts from the first confirmed diagnosis in our centre (2007). [i] Loeys, B.L. et al.. **A syndrome of altered cardiovascular, craniofacial, neurocognitive and skeletal development caused by mutations in TGFBR1 or TGFBR2** *Nat Genet.* 2005; **37**:275-281 [ii] Loeys, B.L. et al. **Aneurysm syndromes caused by mutations in the TGF-beta receptor.** *N Engl J Med.* 2006; **355**:788-798
Methods: 20-year (2005-2025) retrospective review from a single tertiary paediatric cardiology centre. We confirmed gene types (LDS-1, LDS-2 LDS-3, LDS-4, LDS-5, LDS-6) and looked at patterns of inheritance in the cohort. Cardiac presentation was assessed using aortic dilation, mitral and aortic valves. We looked at medical and surgical management of patients and assessed complications including mortality.
Results: A total of 45 patients were analysed. Our cohort had 30 males and 15 females with a mean age of 6.7 years at diagnosis. The most common genetic type was LDS-2 and LDS-3 (n= 12 for both). We found majority of cases were familial (73%) with maternal inheritance more frequent. 55.6% of patients had normal aortic dimensions, 31.1% had dilatation, 8.8% were at the upper limit of normal with 1 presenting with dissection. Valve abnormalities were seen in 28.9% of patients. 2 patients had dissection. Medically managed patients received angiotensin receptor blockers (ARB) &/or beta-blocker used in 84.4% and surgical intervention was required for 20% of patients. During follow-up, 57.8% of patients remained under active care, 40% transitioned to adult services and unfortunately one patient who had dissection passed away.
Conclusions: This review represents 2-decades of experience of cardiac monitoring and management in paediatric LDS. Importance of dedicated specialist programme is key to



good outcomes and learning. Aortic dilatation remains the primary cardiac risk and reinforces importance of close clinical monitoring.



MP-193 / #684

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

KAWASAKI DISEASE SHOCK SYNDROME: CREATING A MULTI-INSTITUTIONAL REGISTRY FOR A RARE CHILDHOOD CRITICAL ILLNESS

Hanady Al Haddad[1], Eyal Sagiv[2], Loubna Lamrani[3], Seda Tierney[4], Luis Martin Garrido-Garcia[5], Surjit Singh[6], Nagib Dahdah[3]
[1]CHU Ste-Justine, Université de Montréal, Montréal, QC, Canada., Montreal, Canada, montreal, Canada, [2]Seattle Children's Hospital, Seattle, WA., Seattle, United States of America, [3]CHU Ste-Justine, Université de Montréal, Montréal, QC, Canada., Montreal, Canada, [4]Stanford University, Stanford, California., stanford, United States of America, [5]Instituto Nacional de Pediatría, Mexico City, Mexico., Mexico, Mexico, [6]Advanced Pediatrics Centre, Post-Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India., Chandigarh, India

Background and Aim: Kawasaki Disease Shock Syndrome is a critical condition in children that requires high level of suspicion for timely diagnosis and treatment. While there are no consensus diagnostic criteria, it is estimated to represent 1.2-7% of Kawasaki disease, and outcomes of the acute illness and coronary vasculitis are unknown. We aimed to build a multi-institutional database to study characteristics and outcomes of KDSS.
Methods: We established a REDCap electronic data capture hosted at CHU Sainte-Justine (Montreal, Canada) for centers to enter retrospective data for matching admissions, 1995-2019. Included were children who met diagnostic criteria for KD and one or both: required admission to the intensive care unit or presented with systolic hypotension for age. This interim report includes data from 5 participating centers (Montreal, Seattle, San Francisco, Mexico City and Chandigrah).
Results: Interim analysis reports 71 children who met the above criteria for KDSS: 38 (53.5%) males, median age 5.5 years (range: <1-20). Diagnosis of KD was established at 9 days (4.5-11) of fever and on admission, 18 (25.4%) of children had an initial different working diagnosis for shock (sepsis, toxic shock syndrome or other). All clinical diagnostic criteria were frequently observed: rash 57 (80.2%), mucosal changes 55 (77.5%), conjunctival injection 55 (77.5%), extremity changes 49 (69%) and lymphadenopathy 37 (52.1%). Incomplete KD criteria were met by 27 (39.7%) of children and were more prevalent among those with initial alternate diagnosis (8 of 18, $p<0.01$). Multi-organ systems were involved in 26 (36.7%) children (12.7%, 15.5%, and 8.5% with 2, 3, or ≥4 systems). The median ICU stay was 4 days and shock management included volume replacement 47 (68%), inotropic agents 29 (43%), vasoactive agents 22 (34%) ventilatory



support 21 (31%) and ECLS 1. Overall, 50% of children were IVIg-resistant. Two children (2.8%) died on hospital days 1 and 27.

Conclusions: KDSS is an acute KD presentation that requires critical intervention for shock. Children were diagnosed late with multi-organ involvement that required aggressive intervention and were more frequently IVIg non-responders. The recognition of KDSS has increased significantly during the COVID-19 pandemic, emphasizing the need for further investigation and standardized diagnostic criteria.



MP-194 / #751

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

EVALUATING PATIENTS WITH KAWASAKI DISEASE: CAN THE SYSTEMIC IMMUNE INFLAMMATION INDEX PREDICT CORONARY INVOLVEMENT?

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Background and Aim: Kawasaki disease is a self-limiting vasculitis of unknown aetiology, and coronary artery lesions are its most common and serious complication. The Systemic Immune-Inflammation Index is a new biomarker of inflammation that may have prognostic value in Kawasaki disease. This study evaluated patients with Kawasaki disease and the prognostic role of Systemic ImmuneInflammation Index in coronary involvement.
Methods: A total of 62 children with Kawasaki disease and 49 healthy controls were included. Systemic Immune-Inflammation Index was calculated as: neutrophils × platelets/lymphocytes).
Results: Systemic Immune-Inflammation Index was also significantly higher in Kawasaki disease patients than controls (2373 ± 2040 vs. 300 ± 218, $p < 0.001$). Subgroup analysis of the Kawasaki disease patients showed that Systemic Immune Inflammation Index was significantly higher in patients with coronary artery lesions than in those without ($p < 0.05$).
Conclusions: In conclusion, Systemic Immune-Inflammation Index is a composite inflammatory biomarker easily obtained from routine blood parameters and may be an independent predictor of coronary artery involvement in Kawasaki disease.



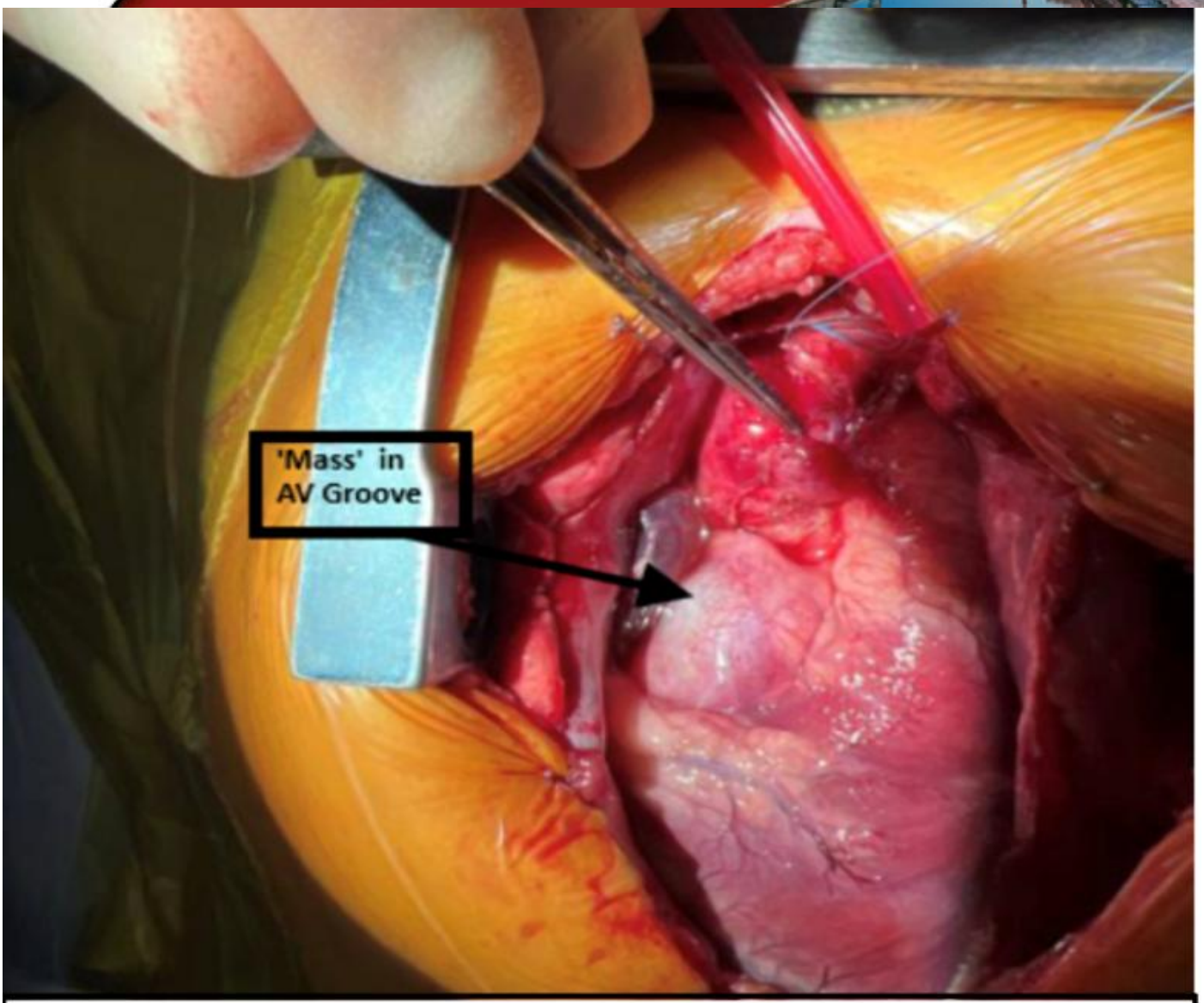
MP-195 / #1343

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

CARDIAC TUMOUR OR KAWASAKI DISEASE? A DIAGNOSTIC CONUNDRUM

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Background and Aim: Coronary pathology as an underlying cause of out-of-hospital cardiac arrest (OHCA) in paediatrics is exceptionally uncommon. We report an extraordinarily unexpected presentation of a toddler with sudden cardiac arrest due to coronary artery pathology, highlighting the rapid deterioration, diagnostic uncertainty and need for advanced multidisciplinary management.
Methods: A previously fit and well toddler, recovering from a recent viral prodromal illness was reported to have collapsed at home. The patient was found to have ventricular tachycardia and ventricular fibrillation (VT/VF), necessitating multiple defibrillations by the Emergency Medical Services (EMS) and the emergency department. Initial echocardiography demonstrated structurally normal cardiac anatomy with normal coronary origins and moderately impaired biventricular function. A subtle echogenicity within the right atrioventricular (AV) groove raised concern. With rapid clinical deterioration and ischemic changes on ECG, extracorporeal life support (ECLS) was initiated. Surgical exploration revealed a well-circumscribed mass within the right AV groove with the right coronary artery coursing through it, resembling a cardiac tumour.

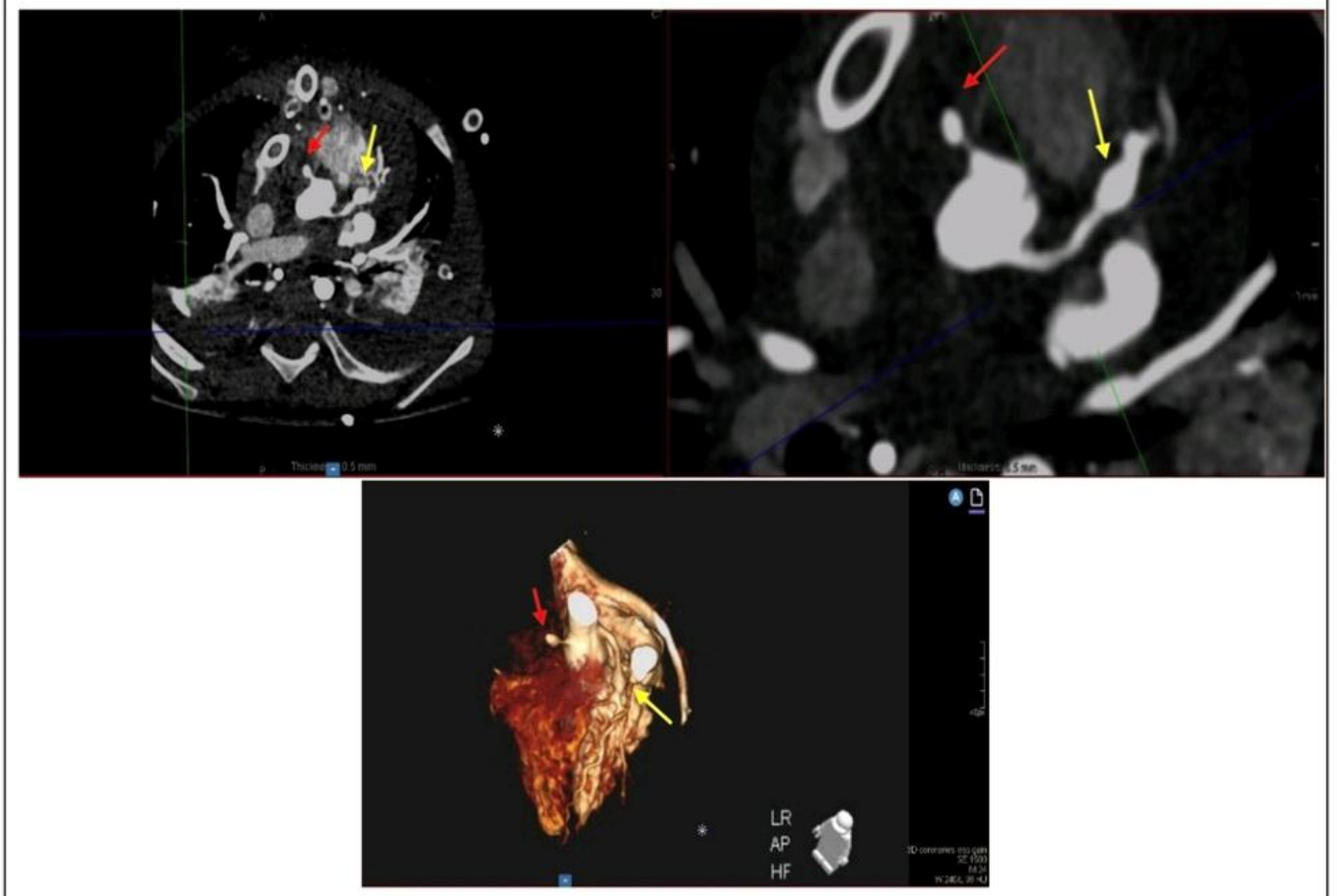


Heart with suspected mass in atrio-ventricular groove seen when chest was opened for ECLS

Results: Following stabilisation, cardiac CT revealed an absence of contrast opacification of the right coronary artery suggesting complete occlusion and a fusiform aneurysm of the left anterior descending artery. The imaging appearances were most consistent with thrombus within a giant coronary artery aneurysm. All other arteries were normal. A detailed retrospective history revealed a febrile episode with mucocutaneous involvement eight months earlier, initially diagnosed as scarlet fever. This suggested that the current presentation may be a sequela of incomplete Kawasaki disease, explaining the organised

thrombus and the lack of acute inflammatory markers at presentation. Primary management strategies centred on ECLS and a therapeutic trial of intravenous immunoglobulin (IVIG). However, given the severity of the coronary vasculopathy involving both arteries, a decision was reached to initiate a cardiac transplant assessment.

Cardiac CT showing the thrombus



A and B showing cross-section showing giant aneurysm in the Left Anterior Descending Artery (LAD)- yellow arrow; and filling defect in right coronary artery (RCA)-red arrow. C showing 3D reconstruction showing the same.

Conclusions: This exceptionally rare case underscores the need to consider coronary abnormalities as a cause of arrhythmia and paediatric OHCA. The findings were consistent with missed incomplete Kawasaki disease complicated by acute thrombosis of giant coronary aneurysms. Early ECLS intervention, prompt imaging and integrated multidisciplinary care proved pivotal to the child's survival in the setting of acute cardiac decompensation.



MP-196 / #268

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

TRANSAORTIC STENTING OF A REIMPLANTED LMCA AFTER ALCAPA REPAIR: A HYBRID APPROACH FOR CHALLENGING CORONARY ACCESS

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Background and Aim: Postoperative left main coronary artery (LMCA) stenosis after surgical repair of anomalous left coronary artery from the pulmonary artery (ALCAPA) is an uncommon but severe complication causing myocardial ischaemia and left ventricular dysfunction. In small infants, conventional percutaneous coronary intervention is often challenging due to small vessel calibre, altered postoperative anatomy, and haemodynamic instability, especially on veno-arterial extracorporeal membrane oxygenation (VA-ECMO). When the reimplanted ostium cannot be reliably engaged, standard transcatheter angioplasty or stenting becomes technically non-feasible. We describe a hybrid transaortic stent implantation for critical postoperative LMCA stenosis in an infant following ALCAPA repair.
Methods: A 3-month-old, 2.9-kg infant underwent LMCA reimplantation with pulmonary artery reconstruction for newly diagnosed ALCAPA. Postoperative severe ventricular dysfunction required VA-ECMO. Coronary reassessment revealed a critical proximal LMCA stenosis. Two transcatheter angioplasty attempts failed due to inability to engage the reimplanted ostium. A hybrid transaortic strategy was therefore adopted. With the chest open on central VA-ECMO, the ascending aorta was accessed under direct vision, and a 16G Abbocath was inserted through a double Prolene purse-string. A Sion Black guidewire supported by a SuperCross 45° microcatheter engaged the reimplanted LMCA achieving stable distal positioning. Angiography confirmed severe proximal stenosis. Angioplasty with a 1.25/15 mm, and subsequently a 2.0/15 mm drug-eluting balloon resulted in significant recoil, prompting implantation of a 2.25/12 mm Resolute Onyx Frontier drug-eluting stent.
Results: The procedure was uncomplicated and achieved an excellent angiographic result with full restoration of LMCA calibre. The patient remained haemodynamically stable and was successfully weaned from VA-ECMO 24 hours later. At three-week follow-up, echocardiography demonstrated a patent LMCA stent with antegrade flow, preserved systolic function, and improved global longitudinal strain.



Conclusions: Hybrid transaortic access provides controlled, coaxial coronary entry when conventional percutaneous engagement is not feasible in critically ill infants. This case demonstrates the technical feasibility and clinical value of hybrid LMCA stenting after ALCAPA repair and supports its use as a bailout strategy in selected patients. To our knowledge, this is the first reported case of hybrid transaortic stenting of a reimplanted LMCA in an infant.



MP-197 / #1410

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

SHORT-TERM AND LONG-TERM OUTCOME OF TRANSCATHETER INTERVENTION FOR AORTIC COARCTATION IN PEDIATRIC PATIENTS: A SINGLE CENTRE EXPERIENCE FROM EGYPT

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Background and Aim: Transcatheter intervention has emerged as the prevailing treatment modality for patients afflicted with coarctation of the aorta (COA). However, literature regarding short- and long-term outcomes in pediatric patients is limited. The objective of this study was to analyze the short- and long-term effects of transcatheter intervention for native and recurrent COA in pediatric patients.
Methods: This retrospective cohort study included 89 pediatric patients with CoA, aged ≤ 18 years, who underwent transcatheter repair between June 2016 and June 2024. Data were collected from medical records, including patients' characteristics, Echocardiographic findings, transcatheter intervention data, and short-term and long-term complications.
Results: The incidence of balloon angioplasty was 66.3% of patients and stenting was 30.3%. After intervention, significant improvements of the fluoroscopic narrowest COA diameter and pressure gradient in comparison to the pre-intervention values (7.99±2.45 vs. 4.56±2.21 mm, and 12 vs. 43 mmHg, p≤0.001). The incidence of short-term and long-term complications was 9% and 12.9% of patients, respectively. Compared to the non-complicated patients (n=75), patients with complications (n=17) had a significantly higher incidence of bicuspid aortic valve (41.2% vs. 13.9%, p=0.01). There was higher incidence of previous COA surgical repair in complicated patients compared to non-complicated patients (35.3% vs 13.9%, p=0.039). There were no significant associations between catheter data and the incidence of complications (p>0.05).
Conclusions: In pediatric patients undergoing COA repair, transcatheter intervention is an effective and safe treatment for COA with few short- and long-term complications. Its efficacy is maintained over a prolonged follow-up duration. However, clinicians should be cautious about the bicuspid aortic valve and prior COA surgical repair as predictors of complications in children undergoing COA repair.



MP-198 / #494

SESSION 10 - VALVULAR DISEASES
15-05-2026 13:15 - 14:15

PERCUTANEOUS TRICUSPID VALVE-IN-VALVE REPLACEMENT USING A BALLOON-EXPANDABLE TRANSCATHETER HEART VALVE IN A HIGH-RISK ADULT WITH EBSTEIN ANOMALY AND GLENN PHYSIOLOGY: A NOVEL VENO-VENOUS LOOP APPROACH

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Background and Aim: Ebstein anomaly often necessitates early tricuspid valve (TV) repair or replacement, and bioprosthetic degeneration over time may require repeated interventions. In patients with prior bidirectional Glenn (BDG) shunt and multiple sternotomies, conventional re operative cardiac surgery carries prohibitive risk, whereas standard transcatheter approaches are challenged by altered venous drainage. The aim of this report is to describe a novel veno-venous loop technique enabling percutaneous tricuspid valve-in-valve (ViV) replacement using a balloon-expandable transcatheter heart valve in a high-risk adult with Ebstein anomaly and Glenn physiology.
Methods: A 32-year-old male with Ebstein anomaly and two prior cardiac surgeries (initial TV repair with BDG shunt(one and half ventricle repair), followed by surgical TV replacement with a 29 mm Carpentier-Edwards porcine bio prosthesis presented with symptomatic right heart failure secondary to severe bioprosthetic stenosis. Multidisciplinary heart-team evaluation determined elevated surgical risk and recommended transcatheter ViV implantation. Due to interruption of conventional venous drainage pathways by the BDG, a customized veno-venous loop was created between the femoral and internal jugular veins to provide a stable delivery rail. A 27.5 mm MYVAL transcatheter valve was deployed across the failing bioprosthesis under fluoroscopic and transesophageal echocardiographic guidance.
Results: The veno-venous loop enabled controlled coaxial positioning and successful deployment of the MYVAL valve without the need for pre-dilatation. Immediate reduction in right atrial pressures and transvalvular gradients was achieved, with no paravalvular leak, embolization, or device instability. The patient experienced rapid symptomatic improvement and was discharged on the third post-procedure day. At 3-month follow-up, he remained in NYHA class I with sustained excellent prosthetic valve function on echocardiography and no procedural or access-related complications.
Conclusions: Percutaneous tricuspid ViV replacement with the MYVAL transcatheter heart valve is a feasible and safe alternative in high-risk patients with Ebstein anomaly and Glenn physiology. Adaptation of access techniques—specifically the creation of a veno-venous



loop—can provide a secure platform for valve delivery in complex congenital venous anatomy. This case highlights the role of balloon-expandable transcatheter heart valve in non-standard annular geometries and supports further evaluation of transcatheter approaches for structural heart disease in adults with prior cardiac surgeries.



MP-199 / #204

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

RAPID 3D CINE CARDIAC MRI FOR PAEDIATRIC CHD: A NOVEL RECONSTRUCTION APPROACH FOR REDUCED SCAN TIME

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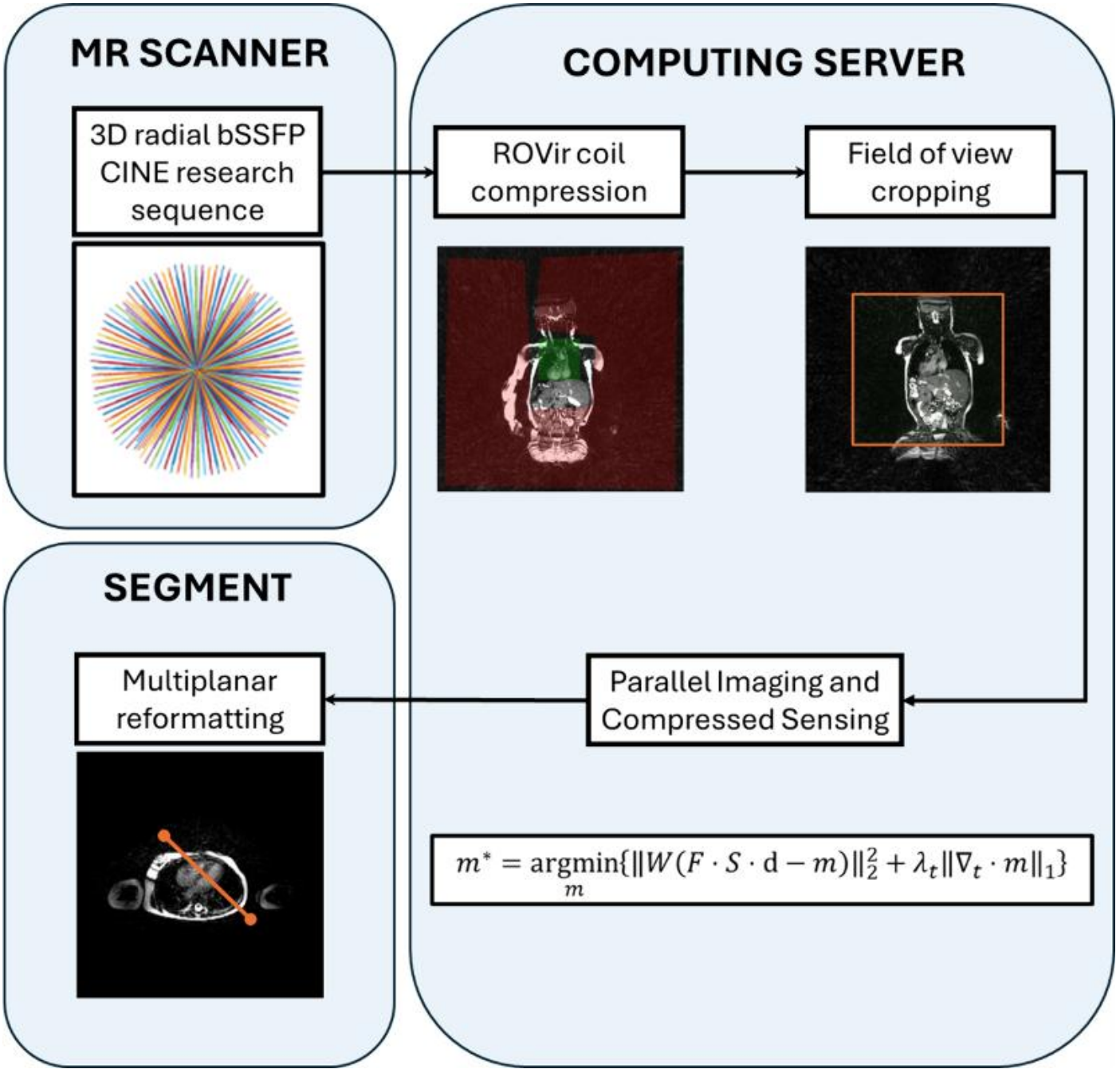
Background and Aim: Cardiac magnetic resonance (CMR) is part of the foundation for paediatric cardiovascular diagnostics and physiology. However, acquiring multiple 2D CINE images in a paediatric patient with a complicated congenital heart defect (CHD) patients is challenging and time consuming, requiring expert radiographers and possibly general anaesthesia. This study investigates the use of an in-house developed 3D radial CINE CMR imaging sequence[1] for paediatric CMR allowing for simpler acquisition planning, however it comes with longer reconstruction time that hampers clinical use. We aimed to address this limitation with an accelerated image reconstruction workflow.
Methods: Five patients were included after ethical approval. All examinations were conducted using a 1.5 T MAGNETOM Aera (Siemens Healthineers, Forchheim, Germany) either under general anaesthesia or sedation with dexmedetomidine. Table 1 shows patient and sequence
information.



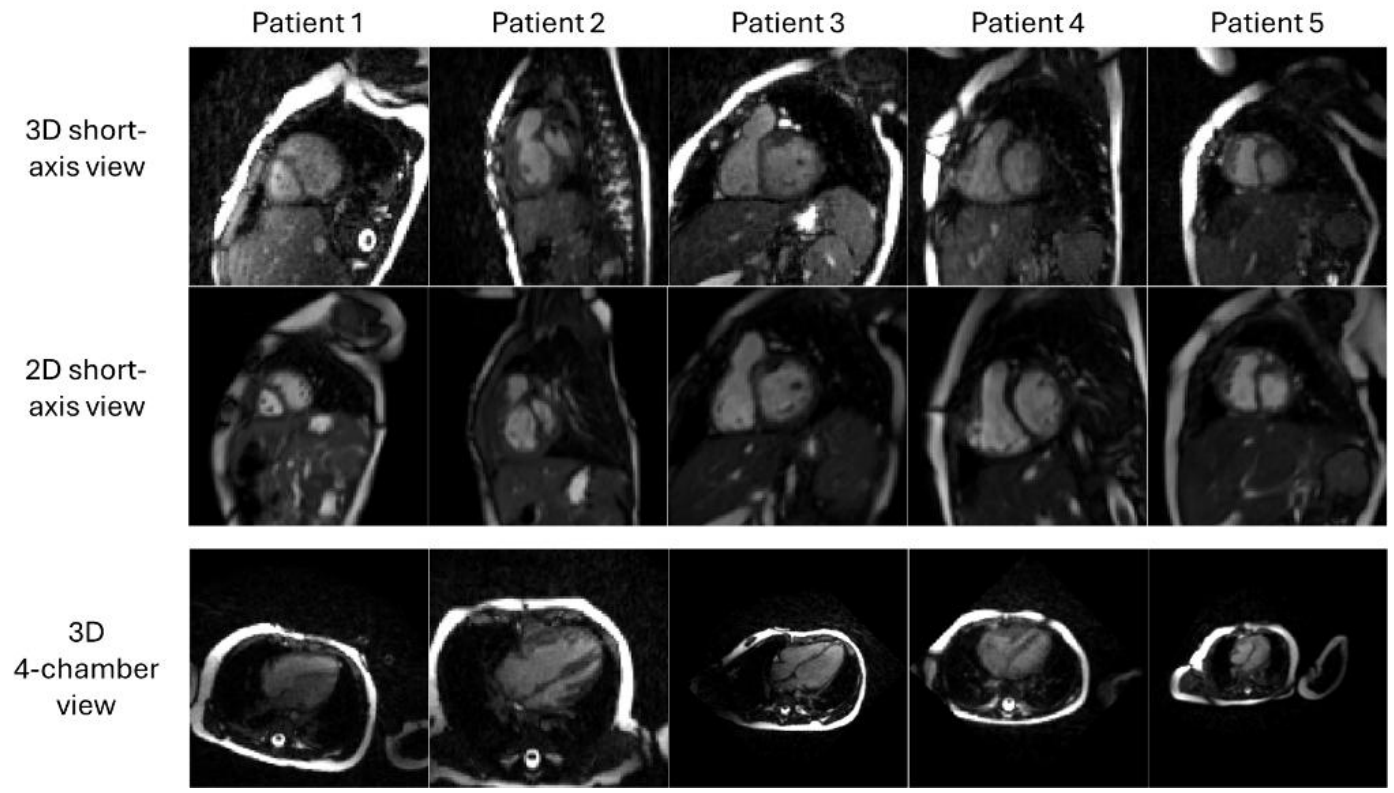
Patient	1	2	3	4	5
Heart rate (bpm)	111	119	109	77	99
Age (months)	5	3	9	8	2
Sex	M	M	F	F	F
2D Cartesian bSSFP short axis CINE sequence					
Number of cardiac phases	40	25	25	25	25
Temporal resolution (ms)	13	19	21	31	24
In-plane pixel size (mm^2)	2.0	0.8	0.7	0.8	0.7
Slice thickness (mm)	8	5	5	5	5
Flip angle	51°	51°	63°	51°	66°
Field of view (mm)	450	300	280	131	260
Number of slices	14	13	20	15	12
3D radial bSSFP CINE research sequence					
Number of cardiac phases	20				
Temporal resolution (ms)	26	26	29	42	32
Isotropic voxel size (mm^3)	1.6	1.6	1.6	1.6	1.6
Flip angle	64°	70°	60°	66°	70°
Reconstructed Field of view (mm)	360				
Number of transversal partitions	230				

Figure 1 shows the acquisition and the offline reconstruction workflow, the latter being performed on a computing server. The proposed method includes coil compression to four coils using the Region Optimized Virtual Coils (ROVir) technique[2] and the field of view was cropped to 60% to lower computational demands. Parallel imaging and compressed sensing were performed to reconstruct a 3D CINE volume with 20 cardiac phases. Segment

(Medviso AB, Lund, Sweden)[3] was used for multiplanar reformatting of the 3D CINE volume.



Results: The proposed acceleration method for the reconstruction workflow provided the 3D CINE volume in 15 minutes for 20 cardiac phases, in contrast to 3.5 hours for 8 cardiac phases previously[1]. The 3D CINE volume replaced multiple 2D CINE stacks, reducing overall scan time from 10 to 3.5 minutes. Figure 2 shows an end-diastolic mid-ventricular 2D and corresponding 3D CINE image for each patient.



Conclusions: This study demonstrates that the 3D CINE sequence significantly reduces scan time and eliminates the need for dedicated slice planning. Thereby duration of anaesthesia may be reduced or even replaced with sedation or feed and sleep methods also in complicated CHD. Additionally, the proposed reconstruction workflow decreases computational demands, therefore moving towards routine clinical implementation. **Acknowledgements** The authors gratefully acknowledge Siemens Healthineers for providing access to pulse sequence development tools. **References** 1. https://doi.org/10.1002/mrm.29467 2. https://doi.org/10.1002/mrm.28706 3. https://doi.org/10.1186/1471-2342-10-1



MP-200 / #1403

SESSION 12 - AORTIC MATTERS
15-05-2026 13:15 - 14:15

PATTERN OF VASCULITIS IN THE LARGEST COHORT OF PEDIATRIC AORTOARTERITIS FROM A TERTIARY CARE CENTRE IN INDIA

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Background and Aim: Pediatric aortoarteritis is a challenging disease to diagnose, monitor, treat and prognosticate. Data on large cohort of pediatric aortoarteritis is lacking in literature.
Methods: Prospective imaging data from CT angiography collected from 2012 to 2025 at a tertiary care pediatric cardiac centre of children with pediatric aortoarteritis diagnosed based on EULAR criteria. They were classified based on angiographic classification by Numano.
Results: There were total of 121 children with median age of 14 years (8 months – 18 years). M:F ratio was(1:4).The commonest pattern was type IV 46%(56) with involvement of abdominal aorta its branches. Type V affecting the entire aorta was second most common pattern seen in 25%(30). Type IIa and IIb involving supradiaphramatic aorta and its branches were 12%(15).. Type I involving head and neck vessels alone was least common seen in 4 patients. Type III with combined thoracic and abdominal aortic disease was present in 13.2%(16). Renal artery involvement was seen in 56%(68). (Left in 23, right in 14 patients and bilateral in 31 patients). Shrunken kidney with complete occlusion of renal artery was seen at presentation in 24 patients. Isolated renal artery involvement was seen without obvious aortic changes. Extreme form of vasculitis with complete occlusion and discontinuity of abdominal aorta was seen in six patients. During follow up some patients had progression of disease. Three patients presented with only aneurysmal dilatation of aorta with no stenosis. Valvulitis was seen in three patients with no stenosis but irregular dilated, thickened aorta. Coronary artery dilatation was seen in four patients. Acute thrombosis of aorta was seen in seven patients. Three of them had complete thrombosis with acute renal failure and hypertensive crisis.
Conclusions: Type IV pattern is the commonest form of pediatric aortoarteritis leading to hypertension. Severe manifestation can occur in form of complete discontinuity of aorta. Shrunken kidney can be seen at initial presentation indicating clinically silent disease for



months to years. It can occur in children as young as 8 months. The pattern in our cohort is different from literature and indicates aggressive and morbid disease in children.



MP-201 / #210

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

FETAL HEART GLOBAL SPHERICITY INDEX AND GLOBAL LONGITUDINAL STRAIN AFTER A FETAL TACHYARRHYTHMIA– A CASE SERIES

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Background and Aim: Fetal tachyarrhythmias are associated with increased morbidity due to impaired ventricular filling, haemodynamic compromise and the risk of hydrops. Although rhythm control can usually be achieved antenatally with anti-arrhythmic medication, there may still be subtle myocardial dysfunction despite restoration of sinus rhythm. Traditional echocardiographic tools such as M-mode and Doppler can identify rhythm and function of the fetal heart but lack they sensitivity for early myocardial changes. Speckle Tracking Echocardiography (STE), including Global Sphericity Index (GSI) and Global Longitudinal Strain (GLS), offers advanced assessment of myocardial function and may detect subclinical functional or geometric alterations in this cohort.
The aim of this study is to evaluate whether STE can detect myocardial shape or functional changes following reversion to sinus rhythm in fetuses treated for tachyarrhythmia.
Methods: A prospective case series of seven fetuses with confirmed tachyarrhythmia was conducted. STE analysis was performed once sinus rhythm had been restored in 15 echocardiographic studies between 26–36^{+4} weeks' gestation. GSI, and ventricular GLS were obtained. A gestational age–matched control group (n=72; 120 studies) provided normative data. Z-scores were generated and statistical comparisons made between the control group and the tachyarrhythmia group.
Results: Five cases presented with 1:1 conduction tachyarrhythmia, and two with atrial flutter. Sinus rhythm was restored in all but one case prior to delivery. No fetus developed hydrops or cardiac failure. Compared with controls, the tachyarrhythmia cohort demonstrated a significantly lower mean GSI ($p<0.01$; $r=0.45$) and LV GLS ($p<0.01$; $r=0.43$), indicating altered cardiac geometry and reduced myocardial deformation despite rhythm normalisation. RV GLS did not differ significantly between groups. Atrial flutter cases showed the greatest abnormalities, including markedly reduced GSI and abnormal LV or RV GLS Z-scores. In several cases, LV GLS improved gradually with sustained sinus rhythm, suggesting functional recovery over time.
Conclusions: STE identified statistically significant differences in cardiac geometry and LV myocardial strain even after successful rhythm control, highlighting its potential role in



detecting subclinical dysfunction following fetal tachyarrhythmia. These findings support the use of STE into post-arrhythmia surveillance and emphasise the need for larger studies to clarify the influence of arrhythmia type and treatment used.



MP-202 / #165

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

PLACENTAL AND UMBILICAL CORD ANOMALIES IN HYPOPLASTIC LEFT HEART SYNDROME AND TRANSPOSITION OF THE GREAT ARTERIES

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Background and Aim: Placental and umbilical cord anomalies have been described in patients with congenital heart disease (CHD), particularly in those with Hypoplastic Left Heart Syndrome (HLHS) and Transposition of the Great Arteries (TGA). However, available reports are scarce and show heterogeneous results. The aim of this study was to describe placental and umbilical cord anomalies in patients with HLHS and TGA in a cohort attended in a tertiary health care center in Argentina.
Methods: Retrospective cohort study. Patients with a prenatal diagnosis of isolated CHD who were born at Hospital Italiano de Buenos Aires between 2018 and 2023 were included. Measures of frequency, central tendency and dispersion were assessed. Categorical variables were analyzed using Fisher's exact test and Freeman-Halton test, while continuous variables were analyzed using ANOVA and Krusker-Wallis test. An interobserver agreement analysis was performed for the interpretation of the placental studies.
Results: Among 124 patients with isolated CHD, 21.8% (27/124) had HLHS, 9.7% (12/124) had TGA and 68.5% (85/124) other CHD. Maternal features were similar across groups, except for maternal diabetes, which was more frequent in patients with TGA compared with HLHS ($p = 0.0011$) and other CHD ($p = 0.0018$). Mean placental weight was 473.3 grams (±104.4) with a mean percentile of 59.2 (±36), and low birth weight was found in 12.3% (15/124). Histological placental anomalies were observed in 45.2% (56/124). No fetal vascular malperfusion lesions were observed in TGA, in contrast with HLHS (18.5%, $p = 0.011$) and other CHD (27.1%, $p = 0.039$). Delayed villous maturation was more frequent in TGA (16.7%), than in HLHS (7.4%, $p = 0.379$) and other CHD (3.5%, $p = 0.054$). Umbilical cord anomalies were present in 30.6% (38/124), but none in TGA, compared with HLHS (33.3%, $p = 0.023$) and other CHD (34.1%, $p = 0.016$). Interobserver agreement was moderate (Cohen's kappa 0.49).
Conclusions: In this cohort, patients with TGA showed no umbilical cord lesions and no fetal vascular malperfusion placental lesions, and had a higher frequency of delayed villous maturation compared with HLHS and other CHD.



MP-203 / #283

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

BRAIN INJURY PATTERNS IN PRETERM INFANTS WITH CONGENITAL HEART DISEASE AND NECROTIZING ENTEROCOLITIS

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Background and Aim: Background: Infants with congenital heart disease (CHD) have increased risk for necrotizing enterocolitis (NEC). While classical NEC primarily affects preterm infants, its occurrence in older infants with CHD suggests a distinct pathophysiology driven by cardiac output deficits and mesenteric ischemia. Preterm infants with CHD represent an especially high-risk subgroup, with combined effects of prematurity and complex cardiac physiology impairing both intestinal and neurological health. Despite the recognized neurological burden of CHD and NEC individually, data on brain injury patterns in preterm infants affected by both conditions remains limited. **Objective:** To explore cerebral injury patterns among preterm infants with CHD stratified by NEC status using neuroimaging assessment.
Methods: Design/Methods: We performed a 15 year (2008-2023) single center retrospective study of preterm infants (gestational age <37 weeks) with CHD. Clinical data encompassed baseline characteristics, CHD type, perioperative details for the first major surgical or catheter-based intervention, and NEC diagnosis. The primary outcome was white and gray matter injury severity and cerebellar abnormalities based on the Garg et al. scoring system. Brain magnetic resonance imaging (MRI) scans were evaluated by two blinded investigators. This was an observational pilot study with descriptive analysis only.
Results: Results: We identified 289 preterm infants (median gestational age 35 weeks, median birth weight 2.30 kilograms) with CHD who underwent cardiopulmonary bypass in the first 2 months of age. Of these 17 (n=7%) developed NEC (Bells stage 2 or higher). In the total cohort, 31 infants had a brain MRI in the first six months (n=4 NEC and n=27 no-NEC). Infants with NEC had smaller corpus callosum ($p = 0.007$), with trends toward a larger subarachnoid space ($p = 0.082$) and greater cerebellar volume loss ($p = 0.093$). Infants with NEC had prolonged postoperative CICU stay (43.5 vs 18.9 days, $p = 0.026$). The distribution of STAT surgical risk categories was also different between groups, with higher risk in the NEC group ($p = 0.039$).
Conclusions: Conclusion: This observational pilot study suggests potential clinical and neuroimaging differences in preterm infants with CHD and NEC. Larger studies



incorporating neuroimaging are warranted to define disease burden and outcomes in this high-risk population.



MP-204 / #1321

SESSION 5 - INTENSIVE CARE AND NDV
14-05-2026 13:15 - 14:15

MASSIVE PULMONARY EMBOLISM AND DIRECT ORAL ANTICOAGULANTS: NEW PERSPECTIVES IN THE PEDIATRIC POPULATION

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Background and Aim: Pulmonary embolism (PE) is a rare but potentially life-threatening event in children, with an incidence of 0.07–0.14/100,000/year. Risk is markedly higher in patients with congenital heart disease due to a prothrombotic environment from both the underlying condition and palliative or corrective surgeries. In particular, children with Blalock–Taussig (BT) shunts or cavopulmonary circulation have additional predisposition due to low-flow areas and loss of pulsatile flow. Diagnosis is challenging due to nonspecific symptoms, and CT pulmonary angiography remains the gold standard. We report a case of massive PE in a pediatric patient with complex congenital heart disease and discuss the multimodal management, including direct oral anticoagulants (DOACs).
Methods: Case report of a 14-month-old girl with prenatal pulmonary valve atresia, intact ventricular septum and hypoplastic right ventricle, previously treated with Rashkind atrial septostomy, BT shunt, and bidirectional cavopulmonary anastomosis, presented with acute central cyanosis and severe desaturation (SpO_2 60%). Urgent CT pulmonary angiography confirmed massive bilateral PE (figure 1.). Initial systemic thrombolysis with alteplase was started but discontinued after 24 hours due to bleeding complications. Anticoagulation with unfractionated heparin was maintained. Percutaneous thromboaspiration was attempted but ineffective, so rescue surgical pulmonary thromboendarterectomy was performed under veno-arterial extracorporeal membrane oxygenation (VA-ECMO) support. Postoperative anticoagulation included heparin, warfarin, acetylsalicylic acid, and subsequently bivalirudin and loco-regional alteplase, followed by initiation of rivaroxaban for long-term management.
Results: The patient needed multimodal interventions upon stabilization; she was successfully weaned from ventilatory and pharmacological support and discharged in stable condition. Parenteral anticoagulation was transitioned to long-term Rivaroxaban (0.8 mg/kg/day), which was well tolerated and enabled an easier at-home management.
Conclusions: Massive PE in pediatric patients with complex congenital heart disease requires aggressive, multimodal management, including systemic and loco-regional



thrombolysis, surgical intervention, and extracorporeal support when necessary. After stabilization, DOACs such as rivaroxaban represent a feasible and effective alternative to traditional anticoagulation, facilitating outpatient management and improving adherence. This case highlights the importance of individualized treatment strategies and the potential role of DOACs in high-risk pediatric population as a new long-term therapy, according to recent evidence.



MP-205 / #1509

SESSION 6 - TRONCO-CONAL DISEASES
14-05-2026 13:15 - 14:15

EXERCISE MODALITY–RELATED DIFFERENCES IN CPET PARAMETERS IN PATIENTS WITH REPAIRED TETRALOGY OF FALLOT

Benedetta Leonardi, Federica Gentili, Eliana Tranchita, Giulia Cafiero, Claudia Montanaro, Marcello Chinali, Rosalinda Palmieri, Giulia Di Già, Giulio Calcagni, Marco Della Porta, Aurelio Secinaro, Ugo Giordano
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Background and Aim: In patients with repaired Tetralogy of Fallot (rToF), cardiopulmonary exercise testing (CPET) is fundamental to functional assessment and risk stratification; however, treadmill and bicycle ergometer protocols are often used interchangeably, and the impact of exercise modality on CPET-derived parameters remains unclear. To evaluate the independent association between exercise modality and CPET-derived parameters in rToF.
Methods: Statistical analyses were performed to compare patients undergoing treadmill versus bicycle ergometer testing. Multivariable linear regression analyses were used to assess whether peak oxygen uptake (VO_2 peak), percent-predicted VO_2 peak, oxygen uptake efficiency slope (OUES), absolute and percent-predicted oxygen pulse, and VE/VCO_2 slope were influenced by exercise modality (treadmill vs bicycle ergometer). Models were adjusted for age at CPET and sex for absolute values, while predicted values were analyzed without covariates. Additional models included right and left ventricular ejection fraction.
Results: A total of 732 CPETs were performed, using a bicycle ergometer (n = 347; mean age 23.7±7.9 years) or treadmill (n = 385; mean age 24.4±8.5 years). Most patients were in NYHA class I (98.1%). Mean VO_2 peak was 27.1 ± 6.4 ml/kg/min (66.9 ± 12.9% predicted), oxygen pulse 10.5 ± 2.8 ml/beat^{-} (78.3 ± 14.2% predicted), OUES 1935 ± 559 ml/min/l/min, and VE/VCO_2 slope 29.9 ± 4.7. Cardiac magnetic resonance showed RVEDVi 120.1 ± 23.8 ml/m^2, RVESVi 55.7± 15.4 ml/m^2, RVEF 54.0 ± 6.4% PR 23.7 ± 17.3% and LVEF 57.6 ± 6.9%. Treadmill testing was associated with higher absolute VO_2 peak (β = +4.2 ml/kg/min, 95% CI 2.8–5.6; $p < 0.001$), higher percent-predicted VO_2 peak (β = +4.7%, 95% CI 1.2–8.3; p = 0.010), and higher absolute oxygen pulse (β = +0.78 ml/beat^{-}, 95% CI 0.20–1.40; p = 0.008). OUES, percent-predicted oxygen pulse, and VE/VCO_2 slope were not affected by exercise modality. Adjustment for biventricular ejection fraction did not modify these associations.
Conclusions: In rToF, CPET modality significantly affects measures of maximal aerobic performance, whereas ventilatory efficiency indices are consistent across protocols.



Exercise modality should be considered when interpreting CPET results, supporting the need for modality-specific reference values in clinical follow-up and multicenter studies.



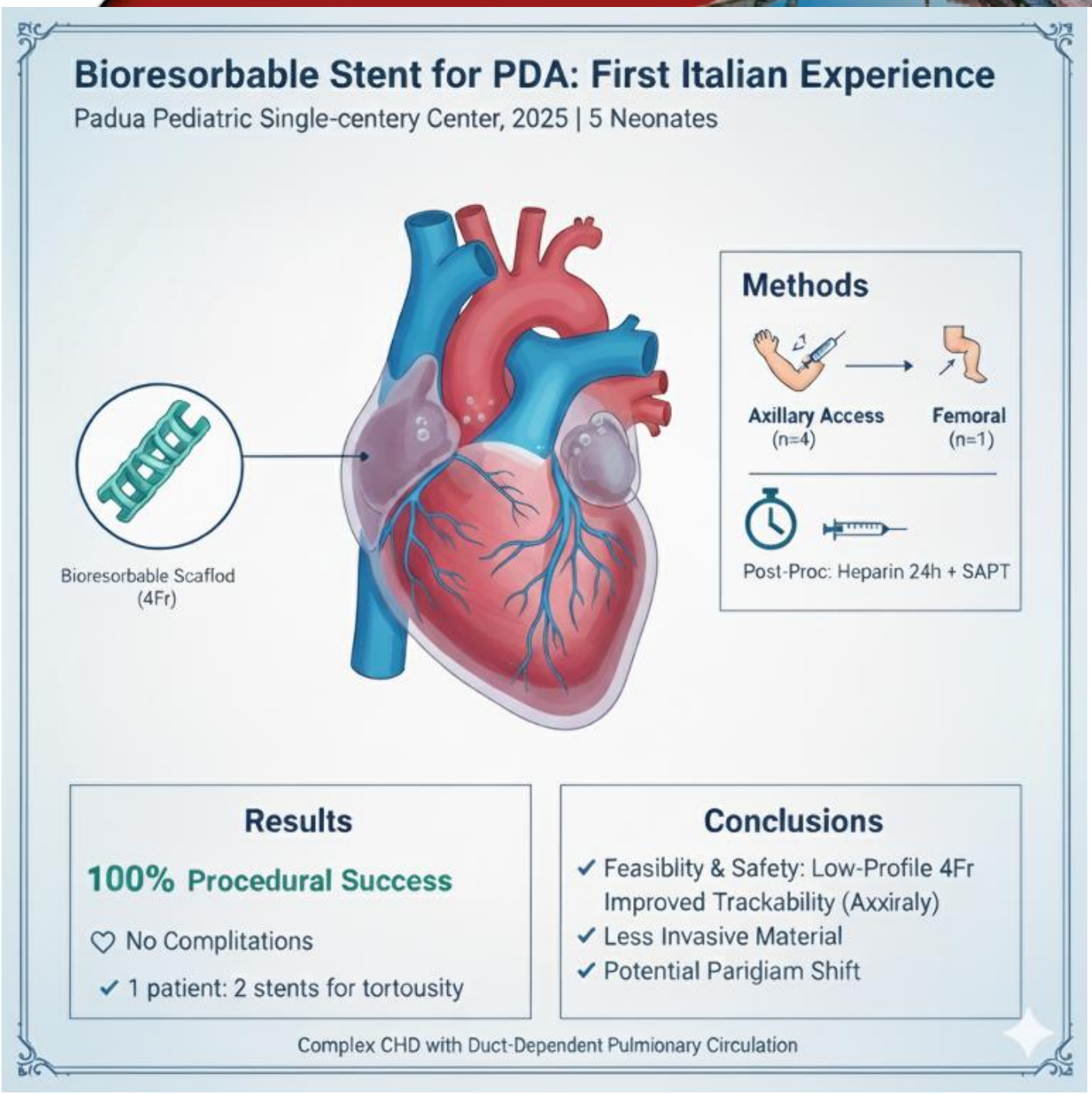
MP-206 / #1415

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

INITIAL MONOCENTRIC EXPERIENCE WITH A NEW BIORESORBABLE STENT FOR PATENT DUCTUS ARTERIOSUS (PDA) STENTING IN NEONATES WITH DUCT-DEPENDENT PULMONARY CIRCULATION

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Background and Aim: Percutaneous stenting of the patent ductus arteriosus (PDA) is a well-established neonatal palliative procedure and an effective alternative to surgical shunts in congenital heart diseases with duct-dependent pulmonary circulation. In clinical practice, low-profile coronary stents are typically utilized. Recently, a specific bioresorbable stent received CE mark approval for PDA implantation. The aim is oo present the first Italian single-center case series of bioresorbable stent implantation in the PDA of neonates with duct-dependent pulmonary circulation.
Methods: In 2025, five bioresorbable PDA stenting procedures were performed at the Pediatric Cardiology Center in Padua. All patients presented with complex congenital heart disease requiring prostaglandin infusion to maintain ductal patency. Vascular access was achieved via the left axillary artery in four cases and the right femoral vein in one case. Stent sizing (length and diameter) was determined by intra-procedural angiographic measurements. Post-procedural management included continuous heparin infusion (20 U/kg/h) for 24 hours in patients with axillary access, followed by single antiplatelet therapy in all patients.
Results:



Procedural success was 100%, with no procedural or peri-procedural complications reported. In one patient, two stents were required due to significant ductal tortuosity. **Conclusions:** In our initial single-center experience, the use of the new bioresorbable stents for PDA treatment in neonates with duct-dependent pulmonary circulation was positive. The low-profile system (4Fr) facilitates axillary artery access, ensuring optimal trackability and ease of shaft manipulation. These bioresorbable stents may represent a



significant advancement in the management of complex duct-dependent heart disease, offering a less invasive alternative to conventional metallic coronary stents.



MP-207 / #1444

SESSION 2 - INVASIVE TREATMENTS
14-05-2026 13:15 - 14:15

ADVANCED LYMPHATIC IMAGING AND INTERVENTIONS IN PATIENTS WITH SEVERE LYMPHATIC COMPLICATIONS: A CASE SERIES WITH UP TO FOUR-YEAR OUTCOMES

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Background and Aim: Complications related to the lymphatic system, including protein-losing enteropathy (PLE), plastic bronchitis (PB), and chylothorax, are associated with substantial morbidity in patients with congenital heart disease and primary lymphatic disorders. Advances in lymphatic imaging and interventional techniques have expanded diagnostic and therapeutic options, but outcome data remain limited. In 2021, a dedicated lymphatic intervention program was established in Copenhagen, Denmark. This study reports early clinical experience from the first treated patients.
Methods: Twenty-two patients (age range 7–34 years; 13 males) with severe lymphatic complications were included, comprising 17 patients with Fontan circulation and 5 with primary lymphatic disease without congenital heart disease. Presenting complications included PLE (n=14), PB (n=4), and chylothorax or chylopericardium (n=4). All patients underwent standardized lymphatic imaging using non-contrast and dynamic contrast-enhanced MR lymphangiography (DCMRL), with thoracic duct patency assessed by ultrasound.
Results: Dynamic contrast-enhanced MR lymphangiography identified pathological lymphatic leakage in the majority of patients, involving the duodenum (n=12), bronchial tree (n=4), or pleural space (n=4). Two patients had no treatable lymphatic leakage identified. Identified lymphatic leaks were treated with selective lymphatic duct embolization (n=7), periduodenal embolization (n=12), or thoracic duct decompression (n=8). In these early data, most treated patients achieved partial or complete clinical



improvement, including improvement in symptoms, laboratory markers associated with protein-losing enteropathy, and functional status. No reinterventions were required during the available follow-up period.

Conclusions: Early experience with lymphatic interventions, including embolization and venous decompression, indicates potential clinical benefit in a complex patient population with severe lymphatic complications and supports the feasibility of a dedicated lymphatic intervention program.



MP-208 / #1298

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

THE CHALLENGE OF PRENATAL DIAGNOSIS OF HYPOPLASTIC LEFT HEART SYNDROME: LIFE BEYOND SURGERY?

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ASST GOM Niguarda, Ssd Cardiologia Pediatrica, Milano, Italy

Background and Aim: Hypoplastic left heart syndrome (HLHS) was formerly considered a lethal diagnosis for whom comfort care was the only option, but in the last 40 years advances in surgical techniques allowed a shift in prognosis. Our impression is that despite a dramatic improvement in survival due to a multidisciplinary approach, pregnancy interruption rate remains high, especially when parents are counseled in centers with low experience in treating these patients. Moreover, also in specialized centers prenatal diagnosis of HLHS is still challenging and data about quality of life are lacking. Primary aim of our study was to evaluate quality of life of HLHS patients focusing on morbidity burden and assistance needs.
Methods: We conducted a retrospective observational study to investigate long-term outcomes, useful to guide prenatal counselling. We reviewed medical records of HLHS patients, at different stages of palliation, regularly followed-up at our institution.
Results: Our study included 35 patients. Median age was 13 years (6 months-22 years); 22 patients were school-aged. 13 patients were in second stage of palliation and 22 were in third stage. Late complications were observed in 48% of patients, including systemic right ventricular dysfunction (8), atrioventricular valve regurgitation (13), arrhythmias (5) and protein-losing enteropathy (2). Most patients (90%) required chronic cardiac medication, with a mean of three daily drugs. 5 patients were evaluated for heart transplant.
Follow-up burden was substantial, with recurrent hospitalizations (median 4 from birth) and frequent outpatient visits, particularly in second stage patients. Neurocognitive and behavioral disorders were identified in 38% of patients in follow-up, from mild deficits to severe multisystem involvement, requiring specialized neuropsychiatric care (8) and educational support (9).
Conclusions: This study gave us an updated picture of long-term outcomes of the palliative 3-steps surgery focused only on HLHS spectrum. These results are useful to counsel parents prenatally and postnatally. Given the improvements in surgical techniques and management of patients, we strongly believe that counselling on congenital heart diseases, especially the most complex ones, should be made in centers experienced on



treatment of the specific disease, sharing with parents also data and outcomes of the institution itself.



MP-209 / #1440

SESSION 3 - FETAL, PERINATAL AND MATERNAL CARDIOLOGY
14-05-2026 13:15 - 14:15

PREDICTIVE VALUE AND CLINICAL IMPACT OF FETAL ECHOCARDIOGRAPHY IN THE DIAGNOSIS OF CONGENITAL HEART DISEASES WITH LEFT VENTRICULAR OUTFLOW TRACT OBSTRUCTION: EIGHT YEARS OF EXPERIENCE AT A TERTIARY REFERRAL CENTER

Gabriella Gaudieri[1], Fortuna Del Gaizo[1], Carmela Morelli[1], Fiorella Fratta[1], Laura Di Pietto[1], Ludovica Spinelli Barrile[1], Beneamino Tormettino[2], Mario Giordano[1], Raffaella Marzullo[1], Gianpiero Gaio[1], Francesca Ripoli[1], Diego Colonna[3], Giovanni Domenico Ciriello[3], Guido Oppido[4], Maria Giovanna Russo[1]
[1]University of Campania "Luigi Vanvitelli", Monaldi Hospital, AORN "Ospedali dei Colli", Pediatric Cardiology Unit, Naples, Italy, [2]"L.Vanvitelli" University Hospital, Obstetrics And Gynecology Unit, Naples, Italy, [3]Monaldi Hospital, Achd Unit, Naples, Italy, [4]Pediatric Cardiac Surgery Unit, Aorn "ospedali Dei Colli", Naples, Italy

Background and Aim: Left ventricular outflow tract obstructions (LVOTO) are a heterogeneous group of congenital heart diseases with a progressive course that can significantly affect neonatal outcome. Advances in fetal and postnatal echocardiography allow early diagnosis of these complex conditions, enabling optimized perinatal management and timely intervention. This retrospective observational study aimed to assess the positive predictive value (PPV) of fetal echocardiography in detecting LVOT obstructive lesions and to evaluate short-term neonatal outcomes in cases with confirmed prenatal diagnosis.
Methods: We reviewed 194 fetal diagnoses of suspected LVOT obstruction performed between 2015 and 2023 at the tertiary referral center Ospedale Monaldi, Naples. Diagnoses included suspected aortic coarctation (56%), hypoplastic left heart syndrome (HLHS, 27%), isolated aortic stenosis (AS, 12%), and Shone complex (4%). Thirty-seven cases (19%) that underwent termination of pregnancy (n = 34 HLHS, n = 2 suspected AS, n = 1 Shone complex) and 27 cases (14%) lost to postnatal follow-up were excluded. In neonates with echocardiographic confirmation of the prenatal diagnosis at birth, short-term outcomes were analyzed, focusing on therapeutic strategy (surgical or percutaneous) and early neonatal mortality.
Results: Among 130 neonates evaluated at birth, 80 had confirmation of the prenatal diagnosis, yielding an overall PPV of 61.5%. The highest PPV was observed for HLHS and Shone complex (both 100%). In line with current literature, most unconfirmed prenatal diagnoses (38.5%) involved suspected aortic coarctation, accounting for 84% of false-



positive cases. Among neonates with confirmed diagnoses, 96.2% received targeted treatment. Surgical correction was required in 80% of cases (Norwood operation, pulmonary artery banding), while 16.2% underwent percutaneous interventional procedures. Despite the anatomical and clinical complexity of these conditions, early neonatal mortality was low, with an overall rate of 5% (2.5% pre-intervention and 2.5% post-intervention).

Conclusions: Fetal echocardiography shows a high PPV in the diagnosis of congenital heart diseases with LVOT obstruction, particularly in experienced centers. Prenatal diagnosis of aortic coarctation remains limited by a high false-positive rate. Early identification of LVOT obstructive lesions improves neonatal outcome through optimized perinatal planning and timely therapeutic intervention, while postnatal imaging remains essential to refine diagnosis and guide clinical management.



MP-210 / #567

SESSION 4 - CLINICAL CARDIOLOGY
14-05-2026 13:15 - 14:15

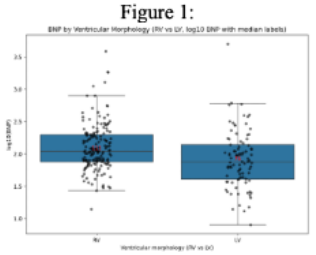
THE UTILITY OF B-TYPE NATRIURETIC PEPTIDE (BNP) AS A BIO-CLINICAL MARKER IN THE FOLLOW-UP OF PATIENTS PALLIATED WITH FONTAN CIRCULATION FOR UNIVENTRICULAR HEART DISEASE.

Suzie Swedan, Abdulla Tarmahomed, Tristan Ramcharan
Birmingham Children's Hospital, Cardiology Department, Birmingham, United Kingdom

Background and Aim: The Fontan is the final palliative procedure for complex congenital heart disease unsuitable for biventricular repair and has markedly improved survival in univentricular physiology. Fontan failure remains a significant long-term complication and may result from ventricular dysfunction, atrioventricular valve regurgitation (AVVR), elevated pulmonary vascular resistance, anatomical obstruction, arrhythmia, or multi-modal mechanisms. B-type natriuretic peptide (BNP) is a potential biomarker for monitoring Fontan circulation. It is released in response to ventricular strain, volume loading, and venous congestion – physiological hallmarks of a failing Fontan. Whether values in this population align with healthy reference ranges is unclear. To assess the relationship between BNP levels and key clinical variables in patients with Fontan circulation and evaluate the need for a Fontan-specific reference range.
Methods: A retrospective cohort study included patients who underwent Fontan between January 2010 and December 2024 and had ≥1 recorded BNP value. Demographic, clinical, imaging, procedural and pharmacological data were collected. Dominant ventricular morphology was categorised as right (RV) or left ventricle (LV). Oxygen saturation, fenestration status, ventricular function, valve regurgitation, and arrhythmias were recorded. BNP (ng/L; normal <400ng/L) was routinely measured during follow-up. A base-10 logarithmic transformation was applied. Mann–Whitney U, Kruskal–Wallis and Spearman correlation were used with significance set at $p<0.05$.
Results: Of 544 Fontan patients, 256 (47%) had BNP data; 159 (62.11%) were male. Median age at Fontan was 4.58 years (IQR 4.07-5.39). Normal BNP was observed in 238 patients (92.9%). BNP correlated with ventricular dysfunction ($r=0.321$), AVVR severity ($r=0.297$), aortic regurgitation ($r=0.318$), hypoxia and patent fenestration ($r=0.24$) and arrhythmia ($r=0.31$) (all $p<0.05$). Patients with RV morphology had higher BNP (median 111 ng/L) compared with LV (median 76 ng/L) ($p<0.0005$). BNP was also elevated in those receiving diuretics, digoxin and/or beta-blockers ($p<0.05$). No significant association was observed with anticoagulation, ACE inhibitors, catheter-derived pressures, or MRI-derived ventricular

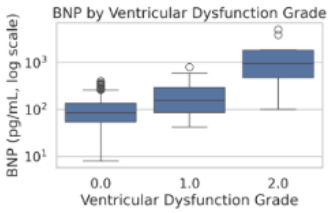
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Figure 1:



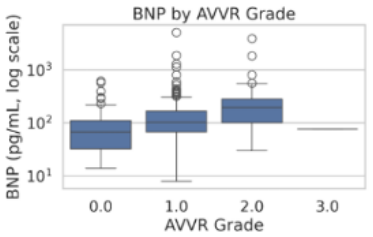
Boxplot of BNP (log scale) across dominant ventricular morphology (RV vs LV). Median BNP appears higher in patients with a dominant RV, though distributions overlap. This is consistent with greater systemic ventricular stress in RV morphology post-Fontan circulation.

Figure 2



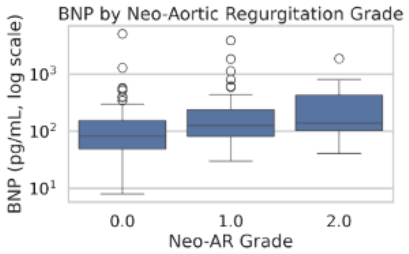
Boxplot of BNP (log scale) across ventricular dysfunction grades (0 = good, 1 = mild, 2 = moderate to severe). BNP tends to increase with worsening dysfunction grade, with overlap between adjacent categories. The monotonic trend supports BNP as a marker of ventricular performance in Fontan patients.

Figure 3:



Boxplot of BNP (log scale) across AVVR grades (0 = none, 1 = mild, 2 = moderate, 3 = severe). BNP levels are directionally higher with increasing AVVR severity. Findings are compatible with increased volume load and atrial/ventricular stretch driving BNP elevation.

Figure 4



Boxplot of BNP (log scale) across Neo-AR grades (0 = none, 1 = mild, 2 = moderate, 3 = severe). BNP tends to be higher in patients with greater Neo-AR burden, though sample sizes are modest. Overlap in distributions reflects biological variability and the limited cohort size.

Conclusions: BNP demonstrates expected behaviour as a bio-clinical marker of physiological burden in Fontan circulation and correlates with key indicators of Fontan dysfunction. These findings suggest BNP may offer integrative value in Fontan surveillance,



supporting earlier detection of deterioration. Further work incorporating serial paired BNP-imaging datasets may clarify its role in risk stratification.



MP-211 / #1299

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

FIRST REPORT OF BILATERAL LUNG TRANSPLANTATION AFTER ATRIAL FLOW REGULATOR IMPLANTATION IN END-STAGE PULMONARY ARTERIAL HYPERTENSION

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Background and Aim: Pulmonary arterial hypertension (PAH) is a rare, progressive condition associated with high morbidity and mortality despite advances in targeted therapies. In end-stage disease, syncope and low cardiac output frequently occur, and atrial septostomy may be used as palliative therapy or as a bridge to transplantation. The atrial flow regulator (AFR) is a novel device designed to create a controlled interatrial shunt, but its role in patients undergoing lung transplantation has not yet been defined. We report the first documented case of bilateral lung transplantation following AFR implantation in a young patient with end-stage PAH.
Methods: Data on clinical status, echocardiography, and hemodynamics were collected from 2014 through 2025.
Results: A 14-year-old male initially presented with severe idiopathic PAH, later found to be associated with systemic sclerosis sine scleroderma. Despite dual oral therapy and subsequent immunosuppression, his pulmonary pressures progressively increased. In 2024, he developed recurrent syncope, prompting urgent evaluation and implantation of an 8-mm AFR. The device provided immediate symptomatic relief, although mild desaturation occurred as expected. Subsequent imaging revealed a superimposed pulmonary veno-occlusive pattern, and the patient was listed for bilateral lung transplantation. The transplant was performed three months after AFR placement, and the device was intentionally left in situ. Postoperatively, the patient required AV-ECMO support due to restrictive right ventricular physiology. The AFR proved beneficial by augmenting systemic output through controlled right-to-left shunting, enabling successful ECMO weaning. His postoperative course was complicated by transient left ventricular diastolic dysfunction, systemic sclerosis flare, acute kidney injury, and aspiration pneumonia; however, he was discharged approximately 100 days after transplantation. At six months, he remained clinically well, with a mild left-to-right shunt through the device. At one year, AFR closure was planned due to new right ventricular volume overload.
Conclusions: This case highlights the potential utility of the AFR not only as a bridge to transplantation but also as a supportive tool during post-transplant hemodynamic



management. AFR implantation may therefore be considered in selected patients with end-stage PAH awaiting lung transplantation.



MP-212 / #917

SESSION 8 - PAH AND HEART FAILURE
15-05-2026 13:15 - 14:15

FEASIBILITY AND TOLERABILITY OF DAPAGLIFLOZIN IN A COHORT PEDIATRIC AND ADULT PATIENTS IN A TERTIARY CENTER

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Background and Aim: Among novel medications for heart failure (HF), sodium–glucose cotransporter 2 inhibitors (SGLT2i) have been shown to reduce mortality and HF-related hospitalizations and are currently recommended as Class I therapy for both HFrEF and HFpEF. However, data on patients with congenital heart disease and on the pediatric population are lacking. In this study, we reviewed the indications for and tolerability of dapagliflozin as HF therapy in pediatric patients and adults patients followed in a tertiary care centre.
Methods: Consecutive patients with HF admitted as inpatients or attending our pediatric and congenital cardiology outpatient clinic who met criteria for HFrEF or HFpEF and had an indication for initiation of dapagliflozin were started on dapagliflozin and followed up according to clinical need. In adults, dapagliflozin was initiated at a dose of 10 mg once daily; in pediatric patients, it was administered as a diluted oral formulation at a dose of 0.1 mg/kg/day. Serial blood tests and transthoracic echocardiograms were performed during follow-up.
Results: A total of 29 patients were prescribed dapagliflozin between April 2024 and December 2025 (41.4% males; median therapy duration 146, IQR 58;302 days). Baseline characteristics of the study population are reported in Table 1. No cardiac adverse events occurred during follow-up. Three patients who were already on the heart transplantation waiting list underwent successful transplantation. One patient stopped medical therapy after full recovery of systolic function. No patients required discontinuation of dapagliflozin due to intolerance. No genital or urinary tract infections were observed during follow-up.



Table 1

	CMP (12; 41.4%)	CHD (17; 58.6%)	p-value
Age (years)	11.3 (9.52)	30 (11.9)	< 0.001
Sex (male)	6 (50.0)	6 (35.3)	0.428
Start as inpatient	8 (66.7)	11 (64.7)	0.913
Other MT	12 (100)	17 (100)	-
ACEi/ARB	6 (50.0)	5 (29.4)	0.260
ARNI	6 (50.0)	8 (47.1)	1.000
Beta-blocker	6 (50.0)	7 (41.2)	0.638
MRA	10 (83.3)	10 (58.8)	0.160
Diuretics	10 (83.3)	12 (70.6)	0.430
PV	0 (0)	2 (11.8)	0.218

Results are expressed as mean (SD) or n(%). CMP cardiomyopathies, CHD congenital heart disease, MT medical therapy, ACEi ace inhibitor, ARB Angiotensin Receptor Blocker, ARNI Angiotensin Receptor Neprilysin Inhibitor, MRA mineralcorticoid receptor antagonist, PV pulmonary vasodilators.

Conclusions: In this cohort of pediatric patients and adults with congenital heart disease, dapagliflozin was well tolerated when used for the treatment of heart failure, with no significant cardiac or infectious adverse events and no need for treatment discontinuation. These findings support the short-term safety and feasibility of SGLT2 inhibitor therapy in this understudied population and warrant further investigation in larger, prospective studies to assess long-term efficacy and outcomes.



MP-213 / #1221

SESSION 9 - ARRHYTHMIAS
15-05-2026 13:15 - 14:15

ARRHYTHMOGENIC CARDIOMYOPATHY BEYOND THE RIGHT VENTRICLE: A PEDIATRIC LEFT VENTRICULAR CASE.

Daria Lauretta, Angelica De Nigris, Giovanni Maria Di Marco, Alfonso Ferrara, Rossana Palumbo, Eleonora Palladino, Giovanni Salomone, Carmine Perna, Gennaro Iasevoli, Rosaria Cosimi, Michela Grieco, Giangiacomo Di Nardo
AORN Santobono Pausilipon Hospital, Cardiology, Naples, Italy

Background and Aim: Introduction:
Arrhythmogenic cardiomyopathy (ACM) is a myocardial disease initially described as a disorder predominantly affecting the right ventricle (ARVC). However, increasing evidence shows that the left ventricle may be involved from early stages or even in isolation. Left ventricular arrhythmogenic cardiomyopathy (ALVC) is characterized by fibro-fatty replacement of the left ventricular myocardium, progressive ventricular dysfunction, and a predisposition to potentially lethal ventricular tachyarrhythmias. These clinical and instrumental features are encompassed within the 2020 international diagnostic criteria known as the “Padua Criteria”. The etiopathogenesis involves both desmosomal (PKP2, DSG2) and non-desmosomal (FLNC, LMNA) mutations, with early and variable arrhythmic phenotypes. Serum biomarkers (plakoglobin, IL-6) and provocative tests may further complement risk stratification. We present the case of a patient with ALVC and severe systolic dysfunction who underwent implantable cardioverter defibrillator (ICD) implantation.
Methods: Case Report:
A 12-year-old male, with no family history of cardiomyopathy or sudden cardiac death, was incidentally found to have frequent ventricular extrasystoles during routine pre-participation sports screening. A 24-hour Holter ECG revealed frequent premature ventricular complexes (PVCs) of two morphologies, episodes of bigeminy and trigeminy. The exercise ECG test was negative for significant ST-T segment changes. Frequent isolated PVCs were recorded. The predominant PVC morphology appeared with variable coupling intervals and occasional fusion beats. The arrhythmia significantly decreased during exercise. Echocardiography demonstrated left ventricular dilation and hypokinesia with an ejection fraction (EF) of 27–30%. Cardiac magnetic resonance imaging (MRI) with gadolinium contrast identified a subepicardial “ring-like” fibrosis pattern, consistent with ALVC. During hospitalization, the patient experienced non-sustained ventricular tachycardia, prompting initiation of amiodarone. Follow-up revealed a reduction in



arrhythmic episodes and improvement in EF. The patient was started on heart failure therapy (bisoprolol, enalapril, spironolactone) and underwent subcutaneous ICD implantation.

Results: Results:

Follow-up showed reduced ventricular arrhythmias, improved systolic function, and clinical stability after ICD implantation.

Conclusions: Conclusions:

This case illustrates a typical presentation of ALVC with severe systolic dysfunction and high arrhythmic risk. Early recognition, comprehensive risk stratification, and multidisciplinary management, including genetic evaluation, are essential. ALVC remains a diagnostic challenge, and timely diagnosis with appropriate preventive strategies is crucial to reduce morbidity and mortality.



MP-214 / #758

SESSION 11 - IMAGING
15-05-2026 13:15 - 14:15

AUTOMATED TAPSE AND MAPSE MEASUREMENT USING DEEP LEARNING: CLINICAL PERFORMANCE ASSESSMENT

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Background and Aim: Assessment of myocardial longitudinal function is fundamental in the diagnostic evaluation of both right and left ventricular performance. Tricuspid Annular Plane Systolic Excursion (TAPSE) and Mitral Annular Plane Systolic Excursion (MAPSE both septal and lateral) remain simple, rapid, and reproducible markers widely used in clinical echocardiography. However, their manual measurement is operator-dependent and prone to variability. This study presents an artificial intelligence–based framework designed to automate TAPSE and MAPSE measurements from M-Mode ultrasound images, aiming to improve measurement consistency and accelerate workflow.
Methods: A U-Net segmentation model was trained on MEIS data and fine-tuned on a dedicated labelled dataset of paediatric m-mode echocardiography images. Performance was assessed on 300 test images (100 per parameter). Median distance metrics included MAE, RMSE, R^2 and MAPE. A robustness analysis used 120 clinician-classified images of good and poor quality.
Results: The model achieved strong agreement with expert annotations: TAPSE: MAE 0.16 cm, RMSE 0.18 cm, R^2 0.85; sepMAPSE: MAE 0.07 cm, RMSE 0.09 cm, R^2 0.93; latMAPSE: MAE 0.11 cm, RMSE 0.13 cm, R^2 0.88. Segmentation fine-tuning yielded Dice scores of 0.87 (train) and 0.73 (validation). Image quality had a clear impact on the network performance: Good-quality TAPSE MAE 0.17 cm vs. poor-quality 0.43 cm; Good-quality latMAPSE MAE 0.20 cm vs. poor-quality 0.26 cm; with corresponding reductions in R^2 (TAPSE –0.43 in poor images). The system failed in 6 good-quality and 17 poor-quality studies.
Conclusions: Automated M-Mode analysis in children is feasible and provides fast and reproducible TAPSE/MAPSE measurements with clinically acceptable accuracy in standard imaging conditions. Although performance declines in poor-quality images, overall results support future integration into echocardiography workflows and multicentre validation.





POSTER ABSTRACTS





P-001 / #182

FIVE YEARS AFTER THE STEPSTONES-CONGENITAL HEART DISEASE TRIAL: IS THE EFFICACY SUSTAINED?

Mariela Acuna Mora[1], Carina Sparud-Lundin[2], Philip Moons[3], Ewa-Lena Bratt[2]
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Background and Aim: In the STEPSTONES-congenital heart disease (CHD) trial, we evaluated the efficacy of a structured transition program for adolescents with CHD. Significant improvements in patient empowerment (primary outcome) and disease-related knowledge six months after transfer to adult care at the age of 18.5y were found. However, the long-term sustainability of these outcomes is not yet known. The aim is to present the preliminary findings on the long-term efficacy of the STEPSTONES-CHD transition program five years after participants exited the trial.
Methods: This post-trial follow-up study included young adults who had been in adult follow-up for more than five years and previously participated in the STEPSTONES-CHD trial. Patient empowerment and disease-related knowledge were measured using the GYPES and KnoCoMH questionnaires, respectively. Recruitment began in spring 2025 and data were available for 44 participants (of 133 that participated in the original trial, response rate 33%). Outcomes were compared between the intervention (IG) and the control group (CG) using independent t-tests and differences between measurements were analyzed with dependent t-tests.
Results: Nineteen participants were part of the IG during the trial, the majority had a moderate CHD (n=26, 61.9%) and their ages range from 23 to 25 years old. Both the IG and the CG showed higher levels of patient empowerment compared to their final measurement during the trial (See Table 1). However, these mean differences were not significant (IG p=0.58; CG=0.19). Disease-related knowledge had increased at the post-trial follow-up in the CG (p=0.076). No significant differences between the IG or CG at the post-trial follow-up in either variable were observed and the observed effect sizes were small.



Table 1. Follow-up of outcomes included in the STEPSTONES-CHD trial		
	Last trial measurement	
	Patient empowerment	*Disease-related knowledge*
Intervention	57.83	5.32
Control	57.74	4.13
*Between groups differences effect size**		
	-0.01	-0.59
	Post-trial follow-up	
Intervention	59.42	4.89
Control	58.00	5.00
*Between groups differences effect size**		
	-0.17	0.08
*Between measurements differences effect size**		
Intervention	-0.130	0.295
Control	-0.310	-0.388
*Effect size measure is Cohen's D		

Table 1. Follow-up of outcomes included in the STEPSTONES-CHD trial

Conclusions: Preliminary findings show no statistically significant differences between groups five years after trial exist. Nevertheless, patient empowerment in the IG remained high even after the trial finalized. Interestingly, the CG had a higher level of disease-related knowledge at follow up, which may indicate, although not significant, an increased engagement with their condition after transfer to adult care. It could also be an indicator that ACHD providers compensated for the low level of knowledge that the patients reported.



P-002 / #1522

LEVOSIMENDAN INFUSION FOR ADVANCED HEART FAILURE TREATMENT IN PATIENTS WITH CONGENITAL HEART DISEASE: A SINGLE-CENTRE OBSERVATIONAL STUDY

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Background and Aim: Levosimendan is a calcium-sensitizing inotrope and vasodilator that enhances cardiac contractility without increasing myocardial oxygen consumption. It is widely used in patients with acute or chronic heart failure (HF), improving ventricular function and reducing mortality.
Evidence suggests its efficacy in enhancing cardiac performance and exercise tolerance in patients with congenital heart disease (ACHD),
despite limited specific studies. We aimed to describe our single-centre experience with levosimendan administration in ACHD patients with HF.
Methods: We retrospectively analysed all patients followed at our ACHD tertiary centre, receiving at least 1 dose of levosimendan between March2020
and December2025. Demographic and clinical data, including echocardiographic data, blood tests, adverse events and hospitalizations were collected at baseline and at follow-up.
Results: Eighteen patients were enrolled (38%female, mean age42±15.9 yrs).Cardiac diagnoses included: systemic right ventricle (n=7), Tetralogy of Fallot (n=4, three with biventricular dysfunction), atrial septal defect (n=2), coarctation of the aorta (n=2), and one case each of univentricular heart with Fontan palliation, PAPVR, and Shone syndrome. Fifteen patients had undergone prior cardiac surgery, 1 had percutaneous ASD closure, and 2 patients had no prior surgery or percutaneous interventions. Over a mean follow-up of11.4±10.7 months, levosimendan was well tolerated, with no major adverse events reported. Periodic outpatient administration was performed in 11 patients, monthly in 10 and every two weeks with half dose in one case. Five hospitalized patients received a single infusion; one patient required treatment during two separate admissions for acute decompensation, and one received monthly infusions for two months before being lost to follow-up. All patients had a history of HF admissions (1to4 per patient) before treatment initiation, whereas during follow-up only 3(17%) experienced hospitalizations. Most patients reported subjective symptoms relief. Three patients died during follow-up: one from sudden cardiac death, one from infectious complications, and one of unknown



cause. One patient was listed for combined heart–liver transplantation, and another is currently awaiting listing for heart transplantation.

Conclusions: Levosimendan appears to be a safe and potentially effective therapeutic option in ACHD patients with advanced HF, with an associated reduction in symptoms and HF-related hospitalizations in most cases. Larger prospective studies are warranted to confirm these findings.



P-003 / #106

CARDIOPULMONARY FITNESS IN PATIENTS WITH A SYSTEMIC RIGHT VENTRICLE: THE QUALISYSTEMIC STUDY

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Background and Aim: Adults with a systemic right ventricle are at high risk of heart failure and functional decline, yet, data on determinants of exercise capacity in this population remain limited. We assessed cardiopulmonary fitness and identified factors associated with peak oxygen uptake (VO_2peak) in a large multicenter cohort.
Methods: The prospective QUALISYSTEMIC study enrolled 99 adults with a systemic right ventricle (congenitally corrected transposition of the great arteries or dextro-transposition of the great arteries after atrial switch) across 13 European centers. Participants underwent standardized cardiopulmonary exercise test (CPET), echocardiography, and patient-reported outcome assessments. Multivariable regression, guided by a prespecified causal framework, was used to identify independent determinants of VO_2peak.
Results: Mean age was 38.8 years; 52% were in NYHA functional class II. VO_2peak was reduced (20.0 ± 6.1 mL/kg/min, corresponding to 62.4 ± 16.8% of the predicted value), together with impaired ventilatory efficiency (VE/VCO_2 slope 34.1 ± 8.1). Independent predictors of lower VO_2peak included female sex, higher NYHA class, severe systemic tricuspid regurgitation, pulmonary stenosis, pacemaker use, older age, higher BMI, lower ventilatory anaerobic threshold, and lower physical component score from the quality-of-life questionnaire. The final model explained 64% of the variance in VO_2peak.
Conclusions: Adults with a systemic right ventricle exhibit moderately reduced, but heterogeneous cardiopulmonary fitness. By integrating clinical, echocardiographic, and patient-reported variables, this study provides the most comprehensive explanatory model to date. Several determinants of cardiopulmonary fitness are modifiable, supporting a care pathway that combines correction of residual lesions, optimization of rhythm and device therapy, and CPET-guided rehabilitation programs.



P-004 / #385

PREVALENCE OF METABOLIC SYNDROME IN ADULTS WITH CONGENITAL HEART DISEASE

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University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Department Of Pediatric Cardiology, Istanbul, Turkey

Background and Aim: Adults with congenital heart disease (ACHD) are increasingly exposed to cardiovascular and metabolic comorbidities as survival improves. Chronic hypoxemia, reduced oxygen saturation, sedentary lifestyle, and altered body composition may influence the development of metabolic syndrome in this population. This study aimed to determine the prevalence of metabolic syndrome in ACHD patients and to compare cyanotic and acyanotic subgroups.
Methods: This cross-sectional study included 50 adult patients with congenital heart disease. Patients were classified as cyanotic or acyanotic according to their underlying cardiac diseases. Metabolic syndrome was defined according to the established international criteria. Body mass index (BMI), waist circumference, systolic and diastolic blood pressure, fasting blood glucose, triglyceride (TG), and high-density lipoprotein (HDL) cholesterol levels were recorded. Descriptive statistics and subgroup distributions were analyzed. Data were demonstrated as mean values.
Results: The mean age of the study population was 27.3 ± 6.3 years, and the mean age at diagnosis was 10.3 ± 22.8 months. Of the patients, 74% were cyanotic (n = 37) and 26% were acyanotic (n = 13). Mean BMI was 24.1 ± 4.1 kg/m^2, waist circumference 84.0 ± 13.0 cm, systolic blood pressure 123.2 ± 14.1 mmHg, and diastolic blood pressure 70.6 ± 11.8 mmHg. Mean TG level was 102.1 ± 48.8 mg/dL, HDL cholesterol 47.8 ± 10.1 mg/dL, and fasting glucose 94.6 ± 30.4 mg/dL. Metabolic syndrome was identified in 12% of patients (n = 6). The prevalence was higher in cyanotic patients compared with acyanotic patients (13.5% vs. 7.7%); however, this difference was not statistically significant.



Parameter	*Value*
Age, years (mean ± SD)	27.3 ± 6.3
Age at diagnosis, months (mean ± SD)	10.3 ± 22.8
Cyanotic patients, n (%)	37 (74%)
Acyanotic patients, n (%)	13 (26%)
Body mass index, kg/m² (mean ± SD)	24.1 ± 4.1
Waist circumference, cm (mean ± SD)	84.0 ± 13.0
Systolic blood pressure, mmHg (mean ± SD)	123.2 ± 14.1
Diastolic blood pressure, mmHg (mean ± SD)	70.6 ± 11.8
Triglycerides, mg/dL (mean ± SD)	102.1 ± 48.8
HDL cholesterol, mg/dL (mean ± SD)	47.8 ± 10.1
Fasting glucose, mg/dL (mean ± SD)	94.6 ± 30.4
Metabolic syndrome, n (%)	6 (12%)
- Cyanotic	5/37 (13.5%)
- Acyanotic	1/13 (7.7%)

Conclusions: The prevalence of metabolic syndrome in ACHD patients was approximately 12%, which appears relatively higher than that reported in healthy individuals of similar age. Although cyanotic patients showed a numerically higher prevalence, the sample size was limited. These findings highlight the importance of regular metabolic screening in the



ACHD population. Larger, multicenter studies are needed to better define metabolic risk profiles in this growing patient group.



P-006 / #718

HEART FAILURE IN ADULTS WITH CONGENITAL AND NON-CONGENITAL HEART DISEASE: A COMPARATIVE STUDY OF CLINICAL FEATURES AND OUTCOMES

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Background and Aim: Heart failure (HF) represents a leading cause of morbidity and mortality in adults with congenital heart disease (ACHD), with onset often occurring as early as the age of 30. Despite its clinical significance, the clinical course and pharmacological treatment of HF in this population remain less well defined than in other types of cardiac disease. This study aimed to investigate the similarities and differences in clinical features and outcomes between congenital and non-congenital heart disease (non-ACHD).
Methods: The study retrospectively enrolled consecutive patients admitted for HF at Policlinico San Donato.HF diagnosis required at least one clinical criterion (New York Heart Association class ≥ II or signs of volume overload) and the need for diuretic therapy at admission. Patients were categorized into HF with preserve (HFpEF), mid-range (HFmrEF) and reduced ejection fraction (HFrEF) subgroups according to current ESC guidelines. Clinical, echocardiographic, and laboratory data were extracted from hospital records.
Results: The study included 257 with ACHD and 119 with non-ACHD. ACHD patients were significantly younger than non-ACHD patients and more frequently exhibited right ventricular dysfunction ($p < 0.001$ and $p = 0.03$, respectively). The prevalence of HFpEF was higher in the ACHD group (58% vs. 34%, $p < 0.001$), while HFrEF was more common in non-ACHD patients (49% vs. 33%). Cardiovascular risk factors and prescription of novel HF therapies (ARNIs and SGLT2i) were less frequent in ACHD ($p < 0.001$ and $p = 0.08$, respectively). During a median follow-up of 27.6 months for ACHD and 24 months for non-ACHD, the composite outcome of HF rehospitalization or cardiovascular death occurred in 39% of ACHD patients and 50% of non-ACHD patients ($p = 0.09$).
Conclusions: This study highlights that ACHD, compared to non-ACHD patients, represent a distinct clinical entity requiring tailored diagnostic and risk-stratification strategies. This emphasizes the limitations of applying standard guidelines to ACHD-HF and the need of further investigations aimed at optimizing clinical care and outcomes in this population.



P-007 / #572

PERCUTANEOUS CLOSURE OF A LEFT VENTRICULAR PSEUDOANEURYSM USING AN ADO II OCCLUDER IN AN ADULT PATIENT SHORTLY AFTER TRICUSPID VALVE REPLACEMENT

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Background and Aim: A pseudoaneurysm may occur following myocardial infarction or as a complication of cardiac surgery. Surgical repair is considered the standard treatment; however, in certain patients, the fragile nature of the ventricular wall can render surgical intervention particularly challenging. Untreated pseudoaneurysms are associated with substantial morbidity and increased mortality. Therefore, each case requires individualized assessment of closure strategies. In selected patients, percutaneous device may represent a reasonable and less invasive alternative to surgical intervention.
Methods: A 65-year-old woman with Ebstein's anomaly, previously treated with tricuspid valve repair at age 36, presented nearly three decades later with severe tricuspid and mitral regurgitation, prompting surgical tricuspid valve replacement and mitral valve repair. Both valves were ultimately replaced with biological prostheses. Intraoperatively, a small perforation of the left ventricular wall was identified and closed. Cardiac CT performed two weeks postoperatively demonstrated a pseudoaneurysm at the site of the prior perforation.
Results: Percutaneous closure of the pseudoaneurysm was undertaken using an Amplatzer Duct Occluder II 6/4 (ADO II) via aortic access. The device was successfully deployed through a 6 F guiding catheter. A small residual shunt was observed immediately after the procedure; however, no signs of hemolysis occurred, and hemoglobin levels remained stable. Serial echocardiography in the days following the intervention confirmed stable device positioning without residual flow. The percutaneous procedure was uneventful and free of complications.
Conclusions: Percutaneous closure of a left ventricular pseudoaneurysm using an ADO II occluder in an off-label context appears safe and feasible. This approach may be considered a valuable therapeutic option in selected patients during the early postoperative period when surgical re-intervention poses elevated risk.



P-008 / #1312

PREGNANCY CONCERNS FOR WOMEN WITH HEART DISEASE – INTERVENTIONS FOR SUPPORT, INCREASED KNOWLEDGE AND SELF-MANAGEMENT- THE NURTURE STUDY

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Background and Aim: Congenital heart disease (CHD) and rheumatic heart disease (RHD) are among Africa's most common cardiovascular conditions, causing significant morbidity and mortality; data regarding pregnant women affected by these conditions from low- and middle-income countries (LMIC) are limited. Thus, we aimed to describe pregnant women with CHD or RHD's understanding of symptoms and the consequences of living with heart disease. Participants were recruited at the combined cardio-obstetric clinic at Groote Schuur Hospital, Cape Town.
Methods: We employed a mixed-methods research design, divided into three phases. The first phase of the study consists of four questionnaires, while the second phase will focus on in-depth interviews with the participants. The third phase will use results from previous phases to develop a mobile-health app to provide knowledge to pregnant women suffering from CHD/RHD.
Results: The study has completed the first phase. 20 participants were enrolled in 2025. Most (35%) of the participants were between the ages of 21 and 25 years. At enrolment, 85% of participants had a CHD diagnosis while 15% had an RHD diagnosis. 25% of participants had a comorbidity, with 35% being on medication. Participants reported a high pregnancy symptom burden, particularly frequent urination (95%), fatigue and pain (90%), nausea and heartburn (75%), with 60% reporting anxiety. Using the EQ-5D questionnaire, the mean self-reported health at enrolment was 71% and 45% of participants had moderate problems with mobility, 50% with usual activities, and 65% with pain and discomfort. Responses suggested low concern regarding illness (average of 4.4/10), high sense of control over illness (8.1/10), high confidence in treatment (7.7/10), and low



burden of heart disease symptoms (2.7/10). The mean reported quality of life was 67%, and 45% of the participants were satisfied with their lives.

Conclusions: Despite a high pregnancy-related symptom burden, participants reported a strong sense of control, low concerns about their illness, and reasonable quality of life at enrolment. However, the presence of comorbidities in 25% of participants and medication use in 35% highlights the complex needs in this population. The next phase will involve interviews to explore lived experiences, unmet needs, and determine health-seeking behaviour.



P-009 / #476

PERCUTANEOUS CLOSURE OF BAFFLE LEAKS LONG-TERM AFTER ATRIAL SWITCH REPAIR FOR TRANSPOSITION OF THE GREAT ARTERIES: A CASE SERIES OF DIVERSE INDICATIONS AND TECHNICAL APPROACHES

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Background and Aim: Baffle leaks are not uncommon after atrial switch procedures in patients with d-TGA , requiring treatment when hemodynamically significant. However, as surgical repair carries substantial risk in this patient population, a percutaneous approach should be considered. We present a case series of five patients in whom the standard technique for percutaneous baffle leak closure had to be modified to achieve successful outcomes.
Methods: From the cohort of all patients who underwent baffle leak closure across both participating centers, five cases are presented for detailed analysis based on the presence of particularly challenging anatomy. Two of these patients had a combination of baffle leak and baffle stenosis, requiring an approach that addressed both issues simultaneously. In the remaining three patients, an isolated baffle leak without associated stenosis was present, yet the pathoanatomy necessitated a modified interventional strategy to achieve successful closure.
Results: In two patients with concomitant baffle stenosis and leak, a covered stent was implanted, allowing simultaneous relief of the obstruction and closure of the baffle leak. In the remaining three patients, the defect was closed using a perimembranous VSD occluder, a muscular VSD occluder, or a Gore Cardioform occluder. All procedures were successful, with no residual shunt during follow-up. Only one patient required intubation due to difficulties achieving adequate sedation. No further complications were observed.



Conclusions: Transcatheter closure of baffle leaks after atrial switch operation represents a valuable alternative to high-risk redo surgery, helping to prevent ongoing cyanosis, heart failure and pulmonary hypertension. Our case series illustrates that, despite the challenging anatomy frequently encountered in patients with d-TGA after atrial switch repair, percutaneous intervention can be successfully performed when adapted to the individual anatomical and hemodynamic conditions.



P-011 / #525

PULMONARY ARTERY SPASMS: A RARE DIFFERENTIAL DIAGNOSIS OF CHEST PAIN IN PATIENTS WITH WILLIAMS-BEUREN SYNDROME?

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Background and Aim: A typical symptom of Williams-Beuren-Syndrome (WBS) is a generalized arteriopathy due to ELN gene mutation which can lead to stenosis or other vascular alterations. Vascular spasms have been reported in this patient group.
Methods: We present the case of a 34-year-old woman with molecular genetic confirmed WBS suffering from recurrent chest pain.
Results: Stress MRI and heart catheterization had shown mild supravalvular aortic stenosis (with calcification of the left coronary sinus, low risk coronary abnormality, subendocadial perfusion deficits of the left ventricle and pulmonary hypertension (PAH)). Her cardiac medication was atorvastatin, ezetimib, bisoprolol, apixaban, sildenafil, torasemid, and night time oxygen. 4 weeks later she was sent to another hospital suffering from severe chest pain. Scintigraphic V/Q scan was performed and was assessed as with bilateral pulmonary embolism (PE), but D-Dimers remained negative. 4 month after that, she came to our center seeking a second opinion. We performed CT-angiogram of the heart and the great vessels after premedication with glyceroltrinitrate spray showing mild exit stenosis of the LPA in addition to the known findings. Additionally, heart catheterization was performed showing PAH (1/2 systemic pressure) under Sildenafil therapy. Right after catheterization, her transcutaneous oxygen saturation decreased from normal to 85% requiring oxygen. She suffered again from severe chest pain. Acute coronary syndrome was excluded by ECG and negative Troponin, D-Dimers were also negative. Emergency CT angiography showed high-grade stenosis of right superior lobar artery with underperfusion of large parts of superior right lobe in V/Q-scan. She was put on Amlodipin instead of Sildenafil and isosorbiddinitrate and glyceroltrinitrate were added, whereupon her symptoms improved and she could be discharged from our hospital.
Conclusions: We hypothesize in this case, that vascular spasm can occur in any artery with or without a specific trigger in WBS patients. In our patient, we are convinced that vascular spams in the pulmonary arteries are the cause of the recurrent chest pain. Thrombus has never been detected in the pulmonary arteries and V/Q-scan cannot differentiate between embolism or spasms of the pulmonary arteries.



P-012 / #438

ANOMALOUS ORIGIN OF THE RIGHT CORONARY ARTERY - HOW 3D PLANNING HELPS DECISION MAKING: A RARE CASE REPORT AND REVIEW OF THE LITERATURE

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Background and Aim: The number of adult congenital heart disease patients in the world is growing, thanks to constant evolution and increasing number of modern surgical and catheter techniques. Anomalous aortic origin of the coronary arteries is an uncommon congenital anomaly, with a reported prevalence of approximately 0.5-1.0% of all congenital heart diseases. Anomalous origin of the right coronary artery is particularly important, since it could cause myocardial ischaemia and exercise-related sudden cardiac death. We report an adult case of anomalous right coronary artery from the left coronary artery and aim to highlight the role of three-dimensional imaging and planning options, therefore creating the chance to give individualized surgical planning for patients.
Methods: We retrospectively reviewed the diagnostic work-up and management of a 51-year-old female patient, referred to our clinic with chest discomfort. Invasive angiography and computed tomography scanning demonstrated the right coronary artery originating from the left coronary artery, running around the aorta. The chronic aortic pulse pressure created a slith orificium and degenerative lesions on the coronary artery itself. Based on the computed tomography scans, patient-specific 3D reconstruction and model printing was performed, and we were able to plan a new orifice for the right coronary artery, therefore avoiding coronary-artery bypass graft surgery.
Results: In the cases of special congenital heart disease, 3D modelling and printing can make a meaningful impact on the management of patients. In our case the operation was uneventful, and control investigations at 3 and 12 months were negative.
Conclusions: 3D technologies can enhance visualisation, thus helping not only the understanding the anatomy or pathology, but giving the opportunity to make personalised, individual surgical solutions



P-014 / #1398

NINE YEARS OF ACTIVITY OF A PREGNANCY HEART TEAM: CHALLENGES AND CONSIDERATIONS

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Background and Aim: Due to the growing number of women with congenital heart disease (CHD) reaching reproductive age, cardiological management during pregnancy has become an expanding need. The aim of this study was to evaluate maternal and fetal outcomes in women with CHD managed at a single dedicated cardio-obstetric center, with the objective of highlighting gaps and challenges in care.
Methods: Maternal and fetal outcomes of women with heart disease who delivered at a single cardio-obstetric center were retrospectively reviewed. Data regarding pregnancy, preconception counselling and peripartum outcomes were extracted from medical records. Patients were classified according to the World Health Organization (WHO) modified 2.0 maternal-cardiovascular-risk classification.
Results: Between 2016 and 2025, 85 pregnant women with heart disease accounted for a total of 107 deliveries.: 28 acquired heart disease (26.1%), 34 arrhythmias (31.7%), and 45 CHD (42%). Among CHD, aortic disease was the most common diagnosis (49%), followed by repaired right- ventricular-outflow tract lesions (16%); 3 patients post Fontan palliation. Only nine CHD patients (25%) received multidisciplinary pre-pregnancy counselling. Most CHD-patients were classified as WHO maternal- cardiovascular-risk class II–II/III (42%) or class III (38%); one patient was in class IV. Diuretic therapy adjustment was required in seven pregnancies (15.6%), mainly in women with pre-pregnancy NYHA class II compared with class I (71.4% vs. 10.5%). Mean gestational age at delivery was 38+4 weeks. Elective caesarean section (CS) was the predominant mode of delivery (73.3%). Obstetric indications accounted for most CS (54.5%), mainly due to previous CS, while aortic dilatation was the leading cardiological indication (6/13). Low birth weight (<2500 g) was the most frequent adverse neonatal outcome (17.8%) and was associated with pre-pregnancy NYHA class II ($p = 0.004$). Peripartum haemorrhage occurred in four cases (8.9%) with challenging management due to therapy and clinical conditions.
Conclusions: Our data confirm that pregnancy outcomes in women with congenital heart



disease are generally favourable when managed in a dedicated multidisciplinary cardio-obstetric centre.with prompt recognition and treatment of clinical deterioration. Further efforts are needed to promote the value of pre-pregnancy counselling through early and effective communication with women affected by CHD beside a a collaboration with the peripheral family planning clinic.



P-015 / #854

BEYOND THE MWHO CLASSIFICATION: FUNCTIONAL ASSESSMENT FOR RISK STRATIFICATION IN PREGNANCY AMONG WOMEN WITH CONGENITAL HEART DISEASE

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Background and Aim: Background
Pregnancy represents a particularly vulnerable period for women with congenital heart disease (CHD) due to the hemodynamic demands of gestation. The modified WHO (mWHO) classification is currently used to estimate maternal risk, although it was developed for all cardiovascular diseases in pregnancy, not specifically for CHD. While validated and widely adopted, studies have shown that mWHO may over- or underestimate risk depending on the underlying CHD. This study aimed to compare the predictive accuracy of mWHO with two CHD-specific, non-pregnancy-oriented classifications: AHA 2018 and ESC 2020.
Methods: Methods
We retrospectively analyzed 171 pregnancies in 134 grown-up CHD (GUCH) patients managed between 2010 and 2025. Each pregnancy was categorized according to mWHO, AHA 2018, and ESC 2020 classifications, harmonized into three comparable risk strata (low, intermediate, high). Predictive accuracy for maternal cardiac, obstetric, and neonatal complications was assessed using area under the curve (AUC), positive predictive value (PPV), and negative predictive value (NPV).
Results: Results
All models reliably predicted maternal cardiac risk, with significant correlations between risk category and cardiac complications ($p<0.05$). AHA 2018 demonstrated the highest discriminative performance (AUC 0.875, $p=0.03$; PPV 92.5%, $p=0.046$; NPV 95.1%, $p=0.049$), outperforming mWHO (AUC 0.805) and ESC 2020 (AUC 0.783). None achieved adequate predictive value for obstetric (AUC≈0.66) or neonatal outcomes (AUC≈0.60).
Conclusions: Conclusions
The mWHO classification shows limited precision in identifying high-risk pregnant CHD patients, likely due to insufficient integration of functional status and individual clinical variables. Incorporating GUCH-specific tools, particularly AHA 2018, may improve



cardiovascular risk stratification; additional parameters are needed for obstetric and neonatal risk assessment.



P-016 / #1380

BEYOND SYMPTOMS: HEMODYNAMIC BENEFITS OF FONTAN CONDUIT STENTING IN ADULTS

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Background and Aim: The Fontan procedure,such as the total cavo-pulmonary connection (TCPC), is nowadays the most common surgical palliation for patients with single-ventricle physiology. Since this anatomy relies on passive pulmonary circulation, it is essential to maintain low pressure in the cirucit. It has been demonstrated that the systolic-diastolic time ratio measured over atrioventricular valve(AVV S/D) by echocardiogram has100%positive predictive value and92%negative predictive value for detecting ventricular end-diastolic pressure≥10 mmHg. We aim to assess if there is any change in the clinical, functional and echocardiographic parameters in patients who undergo a stenting of the Fontan tunnel.
Methods: All adult patients(≥18 years old)with a Fontan circulation who underwent a stenting procedure of the Fontan conduit under active follow-up in our ACHD clinic were identified.Clinical,echocardiographic,functional and blood test data were collected at three-point in time:pre-stent (T0),6-month post-stent (T1),and at latest follow-up (T2).
Results: Out of 290 adults with a Fontan circulation, we performed 45procedure of Fontan conduit stenting. Mean patient's age at procedure was 23±6 year, 57%were male. Indications for stenting were presence of stenosis with a gradient of at least 2mmHg/evidence of relative small size conduit based on BSA. Al latest follow-up(T2) there were no deaths and no need to change oral medication apart from of aspirin initiation in absence of previous antiplatelet or anticoagulant therapy. At T1 and T2follow-up there was no difference in NYHA class(≤II), baseline O2saturation, peak-O2consumption on CPET, 3D-EF and global longitudinal and Free-wall strain. There was a significant reduction in AVV-Systolic/Diastolic (S/D) ratio, from 1.16 ±0.22 to 1.04±0.19 at T1 follow-up($p<0.001$) and to1.0±0.11 atT2 follow-up($p< 0.0001$). Blood tests, including liver markers were stable, with the exception of GGT, which increased slightly at T2 follow-up($p=0.04$). Although there was not a statistically significant change in the pro-BNP levels over time, there was a increasing trend at T1($P=0.06$), but not at T2-follow-up($P=0.23$).



Conclusions: At short- and mid-term follow-up after stenting of the Fontan Conduit there is a significant improvement in the AVV S/D ratio(indirect parameter of invasive VentricularEDP). Hence, this approach should be considered also in asymptomatic patients, especially if the AVV S/D is>1. Interestingly ,there is a concomitant increase inGGT which needs further investigation and multicentre studies.



P-017 / #1263

MATERNAL AND FETAL OUTCOMES IN PREGNANT WOMEN WITH CONGENITAL HEART DISEASE IN THE ERA OF PREGNANCY HEART TEAM: A SINGLE CENTER EXPERIENCE

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Background and Aim: Pregnancy may be associated with maternal adverse outcome in women with Congenital Heart Disease (CHD). The Pregnancy Heart Team (PHT), introduced in the 2018 ESC Guidelines, has been associated with improved maternal-fetal outcomes.
Methods: We retrospectively analyzed baseline characteristics and outcome of pregnancy in woman with CHD referred to our tertiary center from 2020 to 2025. The updated modified World Health Organization (mWHO) 2.0 classification of maternal cardiovascular risk was applied to our population.
Results: From January 2020 to November 2025, 72 patients with CHD completed 84 pregnancies. No spontaneous abortions occurred. Women had received a pre-pregnancy multidisciplinary counseling in 82% of cases, according to the transition and pregnancy guidelines. According to mWHO 2.0 risk assessment, 53 pregnancies (63%) were classified in mWHO 2.0 class I and II, 25 (30%) in mWHO 2.0 II-III and 6 (7%) in mWHO 2.0 III. Median age of pregnant women was 34 years (range 20-44). Median gestational age at the time of delivery was 38 weeks (range 25-41). Elective caesarean sections (CS) were planned in 14/84 pregnancies (16%), mostly for cardiological reasons (10/14), while 8% of pregnancies required an emergency CS, all for obstetric reasons. Maternal cardiac complications occurred in two mWHO 2.0 class III patients: a case of peripheral oedema in a Fontan patient with a twin pregnancy who required treatment with intravenous diuretics post-partum and a case of thrombotic dysfunction of an aortic valve mechanical prosthesis (bicuspid aortic valve) successfully treated with unfractionated heparin. No maternal death, severe arrhythmias or infective endocarditis occurred. Neonatal complications were reported in 16 pregnancies (19%), including 11 preterm delivery (4 early preterm and 7 late preterm) and 5 small gestational age (equally distributed in all classes). No neonatal death and no fetal CHD occurred.
Conclusions: In a group of patients with CHD referred to the PHT of our Center over the past 5 years pregnancy-related complications occurred in a minority of cases and were



successfully treated. Most of women had undergone pre-pregnancy counseling and comprehensive evaluation. However, prematurity and low birth weight occurred in nearly 20% of births. A multidisciplinary team and close collaboration with neonatologists are always essential.



P-018 / #254

VALIDATION OF ARTIFICIAL INTELLIGENCE-DRIVEN ECHOCARDIOGRAPHIC MEASUREMENTS IN PAEDIATRIC CARDIAC DISEASES

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Background and Aim: Paediatric echocardiography is vital for diagnosing congenital and acquired heart diseases but is limited by inter-operator variability and a labour-intensive workflow. Artificial intelligence (AI), particularly deep learning, offers solutions through automated analysis and standardized measurements. This study evaluates a novel AI-based platform, trained on a global database, for automating quantitative echocardiographic measurements in paediatric patients.
Methods: This single-centre, blinded comparative study at Hong Kong Children's Hospital recruit cardiac patients aged 5–21 years with congenital or acquired heart diseases. Exclusions include univentricular circulation and poor image quality. Echocardiography was performed using Acuson Origin™ system equipped with AI-driven tools for automated image acquisition and analysis, including B mode, M-mode, Doppler, speckle tracking imaging and 4-dimensional atrial and ventricular volume as well as function parameters including ventricular ejection fraction and global longitudinal strain. Participants underwent two imaging sequence in succession: first with AI assistance, followed by manual evaluation by a paediatric cardiologist blinded to the AI -derived results. Key structural and functional parameters were measured. Agreement between AI-derived and expert echocardiographic measurements was evaluated using the intraclass correlation coefficient (ICC), while consistency was assessed via Bland–Altman analysis. To quantify absolute and relative measurement discrepancies, mean absolute error (MAE) and root mean square error (RMSE) were calculated
Results: Eighteen patients aged between 7.6-20.4 years were included at the initial stage of our study from July to September 2025 (mean age:11, interquartile range 8.25-12.75). The Bland–Altman analysis demonstrated a mean difference of 0.1 (-2.8-4.8) units between AI-assisted and expert echocardiographic measurements across all parameters and the differences were randomly scattered around the mean difference without any discernible trend, indicating no significant systematic differences. AI-assisted echocardiographic measurements show high agreement (ICC = 0.614-0.998), 38 out of 56 measurements with



ICC>0.90) with all p values <0.05 and low MAE (0.04-4.76) and RMSE (0.07-6.44), except for interventricular septal thickness (ICC = 0.297, p value 0.26).

Conclusions: Our initial comparative study showed that AI-assisted echocardiographic system demonstrated performance highly comparable to paediatric cardiologists in assessing cardiac structure and function in paediatric population.



P-019 / #1215

ARTIFICIAL INTELLIGENCE–DRIVEN EARLY DETECTION AND RISK STRATIFICATION OF CONGENITAL HEART DEFECTS IN NEONATES

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Background and Aim: Congenital heart defects (CHDs) are among the most common congenital anomalies and remain a major cause of neonatal morbidity and mortality, particularly in low- and middle-income countries. Early diagnosis relies mainly on echocardiography and pulse oximetry, which may be limited by availability and expertise. Artificial intelligence (AI) offers new opportunities for early detection and risk stratification. This study aimed to assess healthcare professionals' awareness, perceptions, and readiness regarding the use of AI-based tools for early identification and risk assessment of CHDs in neonates.
Methods: A structured online questionnaire-based survey was conducted among 120 healthcare professionals, including pediatric cardiologists, neonatologists, general pediatricians, and medical AI researchers. The survey collected data on demographics, current CHD diagnostic practices, familiarity with AI, perceived benefits and risks, and willingness to adopt AI tools in neonatal care. Quantitative data were analyzed using descriptive statistics, while qualitative responses were thematically analyzed
Results: More than 60% of respondents believed that AI could improve the accuracy and speed of CHD diagnosis in neonates. Participants highlighted potential benefits such as earlier detection, improved risk stratification, and support in resource-limited settings. Key concerns included data privacy, ethical considerations, lack of training, and limited explainability of AI algorithms. Prior exposure to AI, institutional support, and availability of validation data were associated with higher acceptance of AI-based tools.
Conclusions: Healthcare professionals perceive AI as a promising adjunct for early detection and risk stratification of CHDs in neonates. Successful implementation will depend on structured



P-020 / #133

AI-BASED RISK STRATIFICATION FOR ECMO-THERAPY IN THE ICU OF CHILDREN UNDERGOING ELECTIVE PEDIATRIC CARDIAC SURGERY

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Background and Aim: About 5-7% of patients undergoing pediatric cardiac surgery suffer from adverse events (ECMO, CPR, eCPR) during their postoperative stay in the ICU. Respective patients differ substantially. In addition, the reasons for unstable hemodynamics are heterogeneous and largely individual. Adverse events correlate with higher mortality. The sooner adverse events are recognized, the easier they can be prevented. This study aims to identify the most suitable algorithm for the detection of adverse events in heterogenous data before clinical manifestation.
Methods: In a first step, the peri- and postoperative data from the electronic health record (EHR) of around 1100 patients after cardiac surgery has been collected between 2020 and 2024. Ethic approval has been obtained to continue the data collection until 2027. Various clinical parameters and vital signs are used as predictors. A number of conventional direct classification algorithms are being evaluated. These include logistic regression, random forest/ensemble learning and LightGBM/gradient-boosting machine. In addition, we propose a risk measure based on partial hazard thresholding. Therein, the hazard estimates are derived from survival models. These include a standard time-dependent Cox model, a customized adaptation of the time-dependent Cox model with a risk set adaptation under recurrent events and a generalized proportional-hazards model using a neural hazard estimator.
Results: The data is normally distributed. The dataset is imbalanced between groups. For evaluation we report the AUC obtained from out-of-fold predictions in 5-fold cross-validation. Overall, naive approaches such as logistic regression or the conventional Cox model performed least. Deep learning survival models are observed to be at an advantage. The best performance is recorded by the Cox proportional hazards deep neural network approach. The full scores are summarized in Table 1. Table 1: Out-of-fold prediction AUC scores.

Method	AUC – 6h prediction



Logistic regression; recurrent events	0.67
RandomForest	0.66
LightGBM	0.71
Time-varying linear Cox; sinlge-event	0.67
Time-varying linear Cox; recurrent events	0.69
tdCoxSNN	0.72

Conclusions: We have demonstrated that models which are capable of fitting highly non-linear structures are at an advantage for the prediction of high-risk patient states. Further refinement and more data, possibly a multi-center approach, is suggested for an even more reliable early detection of adverse events.



P-021 / #59

AUTOMATIC SEGMENTATION OFLYMPHATIC PERFUSION PATTERN IN FONTAN PATIENTS

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Background and Aim: The Fontan palliation is the established approach for univentricular congenital heart defects. Although significant improvements in survival rates have been achieved in recent decades, the associated physiology remains prone to serious complications, such as protein-losing enteropathy. This complication is closely linked to congestion in the lymphatic system, highlighting its significance as a risk factor. A precise assessment of the severity of this congestion requires a detailed evaluation of lymphatic perfusion pattern in T2-weighted MRI. This process is time-consuming and requires a high level of expertise, making it impractical for standard clinical protocols. Moreover, this qualitative assessment is subject to observer bias. The use of artificial intelligence for segmentation could provide a potential tool for ensuring an objective and reliable assessment of the lymphatic status in Fontan patients.
Methods: Fontan patients underwent a T2-weighted MRI scan six months after surgery. N = 69 scans were included. Lymphatic malformations were manually annotated. The nnU-Net, developed by Isensee et al., was chosen as the segmentation model for this study. Data augmentation was applied during training to improve the model's robustness and generalize its predictions to a variety of cases, including random rotations, scaling, and intensity adjustments, to artificially increase the diversity of the training data. The Dice Similarity Coefficient (DSC) and Normalized Surface Distance (NSD) metrics were used to quantify the segmentation performance.
Results: Thoracic scans are predicted most accurately (DSC 0.49±0.17, NSD 0.74±0.26), followed by abdominal scans (DSC 0.42±0.19, NSD 0.70±.13), and finally whole-body scans (DSC 0.26±0.16, NSD 0.60±0.23). Scans with higher severity of lymphatic abnormalities (Biko 4: DSC 0.39±0.13, NSD 0.76±0.12) outperforming lower severity (Biko 1: DSC 0.26±0.14, NSD 0.59±0.26).
Conclusions: In this study, we focused on improving the identification of lymphatic



abnormalities in Fontan patients using T2-weighted MRI scans. Given the impracticality of manual annotation due to its time and expertise requirements, we developed an automated tool to label these abnormalities. We found that the distribution of severity types in the training and test sets significantly impacted the model's performance. Specifically, models trained on data with higher degrees of malformations performed better. Overall, our automated tool provides accurate segmentation for lymphatic abnormalities.



P-022 / #1308

EARLY EXPERIENCE OF THE EFFICACY OF A MYOCARDIAL PANEL IN THE MANAGEMENT AND TREATMENT OF PEDIATRIC MYOCARDITIS COMPLICATED WITH ARRHYTHMIAS

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Background and Aim: In pediatric myocarditis, the etiological investigation is advisable but not recommended. We sought to determine the efficacy of combined management and treatment, guided by systematic assessment of viral genome, bacterial serology, and markers of inflammation, in pediatric patients diagnosed with myocarditis complicated by arrhythmias.

Methods: In 2024-25, we enrolled N=9 [7.0 (±4.0) years-old, 66.7% males] consecutive pediatric patients (< 18 years old) presenting with myocarditis complicated by arrhythmias: atrial tachycardia (AT), ventricular tachycardia (VT) or heart block (HB). For our purposes, we compared n=4 patients [7±4.5 years-old, 75% males] managed and treated in 2024 without applying the myocarditis panel, with n=5 patients [8±4 years-old, 60% males] from 2025 in which management and treatment was driven by the panel. The latter consisted of viral genome, bacterial serology and inflammation's markers systematic assay at the hospital admission. All the pathogenic agents detected were treated following currently available guidelines. Antiarrhythmic therapy was implemented according to clinical needs and modified based on lack of response or in case of recurrences. All the participants contextually underwent cardiac magnetic resonance (CMR). The post-discharge follow-up lasted 3 months.

Results: At admission, the most frequent arrhythmia was fascicular tachycardia, n=5/9 (55.6%), followed by an atrioventricular block, n=2/9 (22.2%). The majority (n=6/9, 66.7%) presented with fever, with a CRP median value of 0.8 [Q1-Q3: 0.1, 4.0]. The most frequent pathogenic agents were Mycoplasma and Borrelia (n=2/9; 22.2%, respectively); Enterovirus, Influenza B, and Parvovirus B19 were detected less frequently (n=1/9; 11.1%, respectively). The most commonly used antiarrhythmic treatment was nadolol alone or in



combination with flecainide (n=3/9, 33.3%, respectively). The mean hospitalization was 21±15 days. Patients managed and treated following the myocarditis panel experienced fewer arrhythmias duration time in hours (Log-rank, p=0.011), more extended periods in days free from in-hospital arrhythmic recurrences (Log-rank, p=0.003) and fewer number of recurrences 1 (20.0 %) vs 4 (100.0%), p=0.016. At the post-discharge follow-up, only those treated without a panel experienced recurrence of arrhythmias.

Conclusions: Among pediatric myocarditis, the combined etiological/antiarrhythmic therapeutic management of arrhythmias driven by the systematic application of our myocarditis panel resulted in a short duration of in-hospital arrhythmias, without significant in-hospital or post-discharge complications.



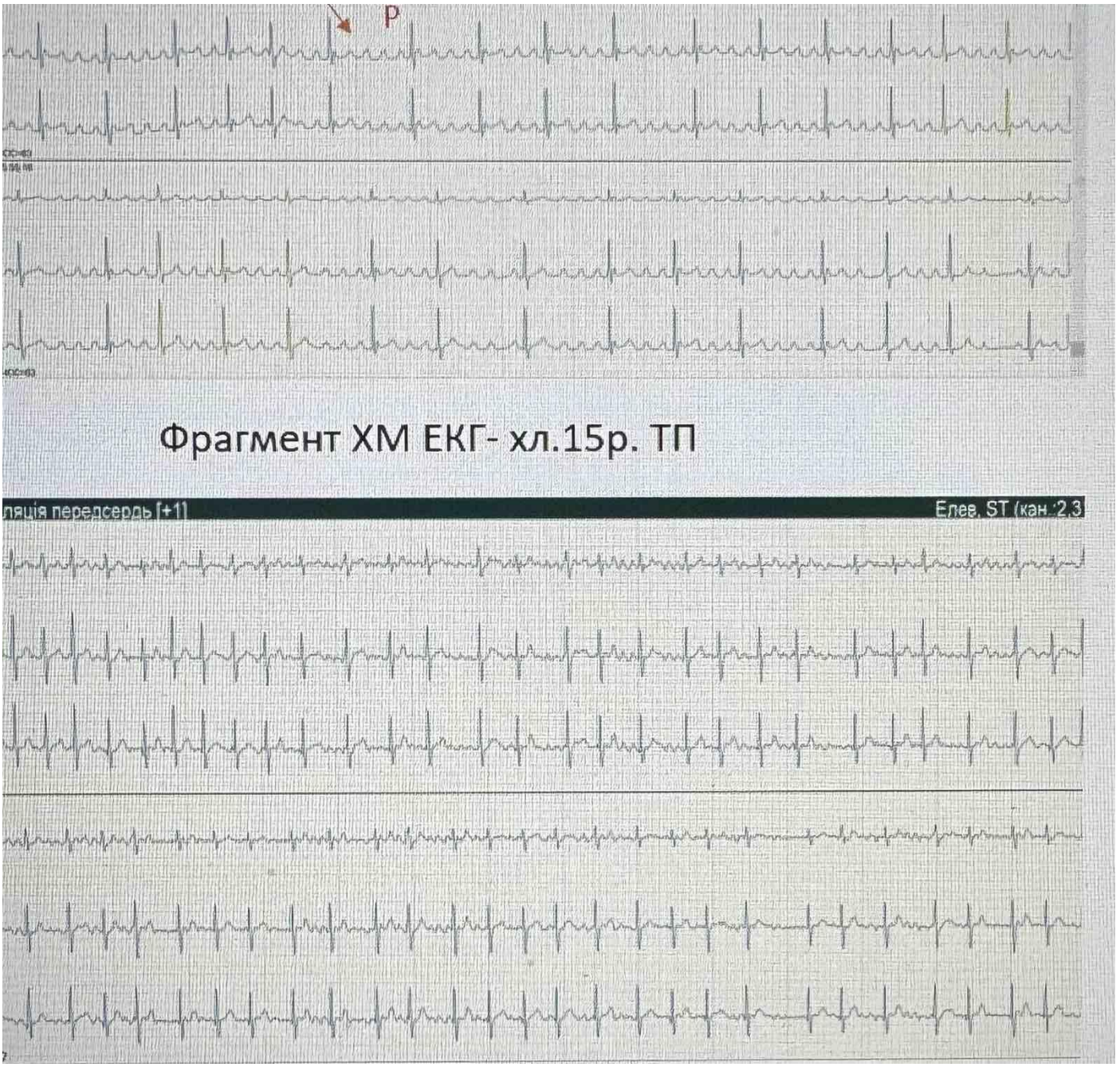
P-024 / #129

ATRIAL ARRHYTHMIAS AFTER COMBINED AORTIC ROOT REIMPLANTATION AND MITRAL VALVE REPLACEMENT IN A CHILD WITH MARFAN SYNDROME

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Background and Aim: Marfan syndrome is a hereditary connective tissue disorder characterized by multisystem involvement, with cardiovascular manifestations being the most life-threatening. Among children, progressive aortic root dilatation and mitral valve prolapse are common findings that can lead to severe regurgitation, ventricular dilation, and an increased risk of acute aortic complications. Early recognition of valvular dysfunction and timely surgical intervention are crucial for preventing irreversible cardiac remodeling and reducing perioperative risk. The simultaneous presence of severe mitral regurgitation and aortic root enlargement in pediatric patients remains a challenge. The aim is to describe the successful management of a 12-year-old child with Marfan syndrome who presented with advanced mitral valve disease and marked aortic root dilatation, treated with a combined valve-sparing aortic root reimplantation (David procedure) and mitral valve replacement.
Methods: Clinical and Echocardopghraphy evaluation was performed in a 12-year-old patient referred for progressive dyspnoea and cardiac enlargement. Echocardiography demonstrated severe mitral regurgitation due to bileaflet prolapse with annular dilatation and myxomatous degeneration, minimal aortic regurgitation, and a significantly dilated aortic root - 45 mm at the sinuses of Valsalva, EF 60%. Given the combination of pathologies and high risk of further progression, a decision was made to perform a combined surgical procedure. Patient underwent a David procedure with reimplantation of the native aortic valve and replacement of the mitral valve using a mechanical St. Jude Medical #33 prosthesis. Operative findings, perioperative management, and postoperative echocardiographic outcomes were analyzed.
Results: Intraoperatively, Barlow-type mitral valve morphology with annular calcification was confirmed. The combined surgical intervention was completed successfully without intraoperative complications. The postoperative course was uneventful: the patient was extubated after 14 hours and treated with nicardipine, furosemide, enalapril, and warfarin. Follow-up echocardiography on postoperative day 8 showed a competent reconstructed aortic valve and a well-functioning mechanical mitral prosthesis, preserved ventricular systolic function (EF 52%), and no pericardial or pleural effusions.

Conclusions: This case demonstrates that combined valve-sparing aortic root reimplantation and mitral valve replacement can be safely performed in children with Marfan syndrome and complex valvular disease. Early, individualized surgical intervention in specialized pediatric cardiac centers is essential for optimizing outcomes and preserving long-term cardiac function.



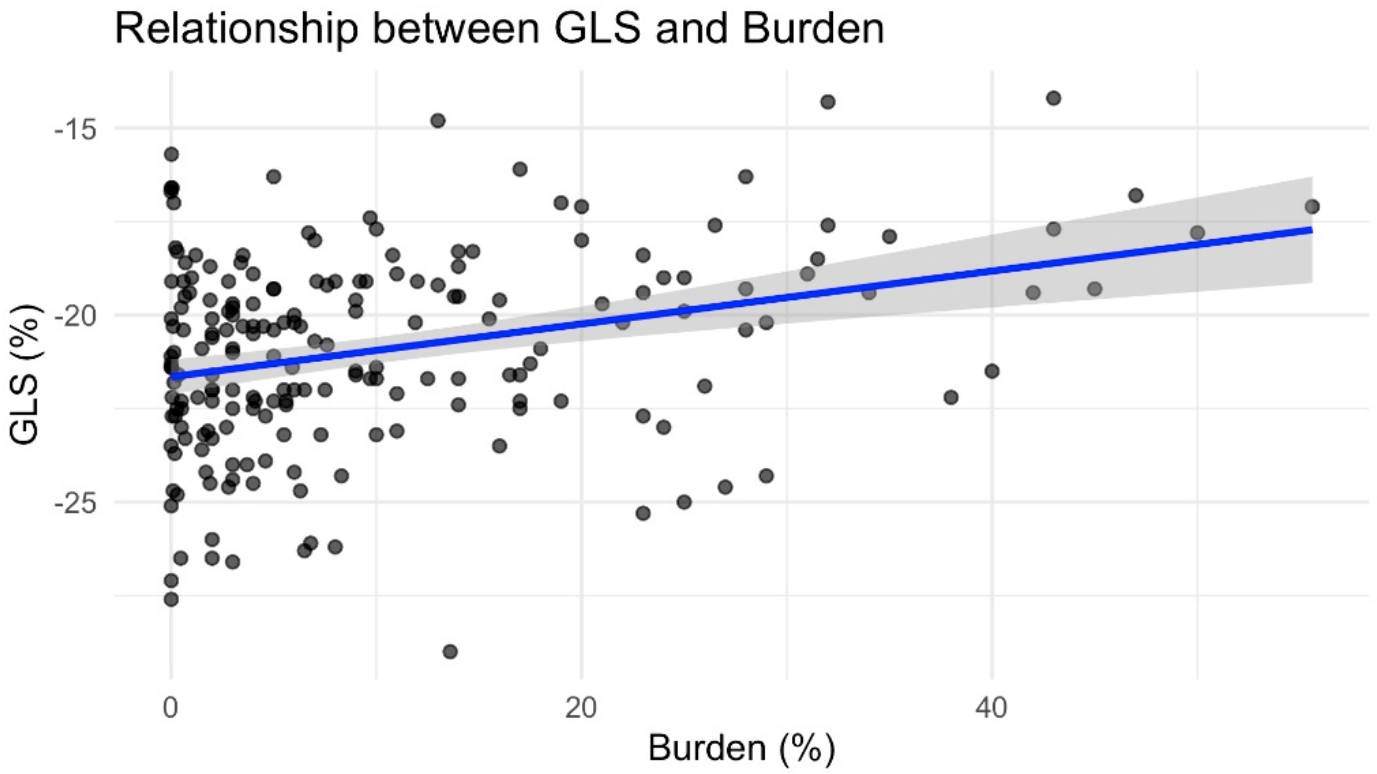


P-025 / #308

SUBTLE CARDIAC DYSFUNCTION IN PAEDIATRIC PATIENTS WITH IDIOPATHIC VENTRICULAR ARRHYTHMIAS

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Background and Aim: Background: Ventricular arrhythmias (VAs) in paediatric patients without structural heart disease rarely lead to overt left ventricular (LV) dysfunction. However, it remains unclear whether these patients may exhibit subclinical cardiac dysfunction and the impact of impaired global longitudinal strain (GLS) is not well known. **Aim:** To evaluate the characteristics of paediatric patients with idiopathic premature ventricular complexes (PVCs) and normal or abnormal LV-GLS, and to identify predictors of LV-GLS impairment.
Methods: Methods: Paediatric patients (<18 y.o.) diagnosed in our Institution with idiopathic VAs were included in this study. Standard transthoracic and two-dimensional speckle tracking echocardiography were used to assess morphological and functional cardiac parameters. Subclinical dysfunction was defined as LV-GLS < -20%. PVC burden was calculated during 24-hours ECG Holter monitoring. Multiple linear regression and logistic regression were fitted.
Results: Results: 199 patients were included (123 with normal LV-GLS and 76 with abnormal LV-GLS: median LV-GLS -22.53% vs -18.36%). Patients with abnormal LV-GLS were older at evaluation (13.28 vs 11.76 y.o; p=0.024), had greater LV end-systolic diameter (2.9 vs 2.8 cm; p=0.01), lower LV ejection fraction (60.54 vs 62.26%; p=0.001) and higher PVC burden (20.3% vs 8.1%; p=<0.001) Moreover, patients with burden >20% were more represented among those with abnormal LV-GLS (31.6% vs 9.8%; p=<0.001). Linear regression showed that LV-GLS was independently associated with age
($\beta = 0.146$, p =0.001) and PVC burden ($\beta = 0.065$, $p < 0.001$). The model explained 16% of LV-GLS variance (adjusted $R^2 = 0.157$). Multivariate logistic regression demonstrated that higher age (OR 1.61, 95% CI 1.01–2.58, p = 0.045) and PVC burden (OR 1.95, 95% CI 1.38–2.76, p < 0.001) were associated with abnormal LV-GLS, while polymorphism showed no significant effect (OR 0.34, 95% CI 0.05–2.40, p = 0.28). The model demonstrated moderate discrimination
(C = 0.696).



Conclusions: Conclusions: In paediatric patients with idiopathic VAs, development of subclinical LV dysfunction defined as reduction of LV-GLS, may be predicted by older age and higher PVC burden. Additional data are needed to determine the optimal PVC burden threshold that identifies patients at risk of subclinical dysfunction in order to guide clinical decisions and follow-up.



P-026 / #1466

MITRAL VALVE PROLAPSE – A PREDISPOSING FACTOR FOR SEVERE VENTRICULAR ARRHYTHMIAS?

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Background and Aim: Mitral valve prolapse (MVP), although usually considered a benign condition, can lead in some cases to clinically important arrhythmias, even life-threatening ones, when mitral valve annular disjunction (MAD) and fibrosis is present, a specific subgroup called "arrhythmic MVP". Ventricular tachycardia in children is rare and often suggests a pre-existing congenital anomaly of the myocardium or a functional alteration.
Methods: Herein we present a series of three children with ventricular arrhythmias and MVP. Case 1: A 11-year-old boy with a known history of MVP with MAD, severe mitral regurgitation, and ostium secundum atrial septal defect, was discovered to have cardiac rhythm disturbances: rare ventricular ectopic beats and a short, monomorphic episode of non-sustained ventricular tachycardia. Case 2: A 16-year-old girl was addressed for a syncopal episode. The physical examination revealed dysmorphic features suggesting Marfan syndrome, confirmed by a pathogenic mutation of the *FBN1* gene. 24- hour electrocardiogram (ECG) Holter monitoring revealed ventricular premature beats. Transthoracic echocardiography showed severe MVP, MAD and severe mitral regurgitation. No dilation in the thoracic or abdominal aorta was detected on computer tomography-angiography and echocardiography. Cardiac magnetic resonance revealed late gadolinium enhancement suggesting fibrosis in the infero-lateral region of the left ventricle. Case 3: A 16-year-old boy was admitted to the hospital for a resuscitated ventricular fibrillation episode. 24-hour ECG Holter monitoring revealed ventricular premature beats. Transthoracic echocardiography showed MVP, MAD and moderate mitral regurgitation. Cardiac magnetic resonance revealed myocardial fibrosis suggested by late gadolinium enhancement in the basal and infero-septal segments of the left ventricle.
Results: The management is different corresponding to the severity of the arrhythmias. The first case was treated with beta-blockers with favorable evolution. Amiodarone was indicated in the second case, with an uneventful outcome. The treatment of the third case



included beta-blockers and an implantable cardioverter-defibrillator in secondary primary prevention of sudden cardiac death.

Conclusions: In essence, while most MVP is benign, some anatomical features (like MAD) and fibrosis causing electrical instability make them prone to serious ventricular arrhythmias, necessitating careful evaluation to prevent sudden cardiac death.



P-027 / #908

FIRST PEDIATRIC ELECTROPHYSIOLOGY–CATHETER ABLATION EXPERIENCE IN THE UNITED ARAB EMIRATES(UAE): OUTCOMES FROM A 54-PATIENT COHORT

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Background and Aim: Paediatric catheter ablation presents unique challenges due to smaller anatomy, diverse congenital heart disease (CHD), and complex arrhythmia substrates. While technological advances have improved safety and efficacy, comprehensive outcome data from the Gulf region remain limited. This study reports the first institutional experience from the United Arab Emirates at Al Jalila Children's Specialty Hospital (AJCH).
Methods: We conducted a retrospective review of 54 consecutive pediatric patients evaluated for EP studies between June 2024 and December 2025. Of these, 51 underwent catheter ablation. The cohort had a mean age of 9.2 years (range: 3 months–16 years) and mean weight of 40.9 kg (range: 6–129 kg), with 11 patients (20%) having underlying CHD (Mainly operated TOF, Ebstein, and heterotaxy). Palpitations were the predominant presenting symptom, reported in 47 patients (92%). Other reported symptoms included chest pain (n=12, 24%), syncope or presyncope (n=7, 14%), and dizziness (n=6, 12%). One patient (2%) had a history of aborted cardiac arrest, while two (4%) were asymptomatic at referral. Symptom overlap was common, with many patients reporting more than one clinical manifestation. The spectrum of treated arrhythmias was Wolff-Parkinson-White/atrioventricular reentrant tachycardia (n=21), atrioventricular nodal reentrant tachycardia (n=17), concealed accessory pathways (n=5), focal atrial tachycardia (n=3), ventricular arrhythmias (n=3), and intra-atrial reentrant tachycardia/flutter (n=2). All procedures employed 3D electroanatomic mapping (EAM). Energy sources were cryoablation (n=20), irrigated radiofrequency (RF, n=17), or non-irrigated RF (n=14).
Results: The acute procedural success rate was 100% with no major complications; two minor complications occurred. Fluoroscopy was entirely avoided in 28 procedures (55%), with a mean exposure of only 4.9 minutes in the remaining cases. Arrhythmia substrates were successfully ablated: (manifest/concealed) accessory pathways (26 total: 16 right-sided, 10 left-sided), slow-pathway modification for AVNRT (n=17), FAT foci (n=3), ventricular foci (n=3), and IART circuits (n=2). During follow-up, only two arrhythmia recurrences were documented, yielding an approximate 96% medium-term success rate. All other patients remained symptom-free.



Conclusions: This inaugural UAE pediatric electrophysiology-ablation cohort shows that modern mapping and tailored pediatric techniques enable high success, minimal complications, and low recurrence, establishing Al Jalila Children's Hospital as a regional leader in pediatric electrophysiology.



P-029 / #371

RE-EVALUATING THE RISK OF SUDDEN DEATH IN SYMPTOMATIC VS ASYMPTOMATIC PATIENTS WITH VENTRICULAR PRE-EXCITATION

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Background and Aim: The overall risk of sudden cardiac death in ventricular pre-excitation (VPE) has been estimated to be 0.1% risk in asymptomatic patients vs 0.3% risk in symptomatic patients per year. Patient factors that have been reported to predict patients at high risk include male sex, age <20, congenital heart disease, familial WPW, presence of multiple accessory pathways, persistence of pre-excitation during exercise stress test (EST) and the capacity for the accessory pathway to conduct rapidly. EP study characteristics that have been used to predict high risk pathways include the shortest pre-excited R-R interval during atrial fibrillation (SPRRAF), the accessory pathway antegrade effective refractory period (APERP) as well as fastest 1:1 conduction.
Methods: Retrospective chart review of 370 patients (ages 1-25) between August 2006-July 2024 (18 years) with documented VPE who underwent an EP study. Duplicates and patients with congenital heart disease were excluded, with 323 patients remaining. Symptoms were defined as palpitations or documented SVT prior to EP study. EP study characteristics that were utilized included SPRRAF < 250 ms, 1:1 AP conduction < 250 ms, and APERP < 250 ms. The presence of one or more of these characteristics constituted high risk.
Results: Of the 321 patients, 29 of 178 that were symptomatic were considered high risk, and 28 of 143 that were asymptomatic were considered high risk (p=0.22). Once PPE was accounted for, 29 of 166 symptomatic and 28 of 106 asymptomatic patients were considered high risk, indicating that high risk pathways were more likely to be found in asymptomatic patients (p=0.0385).
Conclusions: There was no statistically significant difference in the incidence of high-risk pathways based on the presence of symptoms or documented SVT. When accounting for PPE, there was a statistically significant increase in risk among asymptomatic patients. One explanation for this unexpected finding is that patients with a very short APERP have a much narrower window of induction, making clinical SVT less likely. This supports the need for EP studies in all patients with ventricular pre-excitation to accurately risk stratify patients who are at high risk of SCA.



P-030 / #595

SILENT BUT DEADLY: THE VALUE OF A SIMPLE ECG IN IDENTIFYING LONG QT SYNDROME IN CHILDREN

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Background and Aim: Long QT syndrome (LQTS) is a potentially lethal but often silent and unrecognised cardiac disorder in childhood. The aim of this study was to evaluate the diagnostic yield in children with prolonged QT and to highlight the essential role of accurate electrocardiogram (ECG) assessment by primary care physicians in ensuring timely detection and referral.
Methods: Retrospective data review of 116 children (0-18y) who were sent to paediatric cardiologist due to suspected prolonged QT interval from February 2017 to June 2025. QTc intervals were measured using Bazett's formula. P value <0.05 was considered significant.
Results: 76 (66%) of included children were girls and 40 (34%) were boys. Syncope episodes were reported in 20 patients (17%). A total of 48 patients (41%) had no symptoms at all and were referred solely for ECG evaluation. QTc prolongation was identified in 111 of 116 children (95.7%). The mean QTc in the study population was 0.471s. Overall, 52 (44.8%) patients underwent genetic testing, of whom 29 (55.8%) were genotype-positive, mostly *KCNQ1* (62%). Beta-blocker therapy was recommended for 47 patients (41%). Children with a confirmed genetic mutation (0.478 vs 0.467; p=0.029) and an asthenic body habitus (compared to hypersthenic) had a significantly longer QTc (0.471 vs 0.453; p=0.039). No other examined variable demonstrated significant associations with QTc duration. After the full examination, the diagnosis of LQTS was confirmed for 32 patients (28%).
Conclusions: Even in the absence of symptoms and any other clinical correlations, prolonged QTc may be detected by a simple ECG—often the first and only chance to prevent fatal outcomes. Ensuring that primary care doctors can accurately measure and interpret QTc in children is a crucial step toward preventing sudden cardiac death.



P-031 / #565

POST–CARDIAC ARREST OUTCOMES IN PEDIATRIC PATIENTS WITH INHERITED ARRHYTHMIA SYNDROMES: AN EIGHT-YEAR SINGLE-CENTER EXPERIENCE

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Background and Aim: Inherited arrhythmia syndromes represent a major cause of sudden cardiac arrest in otherwise
healthy children and adolescents. Survivors require intensive evaluation and tailored long-term
management, yet real-world data from pediatric centers remain limited. This study presents the
clinical characteristics, acute management, and follow-up outcomes of patients with genetically
determined arrhythmia syndromes who presented to our center after a resuscitated cardiac arrest.
Methods: We retrospectively reviewed all pediatric patients admitted to our tertiary pediatric cardiology unit
following a resuscitated cardiac arrest between 2017 and 2025. Sixteen patients with a diagnosis of
inherited arrhythmia were included. Demographic characteristics,
underlying diagnoses, prior follow-up status, therapeutic interventions (medical therapy, sympathectomy, ICD implantation, catheter ablation), and outcomes were systematically analyzed.
The primary endpoint was survival; secondary endpoints included recurrence of ventricular arrhythmia, appropriate or inappropriate ICD shocks, and need for additional interventions.
Results: Sixteen patients were evaluated after cardiac arrest. The median age was 15.5 years (range: 1.6–
25.8 years). Underlying etiologies included catecholaminergic polymorphic ventricular tachycardia
(CPVT, n=9), long QT syndrome (n=3), Brugada syndrome (n=2), and other genetically suspected
arrhythmia syndromes (n=2). Cardiac sympathetic denervation was performed in seven patients. Six children underwent ICD implantation. Among ICD recipients, one Brugada patient exhibited one
appropriate ICD shock, while another child with CPVT experienced an inappropriate shock
During follow-up, a single patient—who had been lost to regular follow-up and was



non-adherent to medical therapy—died. All other patients remained clinically stable on optimized
medical therapy without further malignant arrhythmic episodes.

Conclusions: Pediatric patients presenting with cardiac arrest due to inherited arrhythmia syndromes constitute a
heterogeneous but high-risk cohort requiring multimodal care. Device therapy, sympathectomy, and
optimized pharmacologic treatment all contributed to stable outcomes in most patients. For CPVT
and long QT syndrome, close follow-up and good medication adherence may allow postponement of ICD implantation, enabling a more tailored approach to timing and device
selection. These findings underscore the need for structured follow-up pathways and adherencefocused care models to optimize outcomes in this vulnerable population



P-032 / #780

PREVALENCE OF WPW PATTERN IN A LARGE POPULATION OF CHILDREN (MORE THAN 24.000) FROM TRANSILVANIA.

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Background and Aim: The prevalence of WPW pattern is unknown among children and youth in Romania.
The present study aims to determine the frequency of WPW pattern in a large population of children from Transilvania (northwestern Romania) which were included in the Cardioped project.
Methods: Over a period of 8 months (May 2015 to December 2015) 24 316 children aged between 7 and 18 years from schools in Northwest Romania (Bihor, Bistrita Nasaud, Cluj, Satu Mare, Salaj, Maramures) and West Romania (Arad, Huedoara, Timis and Caras-Severin).were examined clinically and ECG. Collected data were evaluated by 30 cardiologists and 4 arrhythmologists.
Results: A total of 18 children (0.07%) had WPW pattern on the surface ECG. All children were asymptomatic and 4 of the ECGs associated early repolarization pattern. Age specific –prevalence rates per 10.000 were 3.4 for age group 7-10 years, 15.5 for age group 11-14 years and 9,6 for age group 15-18 years:
Conclusions: WPW pattern has a prevalence of 0.07 % among Romanian children 7 to 18 years old. It is estimated that for the total Romanian population o 7 to 18 years in age, about 1406 children present WPW pattern on ECG examination.



P-035 / #779

VENTRICULAR PRE-EXCITATION: SEMI-INVASIVE ASSESSMENT OF THE RISK OF SUDDEN CARDIAC DEATH IN CHILDREN

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Background and Aim: Ventricular pre-excitation is due to the presence of an accessory pathway, in most cases the Kent bundle, composed of fast, sodium-dependent fibers that directly connect the atria to the ventricles, bypassing the normal atrioventricular nodal conduction system. Most patients are asymptomatic, while Wolff-Parkinson-White syndrome is diagnosed in the presence of the WPW pattern on the ECG and arrhythmic symptoms due to atrioventricular reentrant tachycardia and atrial fibrillation. Atrial fibrillation is a life-threatening arrhythmia because, although statistically infrequent, it can result in ventricular fibrillation and sudden death when an accessory pathway is present.
Methods: Between January 2012 and November 2025, 337 children under 18 years of age with ventricular pre-excitation underwent transesophageal electrophysiological study to define the conduction capacity of the accessory pathway, atrial vulnerability and inducibility of arrhythmias. The primary endpoint of this study was to define the diagnostic and prognostic role of semi-invasive transesophageal evaluation in the risk stratification of sudden arrhythmic death in the pediatric age.
Results: 58 intermittent pre-excitations, 15 concealed pathways and 6 multiple pathways were identified. An arrhythmia was induced in 25.2% of cases at baseline and in 42.1% of cases post-isoproterenol. Indication for transcatheter ablation was given in 54 cases due to electrophysiological risk characteristics, in 20 cases for athletic eligibility, and in 20 cases for persistent symptoms. We discuss our results concerning correlation between localization of the accessory pathway and its electrophysiological parameters (primarily, SPERRI and APERP) and possible prognostic stratification of patients; we also discuss the importance of the preventive sports medical examination.
Conclusions: In light of the study results and literature data, the risk of arrhythmic death is almost identical between symptomatic and asymptomatic patients, hence risk stratification is always indicated. The transesophageal electrophysiological study, where available, is a cornerstone examination for its diagnostic and prognostic validity; EKG study during preventive sports medical examination represents a key moment of possible early diagnosis of pre-excitation.



P-036 / #1433

FEASIBILITY AND DIAGNOSTIC PERFORMANCE OF SINGLE-LEAD ECG PATCH MONITORING IN PEDIATRIC AND CONGENITAL HEART DISEASE POPULATIONS

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Background and Aim: Ambulatory electrocardiographic (aECG) monitoring plays a key role in the ongoing assessment of pediatric patients and individuals with congenital heart disease (CHD). Single-lead adhesive ECG patches offer potential advantages, however data supporting their use in children—particularly those with CHD—are scarce. Accordingly, this study sought to assess the feasibility, signal integrity, diagnostic performance, patient tolerance, and concordance of a single-lead ECG patch compared with a conventional multichannel Holter monitor, in pediatric and CHD cohorts.
Methods: This investigation incorporated two components: (i) a retrospective analysis of 140 outpatient aged 1.5–18 years who underwent patch monitoring for up to six days; and (ii) a prospective, direct comparison involving 20 consecutive pediatric or young adult patients with CHD and/or a history of arrhythmia who received simultaneous 24-hour monitoring using both a single-lead ECG patch and a standard multichannel Holter.
Results: In the direct comparison, the ECG patch provided a greater percentage of analyzable recordings, fewer artifacts related to electrode issues, and higher patient-reported comfort. Nevertheless, the multichannel Holter was superior for evaluating complex conduction disturbances and repolarization abnormalities. Both devices were similar in detecting supraventricular and ventricular ectopy, with excellent patient adherence and fewer monitoring interruptions observed in the patch group. Within the broader pediatric patch cohort (n=140), adherence was high, with 95% completing monitoring and only 5% discontinuing early. The median monitoring duration was 1 day (IQR 1–3), with 31.2% of patients monitored for at least 2 days and 16.1% for 4 days or longer. Symptom–rhythm correlation was achieved in 70% of cases. Clinically meaningful arrhythmias were identified in 4.5% of patients. Monitoring results prompted changes in clinical management in 7% of patients and supported cessation of follow-up in 9%. Among the 20 paired recordings, there was complete agreement between patch and Holter findings.



Conclusions: Single-lead ECG patch monitoring is a practical, well-accepted, and clinically valuable tool for arrhythmia surveillance in pediatric patients and those with CHD. It provides arrhythmia detection comparable to traditional multichannel Holter monitoring while offering improved comfort and more continuous signal acquisition. Multichannel Holter devices remain preferable when detailed assessment of conduction or repolarization is necessary.



P-037 / #673

EVALUATION OF PEDIATRIC PATIENTS WITH WOLFF-PARKINSON-WHITE (WPW) DIAGNOSIS WITH CARDIOPULMONARY EXERCISE TESTING (CPET) BEFORE AND AFTER ABLATION

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Background and Aim: Wolf-Parkinson-White (WPW) syndrome is a common type of arrhythmia in children. An accessory pathway (AP) may lead to dyssynchrony in ventricular contraction. Dyssynchrony may lead to evident or subclinical decrease in myocardial performance. The present study aims to investigate the effects of these APs on subclinical myocardial performance, particularly in the absence of overt clinical manifestations of heart failure.
Methods: This is a single-center observational study including pediatric patients aged between 8 and 18 years who underwent catheter ablation for WPW syndrome. Cardiopulmonary exercise test (CPET) was performed prior to the ablation procedure and repeated at least three months post-ablation, during routine follow-up.
Results: A total of 25 individuals with the median age of 11,2 (8-17) years, underwent ablation for WPW evaluated with CPET. Echocardiographic evaluation with m mode of these patients showed that left ventricular function and ejection fraction were within normal ranges. Seven patients were on antiarrhythmic medication prior to the procedure, but these medications were discontinued before the CPET evaluation. The mean QRS duration prior to ablation was 94.4 ms (range: 80–130 ms). Posteroseptal (32%) were the most prevalent accessory pathway localization. The VO2max of the patients before ablation was measured at 24,3 ml/min/kg, and after ablation, it was 26,4 ml/min/kg (p:0,018). The maximum heart rate of the patients was 177 beats/min before ablation and 186 beats/min after ablation (p:0,002). The maximum METs before ablation was 6,4 and after ablation, it was 7,5 (p:0,001). When comparing the pre- and post-ablation results, a statistically significant increase was observed in VO2max, maximum heart rate, and METs values. The endocardial peak global longitudinal strain in the apical four-chamber view was 19,7% before ablation and remained 19,15% after the procedure. In the comparison of global longitudinal strain values, three patients in the Wolff–Parkinson–White group were excluded from the analysis due to missing data, and no significant difference was detected



(p:0,935).

Conclusions: CPET will be a valuable indicator in the future for the diagnosis, treatment, and follow-up process of WPW due to its detailed assessment of exercise capacity through metabolic measurements.



P-038 / #491

PROLONGED QT INTERVAL IN NEONATES – FINDINGS AT BASELINE AND DURING FOLLOW-UP IN LATER CHILDHOOD.

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Background and Aim: Long QT syndrome is a cardiac channelopathy characterized by abnormal ventricular repolarization, with an estimated prevalence of 1:2500 live births. The syndrome is associated with an increased risk of ventricular arrhythmias and sudden infant death, underlining the importance of early identification. The neonatal QT interval is, however, highly variable and it remains unclear whether neonatal QT prolongation persist into childhood. Furthermore, different correction methods and cut-off values are suggested challenging identification of at-risk individuals. This study aimed to determine the prevalence of neonates with a QT interval above published cut-off values (QTcB: 440 and 460 ms, QTcFri: 394 ms, QTcFra: 383 ms, QTcHod: 434 ms) from a large prospective, population-based cohort study. Additionally, to estimate the upper QTc threshold based on this cohort and determine the proportion of children still having a prolonged QT interval in later childhood.
Methods: Electrocardiograms (ECGs) of 16,032 neonates were obtained and analyzed with a computerized algorithm with manual validation. All neonates with a QTcB above the 98th percentile was offered a follow-up ECG.
Results: Among 16,032 neonates (52% boys, median age 11 days) 3,128 (20% of the cohort) had a QTcB >440 ms and 859 (5% of the cohort) a QTcB >460 ms. Using published cut-off values for QTcFri, QTcFra and QTcHod, we found that 1,344 (8%), 1,917 (12%) and 4,125 (26%) of the cohort were above the thresholds, respectively. Dividing the neonates into two groups based on age, we found that 1,935 (16%), 1,193 (30%) had a QTcB >440 ms and 568 (5%) and 291 (7%) a QTcB >460 ms, for the age-groups 0-14 days (n=12,030) and 15-30 days (n=4,002), respectively (both p<0.001). The cut-off value, defined as the 98th percentile for QTcB was 474 ms. Follow-up data will be available in May 2026.
Conclusions: The QT interval varies depending on the method used for its assessment and use of published cut-off values were associated with a high number of apparently healthy neonates classified as having a prolonged QT interval. There were significantly differences



in the proportion of neonates with a QT interval above thresholds for neonates aged 0-14 days and 15-30 days.



P-039 / #1371

WHEN AMUSEMENTS MIGHT BECOME A BAD HABIT.

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Background and Aim: Palpitations are a common cause of consultation in the pediatric Emergency Department. Unlike adults, heart palpitations in children are more frequently of non-cardiac origin. Therefore anamnesis becomes crucial, and sometimes it happens to find unlikely triggers for arrhythmias.
Methods: An 11-year-old boy presented with epigastric pain, vomiting, and palpitations that developed while he was playing a popular online video game. On admission, his general clinical condition was fair, except for marked tachycardia with a heart rate of 250 beats/min. Electrocardiography showed a narrow-QRS supraventricular tachycardia. Intravenous adenosine was ineffective in restoring sinus rhythm but revealed “sawtooth” flutter waves, allowing the diagnosis of atypical atrial flutter.Several therapeutic strategies were attempted, including repeated electrical cardioversion, transesophageal atrial overdrive pacing, and single-drug antiarrhythmic therapy, all without success. Consequently, an empirical stepwise triple-drug regimen was initiated. Amiodarone was first administered, followed by the addition and gradual up-titration of propranolol, which resulted in a progressive reduction of ventricular response. Subsequent ECG monitoring demonstrated arrhythmic disorganization with the emergence of polyfocal atrial tachycardia. Given the persistence of prolonged episodes of ectopic atrial tachycardia, flecainide was introduced and gradually increased. This combination led to a progressive and satisfactory reduction of the arrhythmic burden and stabilization of the rhythm
Results: A challenging pediatric atrial arrhythmia, refractory to standard treatments, was successfully controlled through a stepwise triple antiarrhythmic therapy with progressive rhythm stabilization.
Conclusions: This case highlights the rarity of atypical atrial flutter and complex atrial dysrhythmias in childhood, as well as the diagnostic and therapeutic challenges they pose. It also emphasizes the importance of considering unusual triggers for arrhythmias in pediatric patients. In our Center, we have observed two cases of arrhythmias temporally associated with playing video games, suggesting that intense emotional or autonomic stimulation may act as a precipitating factor in susceptible children.



P-040 / #415

CLINICAL CHARACTERISTICS AND EARLY OUTCOMES IN PEDIATRIC PATIENTS WITH IMPLANTABLE CARDIOVERTER-DEFIBRILLATORS: A SINGLE-CENTER EXPERIENCE

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Background and Aim: Implantable cardioverter-defibrillator (ICD) therapy in children is rare and supported by limited evidence regarding its indications and outcomes. Pediatric patients present unique anatomical and electrophysiological challenges that may influence implantation strategies and complications. This study aimed to describe the clinical characteristics, underlying cardiac diagnoses, and early outcomes of pediatric patients who underwent ICD implantation in a Spanish referral center.
Methods: A retrospective descriptive study was conducted, including all patients under 18 years of age who received ICD implantation between 2007 and 2025. Demographic characteristics, underlying cardiac disease, presence of structural congenital heart disease, reinterventions, heart transplantation, and mortality were extracted from institutional databases.
Results: A total of 35 patients were included, with a mean age of 156 months (13 years; range 6–230 months). 68.6% of patients were male. ICD was indicated in 54.3% of the cases as a primary prevention and in 45.7% as secondary prevention. 6 patients had structural congenital heart disease. During follow-up, 6 patients required reintervention—mostly for lead dysfunction or generator replacement—while 7 underwent heart transplantation, and 1 patient died. No device-related infections or early postoperative complications were reported.
Conclusions: In this pediatric cohort, ICD implantation was primarily indicated for malignant arrhythmias and cardiomyopathies, showing **low early mortality** and **acceptable safety**. Although reinterventions were relatively frequent, overall outcomes were favorable. These findings support ICD implantation as a safe and effective therapy in carefully selected pediatric patients at risk of sudden cardiac death. Further multicenter studies with longer follow-up are needed to refine indications and long-term management strategies in this population.



P-041 / #727

HIGH NT-PROBNP IDENTIFIES INFANTS AT RISK OF PERSISTENT AND RECURRENT PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA: A RETROSPECTIVE COHORT OF 46 PATIENTS

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Background and Aim: Background: Paroxysmal supraventricular tachycardia (PSVT) is the most frequent arrhythmia in infants and may lead to acute heart failure. Early risk stratification is essential to guide therapy. NT-proBNP is a biomarker of cardiac stress, but its prognostic role in infant PSVT is not well defined. Aims: To assess whether NT-proBNP predicts clinical severity, recurrence, and therapeutic needs in infants with PSVT.
Methods: We conducted a retrospective study, analyzing infants with PSVT, who were under follow-up in our clinic. Data collected included demographics, signs of heart failure, mode of onset, spontaneous termination, recurrence rates, and chronic antiarrhythmic therapy. NT-proBNP at presentation was determined in all patients. Statistical analyses were performed to associate NT-proBNP levels with the clinical parameters collected.
Results: Our cohort included 46 patients, diagnosed with PSVT, equally distributed between sexes (47,8% females). All of the patients had the onset of the tachycardia in infancy, including 19 with the onset in the first month of life. Elevated NT-proBNP was associated with clinical signs of heart failure ($p = 0.0061$, OR = 11.25) and also with agitation at onset ($p = 0.0002$, OR = 17.5). Furthermore, a normal NT-proBNP value markedly increased the chance of spontaneous PSVT termination ($p < 0.0001$, OR = 0.0215). Infants with higher NT-proBNP had significantly more recurrences (median first-year recurrences: 1 vs. 0, $p = 0.0003$) and had a significantly increased need for chronic therapy ($p < 0.0001$).
Conclusions: NT-proBNP at presentation is a strong prognostic biomarker in infant PSVT. Elevated levels identify patients at higher risk for persistent arrhythmia, recurrence, and chronic therapy requirement. Incorporation of NT-proBNP into early evaluation may optimize risk stratification, guide individualized management, and improve patient outcomes.



P-042 / #730

SAFETY AND EFFICACY OF CRYOABLATION IN PEDIATRIC PATIENTS UNDER 26 KG - SINGLE CENTRE EXPERIENCE

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Background and Aim: Cryoablation is a well-established treatment for atrioventricular nodal and accessory pathways reentrant tachycardias in children. Moreover it is valued for its safety near the atrioventricular node region. Although the effectiveness in adolescent pediatric populations is well described, evidence specific to small children weighing ≤26 kg remains limited, with most data extrapolated from broader cohorts. In smaller patients, anatomical scale and catheter stability may influence lesion formation, procedural success and complication risk.
Methods: In our arrhythmologic department at Bambino Gesù Children's Hospital of Rome, all the patients with a weight of 26 kg and less, who underwent cryoablation from January 2023 to October 2025, were selected for this study. Demographic and clinical data, type of procedures, preliminary and long-term results at 1, 6 and 12 months were obtained and analyzed using descriptive methods.
Results: Overall, 19 patients were included in this study (11 of them, 58% males). Median age in the study group was 7 years with IQR 3.0 (4-14 years), with median weight of 24 kg. All of them presented with supraventricular tachycardia: 57.9 % (N=11) atrioventricular nodal re-entry (abr. *AVNRT*) and 42.1 % (N=8) atrioventricular re-entry tachycardia (abr.*AVRT*) with right sided accessory pathway, in 75% anteriorly localized. Centre methodology is cryoablation for all the right heart sided procedures. Intracardiac electrophysiology study, mapping of the right atrium was performed in every case, pre-ablation procedure. Acute success was 100% and no complications were reported during the admission. Relapses were detected in 4 cases: at 1 – month follow-up 3 were reported, 2 in AVNRT and 1 in AVRT group; at 6-month follow-up 1 relapse in AVNRT group. Only one of the relapse case patients underwent repeated ablation, all of them receives antiarrhythmic drug therapy.
Conclusions: Our research has underlined that right sided cryoablation in pediatric patients under mass of 26 kg is safe and effective in the preliminary period; it also demonstrates low long-term relapse rate in AVRT cases. The current study was limited to number of case series. We propose that further studies are needed to be conducted.



P-043 / #717

WHEN REPOLARIZATION CHANGES TELL A STORY: UNMASKING PARTIAL PERICARDIAL AGENESIS

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Background and Aim: Partial congenital pericardial agenesis is an exceptionally rare anomaly, classically associated with leftward cardiac displacement and non-specific electrocardiographic findings. In adolescents—particularly those with greater habitual activity levels—persistent repolarization abnormalities may prompt further evaluation, yet the available literature provides limited guidance on their interpretation. This report aims to describe the electrocardiographic and imaging features that raised suspicion for a partial pericardial defect in a physically active teenager.
Methods: A 15-year-old boy engaging in regular high-intensity recreational sports was referred for assessment of abnormal repolarization patterns documented across several electrocardiograms. Resting tracing showed sinus rhythm (55 bpm), right axis deviation, QRS fragmentation in V2 and stable T-wave inversion across inferior and precordial leads. Ambulatory monitoring confirmed the previous findings, with rare isolated premature ventricular contractions accounting for less than 1% of total beats. Exercise stress testing demonstrated no ischemia or arrhythmias and repolarization changes remained stable throughout exertion. During early recovery, however, low-grade electrical alternans emerged, becoming more pronounced with deep inspiration.
Results: Transthoracic echocardiography showed normal biventricular size and function with no regional wall-motion abnormalities. Chest CT revealed significant cardiac levorotation with a 6–7 cm segment along the right ventricular wall where the pericardium was not clearly visualized, without ventricular herniation or coronary compression. The combination of persistent repolarization abnormalities, rightward QRS axis and marked cardiac levorotation with limited pericardial visualization aligns closely with existing descriptions of partial pericardial agenesis. No structural cardiomyopathy, ischemia, or arrhythmogenic substrate was identified. Recovery-phase QRS alternans, accentuated by deep inspiration, was also observed. Although not typically reported in this condition, this phenomenon may reflect increased cardiac mobility.
Conclusions: This case illustrates that persistent repolarization changes combined with pronounced cardiac levorotation should prompt consideration of a partial pericardial defect. For physically active adolescents such as our patient—highly motivated to continue



sports—clear guidance is difficult to offer in the context of such rare and poorly characterised conditions. Honest counselling, individualised decision-making and careful longitudinal follow-up therefore remain essential.



P-044 / #900

PEDIATRIC PATIENT PROFILE OF CONGENITAL LONG QT SYNDROME: 2010-2025 IN LATVIA

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Background and Aim: Long QT syndrome (abr.*LQTS*) - well-known channelopathy and leading cause of sudden cardiac death in young people without structural heart disease. LQTS clinical presentation varies across a wide spectrum extending from asymptomatic to sudden cardiac death, but what lies in between these presentations? This study aims to recognise pediatric patient phenotypical and genotypical presentation and its correspondence to actual clinical presentation in the Latvian population
Methods: Pediatric patients with a diagnosis of LQTS, phenotypical or genotypical, were selected for this study, treated at the Children's Clinical University Hospital of Latvia, Cardiology Department, from January 2010 to October 2025. Patients' demographic data, referral information, ECG, type of sports activity, clinical presentation, family history, genetic testing results were evaluated.
Results: In total, 62 patients were included in this study, 46 (74.2%) of them diagnosed during the period of 2020 – 2025. This study group consists of 48.4% (n=30) female and 51.6% (n=32) male patients, with a median age at referral to a cardiologist of 12 years (Q1-Q3, 9.5 – 14.5). ECG analysis showed a median value of the longest registered QTc in the female group of 500 ms, male – 490 ms, respectively, with no significant difference between genders (p=0.553). 51.6% (n=32) of the study group patients reported positive family history – known LQTS mutation and/or sudden cardiac death (n=14). 50%(n=31) of patients engaged in competitive sports prior to the diagnosis. 24% of patients (n=15) presented as symptomatic – survived episodes of ventricular tachycardia, complete AV block,and reported syncope episodes. No significant difference in QTc value was detected between the asymptomatic and symptomatic groups. Genetic testing revealed results similar to those observed in the worldwide population: 71%(n=44) LQTS type 1, 9.7%(n=6) type 2, and type 3, type 5, and type 6 were diagnosed in 1 case in each group. 9.7% are waiting for testing results.
Conclusions: Over the last decade, the recognition of LQTS has increased, with more patients being referred to pediatric cardiologists and, as a result, receiving treatment and lifestyle modifications. Further studies, with detailed physical activity type according to



QTc value and patient quality-of-life evaluation, are necessary to characterise the clinical profile.



P-045 / #75

CARDIAC WARNING SYMPTOMS IN PAEDIATRIC OUT-OF-HOSPITAL CARDIAC ARREST SURVIVORS: A MISSED OPPORTUNITY?

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Background and Aim: Out-of-hospital cardiac arrest (OOCHA) in children is a rare event, with an estimated incidence of 8.04 per 100,000 person years and a survival rate of <10%. OOHCA may be the presenting event in children with undiagnosed cardiovascular disease, who were hitherto fit and well. A proportion of adults experiencing OOHCA report warning symptoms, but whether the same is true in paediatric OOHCA survivors has not been systematically evaluated previously.
Methods: Clinical records of 53 consecutive patients with aged 0-18 with no history of arrhythmia, presenting with an OOHCA between 1996 - 2025 to a single UK paediatric tertiary referral centre for inherited cardiovascular disease were retrospectively reviewed.
Results: The mean age at OOHCA was 9.72 ±4.6 years. 27 cardiac arrests (50.9%) occurred on exertion. Following the OOHCA, 41 patients (77.3%) were newly diagnosed with an inherited cardiac condition (ICC), most commonly hypertrophic cardiomyopathy (n=16, 28.1%) and catecholaminergic polymorphic ventricular tachycardia (n=9, 17%). 11 patients (19.3%) had no cause identified despite phenotypic screening. Fourteen (26.4%) patients had a family history of sudden cardiac death but had not been referred for screening. Five patients (9.4%) were under surveillance following previous repair of congenital heart defects, deemed unrelated to their OOHCA. Eight patients (15.1%) had a significant neurological deficit as a consequence of the OOHCA. 21 patients (43.9%) had reported cardiac symptoms prior to their cardiac arrest, 11 of whom (20.7%) had experienced syncope. Nine out of the 11 (81.8%) patients' syncopal events occurred on exertion, with eight of these patients subsequently having an OOHCA in the same circumstances. Of the 11 patients who experienced previous syncope, four patients sought medical attention and had 12-lead ECGs performed with no abnormality reported; none had follow-up arranged. Patients with prior symptoms were older than those without (median of 13 versus 8 years old, p=.012).
Conclusions: This study demonstrates that over a third of paediatric-age OOHCA survivors had prior warning symptoms, with 20% previously experiencing syncope, representing a potential missed opportunity to identify a diagnosis prior to a cardiac event. These findings highlight the need for education, both for medical professionals and the general public, about 'red flag' symptoms.



P-046 / #792

HIGH SAFETY PROFILE OF TRANSSEPTAL PUNCTURE FOR LEFT-SIDED ABLATIONS IN CHILDREN: EXPERIENCE FROM A TERTIARY CENTER

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Background and Aim: Transseptal puncture (TSP) is the standard approach for accessing left-sided arrhythmogenic substrates in pediatric patients. However, children are particularly sensitive to the stochastic effects of ionizing radiation. Therefore, adhering to the ALARA (As Low As Reasonably Achievable) principle—minimizing radiation exposure to the lowest possible level without compromising procedural success—is paramount. This study aims to evaluate the safety, efficacy, and procedural characteristics of TSP in a large pediatric cohort, specifically focusing on a workflow designed to align strictly with ALARA standards.
Methods: We retrospectively analyzed 270 pediatric patients who underwent electrophysiological study and radiofrequency (RF) catheter ablation requiring TSP at our center. All procedures were performed under 3D electroanatomical mapping guidance to minimize overall radiation exposure. However, the transseptal puncture itself was performed using conventional techniques under fluoroscopic guidance alone.
Results: The study population had a mean age of 12.1±4.0 years and a mean body weight of 48.1±19.8 kg. Structurally normal hearts were present in 98.9% of cases. The primary indications were Manifest Accessory Pathways (54.4%) and Concealed Accessory Pathways (37.8%). TSP was successfully performed in 99.3% of patients (268/270). **In the two cases where TSP was unsuccessful, a transaortic approach was utilized, and ablation was successfully completed.**The mean total ablation procedure time was 96.07±38.8 minutes. Remarkably, the mean fluoroscopy time was 56.69±85.19 seconds, reflecting an ultra-low radiation workflow. Overall acute ablation success was 97.0%. No major or minor complications, such as pericardial effusion or tamponade, were observed in the entire cohort.
Conclusions: Our findings demonstrate that transseptal puncture is a highly safe and effective procedure in the pediatric population, with a success rate exceeding 99% and zero complications. Furthermore, this study confirms that even when performed under fluoroscopic guidance alone, with the support of 3D electroanatomical mapping, TSP can



be routinely executed with ultra-low fluoroscopy times (mean <1 minute), demonstrating a successful real-world application of the ALARA principle in pediatric electrophysiology.



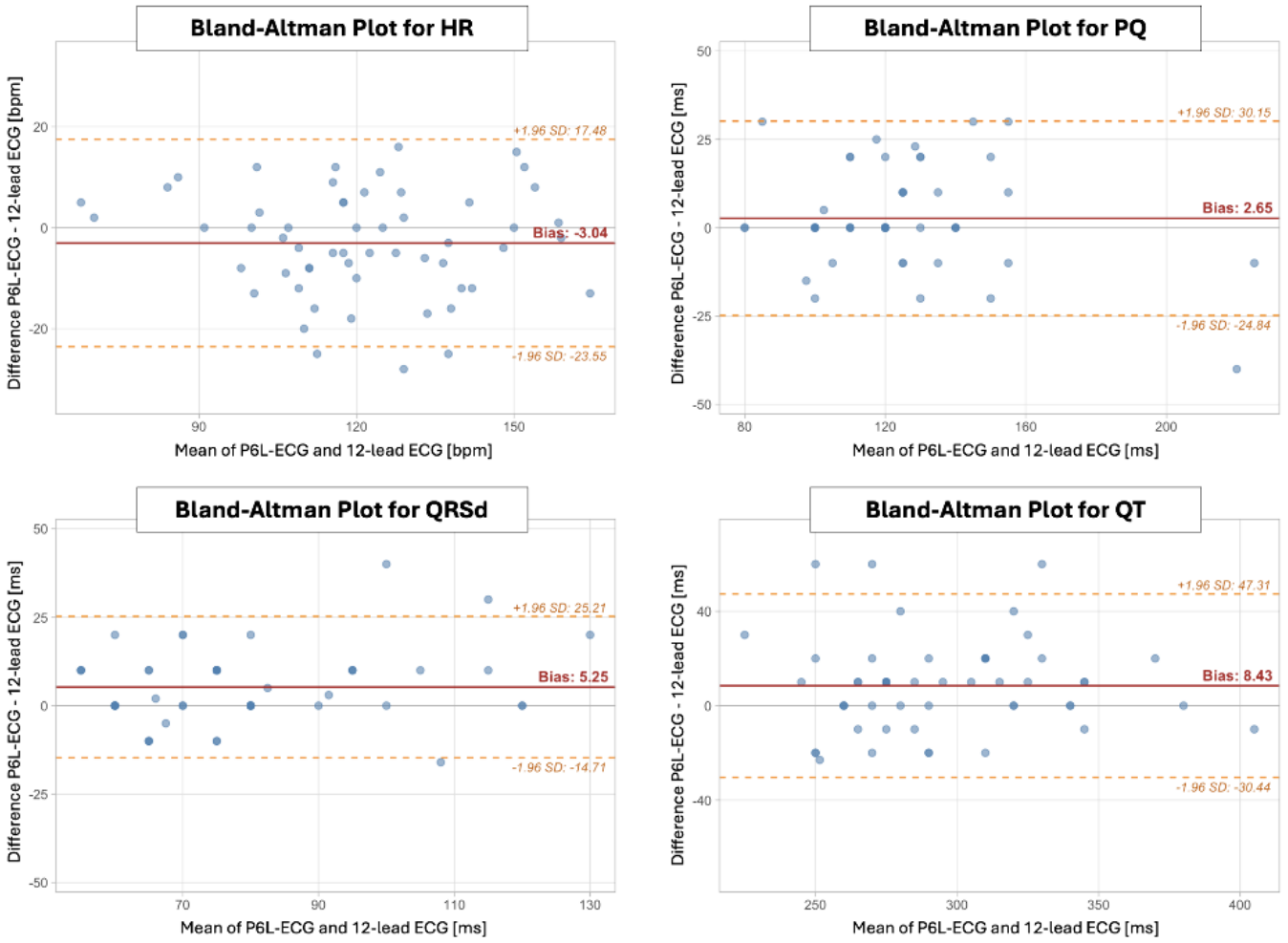
P-047 / #147

FEASIBILITY AND DIAGNOSTIC AGREEMENT OF 6-LEAD PORTABLE ECG AND STANDARD 12-LEAD ECG IN PATIENTS AGED 0-36 MONTHS WITH CARDIAC DISORDERS – A PROSPECTIVE, SINGLE-CENTER STUDY.

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Background and Aim: Electrocardiography is essential in pediatric cardiology, yet obtaining high-quality ECG recordings in the youngest patients is challenging due to limited cooperation, small body size, and motion artifacts. Although portable six-lead ECG devices (P6L-ECG) have shown clinical value in adults and adolescents, data in very young children remain scarce. This study is the first to exclusively evaluate the feasibility and diagnostic performance of P6L-ECG in children aged 0-36 months. The primary objective was to assess the diagnostic agreement between P6L-ECG and standard 12-lead ECG using a novel P6L-ECG acquisition technique.
Methods: This single-center, prospective study enrolled inpatients from the Pediatric Cardiology Department aged 0-36 months. Each patient underwent 12-lead ECG followed by three consecutive 30-second P6L-ECG recordings, using one of the two modified acquisition approaches: hand-assisted chest placement or adhesive electrodes. All P6L-ECG tracings were evaluated for interpretability. Repeatability was assessed using the Interclass Correlation Coefficient (ICC). The highest-quality tracing was selected for quantitative and qualitative comparison with 12-lead ECG. Agreement in interval measurements was evaluated using Bland-Altman analysis, while linear correlation was determined using the Pearson correlation coefficient. Concordance of cardiac axis, heart rhythm, and the detection of abnormalities was also assessed.
Results: Fifty-six children (mean age 11.3±10.7 months) were enrolled, including patients with arrhythmias (38%) and structural heart diseases (80%). P6L-ECG recordings were feasible in all patients, with 75% producing 3 interpretable tracings and 95% yielding ≥2. Hand-assisted chest placement was applied in 46 patients (82%). Repeatability was excellent for HR (ICC=0.91) and good for QT and QTc (ICC=0.89 and 0.78). Strong positive correlation was found for HR, PQ, QT, and QRS (r=0.86–0.89) and was similar across both acquisition techniques. Bland-Altman analysis showed low systematic differences in all intervals. There was 100% concordance for heart rhythm (κ=1.00), 98% for diagnosis (κ=0.97), and 88% for cardiac axis (κ=0.83). Abnormalities were identified in 33 (59%) P6L-ECG

tracings.



Conclusions: P6L-ECG provides feasible, repeatable, and diagnostically reliable ECG tracings even in the youngest pediatric patients, showing strong agreement with 12-lead ECG for key intervals and excellent accuracy in rhythm and diagnostic classification. The device may represent a practical new solution both for clinicians and, potentially, for caregivers.



P-049 / #261

A CASE PRESENTATION OF A NEONATE WITH A RARE FORM OF HEMITRUNCUS ASSOCIATED WITH TRICUSPID ATRESIA AND HYPOPLASTIC RIGHT HEART SYNDROME

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Background and Aim: Introduction Anomalous origin of a branch pulmonary artery from the aorta is a rare congenital malformation, accounting for approximately 0.12% of all congenital heart defects. Anomalous origin of the **left** pulmonary artery from the aorta (ALPA) represents **less than 25%** of reported cases. Truncus arteriosus communis (TAC) type A3 (Van Praagh classification), also known as **hemitruncus**, has been described almost exclusively in association with anomalous origin of the **right** pulmonary artery from the ascending aorta (ARPA), most commonly in patients with tetralogy of Fallot (TOF), pulmonary atresia, or interrupted aortic arch.
Methods: Retrospective review at our institution from 2010 to 2025 identified only **four** patients with hemitruncus. Three of these patients had ARPA, in one association with TOF, and all of them underwent surgical repair. We present a **unique case** of hemitruncus with **ALPA originating from the ascending aorta** in the setting of a left-sided aortic arch and **single-ventricle physiology**, combined with **tricuspid atresia (TA)** and **hypoplastic right heart syndrome (HRHS)**.
Results: Case report A full-term male neonate weighing 2.9 kg was admitted with suspected TA and TAC. Transthoracic echocardiography confirmed **tricuspid atresia with ventricular septal defect and HRHS**, with the arterial trunk arising exclusively from the right ventricle. Hemitruncus was identified, characterized by **absence of the main pulmonary artery (MPA)** and **ALPA arising from the posterior aspect of ascending aorta** in the presence of a left aortic arch. The **right pulmonary artery (RPA)** was non-confluent and supplied by a **right-sided persistent ductus arteriosus**, which was restrictive at its distal segment proximally to the RPA insertion. A **single coronary artery origin** was noted. Computed tomography angiography (CTA) confirmed these findings and a virtual **3D anatomical model** was reconstructed from the CTA dataset. Surgical correction was deemed contraindicated due to the unfavorable pulmonary artery anatomy and significant concerns regarding family compliance and social background. **Palliative**



care was therefore recommended.

Conclusions: Conclusion This case highlights the **exceptionally rare occurrence of ALPA** in a patient with Hemitruncus with **single-ventricle physiology**. A developmental defect involving partial or complete failure of the **left fifth aortic arch** may contribute to the embryogenesis of this anomaly.



P-050 / #1311

PEDIATRIC NORMS OF MYOCARDIAL FUNCTION AND DYSSYNCHRONY USING 2D SPECKLE-TRACKING: ARE Z SCORES A GOOD IDEA?

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Background and Aim: Speckle-tracking echocardiography (STE) provides precise assessment of myocardial function (2D strain) and ventricular dyssynchrony. In pediatrics, its clinical application is limited by the absence of reference values. This study aimes to validate and refine Z-score models for pediatric 2D strain and dyssynchrony parameters, assess reproducibility, and evaluate their consistency across different ultrasound systems.
Methods: A total of 248 healthy children (aged 0–17 years) were prospectively enrolled. Echocardiographic imaging was performed using two ultrasound systems (Vivid E9, GE; IE-33, Philips). 2D Strain and dyssynchrony parameters were analyzed using TOMTEC independent software. The published pediatric 2D Strain Z-score models proposed by Romanowicz et al. were tested, and new own models were developed with our cohort. The coefficient of determination R^2 was calculated to evaluate Z-score explanatory power regarding the 2D strain measurement variability. The same methodology was used for the analysis of STE dyssynchrony parameters. Intra- and interobserver reproducibility were assessed in a subset of 50 subjects.
Results: The Z-score models by Romanowicz and al. and those developed specially for this study exhibited low explanatory power for pediatric 2D strain parameters (R^2 < 10%). Variability related to anthropometric parameters lacked clinical significance, and the utility of Z-scores was not established. Unadjusted reference values for all STE parameters are proposed: [mv1] LV GLS −23.4 ± 2.5%, RV FW LS −28.6 ± 5.0%, mean time to peak delay 425 ± 41 ms, Yu index 42 ± 16 ms. STE-derived strain showed high reproducibility, whereas dyssynchrony parameters showed acceptable reproducibility. 2D strain values were independent of the ultrasound system but dyssynchrony parameters were significantly influenced by the ultrasound system.
Conclusions: Z-score models are not suitable for the analysis of STE parameters in pediatric population. The use of unadjusted reference values is justified due to the lack of clinically relevant anthropometric STE variations during childhood. These findings allow an easier use of STE in children and support the integration of STE analysis particularly for



longitudinal monitoring of cardiac function in congenital heart disease and young cardiomyopathies.

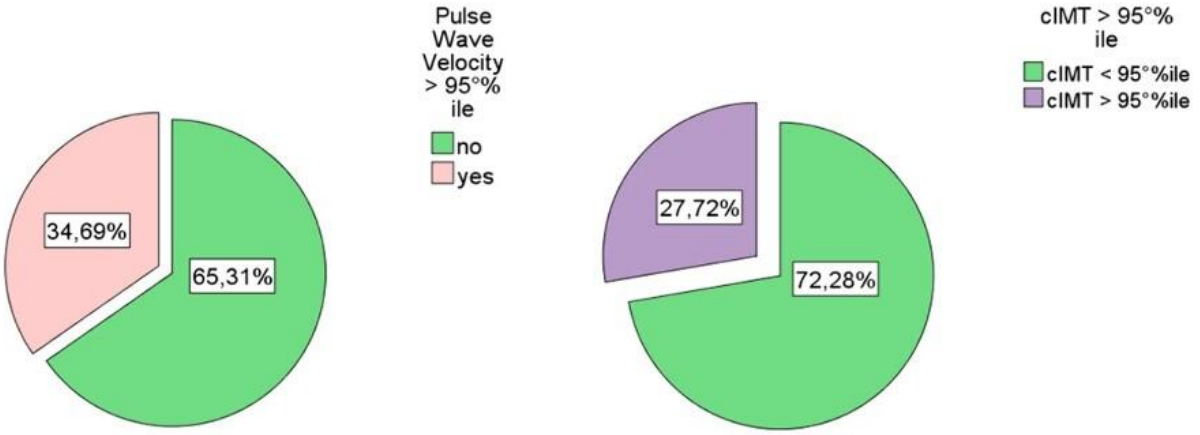


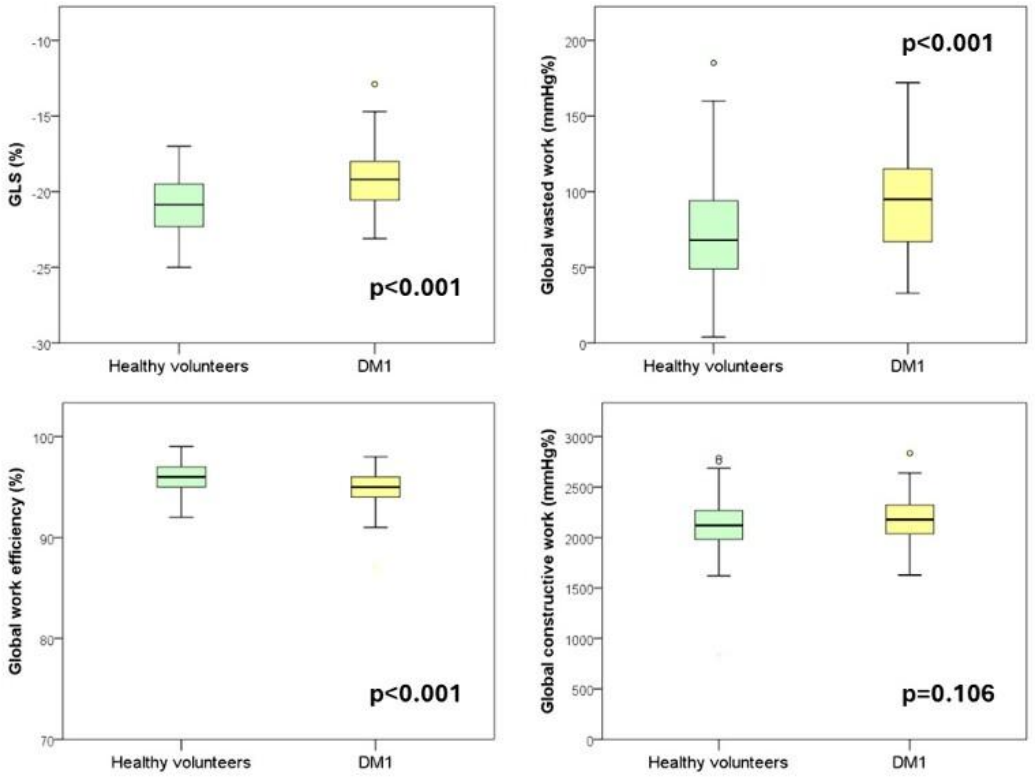
P-051 / #414

CARDIOVASCULAR SCREENING IN A COHORT OF PAEDIATRIC PATIENTS WITH TYPE 1 DIABETES MELLITUS FROM MORE THAN 5 YEARS

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Background and Aim: Cardiovascular disease (CVD) remains the leading cause of morbidity and mortality in Western countries. Early detection of subclinical cardiovascular alterations is particularly important in high-risk groups, such as children and adolescents with long-standing type 1 diabetes (T1D). Although conventional echocardiography is widely used, it has limited sensitivity in identifying subtle myocardial dysfunction in young individuals. Advanced imaging modalities may therefore enhance our understanding of early cardiovascular involvement in this vulnerable population. The aim of the study is to assess whether paediatric patients with a T1D duration of more than 5 years already exhibit signs of cardiovascular impairment.
Methods: We enrolled 126 patients with T1D aged 6–20 years, followed at our institution for at least 5 years. Anthropometric data, glycaemic control parameters, and both conventional and advanced echocardiographic measurements were collected for all participants. Markers of vascular damage—left carotid intima–media thickness (cIMT) and pulse wave velocity (PWV)—were assessed, along with markers of subclinical ventricular dysfunction (global longitudinal strain, myocardial work indices). Advanced left ventricular functional parameters were compared with those of 126 age-matched healthy volunteers from our laboratory.
Results:





Median follow-up was 7 years, IQR 5. Glycaemic control was generally satisfactory (median HbA1c 6.9%, IQR 1.2%). Twenty-eight percent of patients showed cIMT values above the 95th percentile, and 35% had PWV values above the 95th percentile. Conventional



echocardiographic parameters were within normal limits for all participants. However, global longitudinal strain (GLS) and global work efficiency (GWE) were significantly lower in the T1D group compared with controls ($p < 0.001$), whereas global wasted work was significantly higher ($p < 0.001$). No correlations were observed between echocardiographic parameters and either diabetes duration or glycaemic control.

Conclusions: The evaluated parameters revealed evidence of subclinical cardiovascular involvement, at both vascular and myocardial levels, in paediatric patients with long-standing T1D. The lack of correlation with disease duration or metabolic control suggests a substantial role of individual susceptibility in driving cardiovascular damage. These findings highlight the need to reconsider—and possibly anticipate—cardiovascular prevention strategies even in young people with type 1 diabetes.



P-052 / #1548

ADVANCED ECHOCARDIOGRAPHY IN THE FOLLOW-UP OF FONTAN PATIENTS

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Background and Aim: Patients with univentricular heart physiology constitute a growing and clinically complex population as a result of improved survival following staged surgical palliation culminating in the Fontan procedure. Although Fontan circulation has markedly enhanced life expectancy, it is characterized by a non-physiological hemodynamic configuration that predisposes patients to progressive ventricular dysfunction, elevated filling pressures, reduced cardiac output, and multisystem complications. Early identification of hemodynamic deterioration and Fontan failure remains challenging, as conventional echocardiographic parameters often show limited sensitivity and poor correlation with invasive measurements. The aim of this study was to investigate the role of advanced echocardiography, with particular emphasis on speckle tracking–derived strain imaging, in the follow-up of patients with Fontan circulation, and to evaluate its relationship with invasive hemodynamic data, cardiopulmonary exercise testing (CPET), and clinical manifestations of Fontan failure.
Methods: This observational study included patients with completed Fontan circulation undergoing comprehensive clinical assessment. All subjects underwent standard transthoracic echocardiography and advanced imaging, including ventricular and atrial strain analysis. In a subset of patients, echocardiographic findings were compared with invasive measurements obtained during cardiac catheterization, including total cavopulmonary connection pressure and pulmonary capillary wedge pressure. Functional capacity was assessed using CPET. Statistical analyses explored correlations between echocardiographic parameters, invasive hemodynamics, exercise performance, anatomical variants, surgical characteristics, and the presence and phenotype of Fontan failure.
Results: Advanced echocardiographic parameters, particularly global longitudinal strain of the dominant ventricle and atrial strain indices, showed significant correlations with invasive filling pressures and Fontan circuit pressures, outperforming conventional diastolic indices. Impaired strain values were associated with the presence of Fontan failure and with reduced exercise capacity on CPET. These associations were observed across different anatomical substrates and surgical techniques, supporting the robustness of strain imaging in this heterogeneous population.
Conclusions: In conclusion, advanced echocardiography and strain imaging provide



meaningful, non-invasive insights into ventricular performance and hemodynamic burden in patients with Fontan circulation. Their integration into routine follow-up may enable earlier detection of subclinical dysfunction, improve risk stratification, and support more personalized clinical management of Fontan patients.



P-053 / #581

FEASIBILITY AND DIAGNOSTIC VALUE OF CMR-DERIVED STRAIN COMPARED WITH ECHOCARDIOGRAPHIC 3D STRAIN IN PAEDIATRIC FONTAN CIRCULATION

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Background and Aim: Patients with congenital heart disease, including those with Fontan palliation, are at high risk of progressive ventricular dysfunction, and conventional measures such as ejection fraction (EF) often fail to detect early systolic impairment. Up to 40% of patients with preserved EF may still develop heart failure symptoms. Echocardiographic speckle-tracking (EST) and 3D global strain are used to identify subclinical dysfunction, but assessments are frequently limited by acoustic windows, image variability, and operator dependence. Cardiac magnetic resonance (CMR) feature tracking (FT) offers detailed myocardial deformation analysis and may provide more reliable evaluation in univentricular physiology. **This study aimed to compare ventricular systolic function assessed by CMR-derived FT strain with echocardiographic 3D global strain in pediatric patients with Fontan circulation.**
Methods: Thirty-two pediatric Fontan patients undergoing annual follow-up were prospectively enrolled. All underwent transthoracic echocardiography with EST and 3D global strain, as well as comprehensive CMR including ventricular volumetry, 4D flow, lymphography, and relaxometry, in addition to cardiopulmonary exercise testing. Pearson's correlation was used to assess relationships between echocardiographic and CMR-derived strain parameters and between strain and CMR-derived ventricular volumes or EF.
Results: Thirty-two patients (mean age 13.6 ± 4.6 years) were included. Mean oxygen saturation was 93% ± 3%, and time since Fontan completion was 10.0 ± 4.1 years. Ventricular volumes were moderately elevated (EDVI 92 ± 24 ml/m^2; ESVI 47 ± 17 ml/m^2), while EF remained relatively preserved (52% ± 7.6%). CMR strain values showed considerable variability: short-axis global radial strain (27.4 ± 10.5%) and circumferential strain (–12.7 ± 6.6%) were available in 12 patients; long-axis global radial (15.3 ± 9.4%) and longitudinal strain (–13.4 ± 5.3%) were available in 22. Echocardiographic 3D strain was measurable in 19 patients (–11.4 ± 6.3%), with feasibility limited by suboptimal imaging. Across all patients with paired datasets, **no significant correlations** were observed between echocardiographic and CMR-derived strain values. Neither modality's strain measures correlated with CMR-derived ventricular volumes or EF.



Conclusions: In Fontan patients, CMR-derived strain is more feasible and potentially more informative than echocardiographic 3D strain. These findings support CMR-FT as a preferred modality for systolic function assessment in univentricular hearts.



P-054 / #403

CAN CIRCULATING ECM-RELATED BIOMARKERS PREDICT AORTIC STRAIN ABNORMALITIES IN CHILDREN WITH BICUSPID AORTIC VALVE? AN EXPLORATORY STUDY

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Background and Aim: Aortic wall dysfunction may begin early in children with bicuspid aortic valve (BAV), yet the relationship between aortic strain parameters and circulating extracellular matrix (ECM) biomarkers remains unclear. This study aimed to evaluate aortic strain abnormalities in BAV, investigate their association with serum biomarkers (MMP-2, MMP-9, TIMP-1/2, MMP2/TIMP1 ratio, endotrophin, TGF-β1, apelin), and explore their potential predictive value.
Methods: Forty BAV patients and 40 age-, sex- and BSA-matched healthy controls underwent standardized echocardiography including aortic strain, distensibility and stiffness index measurements. Serum biomarkers were quantified using ELISA. Subgroup analyses were performed according to ascending aortic Z score (≥2 vs <2) and presence of aortic regurgitation (AR). Correlation analyses, ROC curves and multivariable regression were applied.
Results: Ascending aortic Z score was significantly higher in BAV ($p<0.001$). Aortic strain was markedly reduced (14.8±2.4 vs 21.0±2.9, $p<0.001$), while stiffness was increased and distensibility decreased (both $p<0.01$). MMP-2, MMP-9 and MMP2/TIMP1 levels were significantly higher in patients (all $p\approx0.03–0.04$). AR-positive patients had further impairment in strain and distensibility ($p<0.01$). In whole-group correlational analysis, aortic strain showed negative associations with MMP-2, MMP-9, MMP2/TIMP1 ($r=–0.30$ to $–0.51$) and ascending aortic Z score ($r=–0.51$). These associations weakened within the patient-only subgroup but remained directionally consistent. No biomarker independently predicted strain in multivariable regression. ROC curves showed limited discrimination (AUC 0.43–0.65).
Conclusions: Children with BAV exhibit early impairment in aortic strain and distensibility independent of age, sex and BSA. Although circulating biomarkers are altered, they do not independently predict aortic dysfunction, whereas strain imaging appears more sensitive in early disease. Larger prospective studies are required.



P-055 / #612

REALISING THE POTENTIAL OF PHYSIOLOGIST-LED CLINICS IN PAEDIATRIC CARDIOLOGY: A PLANNED QUALITY IMPROVEMENT PROJECT TO IMPROVE RELIABILITY AND CONSISTENCY OF A SERVICE

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Background and Aim: Transthoracic echocardiography (TTE) is the cornerstone non-invasive imaging modality for diagnosis, surveillance, and follow-up of patients with congenital heart disease (CHD). Despite this, many patients wait three-times longer than the NHS England six-week target for diagnostic testing. Physiologist-led clinics (PLC) have emerged as a low-cost solution in recent years, providing high-quality diagnostic and surveillance services to low-risk, stable patients whilst saving consultant time. In this quality improvement project, we investigated Bristol Royal Hospital for Children (BRHC) PLCs in their current format and identified potential change ideas. The one-year project aimed to create at least one regular PLC slot, and ten clinic patients per month in total, thus increasing BHRC PLC consistency and reducing unutilised outpatient capacity without additional financial investment.
Methods: The Model for Improvement (MfI) Framework was used to plan and structure our project. Baseline analysis revealed key challenges relating to finding and securing a regular PLC slot per month and addressing consultant perceptions to increase referral numbers. Following an extended planning/consultation phase, Five Plan-Do-Study-Act (PDSA) cycles were performed targeting issues identified from process mapping and root-cause analysis.

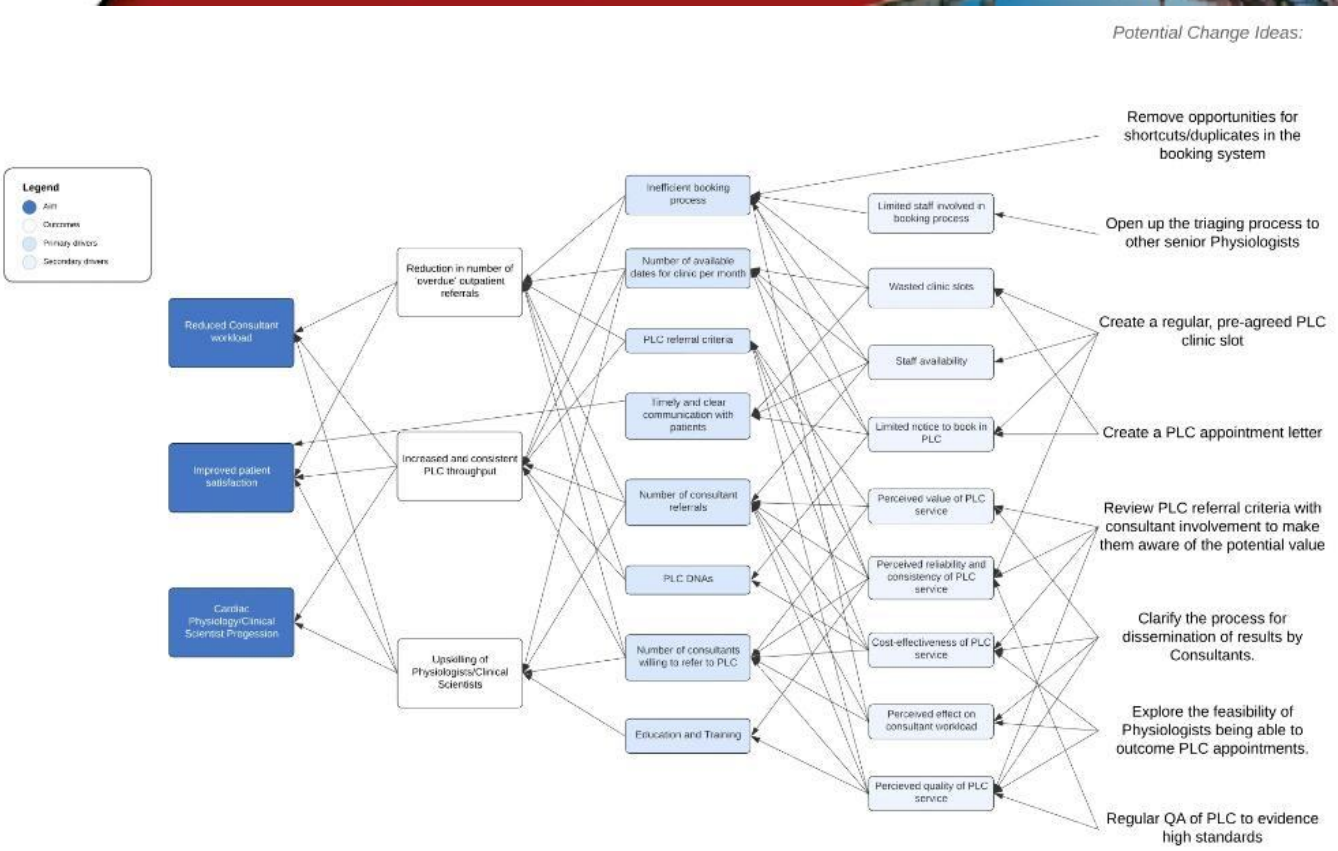


Figure 1. Driver diagram and potential change ideas.

Results: Initial 'quick win' PDSA cycles were implemented to prevent duplicate 'waste' referrals and establish consistent nursing support for clinic performance. Although securing regular PLC slots remained challenging, from March 2025 we proactively identified and booked unutilised outpatient capacity one month in advance. Following this, there was a mean of 14 PLC patients, 3.4 PLC clinics, and 4.1 unutilised half-day outpatient slots per month, compared to 6.2, 1.7, and 6.5 respectively at baseline. Furthermore, the PLC Clinic DNA rate reduced from 9.9% to 3.4%. This QI process appears to have increased consultant engagement in the PLC service, with number of consultants referring per month increasing from 1.5 to 3.8, whilst anecdotal patient feedback has been positive.

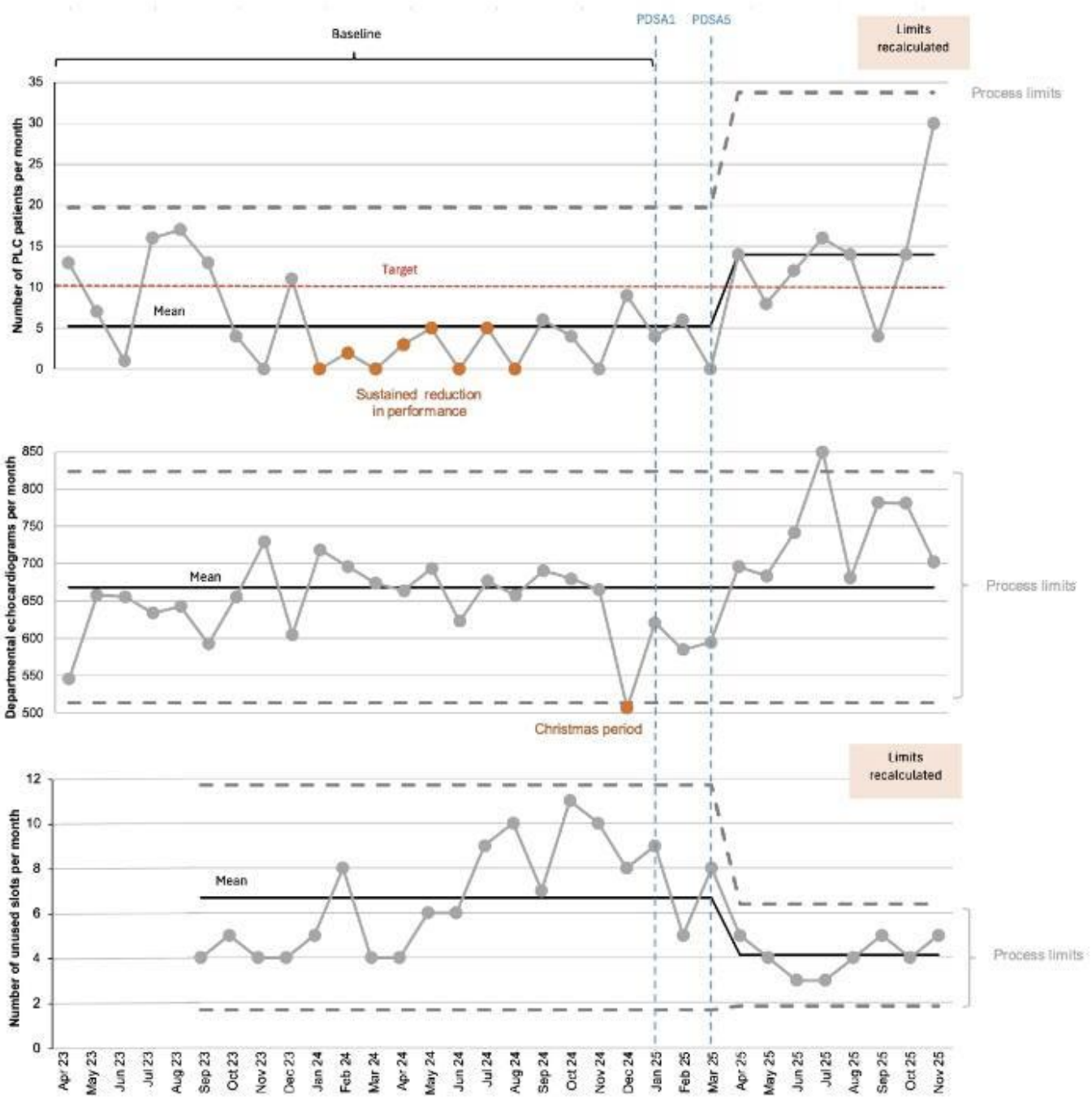


Figure 2. Performance metrics of physiologist-led clinics from the beginning of available data until present. PDSA1 labelled to illustrate the first PDSA cycle. PDSA5 labelled to demonstrate the onset of expected changes in metrics.

Conclusions: Undertaking this QI process has ended sustained BHRC PLC inactivity to increase PLC throughput and reduce wasted NHS outpatient capacity. This improved PLC structure may provide a cost-neutral model to be extrapolated to other tertiary paediatric centres in the management of increasing TTE demand.

P-056 / #652

NON-CATHETER-RELATED SPONTANEOUS ABDOMINAL AORTIC THROMBOSIS IN HEALTHY NEONATES

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Background and Aim: Abdominal aortic thrombosis is a rare entity in neonates and has mostly been associated with umbilical artery or cardiac catheterization. Other possible causes include peripartum asphyxia, septicemia or inflammatory disease.
Methods: **Case report**: We report the case of a neonate with no maternal medical background presenting with absence of femoral and pedal pulse. No organ failure was detected and initial cardiac ultrasound showed no sign of coarctation.
Results: A Doppler ultrasound and CT angiogram (Figure 1) were performed showing a thickening of the walls of the sub renal aorta, with gauge disparity and complete thrombosis of the aorta below the ostium of the renal arteries, extending to the iliac bifurcation, the right external iliac artery and the proximal left external iliac artery. The patient showed no signs of decreased lower limb perfusion so no thrombolytic treatment was performed and anti-coagulation treatment was initiated. There was neither biological nor mechanical (catheter-related spontaneous abdominal aortic thrombosis) predisposing condition for thrombosis. Because of the aortic wall thickening found in both CT angiograms, exploration of inflammatory disease was performed. Follow up exams at 6 months showed a significant reduction of the thrombosis but a persistence of circumferential aortic wall thickening (Figure 2). Figure 1: First CT scan, frontal and sagital views showing thrombosis of the sub renal abdominal
aorta

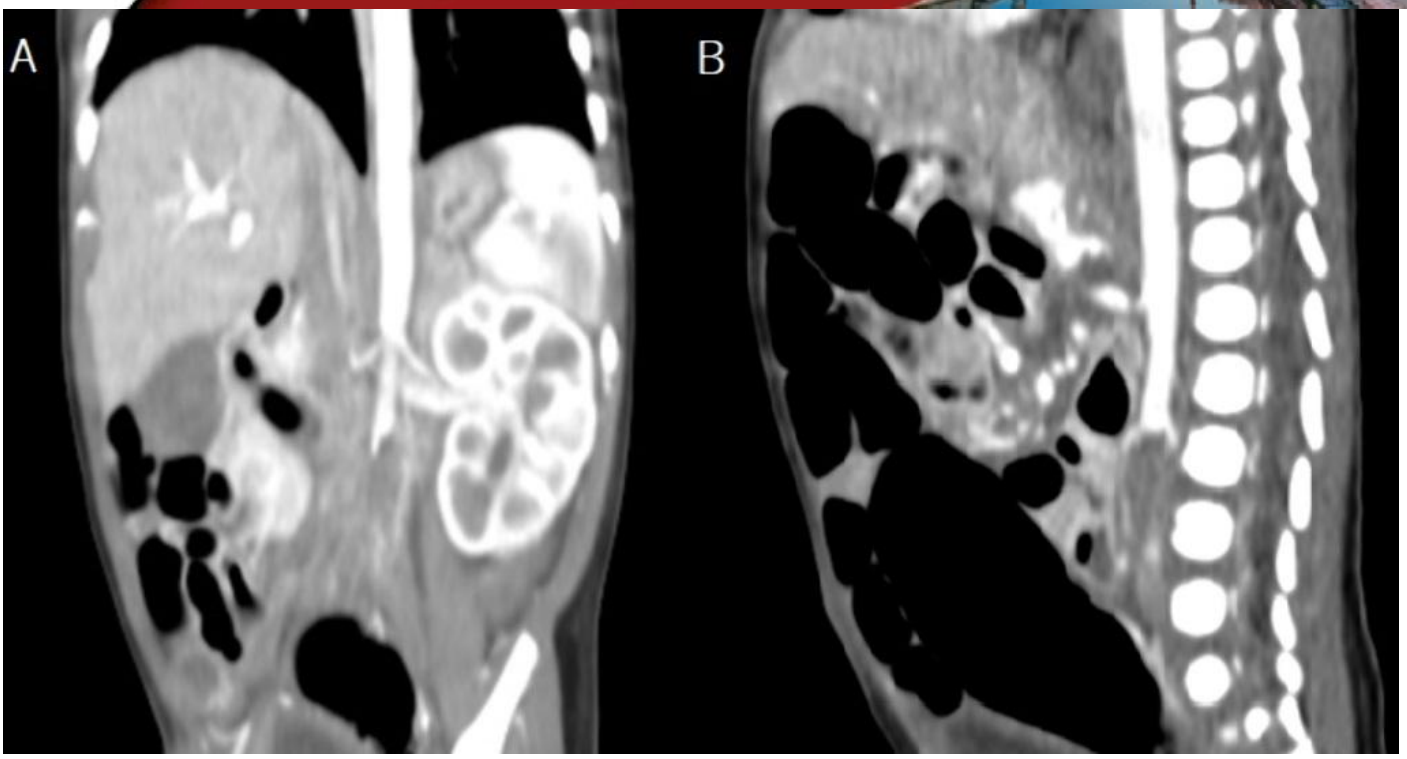
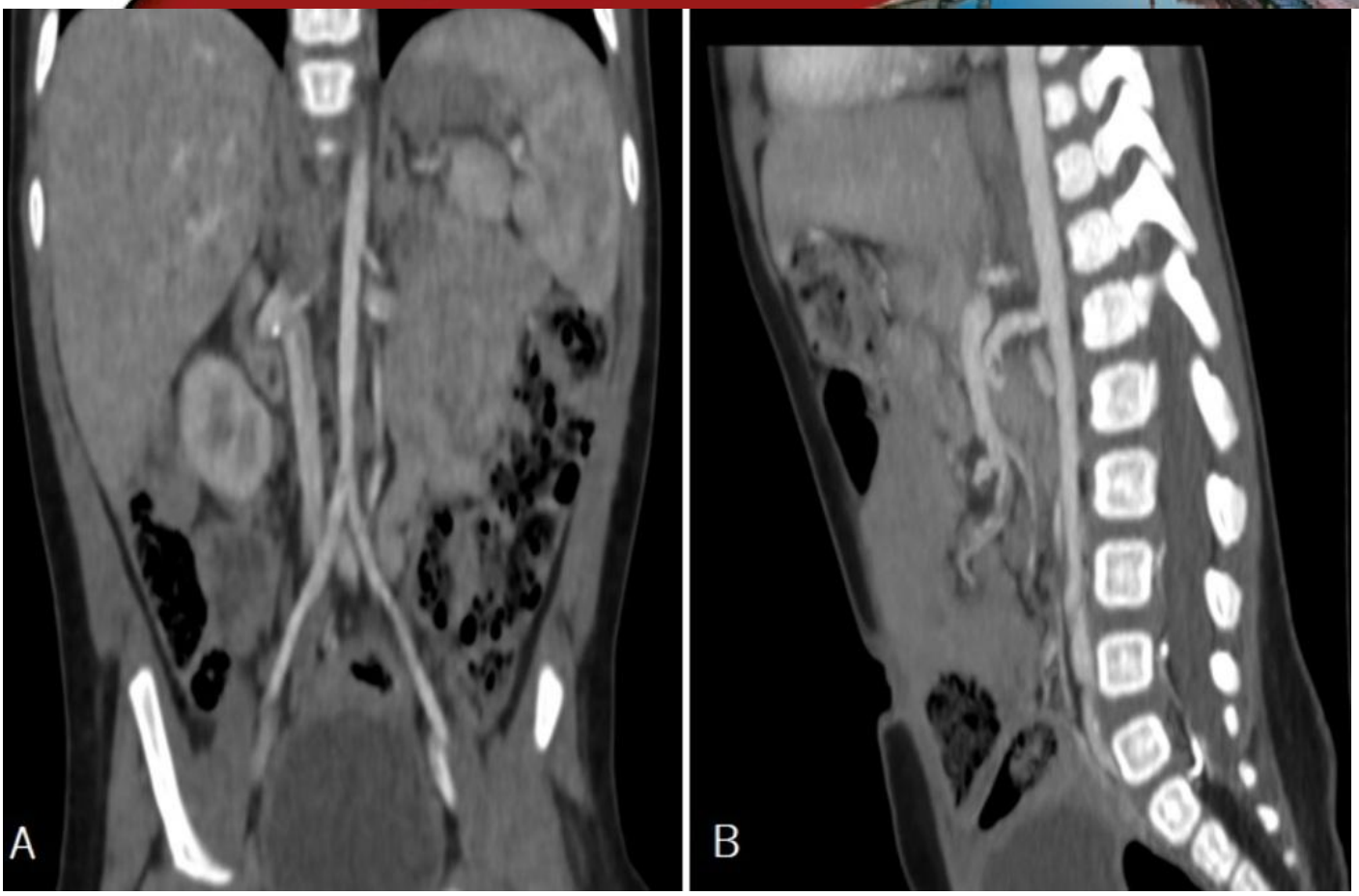


Figure 2: Follow-up CT scan, frontal and sagital views showing aortic thrombosis regression



Conclusions: **Conclusion**: Abdominal aortic thrombosis is a rare entity in neonates. The treatment is considered depending on the clinical presentation and tolerance. In this case, the patient was clinically and biologically stable with no complication thus no thrombolytic treatment was considered and simple anti-coagulation treatment was initiated. Irregular appearance of the walls of the superior mesenteric artery in the first CT angiogram evoques a possible connective tissue anomaly or vasculopathy.



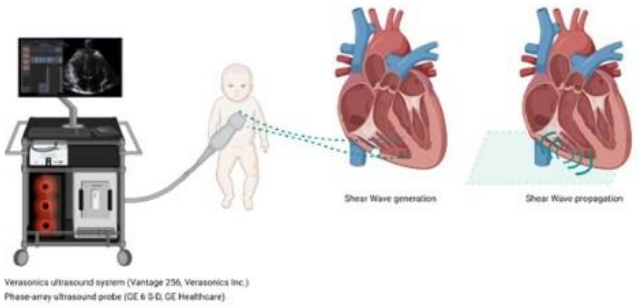
P-057 / #711

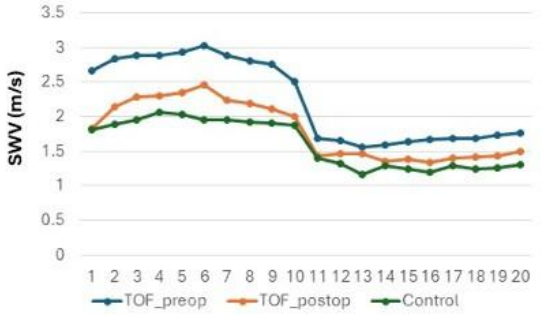
RIGHT VENTRICULAR STIFFNESS AFTER TETRALOGY OF FALLOT REPAIR: NEW INSIGHTS FROM ULTRAFAST ULTRASOUND IMAGING

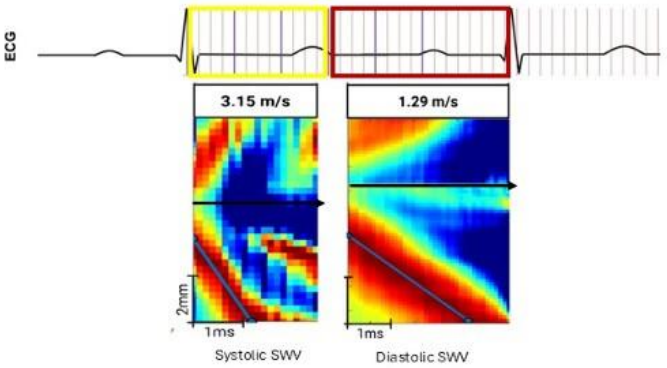
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[1]The Hospital for Sick Children, Department Of Pediatric Cardiology, Labatt Family Heart Centre, Toronto, Canada, [2]Bordeaux University Hospital (CHU), Department Of Pediatric And Adult Congenital Cardiology, Pessac, France

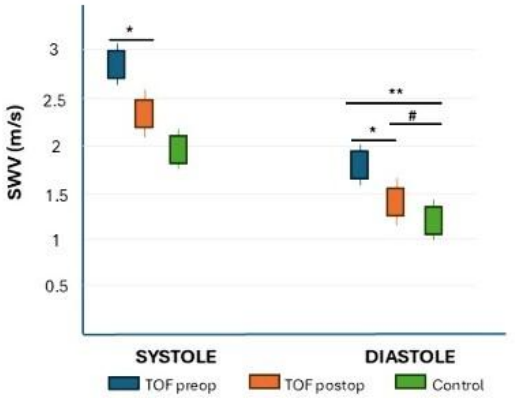
Background and Aim: After Tetralogy of Fallot (ToF) complete repair, right ventricular (RV) adaptation remains highly variable. Residual lesions may lead to maladaptive remodeling, and evolution to RV failure is poorly understood. Conventional echocardiography is limited in detecting early remodeling changes. Ultrafast ultrasound imaging (UUI) with shear wave velocities (SWV) assessment provides direct, quantitative assessment of myocardial stiffness and may reveal early tissue changes. This pilot study aimed to (1) assess the feasibility of UUI in infants with unrepaired ToF, (2) compare pre- and early postoperative RV stiffness, and (3) explore associations with postoperative restrictive physiology.
Methods: Eight ToF infants were prospectively enrolled between January–June 2025. Eight age-matched healthy controls were included. UUI was performed prior to complete repair, and on postoperative day two. SW were generated using acoustic radiation force, and high-frame-rate diverging-wave imaging (3320 fps) recorded propagation velocity, a surrogate for myocardial stiffness (Verasonics). Twenty cardiac-cycle-acquisitions per view (LAX, SAX), and 4 views per patient were obtained, allowing measurements of peak systolic and mean diastolic SWV (MATLAB). Clinical and conventional echocardiographic parameters were documented at both time points.
Results: UUI acquisition and analysis were feasible in all 8 ToF patients (100%), median age 5.8 months (IQR 4.8-7.0), and 8 controls, median age 4.2 months (IQR 2.5-6.3). Median heart rate was respectively 131bpm (IQR 109-144) and 125bpm (IQR 120-140). RV stiffness was significantly higher before repair and decreased following repair in ToF: peak systolic SWV 2.81 m/s ± 0.31 vs 2.16 m/s ± 0.19, mean diastolic SWV 1.65 m/s ± 0.19 vs 1.30 m/s ± 0.12, both $p<0.001$. After repair, peak systolic SWV was comparable to controls, while mean diastolic SWV remained elevated ($p= 0.030$). Systolic/diastolic SWV ratio remained similar, suggesting preserved contractility. Comparing repaired ToF with controls: RV free-wall thickness was significantly higher (0.30 cm vs 0.16 cm, $p=0.020$), RVSP and RVFAC remained similar, and RV longitudinal strain and LVEF were significantly reduced (-11% [-10- -13] vs –19% [-17- -20], $p=0.001$, 62% [59-65] vs 73% [69-81]). Higher preoperative diastolic SWV showed moderate correlation with restrictive physiology after repair ($r = 0.45$,

p=0.030).









Conclusions: UUI is feasible in infants with ToF and provides direct quantification of RV myocardial stiffness. Early postoperative reduction in diastolic SWV suggests acute positive changes in myocardial remodeling but remained higher than controls. SWV-based stiffness assessment may offer a sensitive marker for diastolic dysfunction and could guide postoperative surveillance and timing of intervention in ToF.

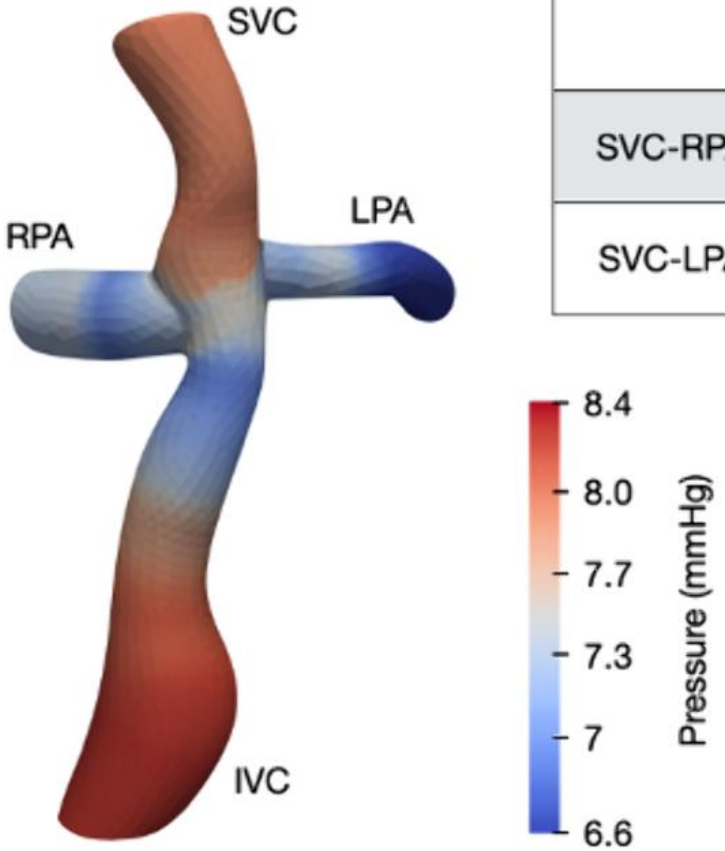
P-058 / #484

COMMON PITFALLS IN ENERGY-LOSS QUANTIFICATION IN TCPC AND OTHER CONGENITAL LESIONS — AND HOW TO OVERCOME THEM

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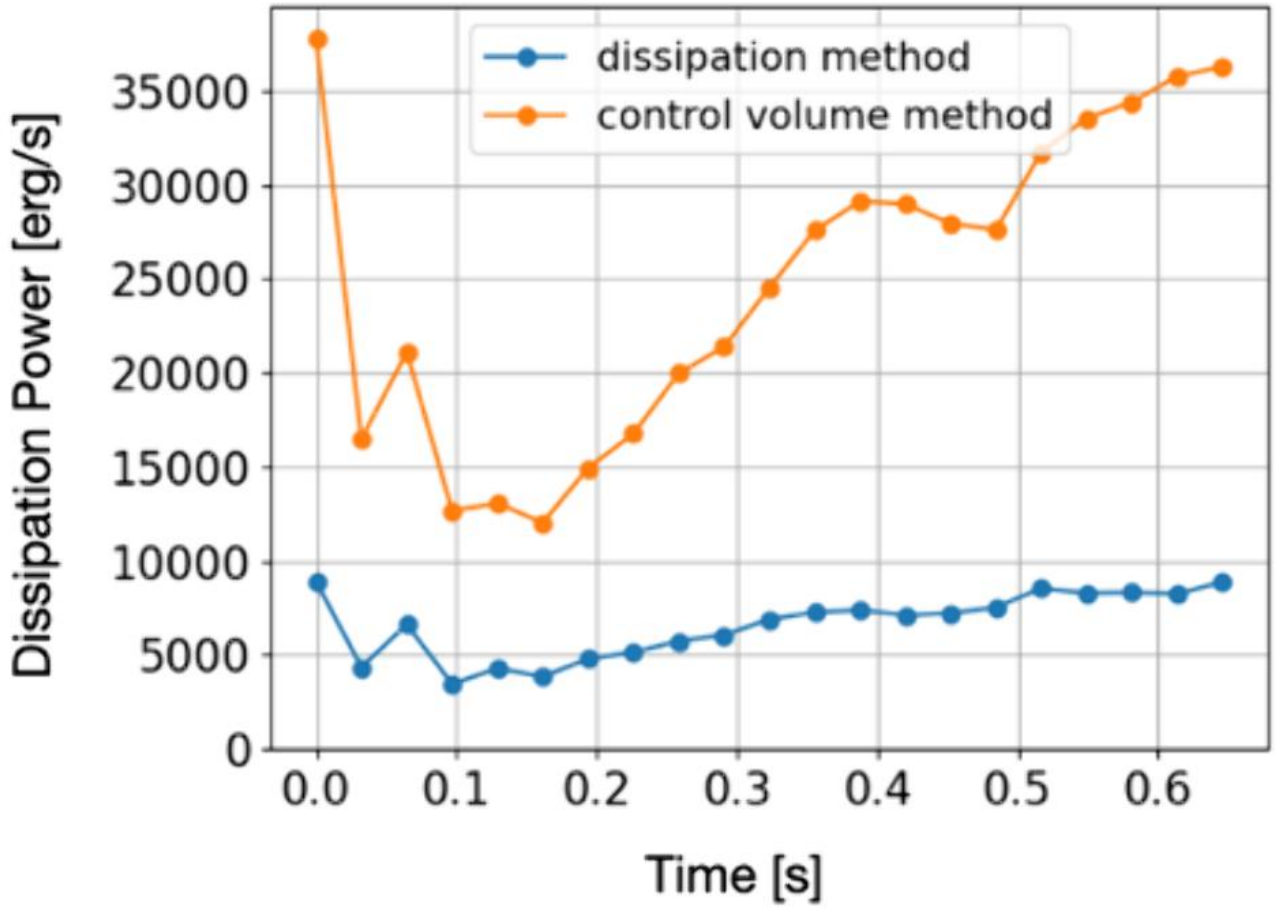
Background and Aim: Energy losses reflect the inefficiency of blood flow and are increasingly recognised as an important hemodynamic marker, particularly in complex congenital anatomies such as the Fontan/TCPC circulation. Elevated losses can indicate impaired physiological efficiency even when pressures or flow rates appear near normal. In the absence of complete hemodynamic information—including both velocity and pressure fields—clinical assessments often rely on surrogate measures such as kinetic energy or pressure gradients to judge the severity of energy losses. More sophisticated approaches combine kinetic energy and pressure to compute energy-flux differences across a control volume, or estimate dissipation by integrating velocity-gradient information throughout the flow field. However, it remains unclear how reliably these methods perform when applied to 4D flow MRI.
Methods: Using physical considerations—such as Bernoulli's theorem, expected noise levels, and typical MRI SNR—we demonstrate that simplified proxy measures of energy loss are intrinsically unreliable and can yield misleading interpretations. We substantiate this through explicit kinetic-energy calculations, pressure reconstructions from 4D flow MRI, and comparisons with patient-specific hemodynamic simulations in TCPC patients.
Results: Pressure differences—although too small for detection with standard catheters—contribute as much as, or even more than, kinetic energy differences to total energy loss (Figure 1). Furthermore, we show that the standard dissipation formulation substantially underestimates true losses due to unresolved small-scale gradients (Figure 2), requiring turbulence corrections and advanced denoising. To address this, we introduce a fully automated open-source pipeline that applies all necessary corrections and enables robust, reproducible energy-loss quantification from 4D flow MRI. **Figure 1: Centerline-based systolic pressure reconstruction from 4D flow MRI in a TCPC patient, together with cycle-averaged kinetic and pressure energy differences between the SVC and RPA/LPA.**





	ΔE_{kin}	ΔE_p
SVC-RPA	-405 erg/ml	973 erg/ml
SVC-LPA	-214 erg/ml	239 erg/ml

Figure 2: Total power loss over one cardiac cycle in a TCPC anatomy, computed from simulation data using the dissipation method and the precise control-volume method. The dissipation method markedly underestimates the true energy loss.



Conclusions: Many existing approaches for estimating energy losses from 4D flow MRI are unreliable and offer limited clinical value. We present a clear, physics-grounded strategy and provide validated open-source tools that enable robust energy-loss quantification, supporting more accurate hemodynamic assessment in TCPC and other congenital pathologies.



P-059 / #176

UNMASKING HIDDEN DYSFUNCTION IN PEDIATRIC HYPERTROPHIC CARDIOMYOPATHY: A MULTI-LAYER ECHOCARDIOGRAPHIC ANALYSIS OF VENTRICULAR AND ATRIAL MECHANICS

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Background and Aim: In children with hypertrophic cardiomyopathy (HCM), it is often difficult to assess symptom severity, diastolic burden and arrhythmic risk, and left ventricular function solely by ejection fraction. In this study, we aimed to describe the strain characteristics of left ventricle (LV) and left atrium (LA) in a relatively small but detailed group of pediatric HCM patients and to investigate the relationship of these parameters with classical echocardiographic findings and the presence of an ICD.
Methods: We retrospectively analyzed 20 hypertrophic cardiomyopathy patients who had been followed since childhood. Detailed transthoracic echocardiography was performed for each patient. Two-dimensional speckle-tracking was used to measure LV global longitudinal strain(GLS) from three apical views and LA reservoir(LASr), conduit and contractile strain. Tissue Doppler Imaging(TDI) velocities were recorded at the septal and lateral mitral annulus. Diastolic functions were assessed with pulsed-wave Doppler E/A ratio and the E/e' index. The biplane Simpson method was used to calculate left ventricular ejection fraction (LVEF).
Results: Median age at the time of the last echocardiogram was 16.2 years (IQR 9.0–18.8). Median weight was 53.5kg (IQR 25.8–66.0;mean49.5±22.7 kg). Pathogenic mutations were identified in15/20(75%), and an ICD had been implanted in 7/20(35%) patients. Although LVEF remained within the normal range for most patients (mean 65.4±7.9%;range50–84%), mean global LV longitudinal strain (LV GLS Avrg) was–19.2 ±4.5% (range–10 to–24.9%) and showed mild-to-moderate impairment. Lower LASr Global was consistently seen in patients with larger LA area(p=0.005) and higher medial E/e' (p=0.008), suggesting a stronger association with LASr Global than LV GLS(p=0.027). Children with an ICD had markedly lower LA reservoir strain than those without an ICD (median 25%vs41%),whereas LV GLS did not differ meaningfully between groups. These findings suggest that LA mechanical impairment is more pronounced than LV systolic strain abnormalities in HCM patients who had been deemed at higher arrhythmic risk requiring implantation.



Table 1. Clinical and echocardiographic characteristics, including LA strain, in children with hypertrophic cardiomyopathy		
Clinical profile		
	Age at initial presentation, years	Mean 8.9 ± 5.9; median 9.0; IQR 3.0–13.8; range 0.08–19
	Age at last echocardiogram, years	Median 16.2; IQR 9.0–18.8
	Weight at last visit, kg	Mean 49.5 ± 22.7; median 53.5; IQR 25.8–66.0; range 12–99
	Pathogenic / likely pathogenic sarcomeric variant	15 (75%)
	Positive family history of CM or SCD	5 (25%)
	ICD implanted	7 (35%)
LV systolic function		
	LV ejection fraction, % (biplane Simpson)	65.4 ± 7.9 (range 50–84)
	LV GLS Average, %	−19.2 ± 4.5 (range −24.9 to −10.0)
	LV GLS A4C, %	−20.2 ± 5.1
	LV GLS A2C, %	−19.6 ± 5.4
	LV GLS A3C, %	−17.8 ± 4.3
	MAPSE, mm	12.1 ± 3.9 (range 5.3–20.0)
LA structure and diastolic indices		
	LA area, cm^2	12.1 ± 4.1 (range 6.5–21.0)
	LA long-axis, mm	28.0 ± 5.8 (range 18–41)
	Mitral PWD E/A	1.62 ± 0.45
	Mitral PWD E velocity, cm/s	78.2 ± 30.0
	Medial E/e' (TDI)	12.1 ± 5.6
	Lateral E/e' (TDI)	9.6 ± 8.1
LA strain (2D speckle tracking)		
	LASr Global, %	35.4 ± 11.3 (range 12.2–54.5)
	LAScd Global, %	−25.4 ± 9.4 (range −39.7 to −10.9)
	LASct Global, %	−10.1 ± 3.9 (range −15.8 to −0.9)

Conclusions: In pediatric HCM with largely preserved LV ejection fraction, LA reservoir strain is substantially impaired and closely linked to LA enlargement and elevated filling pressures, more than to LV systolic strain. Reduced LASr may capture advanced atrial remodeling in children considered at higher arrhythmic risk and warrants further validation in larger cohorts.



P-060 / #310

FROM DETECTION TO MANAGEMENT: A CONTEMPORARY ANALYSIS OF CARDIAC MASSES IN THE PEDIATRIC POPULATION

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[1]University of Health Sciences, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Department Of Pediatric Cardiology, Istanbul, Turkey, [2]University of Health Sciences, Mehmet Akif Ersoy Chest Cardiovascular Surgery Training and Research Hospital, Department Of Pediatric Cardiac Surgery, ISTANBUL, Turkey

Background and Aim: Primary cardiac tumors are rare clinical entities with a wide clinical spectrum, ranging from incidental asymptomatic findings to life-threatening conditions. Tumor pathology, localization, and size are key determinants of clinical behavior and management. The aim of this study was to review the diagnostic characteristics and follow-up outcomes of pediatric patients with cardiac masses and to identify risk factors associated with potentially life-threatening complications.
Methods: Medical records of patients followed in our clinic between 2010 and 2025 with a diagnosis of cardiac mass were retrospectively reviewed. Demographic characteristics, tumor features, clinical presentation, management strategies, and follow-up data were analyzed.
Results: The study included 27 patients with a median age at diagnosis of 22 months (range: 1–207 months); 13 were male (48%) and 14 female (52%). The most common tumor type was rhabdomyoma (n=14). Tumor burden was single in 14 patients and multiple in 13 patients. Tumor localization included most frequently the left ventricle (n=11) followed by right atrium (n=5) and right ventricle (n=5); two patients had tumors involving multiple cardiac sites. Indications for surgical or medical intervention included suspected malignancy, compression- or obstruction-related symptoms, embolic risk, cardiac dysfunction, arrhythmia, and exercise-induced symptoms. Five patients underwent surgical resection. Ten patients required medical therapy, including everolimus, heart failure treatment, and antiarrhythmic medications. Six patients received antiarrhythmic therapy; notably, two patients with fibroma presented with ventricular extrasystole or ventricular tachycardia requiring treatment. One patient received medical therapy for heart failure. Consistent with the literature, everolimus was used in three selected patients with rhabdomyoma, resulting in tumor size reduction or stabilization. No mortality occurred during follow-up. Detailed data are summarized in the Table 1 and
2.



Table 1: Characteristics of all Patients (n:27)	Variables	n(%)
Diagnoses	Rhabdomyoma	14
	Fibroma	5
	Myxoma	2
	Teratoma	2
	Hemangioma	2
	Papillary fibroelastoma	1
	Spindle-cell lesion	1
Diagnostic Methods	Pathology	5
	MRI+ECHO (no pathology)	15
	ECHO only	7
Number Of Masses	Single:14 patients	14
	Multipl:13 patients	13
Localization Of Masses	Right atrium	5
	Left atrium	2
	Right ventricle	5
	Left ventricle	11
	Pericardium	1
	Aortic cusp	1
	Multiple sites	2

Table 2: Characteristics Of Patients Requiring Treatment (n: 8/27)	Variables	n(%)
Diagnoses (n=8)	**-Surgically treated**	5
	Hemangioma	2
	Fibroma	2
	Spindle-cell lesion	1
	-Everolimus therapy	3
	Rhabdomyoma	3
Localization in patients receiving Everolimus	Right ventricle	2
	Multipl sites	1
Localization in surgically treated patients	Right atrium	3
	Left ventricle	2
Number of masses in surgically treated patients	Single mass	100%
Pericardial effusion	Myxoma, Hemangioma, Fibroma, Rhabdomyoma	4

Conclusions: Pediatric cardiac masses exhibit a heterogeneous clinical profile, with rhabdomyoma being the most frequently identified tumor type. Tumor localization and burden, along with associated complications particularly arrhythmia and hemodynamic effects, play a central role in management decisions. In selected patients, everolimus therapy was associated with tumor regression or stabilization, supporting its role as an effective treatment option. These findings highlight the importance of individualized evaluation and tailored management strategies in pediatric cardiac tumors.



P-061 / #762

HYPOPLASIA OF THE POSTERIOR MITRAL LEAFLET: AN UNCOMMON CAUSE OF MITRAL REGURGITATION

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Background and Aim: Posterior mitral leaflet (PML) hypoplasia is an uncommon congenital cardiac condition.This mitral valve abnormality has been historically described in children and infants with symptomatic severe mitral regurgitation (MR) and is considered a cause of intrauterine death .
Methods: We report the case of a 5-year-old child with no significant medical history who presented to the emergency department with acute respiratory distress.
Results: Clinical examination revealed tachypnea, increased respiratory effort, and a systolic murmur at the apex. Transthoracic echocardiography demonstrated a large anterior mitral leaflet (AML), absent PML and a muscular formation .The mitral valve leaflet was markedly elongated, mildly thickened, and occupied the entire closure line of the mitral annulus with no contribution of the hypoplastic posterior leaflet causing severe and eccentric MR jet .This malformation was associated to type 1 L-R bicuspid aortic valve. The patient was stabilized with oxygen supplementation, intravenous diuretics, and vasodilators, with gradual improvement in respiratory status. Pediatric cardiology consultation was arranged to assess the feasibility of surgical repair. Posterior mitral leaflet (PML) hypoplasia is a rare congenital mitral anomaly, typically diagnosed in infancy or childhood and often associated with significant mitral regurgitation. Its embryologic origin is not fully understood, arising from abnormal development of the left lateral endocardial cushion and sometimes impaired muscularization of the posterior mitral apparatus. The most commonly associated congenital cardiac anomalies are bicuspid aortic valve and atrial septal defect (ASD). In patients with hypoplastic PMVL, severe mitral regurgitation is the main clinical concern. Surgical repair is preferred when anatomy is favorable, using annuloplasty with pericardial patch augmentation of the posterior leaflet. Valve replacement is considered if repair is not feasible. Interventional approaches, may be considered in selected cases, although leaflet hypoplasia or unfavorable anatomy can limit feasibility.
Conclusions: This case highlights an unusual presentation of posterior mitral leaflet hypoplasia revealed by acute respiratory distress. Echocardiography is essential for diagnosis, and early multidisciplinary management is critical to determine the optimal therapeutic strategy.



P-062 / #667

ECHOCARDIOGRAPHIC PHENOTYPING OF MYOCARDIAL DYSFUNCTION IN CHILDREN WITH SEPSIS - A SYSTEMATIC REVIEW

Diana Jecan Toader[1,2], Simona Cainap[3,4], Alexandru Jecan[5,6], Cecilia Lazea[4,7], Daniela Iacob[2,8], Calin Cainap[1,9]
[1]University of Medicine and Pharmacy "Iuliu Haţieganu", Department Of Oncology, Cluj-Napoca, Romania, [2]Emergency Clinical Hospital for Children, Cluj-Napoca, Romania, [3]University of Medicine and Pharmacy "Iuliu Haţieganu", 2nd Pediatric Discipline, Cluj-Napoca, Romania, [4]Emergency Clinical Hospital for Children Cluj-Napoca, Cluj-Napoca, Romania, [5]University of Medicine and Pharmacy "Iuliu Hatieganu" Cluj-Napoca, Departament Of Surgical Specialities, Cluj-Napoca, Romania, [6]Leon Daniello Pneumology Hospital, Cluj-Napoca, Romania, [7]University of Pharmacy and Medicine Iuliu Hatieganu Cluj-Napoca, Pediatrics 1, Cluj-Napoca, Romania, [8]University of Medicine and Pharmacy "Iuliu Hatieganu", 3rd Pediatric Discipline, Cluj-Napoca, Romania, [9]The Oncology Institute “Prof. Dr. Ion Chiricuta, Department Of Medical Oncology, Cluj-Napoca, Romania

Background and Aim: Despite important advances in sepsis care, septic cardiomyopathy remains a highly prevalent and clinically relevant complication. To date, the condition remains poorly understood, as no universally accepted definition or standardised assessment method currently exists. To address this gap, we performed a systematic review to identify echocardiographic techniques used to assess septic myocardial dysfunction in children and summarise the reported abnormalities. A secondary objective was to evaluate their association with clinical outcomes.
Methods: PubMed, Scopus, Embase and Web of Science were searched from inception to September 12, 2024. Studies were eligible if they reported echocardiographic parameters in pediatric patients diagnosed with sepsis.
Results: Twenty-three observational studies were included. They demonstrated considerable heterogeneity in patient cohorts, definitions and reported echocardiographic parameters. LVEF was the most commonly assessed index, with estimates of LV systolic dysfunction ranging from 18.9% to 77.5%, though most studies reported rates near one-third of patients. Strain echocardiography consistently detected myocardial impairment even when LVEF values were within normal limits. Data on diastolic dysfunction were highly inconsistent across studies due to high variability in diagnostic definition. Among the reported parameters, E/e’ ratio appeared to identify the largest subset of patients. Only a few studies included long-term follow-up, with the majority reporting incomplete cardiac recovery in a subset of patients. Although several studies reported associations between echocardiographic abnormalities and clinical outcomes, the direction and strength of



these associations varied.

Conclusions: The marked heterogeneity in study methodologies and reported findings underscored the need for a standardised definition and unified evaluation protocols for septic cardiomyopathy in children.



P-063 / #569

NORMAL RANGES OF THREE-DIMENSIONAL LEFT VENTRICULAR STRAIN ECHOCARDIOGRAPHY VALUES IN CHILDREN – SINGLE CENTER STUDY – PRELIMINARY RESULTS.

Halszka Kamińska[1], Julia Haponiuk-Skwarlinska[2], Radosław Pietrzak[2]
[1]Medical University of Warsaw, Dept. Of Pedatric Cardiology And General Pediatrics, Warszawa, Poland, [2]Medical University of Warsaw, Department Of Pediatric Cardiology And General Pediatrics, Warsaw, Poland

Background and Aim: Background Three-dimensional (3D) strain echocardiography is known as a novel and sensitive method of left ventricular function assessment, however dedicated ranges of normal values for pediatric population are still not explicitly established. **Aim** To assess the normal values of left ventricular 3D strain echocardiography in children.
Methods: The study enrolls healthy children from single center in Warsaw (Poland) in whom 3D echocardiography is performed and analyzed further offline with the use of automatic 4D LV-Analysis software (Philips Medical System, USA) assessing left ventricular global longitudinal strain (LV-GLS), global circumferential strain (LV-GCS) and global radial strain (LV-GRS). The results are analyzed for distribution pattern, ranges and average values with further analysis of percentile and Z-score layout for adequate normal values illustration.
Results: Currently analyzed sample amounts to 50 children (30 boys), aged 2-17 (mean 12±4.6) years. Further 100 patients results await analysis and enrollment process is still ongoing. Interim data show normal distribution with following means, standard deviations and ranges (min – max): LV-GLS: 24.9±3.7%; min -17.3%, max -34.1%; LV-GCS: -27.4±4.7%; min -18.5%, max -38.3%; LV-GRS: 44.4±5.4%; min 39.0%, max 56.9%.
Conclusions: Normal values of 3D strain echocardiography in healthy children from single centers worldwide are necessary for developing universal norms dedicated to this modality in pediatric population.



P-064 / #518

ATYPICAL PERSISTENCE OF A CONGENITAL MITRAL VALVE BLOOD CYST IN AN ASYMPTOMATIC ADOLESCENT DANCER: CASE REPORT

Mariam Kapanadze
EVEX Didube Clinic, Pediatric Cardiology, Tbilisi, Georgia

Background and Aim: Congenital blood cysts of the cardiac valves are rare embryologic remnants typically identified in neonates and usually regress during early infancy. Persistence into childhood or adolescence is uncommon, and guidance for evaluation in older patients is limited. Although often asymptomatic, mitral valve blood cysts may cause embolic events, valvular dysfunction, intracardiac obstruction, or rarely arrhythmias and syncope. Because of these potential complications and the overlap with other intracardiac masses, careful imaging assessment and structured follow-up are recommended. Echocardiography is the primary diagnostic tool, while modalities such as transesophageal echocardiography (TEE) or cardiac magnetic resonance imaging (MRI) may be used for further anatomical clarification. However, in stable asymptomatic patients, families may decline additional testing, creating challenges for risk assessment and management. **Aim:** To describe the rare persistence of a congenital mitral valve blood cyst in adolescence, highlight challenges when advanced imaging is declined, and emphasize the role of structured echocardiographic follow-up in asymptomatic patients.
Methods: Initial evaluation with transthoracic echocardiography (TTE) characterized the mitral valve lesion. Potential complications and the option of further evaluation with TEE or MRI were discussed, but additional imaging was declined due to the absence of symptoms and concern about unnecessary escalation of care. The patient was instructed to report any new symptoms. Conservative management was pursued with scheduled TTE follow-up at 3 and 6 months to monitor cyst morphology, mitral regurgitation severity, and overall cardiac function.
Results: Baseline TTE revealed a mobile 14×16 mm cystic mass attached to the anterior mitral leaflet, consistent with a congenital blood cyst, with mild–moderate mitral regurgitation and normal ventricular function. Follow-up TTE at 3 and 6 months demonstrated stable cyst size, unchanged mitral regurgitation, and preserved chamber dimensions. Electrocardiography showed normal intervals without arrhythmias. The patient remained fully asymptomatic and continued unrestricted physical activity.
Conclusions: This case illustrates the rare persistence of a congenital mitral valve blood cyst into adolescence, demonstrating stable morphology and valvular function over six months of follow-up. In asymptomatic patients who decline advanced imaging, structured echocardiographic surveillance may serve as a safe and practical management strategy,



supporting conservative follow-up in the absence of hemodynamic compromise or rhythm abnormalities.

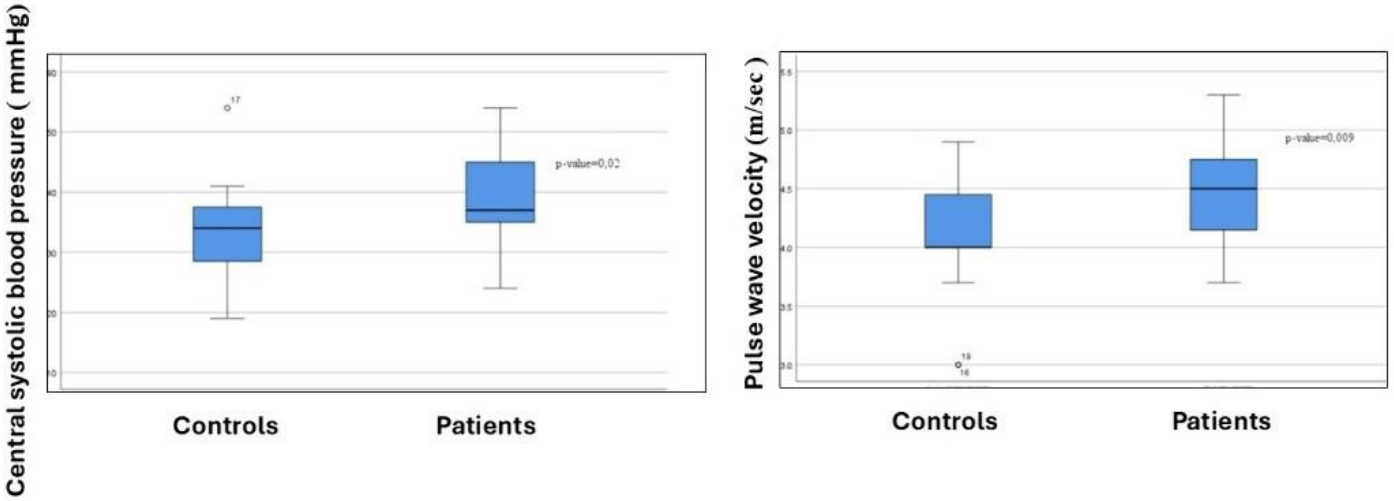


P-065 / #230

ECHOCARDIOGRAPHIC ANATOMIC CHARACTERISTICS, CLINICAL PHENOTYPE AND AORTIC WALL PROPERTIESN IN CHILDREN 11-18 YEARS OLD WITH A BICUSPID AORTIC VALVE

Christina Loukopoulou[1], Eirini Kostopoulou[1], Marios Papasotiriou[2], Kyriaki Papadopoulou-Legbelou[3], Andreas Giannopoulos[3], Ageliki Karatza[1]
[1]UNIVERSITY OF PATRAS MEDICAL SCHOOL, Paediatrics, RIO, PATRAS, Greece, [2]UNIVERSITY OF PATRAS MEDICAL SCHOOL, Nephrology, Rio, Patras, Greece, [3]Aristotle University of Thessalomiki. Greece, Paediatric Cardiology, Thessaloniki, Greece

Background and Aim: Bicuspid aortic valve (BAV) is the most common congenital heart disease in children and adolescents with an estimated prevalence of 0.5%-2%. It may lead to aortic stenosis, aortic regurgitation, and aortic root dilatation, while increased arterial stiffness and impaired aortic elasticity have also been described.
Methods: We investigate the echocardiographic characteristics and aortic elasticity in 23 adolescents aged 11-18 years with BAV and compared their aortic elastic properties with 23 adolescents with normal tricuspid aortic valve matched for age and gender. Vascular dysfunction parameters were recorded in both populations using the Mobil-O-Graph device. In the first group/ The valve morphology, complications, and progression over time were assessed.
Results: BAV was more frequent in males (69.5%). Positive family history in first-degree relatives was observed in 21.7% of patients. The most common morphology was the fused type (52.2%), specifically the fusion of the right and non-coronary cusp (66,7%). Most adolescents (26,1%) presented with both stenosis and regurgitation, while 17.4% had aortic root dilatation. Adolescents with BAV had increased pulse wave velocity (PWV) (p= 0.009) and higher central systolic blood pressure (p= 0.02) compared to healthy controls. Linear regression analysis regression analysis in the study population showed that age, weight, height, high BMI, hypertension and a BAV (p=0.009) were significant determinants of PWV. Also, linear regression analysis in children with a BAV showed that aortic root dilatation, the location of the dilatation and the evolution dilatation were determinants of high central systolic pressure (p=0.03, p=0.038 and p=0.05, respectively. The central aortic blood pressure and pulse wave velocity of the aorta in the control group and in patients with a bicuspid aortic valve are are shown in the **Graph** (left and right, respectively).



Conclusions: The study demonstrated that adolescents with bicuspid aortic valve have measurable indications of early arterial stiffening and reduced aortic elasticity. Future larger and long-term studies are warranted to clarify the contribution of bicuspid aortic valve to premature vascular dysfunction and future cardiovascular risk.



P-066 / #781

INFRACARDIAC TOTAL ANOMALOUS PULMONARY VENOUS DRAINAGE TO THE PORTAL VEIN: A RARE NEONATAL PRESENTATION

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[1]The Leeds Teaching Hospitals NHS Trust, Paediatric Cardiology, Leeds, United Kingdom, [2]The Leeds Teaching Hospitals NHS Trust, Congenital Echo Department, Leeds, United Kingdom

Background and Aim: Total anomalous pulmonary venous drainage (TAPVD) accounts for 1–5% of congenital heart disease, with the infracardiac form being the second most common type, representing approximately 26% of cases. Infracardiac TAPVD occurs when pulmonary veins drain into a descending vertical vein that traverses the diaphragm and connects to the inferior vena cava via the ductus venosus, hepatic veins, or portal vein. Because pulmonary venous return bypasses the left atrium, adequate oxygenation depends on right-to-left atrial shunting, and portal venous resistance may worsen obstruction. We report a neonate presenting with postnatal desaturation and unobstructed infracardiac TAPVD draining to the portal vein.
Methods: Data, including echocardiography, CT angiography, operative findings, and treatment records, were retrospectively reviewed, with all patient identifiers removed for confidentiality.
Results: A male infant, aged three hours, was admitted to the neonatal unit following a dusky episode. Born at 38 weeks' gestation with a birth weight of 2550 g, he was clinically well at delivery, and no antenatal abnormalities had been identified. Shortly after admission, he required non-invasive positive pressure ventilation due to low saturations, but escalating oxygen requirement led to intubation and mechanical ventilation. Initial echocardiography demonstrated all four pulmonary veins draining into a common confluence posterior to the left atrium. A descending vertical vein arose from this confluence, appearing unobstructed as it traversed the diaphragm, although its systemic connection was unclear. There was an unrestrictive secundum atrial septal defect with right-to-left shunting, alongside right atrial and right ventricular dilatation and systolic right ventricular pressure of 69 mmHg. There was no obstruction of the pulmonary venous return (figure1). To clarify the connection to the systemic venous drainage, a CT angiogram was performed, revealing that the pulmonary veins formed a long descending channel entering the abdomen and draining anomalously into the portal vein. The portal vein was significantly dilated with intense hepatic enhancement, consistent with anomalous venous return (figure2). The infant underwent successful surgical correction on day two of

life.

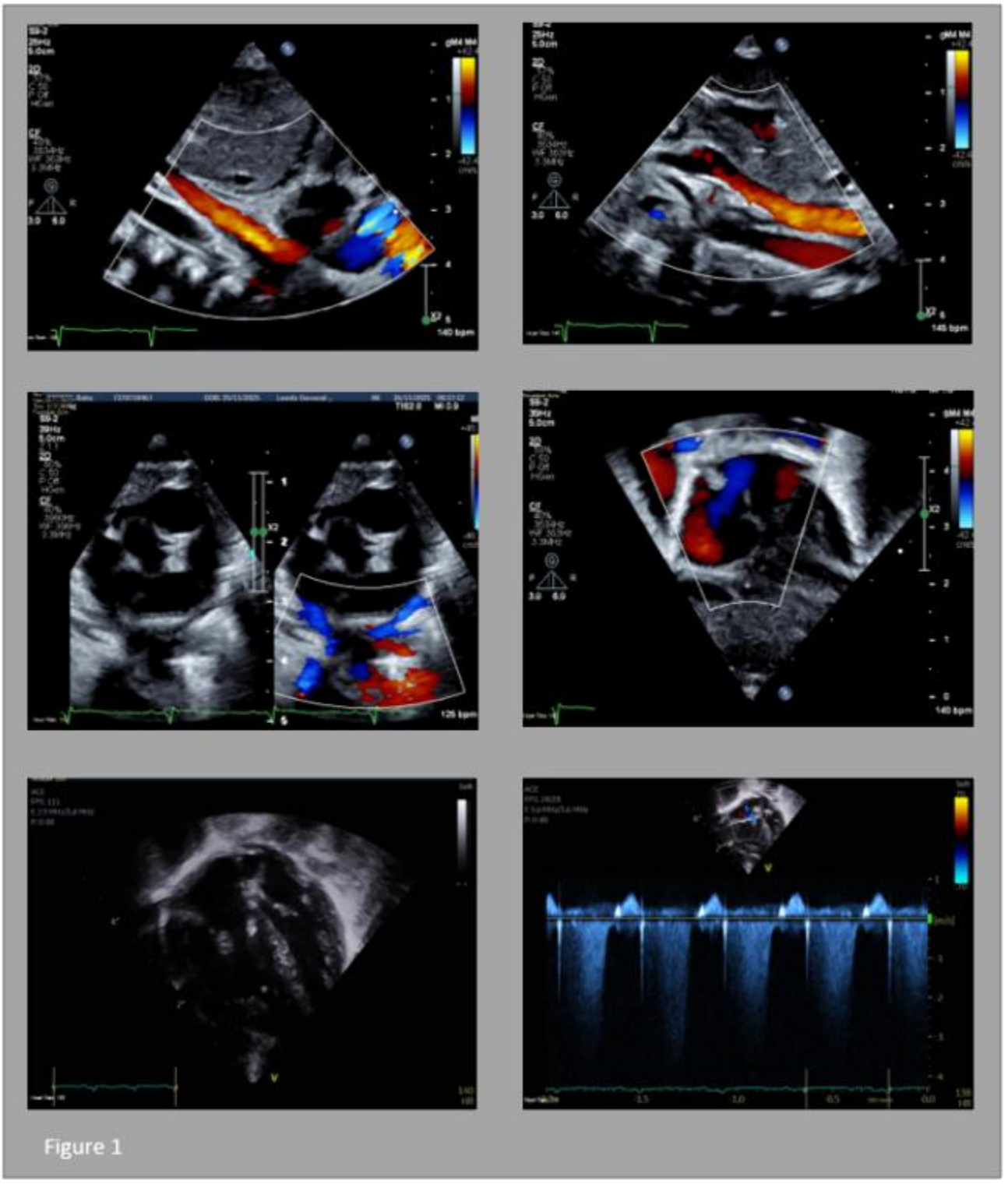


Figure 1



Figure 2

Conclusions: This case illustrates the use of multimodality imaging to clarify the anatomy of a complex cyanotic lesion. Unusually, in this case, there was no obstruction, as is often present in infracardiac TAPVD.



P-067 / #444

ACCESSORY MITRAL VALVE TISSUE WITH OR WITHOUT LEFT VENTRICULAR OUTFLOW TRACT OBSTRUCTION. REPORT OF 4 ADDITIONAL CASES.

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MITERA HOSPITAL, Pediatric Cardiology Department, Athens, Greece

Background and Aim: Accessory mitral valve tissue (AVMT) is a rare congenital anomaly, isolated or associated with other congenital anomalies either asymptomatic or causing symptoms from LVOT obstruction or mitral regurgitation. The aim of the paper is to describe the echocardiographic features of the AMVT that differentiate it from other entities it mimics, like masses or thrombi.
Methods: We present 4 interesting cases of AMVT.
Results: Patient 1 was a thirteen-year-old boy that was referred because of a mobile structure attached to the aortic valve incidentally found during routine sports clearance (Fig.1). ECG was normal and he was asymptomatic. Echocardiography revealed multiple accessory chords from the ventricular surface of the anterior mitral leaflet to the IVS of the LVOT and the aortic annulus (Fig.2) Fig
.1.

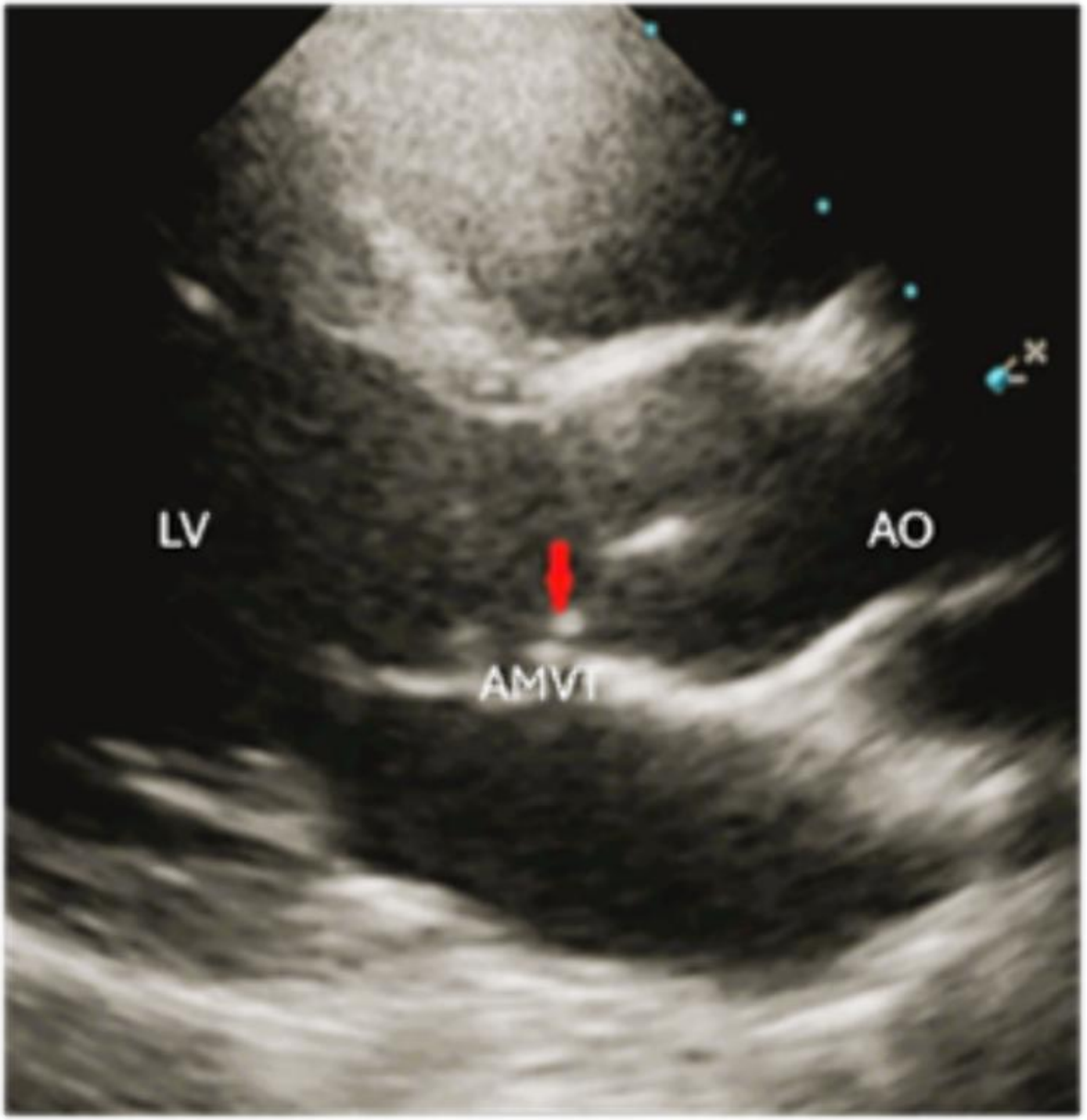
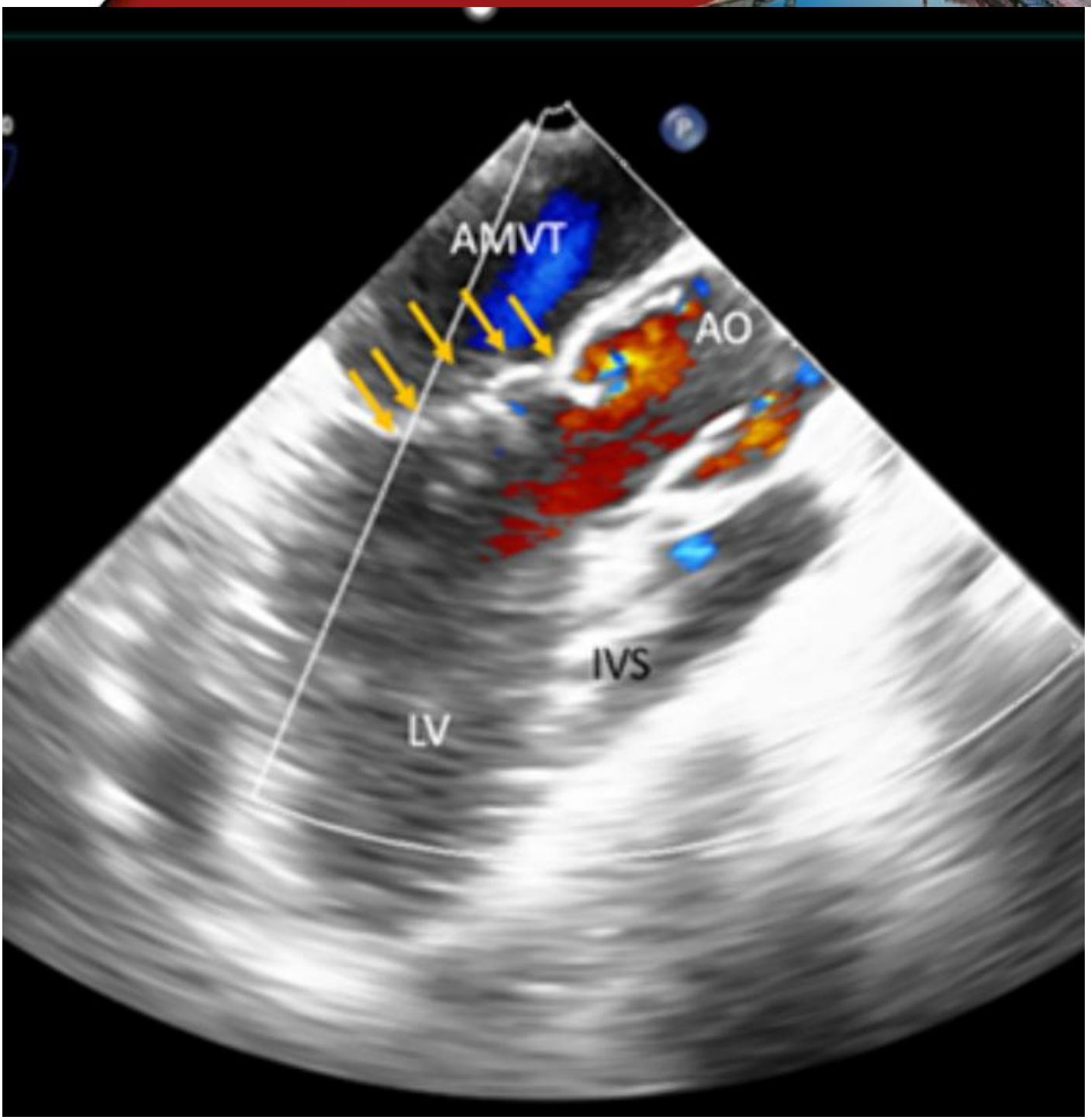
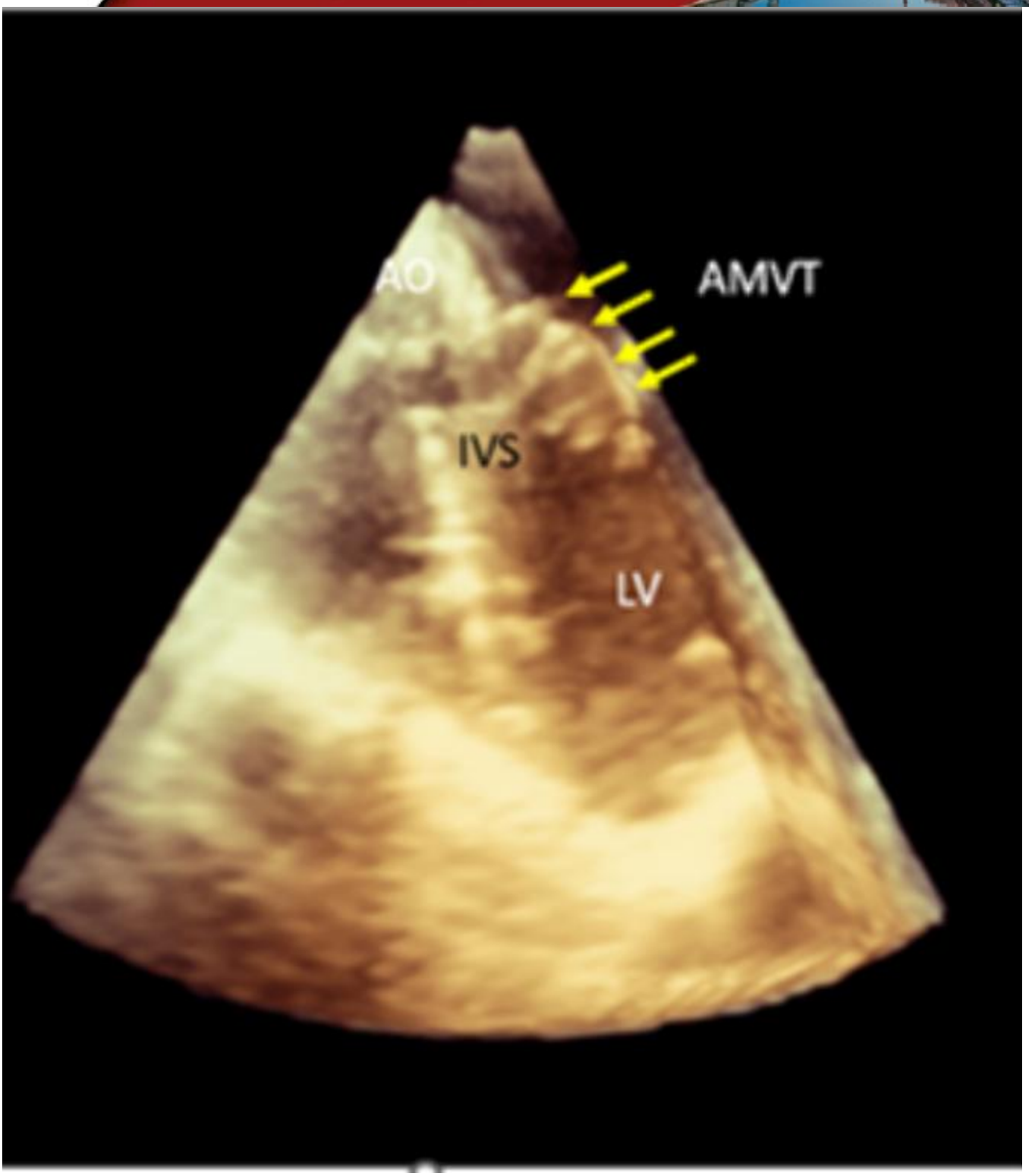


Fig. 2.



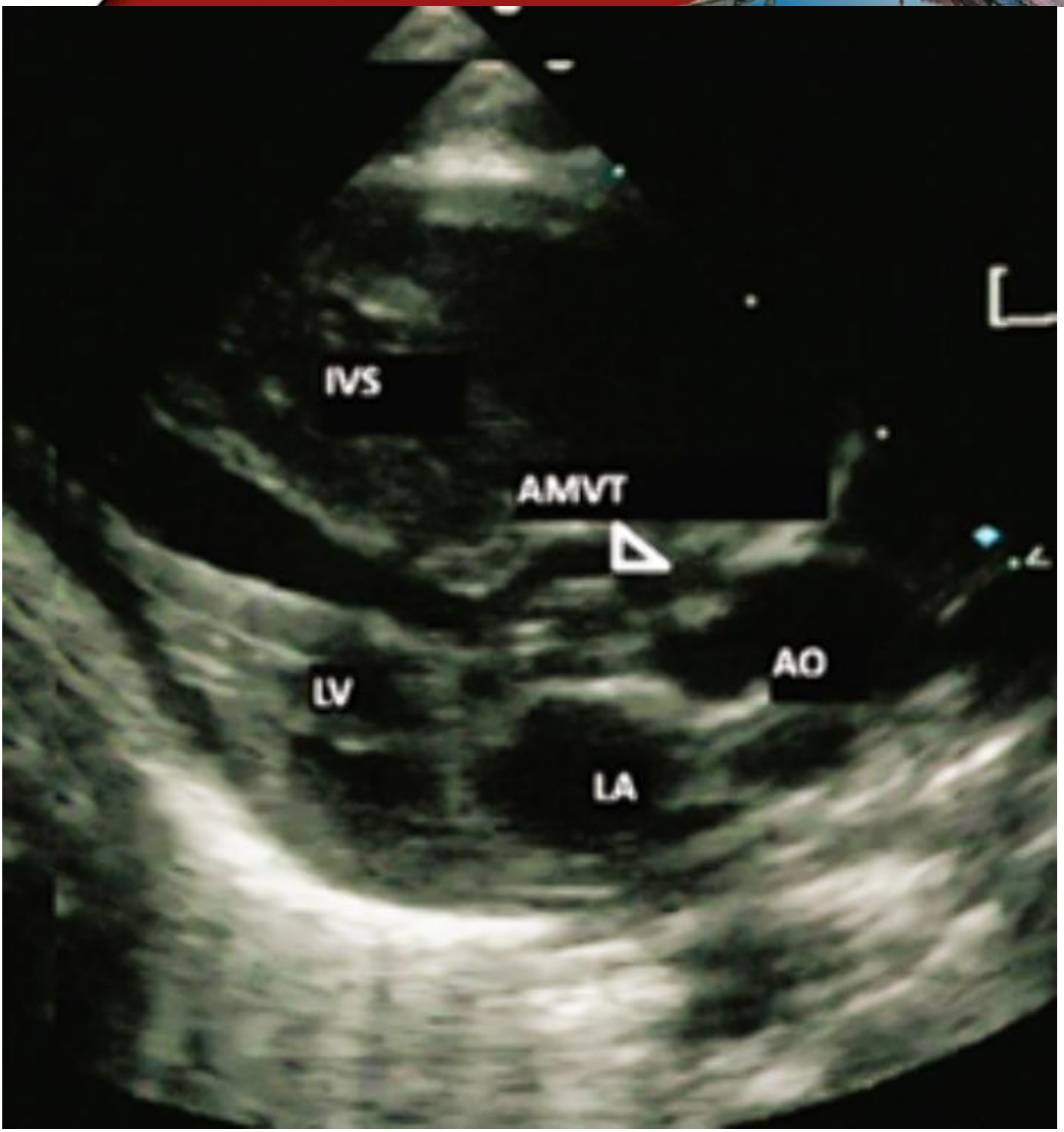
2D and 3D TOE confirmed the presence of multiple chords in the LVOT to the IVS and aortic annulus, not affecting the flow or the function of the aortic valve. (Fig. 3). The stress test was negative and the patient was advised to return for follow up in one year. Fig. 3


AMVT
AO
IVS
LV



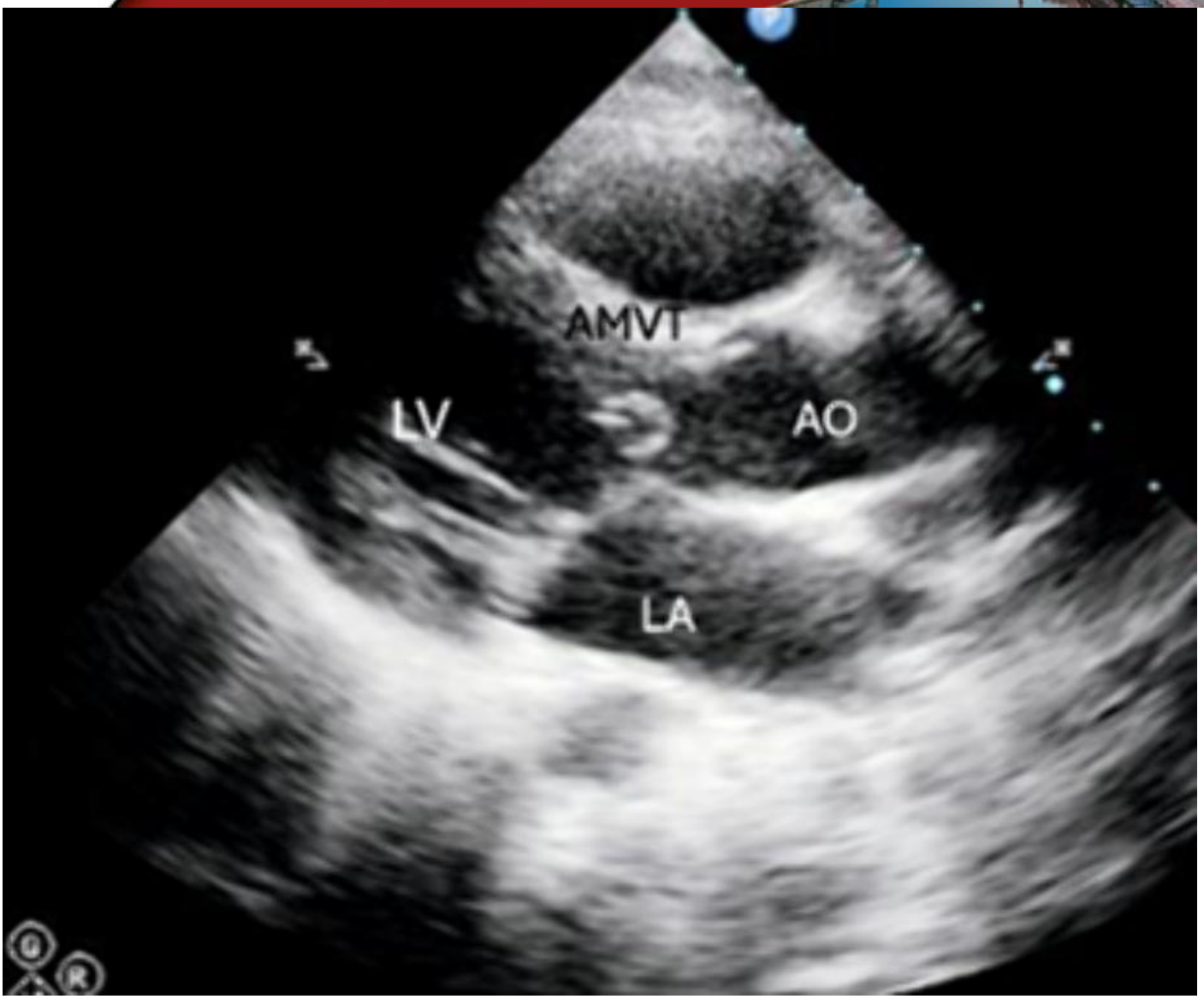
Patient 2 was an asymptomatic neonate referred because of a murmur. Echo revealed a highly mobile circular structure in the LVOT causing severe obstruction that prompted surgical resection (Fig 4).

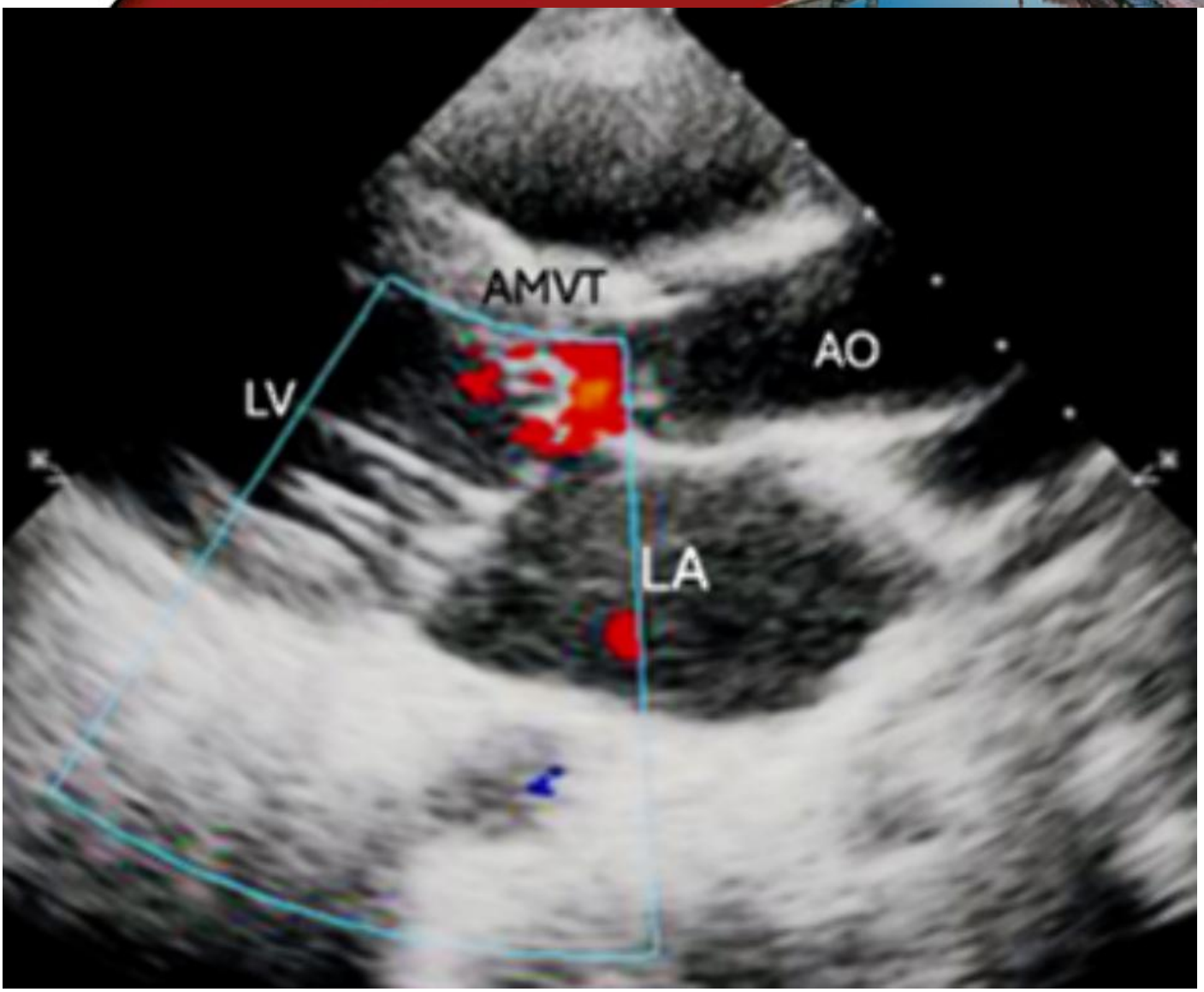
Fig.4



Patient 3 was an 8 year old boy with atypical thoracic pain, without any significant LVOTO. (fig.5)

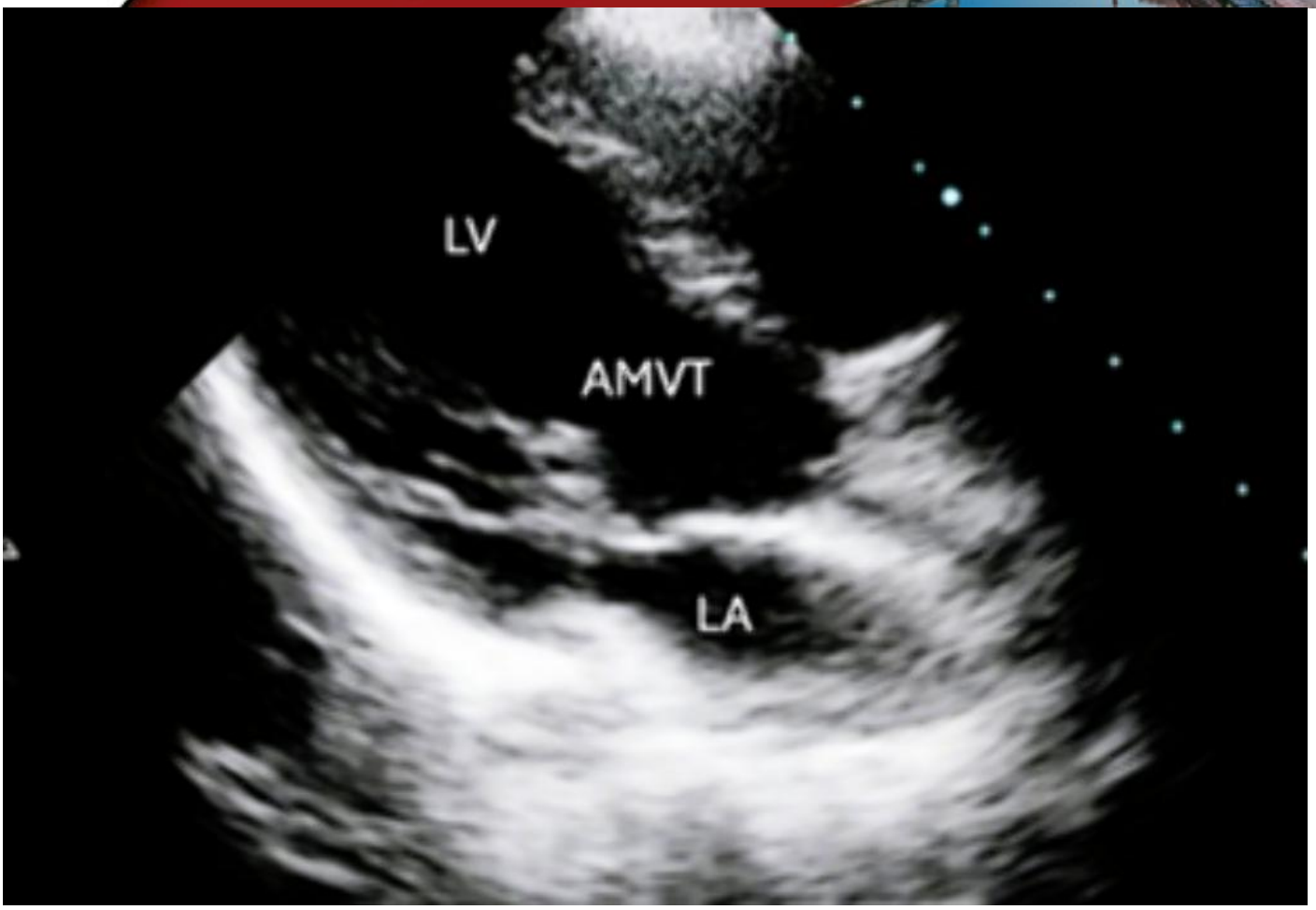
Fig.5

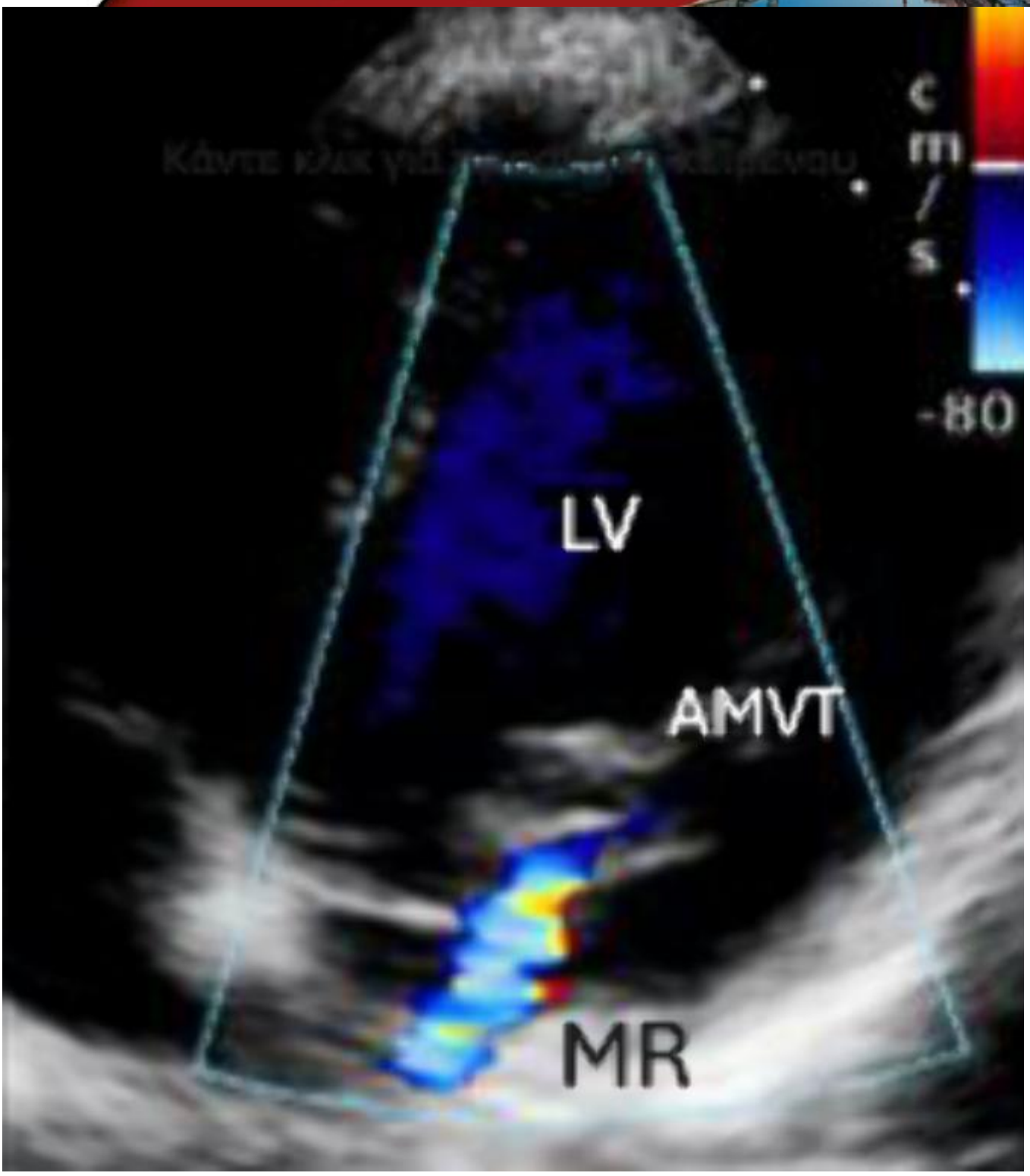

AMVT
LV
AO
LA



Patient 4 was a 3 year old toddler, referred for the incidental finding of an anterior mitral valve leaflet mass, causing mild mitral regurgitation. (Fig. 6).

Fig.6


LV
AMVT
LA



Echocardiography in patients 3 and 4 revealed a circular mobile mass arising from the anterior mitral leaflet protruding into the LVOT. Echo findings did not change during a nine year follow up.

Conclusions: AMVT is a rare entity in children that can be confused with other anomalies



and is usually asymptomatic unless it causes obstruction of LVOT or mitral regurgitation. A detailed echocardiographic study can reveal its characteristics in every case and define the risk of complications.

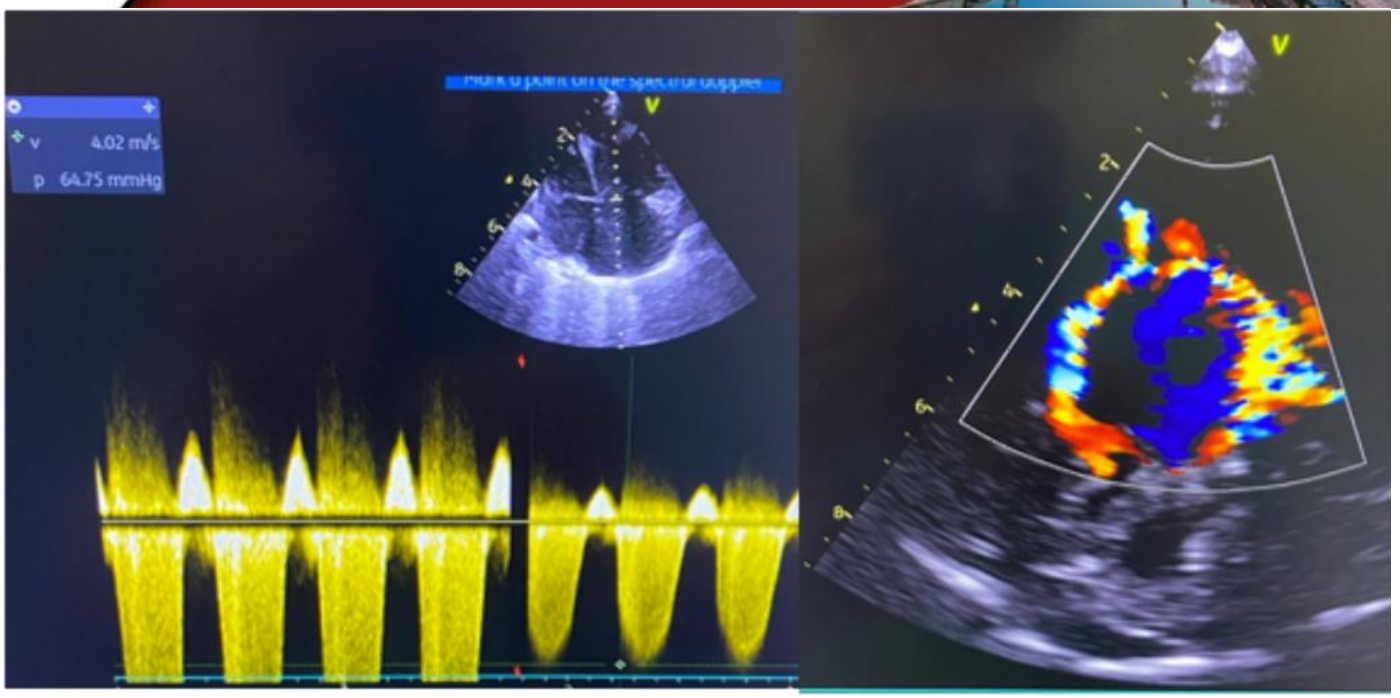


P-068 / #161

VEIN OF GALEN ANEURYSMAL MALFORMATION MIMICKING CRITICAL COARCTATION OF THE AORTA IN A NEONATE: A CASE REPORT

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[1]CLINICAL CENTER OF CHILDRENS' HEALTHCARE OHMATDYT, Department Of Pediatrics, Lviv, Ukraine, [2]Danylo Halytskyy Lviv National Medical University, Propedeutics Of Pediatrics And Medical Genetics, Lviv, Ukraine

Background and Aim: Vein of Galen aneurysmal malformation (VGAM) is a rare congenital cerebrovascular anomaly characterised by high-flow arteriovenous shunting that can lead to severe neonatal high-output cardiac failure. The resulting pulmonary hypertension, right-sided volume overload, and ductal-dependent systemic perfusion may imitate obstructive left-sided congenital heart defects, especially critical coarctation of the aorta. This report aims to describe a neonatal presentation in which VGAM closely mimicked critical coarctation, emphasising the diagnostic challenges and the need for integrated cardiac and neuroimaging.
Methods: We describe the clinical course, cardiac and neuroimaging findings, and management of a term neonate presenting with severe cardiorespiratory compromise shortly after birth. Serial echocardiography and neurosonography were performed to evaluate the cause of circulatory failure. Supportive intensive care measures, including prostaglandin infusion, mechanical ventilation, pulmonary vasodilators, and inotropes, were recorded.
Results: A term male infant (38 weeks, 2830 g; Apgar 5/7/7) was born following a pregnancy complicated by maternal varicella, placental pathology, and prolonged rupture of membranes. Immediately after delivery he developed respiratory distress, cyanosis, and neurological depression. Echocardiography demonstrated markedly dilated right-sided chambers, systemic right ventricular pressure (76 mmHg), severe pulmonary hypertension, hypoplastic aortic arch segments measuring 8/6/4 mm (Z-score - 2), and a large patent ductus arteriosus with right-to-left shunting. These findings were initially interpreted as critical coarctation of the aorta. However, the severity of right ventricular overload appeared disproportionate to the suspected arch obstruction. Cranial ultrasound revealed a large VGAM with progressive ventriculomegaly. The high-flow arteriovenous shunt accounted for the infant's pulmonary hypertension and pseudo-coarctation physiology. Despite maximal neonatal intensive care - including ventilation, inotropes, antibiotics, and metabolic stabilisation - the patient developed refractory multiorgan failure and died on day 22 of life before endovascular treatment could be undertaken.
Conclusions:



VGAM can closely mimic critical coarctation of the aorta, leading to potential misdiagnosis and delayed referral. Early neuroimaging should be considered in neonates with unexplained pulmonary hypertension and disproportionate right ventricular overload. Prompt identification of VGAM is critical to enable timely transfer for specialised endovascular management and to optimise outcomes.



P-069 / #933

INCIDENTALLY DETECTED PERICARDIAL CYST IN A PEDIATRIC PATIENT: MULTIMODALITY IMAGING AND CONSERVATIVE MANAGEMENT.

Daria Lauretta, Angelica De Nigris, Giovanni Maria Di Marco, Rossana Palumbo, Giovanni Salomone, Eleonora Palladino, Rossella Vastarella, Fabiana Cerrato, Cinzia Gallo, Giangiacomo Di Nardo
AORN Santobono Pausilipon Hospital, Cardiology, Naples, Italy

Background and Aim: Pericardial cysts are rare benign congenital anomalies of the pericardium and are infrequently encountered in the pediatric population. They are often asymptomatic and incidentally detected, with multimodality imaging playing a crucial role in accurate diagnosis and anatomical characterization.
Methods: Case report An 11-year-old child presented to the Emergency Department with cough and non-specific chest pain. Physical examination and laboratory investigations showed no evidence of cardiac pathology or infectious disease. As part of the initial diagnostic work-up, transthoracic echocardiography was performed and revealed a well-circumscribed, anechoic, saccular formation located along the lateral wall of the left ventricle, without signs of intracardiac communication or functional impairment. Subsequently, a chest computed tomography (CT) scan, performed to further evaluate thoracic symptoms and better define the lesion, demonstrated a well-defined, fluid-attenuation mass adjacent to the pericardium. To further characterize the lesion and assess its relationship with surrounding cardiac structures, cardiac magnetic resonance imaging (MRI) was subsequently obtained. MRI demonstrated a thin-walled pericardial cyst with homogeneous signal intensity, absence of internal septations, and no contrast enhancement. There were no signs of myocardial involvement, pericardial inflammation, or compression of the cardiac chambers.
Results: Cardiological Assessment and Management:
In light of the absence of cyst-related symptoms and the benign imaging characteristics, a conservative management strategy was adopted. This approach includes regular clinical evaluations, periodic transthoracic echocardiographic follow-up, and scheduled 24-hour ambulatory electrocardiographic (Holter ECG) monitoring to exclude occult rhythm disturbances over time.
Conclusions:
This case highlights the complementary roles of echocardiography, CT, and cardiac MRI in the diagnostic assessment of pericardial cysts, allowing precise localization and detailed tissue characterization. In pediatric patients without symptoms, hemodynamic compromise, or electrical instability, conservative management with structured



cardiological follow-up—including echocardiography and ambulatory ECG monitoring—represents a safe and appropriate strategy.

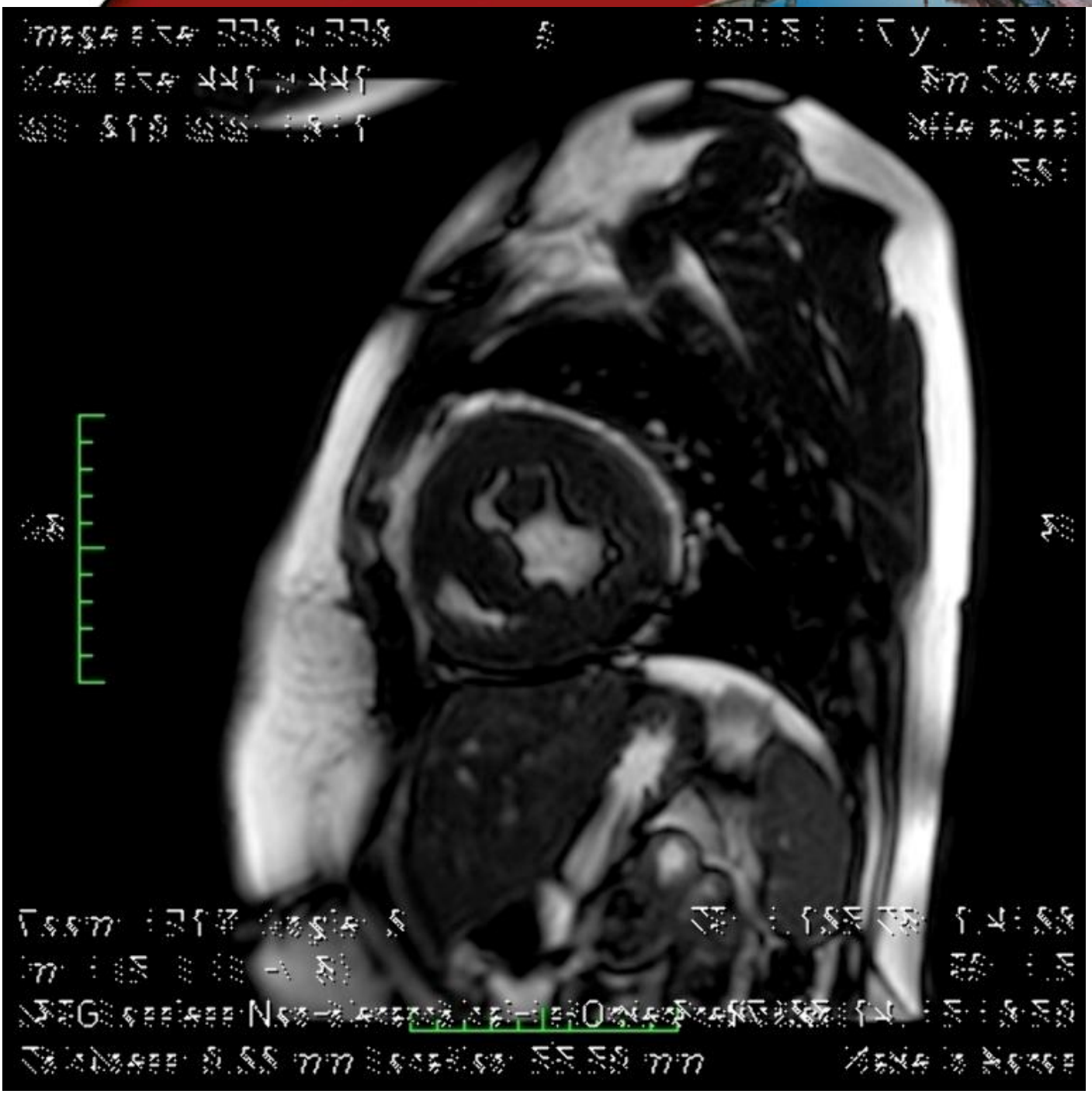


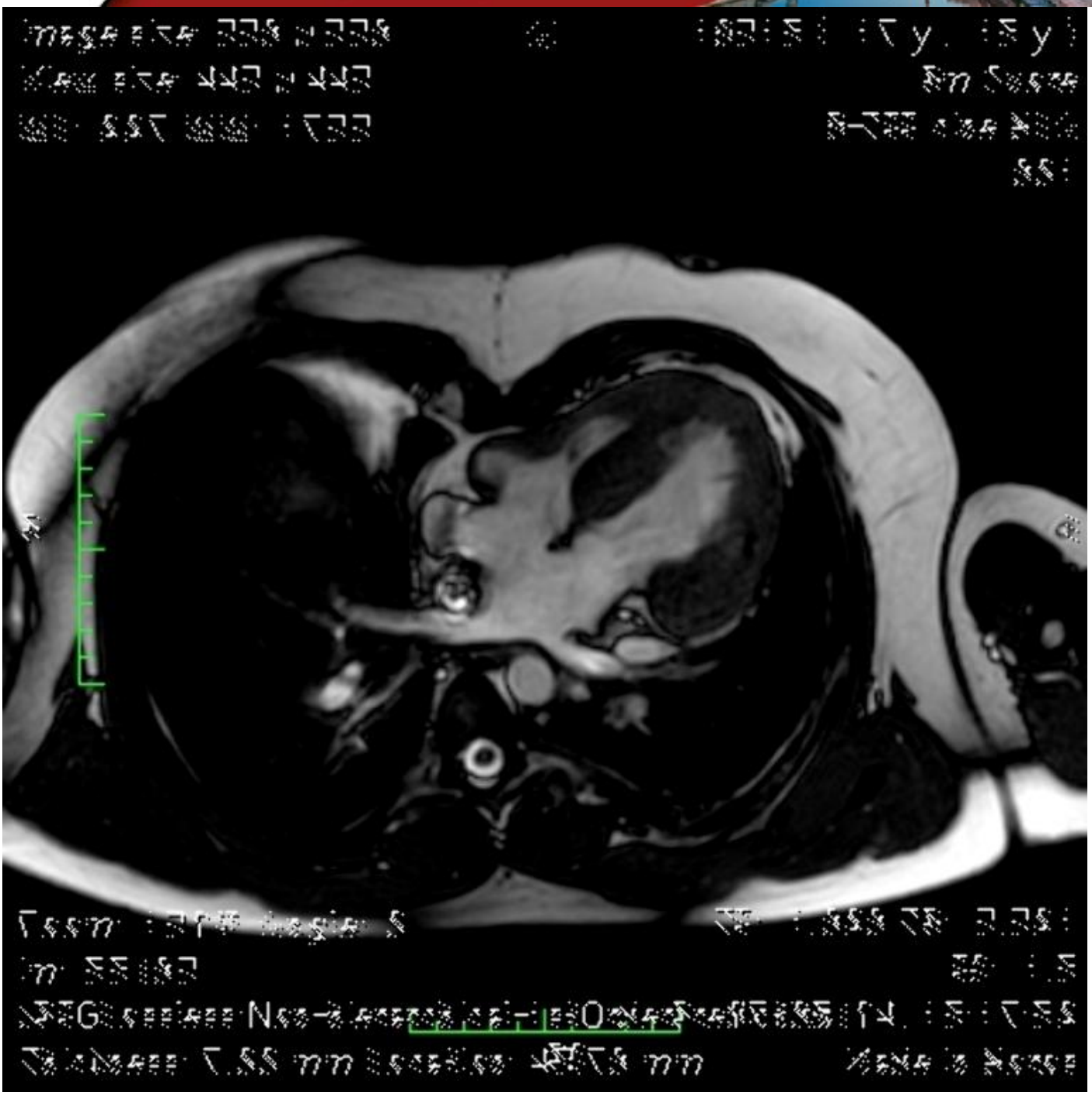
P-070 / #1222

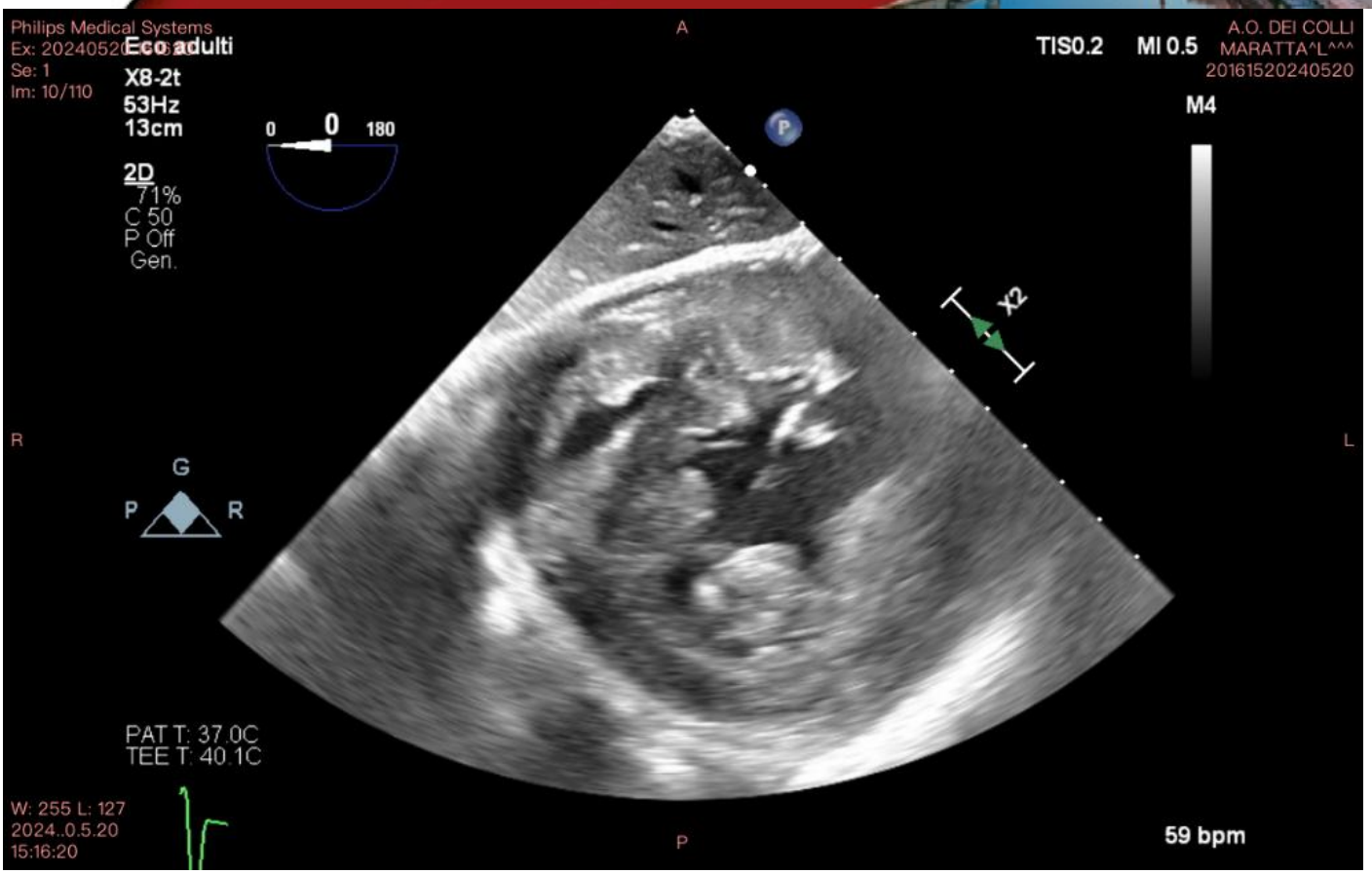
HYPERTROPHYC CARDIOMYOPATHY IN FONTAN PATIENT RELATED TO LATE MID-VENTRICULAR OUTFLOW OBSTRUCTION

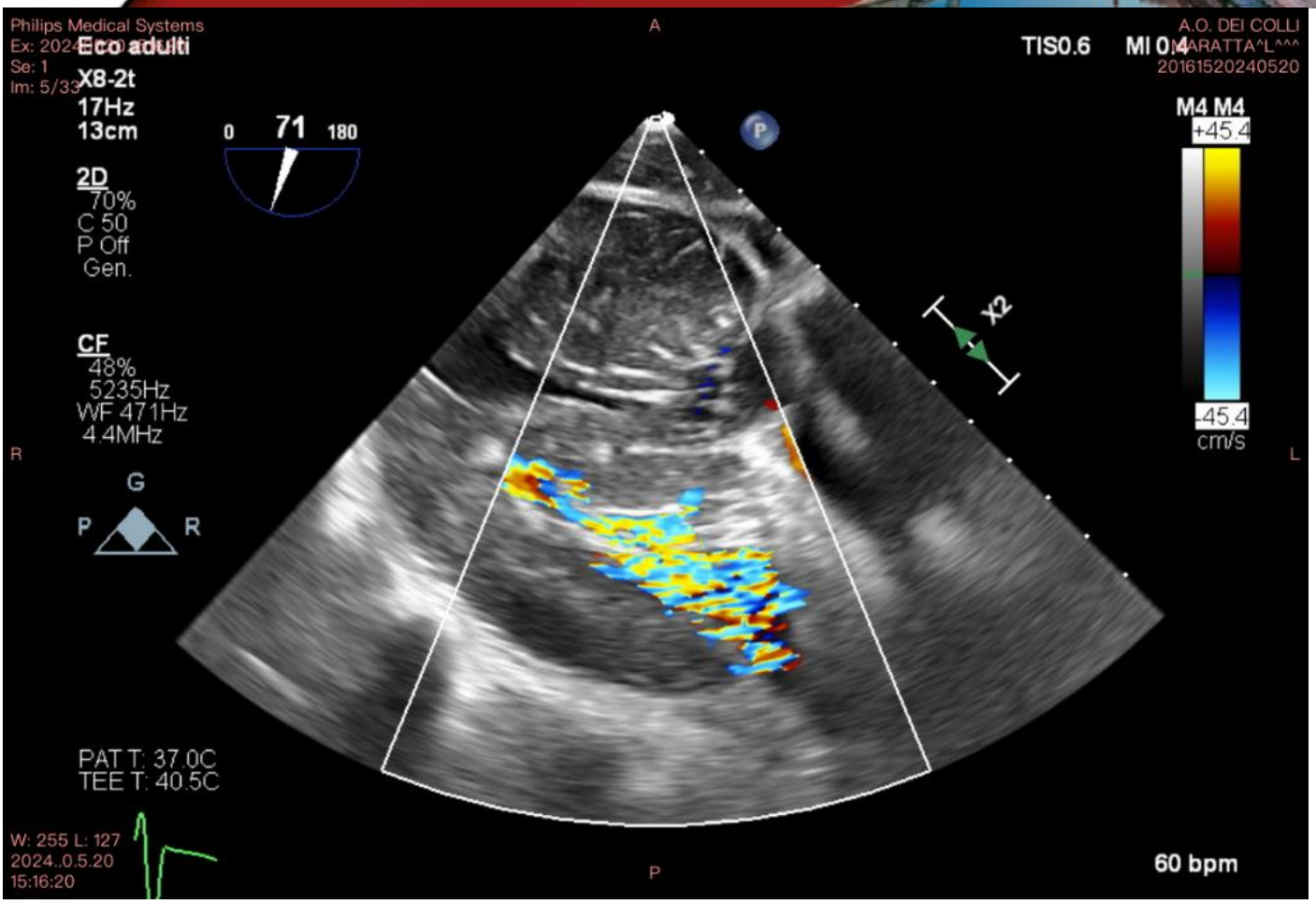
Raffaella Marzullo[1], Raffaella Basile[1], Giancarlo Scognamiglio[2], Flavia Fusco[2], Roberta Ancona[1], Fortuna Del Gaizo[1], Fiorella Fratta[1], Mario Giordano[1], Nicola Grimaldi[2], Michela Palma[2], Guido Oppido[3], Giuseppe Limongelli[4], Berardo Sarubbi[2], Maria Giovanna Russo[1]
[1]University of Campania "Luigi Vanvitelli", Monaldi Hospital, AORN "Ospedali dei Colli", Pediatric Cardiology Unit, Naples, Italy, [2]Monaldi Hospital, Achd Unit, Naples, Italy, [3]Pediatric Cardiac Surgery Unit, Aorn "ospedali Dei Colli", Naples, Italy, [4]Inherited and Rare Cardiovascular Disease Unit, Department of Translational Medical Sciences, University of Campania "Luigi Vanvitelli", Naples, Italy

Background and Aim: Systemic ventricular outflow obstruction in patients with functionally univentricular heart underwent Fontan procedure promotes myocardial hypertrophy, and this has been shown to be an unequivocal risk factor for poor outcomes.
Methods: A 17-year-old man with congenitally corrected transposition of the great arteries, pulmonary valve atresia and multiple ventricular septal defects and background of modified Fontan operation was regularly followed-up in our center. In 2021, the echocardiogram reveled a dynamic obstruction due to prominent muscle ridge of ventricle septum with a peak gradient of 30 mmHg. Thus, he was referred to CMR which showed unobstructed surgical Fontan connections and normal univentricular size and function. Over the next 4 years, the gradient gradually increased across the systemic ventricular outflow tract (range 60-80 mmHg) and the single ventricle developed a severe concentric hypertrophy with a mild dysfunction and a restrictive filling pattern. These data were confirmed by the transesophageal echocardiogram and the newest CMR. The patient was referred to genetic screening for cardiomyopathies and none pathogenetic mutations were detected. Further investigation revelead that the patient had reduced exercise tolerance (VO2 peak 11.1 ml/kg/min). Beta-blocker and SGLT2 inhibitor treatment were introduced and ICD therapy was indicated for frequent non-sustained ventricular tachycardias. Currently, the cardiac transplantation process evaluation is ongoing.
Results:






Philips Medical Systems
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Se: 1
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Eco adulti
X8-2t
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P
59 bpm



We hypothesized that the hyperthrophic cardiomyopathy was related to systemic ventricular outflow obstruction supported by a prominent muscle ridge of the ventricular septum concurring to narrow the space between the right side-ventriculoinfundibular fold and the infundibular septum.

Conclusions: Systemic ventricular outflow obstruction after the Fontan operation is a progressive lesion. We suggest that patients at risk for progressive ventricular outflow obstruction should be managed aggressively in order to get to the optimal care.



P-073 / #503

RETROSPECTIVE STUDY TO COMPARE THE ECHOCARDIOGRAPHIC RV-PA COUPLING INDICES WITH CLINICAL STATUS AND CATHETERIZATION DERIVED RV STROKE WORK INDEX

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Background and Aim:

Primary Objectives

Correlate echo-derived RV-PA coupling indices (TAPSE/PASP, TDI S'/PASP) with clinical symptom severity
Validate echo-derived coupling indices against gold-standard catheter-derived RV stroke work index Assess the clinical utility of non-invasive RV-PA coupling assessment

Methods: Review catheterization database for last 24 months

Cross-reference with echocardiography database for timing concordance

Inclusion:

Heart failure (preserved EF, reduced EF. Isolated LV/ RV/ biventricular dysfunction)
Pulmonary hypertension (pre-capillary, post-capillary)
Pre-tricuspid shunts

Exclusion:

Post-tricuspid shunts, Single ventricles
RV outflow obstruction

Results: In our pediatric cohort, echocardiographic RV–PA coupling indices showed clear relationships with clinical status.

TAPSE/PASP decreased progressively with worsening NYHA/Ross class. Children in NYHA/Ross I–II had significantly higher TAPSE/PASP than those in III–IV (median 0.45 vs 0.28 mm/mmHg, $p<0.001$). A similar pattern was observed for TDI S'/PASP (median 0.24 vs 0.15 cm/s per mmHg, $p<0.001$). Across the whole cohort, both indices correlated moderately and inversely with symptom severity treated as an ordinal variable (Spearman $r\approx-0.45$ for TAPSE/PASP and $r\approx-0.40$ for TDI S'/PASP, both $p<0.001$).



In the ambulatory subgroup (age ≥6 years), lower TAPSE/PASP and TDI S'/PASP were associated with shorter 6-minute walk distance ($r \approx 0.50$ and $r \approx 0.42$ respectively, $p<0.01$), supporting their functional relevance.

TAPSE/PASP correlated moderately to strongly with RVSWI ($r \approx 0.60$, $p<0.001$). TDI S'/PASP showed a slightly weaker but still significant correlation ($r \approx 0.52$, $p<0.001$). When patients were stratified by RVSWI tertiles, median TAPSE/PASP and TDI S'/PASP values increased stepwise across low, intermediate, and high RVSWI groups (global $p<0.001$ for both trends).

On multivariable linear regression adjusting for age, body surface area, and underlying diagnosis, TAPSE/PASP remained independently associated with RVSWI ($\beta \approx 0.45$, $p<0.001$), indicating that it captures true variations in RV pump performance beyond simple size or age effects.

Patients in the lowest TAPSE/PASP tertile had significantly higher NT-proBNP, worse NYHA/Ross class, and a higher 90-day rate of heart failure hospitalization or need for escalation of advanced therapy compared with the upper tertiles (composite event rate ≈30% vs 8%, $p<0.01$). Similar, though slightly less pronounced, gradients were seen with TDI S'/PASP.

Conclusions: The non-invasive TAPSE/sPAP ratio showed good agreement with invasive coupling indices and emerged as a practical prognostic marker, supporting its integration into routine pediatric echocardiographic assessment.



P-074 / #50

SUCCESSFUL CARDIAC RESYNCHRONISATION THERAPY FOR LEFT BUNDLE BRANCH BLOCK INDUCED DILATED CARDIOMYOPATHY IN AN INFANT

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Background and Aim: Cardiac resynchronisation therapy (CRT) with a biventricular pacemaker is an established therapy for adults with left bundle branch block (LBBB) and reduced ejection fraction (EF) after myocardial infarction. We present a case of successful CRT with bipolar epicardial left ventricular (LV) leads in an infant for severe dilated cardiomyopathy with LBBB.
Methods: A 4-month-old male infant presented with tachypnoea, left chest wall asymmetry and cardiomegaly on chest X-ray. His electrocardiogram (ECG) showed complete LBBB with a QRS duration of 160ms. Transthoracic echocardiography demonstrated severe LV dilation (Z-score +10.1) with severely impaired LV systolic function (biplane EF 16%) and moderate mitral regurgitation. Myocardial strain analysis revealed severe electromechanical dyssynchrony with early septal activation and pre-systolic stretch of the posterior and lateral walls, followed by late posterior and lateral wall diastolic activation. The patient was transferred interstate to The Royal Children's Hospital in Melbourne for an electrophysiology and transplant assessment and deemed suitable for CRT, given the LBBB findings on ECG and mechanical dyssynchrony. He underwent an epicardial dual chamber pacemaker (Medtronic™ Azure) insertion with atrial leads to the left atrial appendage and left ventricular leads at the base of the left ventricle. A dyssynchrony assessment was performed intraoperatively to assist with optimal lead placement and optimal atrioventricular (AV) delay to achieve fusion between the AV node conduction and the LV basal pacing.
Results: Immediately after the procedure, the QRS duration reduced from 160ms to 118ms, and dyssynchrony and global myocardial strain parameters significantly improved. Over the 36-month follow-up, the single lead CRT resulted in a progressive, dramatic normalisation of LV dimensions (Z-score +1.8) and systolic function (biplane EF 61%) and physiologic mitral regurgitation.
Conclusions: CRT was highly successful in managing LBBB-induced severe dilated cardiomyopathy and our patient avoided cardiac transplantation. Myocardial strain analysis was clinically valuable in planning for CRT and ongoing surveillance, with excellent demonstration of interval improvement in LV dyssynchrony.



P-075 / #119

VASCULAR RINGS: A SINGLE CENTER RETROSPECTIVE STUDY

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Background and Aim: Vascular rings are rare congenital anomalies of the cardiovascular system caused by abnormal development of the aortic arch. Clinically, they may present with varying degrees of compression of the respiratory tract and/or esophagus.
Methods: A retrospective analysis was conducted on 23 patients (12 females / 11 males) with vascular rings treated at our institution between January 2017 and June 2024. The incidence of various forms of vascular rings, their association with other congenital heart defects (CHDs) and genetic disorders, the rate of prenatal detection, imaging modalities, the need for surgical intervention, surgical outcomes, and survival rates were evaluated.
Results: The incidence of specific vascular ring types was as follows: double aortic arch in 9/23 (39%) patients, various forms of right aortic arch vascular rings in 13/23 (57%), pulmonary sling in 1/23 (4%) patients. The age at diagnosis ranged from 0 to 16 years. Isolated vascular rings were found in 12/23 (52%) patients, while associated significant CHDs were present in 11/23 (48%) patients. Tetralogy of Fallot was the most common associated CHD, found in 7/11 (64%) of these patients. Genetic syndromes were identified in 4/23 (17%) patients—specifically, Down syndrome in 2 and DiGeorge syndrome in 2. The prenatal detection rate of vascular rings was 30% (7/23). CT angiography confirmed the diagnosis of vascular rings in all 23 patients (100%). Surgical interventions were performed in 20/23 (87%) patients. The median age at surgery was 7.5 months (range: 2 months – 6 years) in patients with isolated vascular rings, and 5.5 months (range: 14 days – 1 year) in those with associated CHDs. The survival rate among patients with isolated vascular rings was 100%. Among patients with associated CHDs, the survival rate was 92% (11/12).
Conclusions: Vascular rings may occur as isolated anomalies or in association with other congenital heart defects. Clinical symptoms are typically due to external compression of the tracheobronchial tree or esophagus. CT angiography plays a crucial role in the detailed imaging and diagnosis of vascular rings. This study demonstrates that, once diagnosed, surgical intervention can be performed with excellent outcomes and minimal mortality.



P-076 / #221

PULMONARY ARTERY DIMENSIONS IN THE INTERSTAGE PATIENT WITH HYPOPLASTIC LEFT HEART SYNDROME (HLHS)

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Background and Aim: Patients with hypoplastic left heart syndrome (HLHS) undergo staged palliative surgery towards the Fontan circulation. Superior cavopulmonary connection (SCPC) relies on adequately grown pulmonary arteries (PAs). In our institution, this assessment has been with echocardiography and cardiac Computer Tomography (CT). We describe the 'normal' pulmonary arterial sizes on CT in this cohort.
Methods: We performed a retrospective review of all pre-SCPC CTs in HLHS patients(2016-2024). Demographics and prior procedures were recorded along with pulmonary arterial measurements of both PAs(proximal, mid, distal), cross-sectional area(CSA) calculated and indexed to body surface area.
Results: 46cans across 34 patients between pre-SCPC were analysed**.** 65% male, mean birthweight was 3.1kg(±0.46). There were two premature births(33 and 36 weeks). Primary Norwood was performed in 29, median 4 days(2-13), with 5 having PA bands and then Norwood at a median of 33 days(18-75). 79% had a modified BTT(mBTT) shunt and 21% Sano conduit. Two patients died interstage and one was deemed unsuitable for SCPC. All other patients underwent SCPC at a median age of 117(81-234) days. There was one late death after SCPC related to progressive right ventricular dysfunction. Mean (SD) PA sizes are shown in table 1. The mid and distal LPA were statistically significantly smaller than the RPA, with no linear correlation to native or neo-ascending aorta CSA. Table 1:

	Minimum diameter(mm)	Minimum diameter indexed(mm/m^2)	Maximum diameter(mm)	Maximum diameter indexed(mm/m^2)	Area(mm^2)	Area indexed(mm^2/m^2)
Proximal RPA	4.1(±1.4)	16.3(±4.7)	4.6(±1.5)	18.4(±5.8)	16.3(±9.9)	64.0(±37.6)
Mid RPA	4.5(±1.6)	17.7(±5.5)	5.2(±1.6)	20.8(±6.4)	19.9(±12.3)	78.2(±46.2)



Distal RPA	4.7(±1.8)	18.7(±6.6)	5.6(±1.9)	22.2(±7.4)	23.3(±17.1)	90.9(±63.5)
Proximal LPA	3.3(±1.1)	13.5(±4.6)	4.3(±1.4)	17.2(±5.5)	12.3(±8.2)	48.8(±32.7)
Mid LPA	2.7(±0.9)	10.9(±3.5)	3.4(±1.1)	13.7(±4.5)	8.1(±5.6)	31.8(±21.3)
Distal LPA	3.4(±0.9)	13.4(±3.6)	4.2(±1.3)	16.6(±5.1)	11.7(±6.7)	46.3(±25.2)

Conclusions: With increasing use of cardiac CT prior to SCPC, it is important to understand the 'normal' values. Though we find no correlation, based on the geometric appearances on CT, we believe the RPA/LPA size discrepancy may in part be due to distortion behind the neo-aortic anastomosis. This is a single centre study with majority mBTT shunt so may not be universally applicable, but provides useful information given successful SCPC in all patients.



P-077 / #1271

WHEN THE INFIRIOR VENA CAVA PLAYS HIDE AND SEEK: DIRECT HEPATIC VENOUS DRAINAGE WITHOUT AZYGOS CONTINUATION

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Background and Aim: Congenital anomalies of the inferior vena cava (IVC) are uncommon, and most documented cases involve continuation through the azygos or hemiazygos vein. The present case represents an exceptionally rare variant in which a hypoplastic IVC is accompanied by ectatic hepatic veins draining directly into the right atrium, without any azygos continuation. This anomaly highlights an unusual morphological presentation that can present challenges in diagnosis and management. We discuss this case, emphasizing its rare nature, the diagnostic approach, and implications for follow-up.
Methods: Case report A male infant was referred for cardiology follow-up after prenatal echocardiography raised concerns about a subaortic ventricular septal defect and agenesis of the ductus venosus. Postnatal development, including feeding and growth, was normal. Initial echocardiography revealed a hypoplastic IVC with hepatic venous drainage directly into the right atrium. Abdominal ultrasound suggested persistence of the intrahepatic segment of the IVC, though the hepatic venous return pathway was unclear. Contrast-enhanced CT confirmed the hypoplastic IVC, with right and left hepatic veins converging into an ectatic middle hepatic vein draining directly into the right atrium, without azygos continuation. Given the absence of symptoms, a conservative management strategy was adopted. Follow-up includes clinical evaluation every 6–12 months and echocardiography to monitor atrial size and cardiac function. Liver function tests will be performed to detect early signs of hepatic congestion. Particular attention is given to the risk of thrombosis within the ectatic hepatic veins or hypoplastic IVC. Early recognition relies on careful surveillance for subtle signs such as unexplained swelling, abdominal discomfort, or changes in liver enzymes, which may prompt timely imaging and specialist consultation. Vigilance during follow-up ensures that thrombotic or hepatic complications can be identified and managed promptly.
Results: Imaging revealed a hypoplastic IVC with direct hepatic venous drainage.
Conclusions: This case illustrates a rare congenital IVC anomaly with direct hepatic venous drainage into the right atrium. Multimodal imaging was essential for anatomical



characterization, and conservative management with regular clinical and echocardiographic monitoring, along with selective liver function assessment, is appropriate for asymptomatic patients, with heightened attention to early signs of thrombosis or hepatic dysfunction.



P-078 / #853

PHENOTYPES OF LEFT VENTRICULAR DEFORMATION IN PEDIATRIC CARDIOMYOPATHY: A STRAIN-BASED ANALYSIS

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Background and Aim: Global longitudinal strain (GLS) measured by speckle-tracking echocardiography has become an important tool for the early detection of myocardial dysfunction. Several studies have shown that GLS is more sensitive than left ventricular ejection fraction (LVEF) for identifying subclinical systolic impairment. In hypertrophic cardiomyopathy (HCM), GLS is the most sensitive parameter for detecting early systolic dysfunction and can differentiate phenotypes. In dilated (DCM) and restrictive cardiomyopathy (RCM) reduced GLS values are associated with higher risk of adverse outcomes, including hospitalization and mortality.

Our aims are to characterize global and segmental left ventricular deformation using GLS in different phenotypes of pediatric cardiomyopathy, and to explore its relationship with conventional parameters. A secondary objective was assessing presence of diastolic dysfunction markers.
Methods: A cross-sectional observational study was conducted at a tertiary referral center. Echocardiograms from patients under 18 with diagnosis of DCM, HCM, RCM, or non-compaction cardiomyopathy (NCCM) were included, using the first study available in our institution. Examinations with insufficient data were excluded. Systolic function was assessed using M-mode fractional shortening, M-mode LVEF, and biplane Simpson LVEF. Myocardial deformation analysis (GLS and segmental strain) was performed using GE speckle-tracking. Strain maps were generated according to the AHA bullseye model. Analyses were performed in Stata 19, including descriptive statistics for GLS and Pearson correlations between GLS and LVEF.
Results: A total of 38 patients were included. Mean age was 7 ± 5.2 years, 57% male. Distribution was: DCM (n=13), HCM (n=13), NCCM (n=10), and RCM (n=2). Systolic function averages were: fractional shortening 34%, M-mode LVEF 63.3%, and Simpson LVEF 57.4%. Mean GLS for the entire group was –12.1% . By phenotype: DCM –13%, HCM –13.7%, NCCM –10.3%, and RCM –11%. Correlation analysis showed no significant association between GLS and conventional systolic function parameters. Strain maps were generated and compared with previously described phenotypic patterns.
Conclusions: In this cohort, GLS was reduced across phenotypes, with low values in NCM. The absence of correlation between GLS and systolic function measures shows the



limitation of LVEF in capturing mechanical impairment. Regional strain mapping allowed identification of phenotype-specific deformation patterns, supporting the importance of GLS for early evaluation of pediatric cardiomyopathy.



P-080 / #914

COMPARISON OF DIAGNOSTIC ACCURACY OF CARDIOVASCULAR CT AND TRANSTHORACIC ECHOCARDIOGRAPHY NEONATES AND INFANTS WITH CONGENITAL HEART DISEASE

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Background and Aim: Congenital heart diseases (CHD) are among the most frequent congenital disorders and remain the leading cause of death worldwide, despite advances in the perinatal and perioperative management. Post-natal imaging assessment of babies with CHD has changed over time, cardiovascular CT (CCT) or MRI (CMR) being used with increased frequency. The aim of this study was to compare diagnostic accuracy of transthoracic echocardiography (TTE) and CCT in a cohort of neonates and infants with CHD.
Methods: This retrospective single centre longitudinal study involved babies with CHD born between 2020-2025. We enrolled only newborns and infants below 1 year of age requiring a CCT scan when standard TTE after MDT discussion was considered non conclusive. Sensitivity (Se), specificity (Sp) and accuracy of TTE and CCT compared to intraoperative findings as gold standard were investigated.
Results: We enrolled 26 consecutive patients with CHD (53.8% neonates, 38.5% males), including 6 with tetralogy of Fallot (23.0%), 4 with aortic arch hypoplasia and aortic coarctation (15.4%), 3 with D-transposition of the great arteries (11.5%), 3 with double outlet right ventricle (11.5%), 4 with total anomalous pulmonary venous return (15.4%), 3 with hypoplastic left heart syndrome (11.5%), 3 with other complex CHD (11.5%). The main indication for CCT was coronary arteries anatomy in 10 (38.5%), followed by pulmonary veins in 4 patients (15.4%), aortic arch anatomy in 3 (11.5%), PA branches and MAPCAS evaluation in 4 (15.4%). Se, Sp and accuracy of the non-conclusive TTE were 95.7%, 100%,



96.2% in detecting intracardiac anomalies; 35.7%, 66.7% and 41.2% in extracardiac anomalies and 33.3%, 0% and 11.1% in coronary arteries abnormalities. CCT showed a Se, Sp, accuracy of 100% in assessing intracardiac anatomy and coronary anatomy, 92.9%, 100%, 94.1% for extracardiac thoracic anatomy. All CCT scans ran uneventfully.
Conclusions: While TTE remains highly accurate for intracardiac assessments, CCT may represent a useful technique when echocardiography is not diagnostic dealing with coronary arteries and extracardiac thoracic findings. When warranted, CCT protocols should be tailored to the clinical question and dedicated imagers should supervise the scan in order to optimize surgical planning and patient outcomes while minimizing radiation exposure.



P-081 / #808

MYOCARDIAL WORK DERIVED FROM MYOCARDIAL STIFFNESS AND STRAIN IN CHILDHOOD CANCER SURVIVORS TREATED WITH HIGH DOSE ANTHRACYCLINE THERAPY.

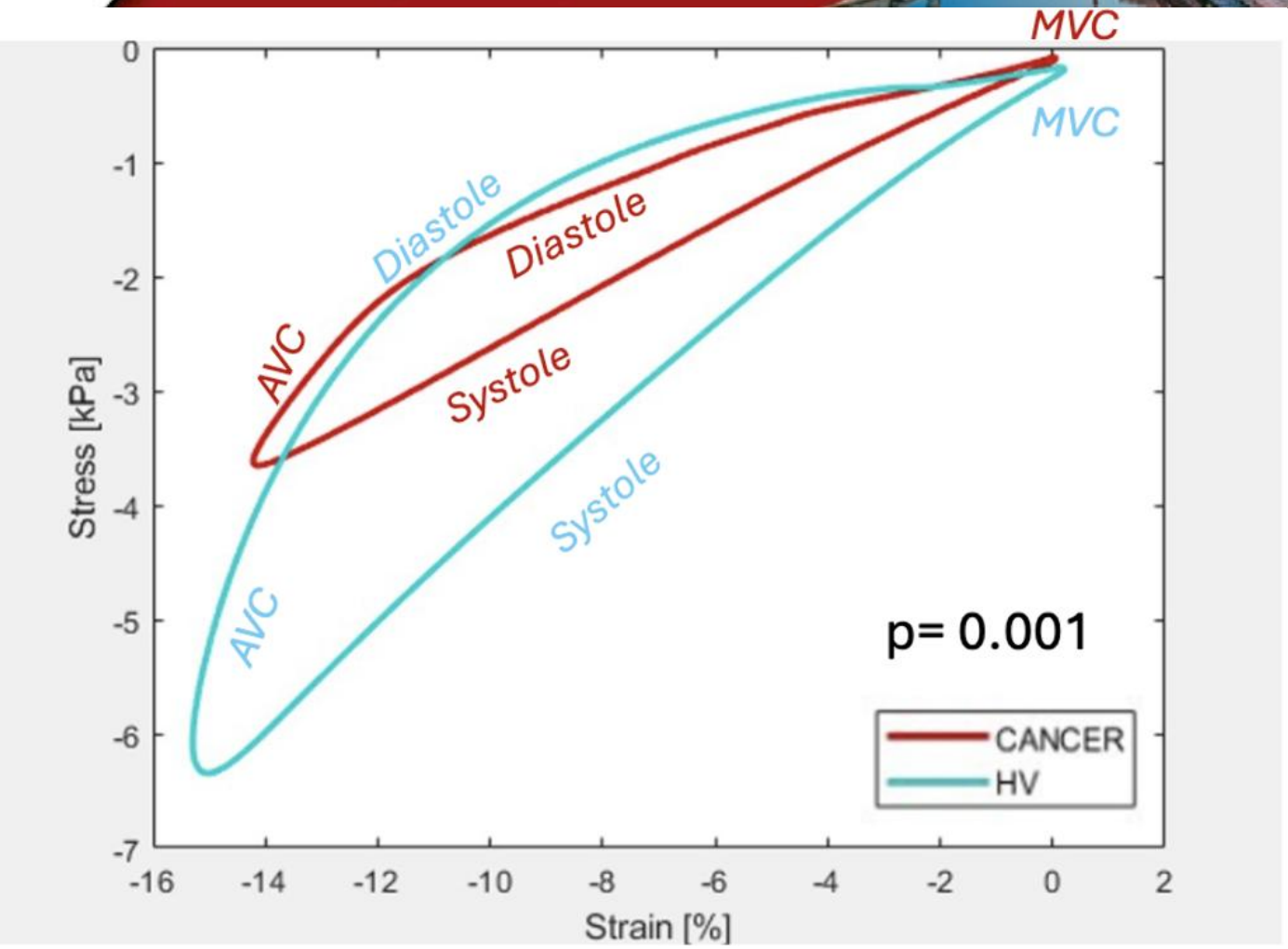
Alice Pozza[1], Luca Zanella[2], Nikan Fakhari[3], Maelys Venet[1,4], Jérôme Baranger[1], Wei Hui[1], Andreea Dragulescu[1], Mark Friedberg[1], Paul Nathan[5], Olivier Villemain[1,3,4], Luc Mertens[1]

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Background and Aim: Recent advances introduced myocardial work (MW) assessment derived from shear wave elastography-myocardial stiffness and strain measurements. The purpose of this study is to compare MW in childhood cancer survivors (CCS) treated with anthracyclines (AC) cumulative doses ≥250 mg/m^2 and ≥ 5 years off therapy with age-matched healthy volunteers (HV).

Methods: This is a prospective single centre, cross sectional study (January 2025-December 2025). We included 20 CCS (median age at study: 16 [IQR 15–17] years, M 9), median AC cumulative dose 367 [IQR 300-435] mg/m2, diagnosed with either solid tumours (n=11) or blood malignancies (n=9) and 20 age-matched HVs. Using a Verasonics system (Verasonics, USA), myocardial strain, thickness, and myocardial stiffness were assessed in the basal antero-septal segment throughout the full cardiac cycle.

Results: Peak systolic shear wave velocity (SWV) was lower in CCS compared to HV (2.97 [IQR 1.7-2.4] m/s vs 4 [IQR 3-3.87] m/s, p 0.01), while mean diastolic SWV was significantly higher in CCS (2.30 [IQR 1.7-2.4] m/s vs 1.62 [IQR 1.42-2] m/s, p 0.01). One-beat segmental work was significantly lower in cancer patients (7.8 ±9.4 Jp/mm), compared to HV (26.9 ±26uJ/mm), p=0.01. Contributive work was significantly higher in HV (61.8±27 kPa%) compared to CCS (38.9±22 kPa%), p=0.02. The stiffness-strain loop area was higher in HV compared to cancer patients (279.5± 243 vs 105.4± 85 kPa% respectively, p 0.01). The stress-strain loop area was higher in HV than CCS (6.6±2.1 vs 4.1±1.6 kPa% respectively, p 0.001) (Figure
1).



Conclusions: Myocardial function assessment in CCS is challenging as conventional measurements of pump function do not accurately reflect myocardial function. Our study indicates that high-dose AC exposure is associated with impaired myocardial work ≥ 5 years after treatment, suggesting a decreased contractile function even in patients with preserved global longitudinal strain. Our findings provide additional rationale for long-term surveillance in the CCS group.



P-082 / #849

ASSESSMENT OF MEDIUM-TERM IMPACT OF HIGH DOSES CARDIOTOXIC ANTHRACYCLINE ON MYOCARDIAL AND LOCAL ARTERIAL STIFFNESS USING SHEAR WAVE IMAGING IN CHILDHOOD CANCER SURVIVORS

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Background and Aim: We investigated the medium-term impact of high-dose anthracycline (AC) on myocardial and carotid stiffness in childhood cancer survivors (CCS) using ultrasound-based shear wave elastography (SWE).
Methods: This is a prospective single-centre, cross-sectional study (January 2025-December 2025). For the patient group, we included 40 CCS treated with AC cumulative dose ≥250 mg/m^2 and off therapy ≥5 years. Data of CCS were compared with those from 40 age-matched healthy volunteers (HV). All data were obtained on a Verasonics Vantage ultrasound scanner (Verasonics, USA). Myocardial stiffness (MS) was assessed using induced SWE in the interventricular septum as per protocol, measuring both peak systolic and mean diastolic shear wave velocity (SWV). Local natural arterial pulse wave velocities (PWV) were measured in the left common carotid artery by using ultrafast ultrasound imaging. Both PWV at the systolic foot (PWV-sf) and at the dicrotic notch (PWV-dn) were measured.
Results: The CCS group (age at study: 16 [IQR 15-17] years) were treated for solid tumors (53.66%) or blood malignancies (46.34%). Figure 1 depicts the SWV throughout the full cardiac cycle. Table 1 reports the SWV and PWV data in CCS and HV. In the multivariable model, cancer diagnosis was the only independent predictor of peak systolic SWV (β= -0.88, P< 0.001), mean diastolic SWV (β= 0.41, P< 0.001) and dnPWV (β= 0.95, P= 0.001).

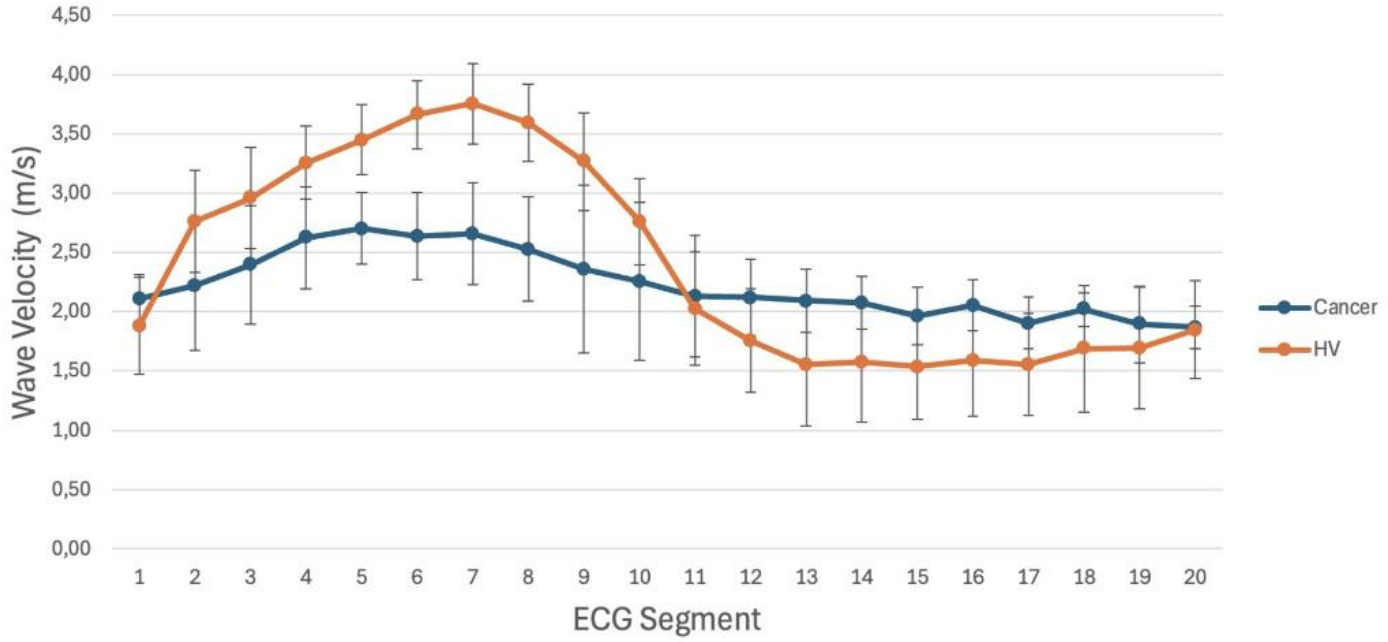


Table 1: Shear wave imaging in CCS and HV.

Variable	CCS	HV	p value
Peak systolic SWV (m/s)	2.97 [IQR 2.77-3.01]	3.77±0.4	0.0001
Mean diastolic SWV(m/s)	2.04±0.38	1.64±0.22	<0.0001
PWV-sf (m/s)	5.69 ± 0.69	4.68 ±0.96	<0.0001
PWV-dn (m/s)	7.95 ±0.80	6.90 ±0.86	<0.0001

Conclusions: CCS present altered MS in both systole and diastole, and higher arterial stiffness compared to HV. In multiple regression analysis, cancer diagnosis emerged as the main independent predictor of both peak systolic and mean diastolic SWV. We hypothesize that the lower systolic values could indicate decreased intrinsic contractility, while higher diastolic values indicate differences in diastolic function between CCS and HV. Future studies should explore CCS clinical outcomes based on changes in myocardial and vascular stiffness.



P-083 / #1421

ECHOCARDIOGRAPHIC ATRIAL STRAIN FOR NON-INVASIVE ESTIMATION OF PULMONARY ARTERY WEDGE PRESSURE IN FONTAN PATIENTS

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Background and Aim: Diastolic dysfunction is present in approximately 70% of patients with a functional single ventricle following Fontan palliation. The resulting elevation in atrial pressure is a critical determinant of Fontan failure. This study aimed to investigate the relationship between echocardiographic atrial strain and invasive atrial pressure, and to explore a non-invasive methodology for estimating pulmonary artery wedge pressure (PAWP) in this population.

Methods: We enrolled 61 Fontan patients (mean age: 14.3 years; 72% male) who underwent simultaneous cardiac catheterization and transthoracic echocardiography. Patients were classified into three groups based on atrial morphology: 1) Common Atrium (CA; absence of atrial septum), 2) Left Atrium (LA; presence of an isolated right atrium not connected to the single ventricle), and 3) Bi-Atrium (BA; separated by a fenestrated atrial septum). Atrial reservoir, conduit, and pump strains were quantified using speckle-tracking analysis from apical four-chamber views. These parameters were compared with invasively measured single ventricular end-diastolic pressure (SVEDP) and PAWP.

Results: The cohort comprised 21 CA, 21 LA, and 19 BA patients. Atrial reservoir strain demonstrated a significant negative correlation with PAWP in the CA ($r=-0.58$, $p<0.01$) and BA ($r=-0.56$, $p=0.01$) groups. Conversely, no significant correlation was observed in the LA group ($p=0.71$). Neither conduit nor pump strain correlated with PAWP in any group. Furthermore, SVEDP showed no significant association with any atrial strain parameters. Based on linear regression analysis incorporating 95% prediction intervals in the combined CA and BA cohort (n=40), an atrial reservoir strain of < 7.8% was identified as a preliminary threshold for predicting elevated PAWP (≥12 mmHg).

Conclusions: Atrial reservoir strain is significantly associated with PAWP in Fontan patients with CA and BA morphologies, but not in those with LA morphology. Although further large-scale validation is warranted, an atrial reservoir strain of < 7.8% may serve as a potential non-invasive indicator for identifying patients at risk of elevated PAWP (≥12 mmHg).





P-086 / #1397

PREDICTORS OF TAPSE AND RIGHT VENTRICULAR DIMENSIONS IN PEDIATRIC ECHOCARDIOGRAPHY

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Background and Aim: TAPSE (Tricuspid Annular Plane Systolic Excursion) is an echocardiographic measurement used to assess right ventricular (RV) systolic function. This study aims to identify the best singular predictor for TAPSE in a pediatric population.
Methods: A retrospective analysis was conducted on echocardiographic studies of patients aged 1–18 years with normal findings and adequate 2D/M-mode images. TAPSE was measured using the standard M-mode method, while RV long-axis dimensions were obtained via 2D and M-mode. Predictor performance was assessed through simple linear regression, evaluating R^2 values for age, height, weight, BMI, and RV dimensions. Statistical analysis was performed using Wizard 2 software, with significance set at $p < 0.005$. Values were presented as mean +- SD or median (Q1–Q3) depending on the data distribution.
Results: A total of 84 previously archived echocardiographic recordings were eligible for analysis. The mean TAPSE was 22.56 ± 4.484 mm • The strongest predictor for TAPSE was M-mode RV Major measurement, with an R^2 value of 0.369. • The 2D RV length also showed a moderate correlation with TAPSE ($R^2 = 0.309$). • Age, height, and weight had weaker predictive values (R^2 ranging from 0.302 to 0.33), indicating that while growth parameters contribute, structural echocardiographic measures provide stronger predictive value for RV systolic function.
Conclusions: This study highlights the key echocardiographic and clinical predictors of TAPSE and RV dimensions, contributing to the establishment of normative values in a pediatric population. The findings indicate that M-mode RV Major measurement is the most effective singular predictor of TAPSE, followed by 2D RV length. While age, height, weight, and BMI influence TAPSE to some extent, their predictive strength is comparatively lower. These insights are essential for optimizing echocardiographic assessments of right ventricular function, particularly in pediatric patients, by refining measurement techniques and adjusting for patient size and age.



P-087 / #1478

LONGITUDINAL ECHOCARDIOGRAPHIC TRAJECTORIES IN A COHORT OF CHILDHOOD CANCER SURVIVORS WITH ANTHRACYCLINE-INDUCED CARDIAC DYSFUNCTION.

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Background and Aim: Current cardiotoxicity guidelines offer limited guidance for pediatric patients who already exhibit cardiac impairment following anthracycline (AC) therapy, leaving a critical gap in risk-adapted surveillance. We aimed to characterize the longitudinal echocardiographic evolution of cardiac structure and function in childhood cancer survivors (CCS), with the goal of stratifying patients at risk of progression to moderate-to-severe cardiac dysfunction (CD).
Methods: Retrospective single-center study including pediatric cancer patients who developed AC-induced CD over a 20-year period (2004-2024). Serial echocardiographic parameters were analysed, focusing on ventricular geometry, systolic and diastolic function. Cardiac structure was evaluated by wall thickness and thickness to dimension ratio (TDR) and values were expressed as BSA normalized z-scores. Longitudinal changes were modelled using mixed-effects models and analysed within two groups according to CD: moderate to severe systolic dysfunction group (Ejection Fraction (EF) ≤ 44%) and mild systolic dysfunction group (EF 45-50%).
Results: Seventy-six patients were included; the median age at cancer diagnosis was 7.6 years [IQR 3.6–11.9], and it did not differ between CD groups. Moderate to severe CD was found in 49 patients (64%), mild CD was found in 27 (36%). Both septal and posterior wall thickness and TDR z-scores diverged significantly between the two CD groups (p=0.002, p=0.035 and p=0.008, respectively), with a progressive decline in the moderate to severe CD group compared to a more stable trajectory in the mild CD group. Systolic function evaluated by EF and Global Longitudinal Strain (GLS) progressively declined over time in both CD groups, in a parallel pattern (p=0.57). The moderate to severe CD group had lower EF and GLS values at baseline. The two subgroups did not present any significant difference in diastolic parameters.
Conclusions: Our findings highlight the value of interpreting echocardiographic trajectories in CCS with AC-induced cardiac dysfunction. Integrating baseline systolic



function with serial measurements of structural and systolic parameters may help identify patients at high risk of progressing to moderate-to-severe CD.



P-088 / #376

UTILITY OF FDG-PET/CT IN INFECTIVE ENDOCARDITIS: A SINGLE-CENTER STUDY OF 12 CASES ON INFECTION LOCALIZATION AND TREATMENT RESPONSE ASSESSMENT

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Background and Aim: End-of-treatment (EOT) 18F-fluorodeoxyglucose positron emission tomography/computed tomography (FDG-PET/CT) is a promising tool to assess treatment response in infective endocarditis (IE). Previous studies report a high negative predictive value when EOT PET/CT is negative, whereas positive findings remain difficult to interpret. We describe our single-center experience with FDG-PET/CT performed near the end of antibiotic therapy in patients with IE.
Methods: We retrospectively reviewed patients with definite or possible IE at our institution who underwent FDG-PET/CT toward the end of intravenous antibiotic therapy, before completion. Clinical characteristics, echocardiographic and microbiological data, and PET/CT findings were collected. All scans followed recommended cardiac PET preparation with low-carbohydrate diet and fasting. PET/CT was considered positive when focal or heterogeneous FDG uptake compatible with active infection was seen along cardiac structures or extracardiac foci, and negative when no abnormal uptake suggestive of infection was present. We evaluated the contribution of PET/CT to infection localization, assessment of treatment response, and management decisions.
Results: Twelve patients with IE underwent FDG-PET/CT near the end of antibiotic therapy. FDG-PET/CT was positive in 5 of 12 cases (41.7%). In these patients, PET/CT clarified the localization of infection (e.g., prosthetic valve or extracardiac embolic foci) and supported assessment of residual inflammatory activity. In one PET/CT-positive case, persistent focal uptake led to prolongation of antibiotic therapy, and a follow-up PET/CT demonstrating a marked decrease of FDG uptake allowed a more confident decision to discontinue treatment. In other positive cases, persistent or extensive FDG uptake was interpreted as indicating the limits of medical therapy and contributed to the decision to proceed to surgical intervention in multidisciplinary team discussions. In the remaining 7 patients, FDG-PET/CT showed no abnormal uptake compatible with active infection.
Conclusions: Our experience suggests that FDG-PET/CT performed near the end of antibiotic therapy may help localize infection more accurately, better evaluate treatment response, and guide management in selected patients with IE. Although this series is small and descriptive, the data support a complementary role of near-end-of-treatment PET/CT



within a multimodal imaging strategy. Larger prospective studies are needed to define which patients benefit most and to clarify its impact on clinical decision-making.



P-089 / #309

18F-FDG PET/CT: REVOLUTIONIZING THE DIAGNOSIS OF INFECTIVE ENDOCARDITIS

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Background and Aim: •Diagnosing infective endocarditis (IE) in patients with prosthetic valves or complex cardiac conditions, especially in the paediatric and grown-up congenital heart (GUCH) populations, poses a significant challenge. •Echocardiography, the standard diagnostic tool, often yields inconclusive results, particularly in prosthetic valve endocarditis (PVE). •FDG PET/CT offers a promising solution by detecting infection through metabolic activity. •This study evaluates its diagnostic accuracy in cases of suspected IE with inconclusive echocardiographic findings. •Role of FDG PET in Infective Endocarditis •What additional value it has to the prevailing Diagnostic Criteria
Methods: •This Prospective study was conducted over two years, from July 2022 to June 2024, including all pediatric (0-18years) and GUCH patients with clinical suspicion of IE who underwent FDG PET/CT scans at our center. •Patients were included based on clinical presentations of fever, positive blood cultures, or suggestive echocardiographic findings. Clinical data, including fever duration, blood culture results, and echocardiographic findings (both transthoracic and transesophageal), were recorded. •Duke criteria were used for final diagnosis categorization. •FDG PET/CT scans were evaluated for abnormal metabolic uptake suggestive of infection in both cardiac and extracardiac sites.
Results: •The cohort included 14 patients (10 males, 4 females) aged 2 to 64 years (mean age: 19.57 years). •Twelve patients (85.7%) presented with fever (mean temperature: 100.9 ± 1.4°F; •Mean fever duration: (3 weeks). •Two patients were afebrile and tested negative on FDG PET/CT.
Conclusions: FDG PET/CT Findings •Increased FDG uptake suggestive of infection was observed in 7 out of 14 patients •Sites of increased metabolic activity were seen primarily in prosthetic devices, cardiac patches, and pulmonary regions

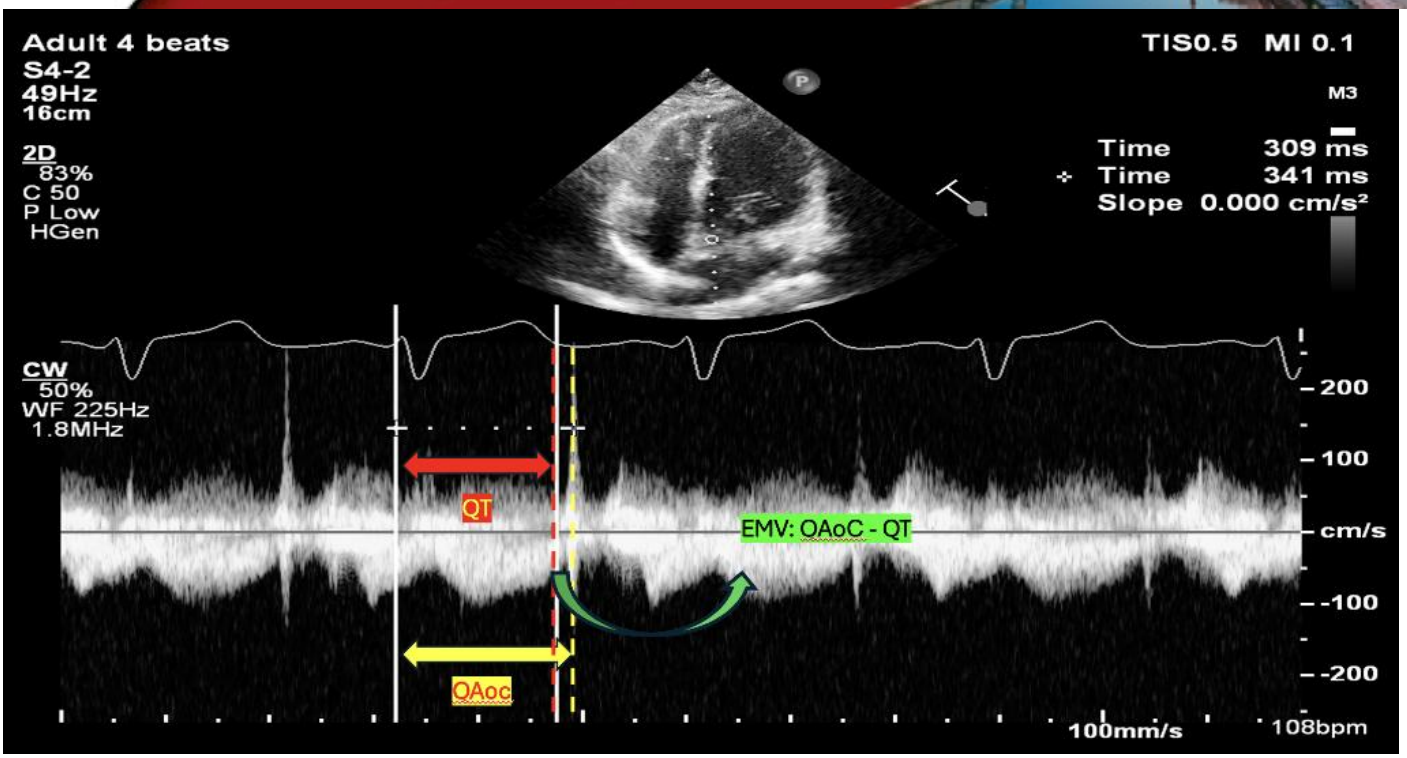


P-090 / #177

ELECTROMECHANICAL WINDOW AS A MARKER OF ACUTE MYOCARDITIS PHENOTYPE : INSIGHTS FROM STRAIN IMAGING, CARDIAC MRI, AND HOLTER MONITORING

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Background and Aim: Acute myocarditis is a common childhood cardiac condition with a highly variable clinical course, ranging from asymptomatic presentation to severe cardiac dysfunction and malignant arrhythmias. Prognostic assessment remains challenging. The electromechanical window (EMW) is an echocardiographic marker reflecting myocardial electrical–mechanical interaction and has been associated with arrhythmic risk. This study aimed to evaluate the association between echocardiographically measured EMW and clinical findings in pediatric myocarditis.
Methods: In this prospective study, clinical data, electrocardiographic recordings, and transthoracic echocardiographic images of 20 pediatric patients diagnosed with myocarditis were compared with those of 40 age-matched healthy children. EMW was calculated using continuous-wave Doppler with simultaneous ECG recording as the difference between the interval from QRS onset to aortic valve closure (QAoC) and the QT interval (EMW=QAoC−QT)(İmage 1). To account for heart rate variability, corrected EMW (EMWc=EMW/√RR) was also evaluated. Associations between EMW values and PR, QRS, and QTc intervals, left ventricular systolic function assessed by shortening fraction(SF), global longitudinalstrain(GLS), presence of ventricular arrhythmias, and clinical course were
analyzed.



Results: Myocarditis was more frequently observed in male patients. EMW and EMWc values were significantly more negative in the myocarditis group compared with healthy controls. Despite increased EMW negativity, no significant QTc prolongation was observed in these patients. There was no statistically significant correlation between EMW and left ventricular shortening fraction. PR and QRS intervals were longer in the myocarditis group compared with controls. These findings suggest that EMW may provide prognostic information independent of QTc duration. Among the 20 myocarditis patients with Holter monitoring, non-sustained ventricular tachycardia was detected in two patients and frequent premature ventricular contractions in two others; these patients demonstrated markedly negative EMW values ranging from −2 to−32 ms. Due to limited event numbers, statistical analysis was not performed(Table
1).



	Myocarditis patients (n:20)	Control group (n:40)	p
Male sex	16 (%80)	20 (%50)	**0,029**
Age	15,2 [IQR 11,6–17,1]	13,1 [IQR 9,1–16,3]	>0.5
Heart rate (bpm)	82,5 (IQR 70,0–99,5)	87,5 (IQR 80,3–95,8)	0,694
SF (%)	36.0 (IQR 35.0–41.5)	38.5 (IQR 35.0–42.0)	0.263
GLS (%)	-21,30 (IQR −23,88/−19,90)	-	
Troponin T (ng/L) (at admission)	194 [IQR 54.65–480.80]	-	
Troponin T (ng/L) (peak)	221.7 [IQR 56.61–639.00]	-	
NT-proBNP (ng/L)	91.92 [IQR 36.32–754.50]	-	
CRP (mg/L)	3.76 [IQR 0.60–59.52]	-	
PR interval (ms)	136 ms (IQR 128–143)	126 (IQR 122–134)	**0,032**
QRS duration (ms)	83 ms (IQR 78,5–91,5)	78 (IQR 74–82)	**0,009**
QTc interval (ms)	417 (IQR 406,8–432,0)	423 (IQR 409,5–433,8)	0,397
EMW (ms)	-3,41±24,10	11,73±8,91	**0,013**
EMWc (EMW/√RR)	−0,110 (IQR −0,798–0,542)	0,410 (IQR 0,206–0,587)	**0,015**

*Table 1: Table. Electromechanical Window and Cardiac Parameters in Pediatric Myocarditis

Conclusions: EMW is a noninvasive and easily applicable echocardiographic parameter reflecting myocardial electromechanical discordance in patients with myocarditis. Increased EMW negativity was associated with a higher arrhythmic burden. Prolonged PR and QRS intervals may indicate concomitant involvement of the cardiac conduction system. These findings suggest that EMW may serve as a useful adjunctive tool for risk stratification in pediatric myocarditis.

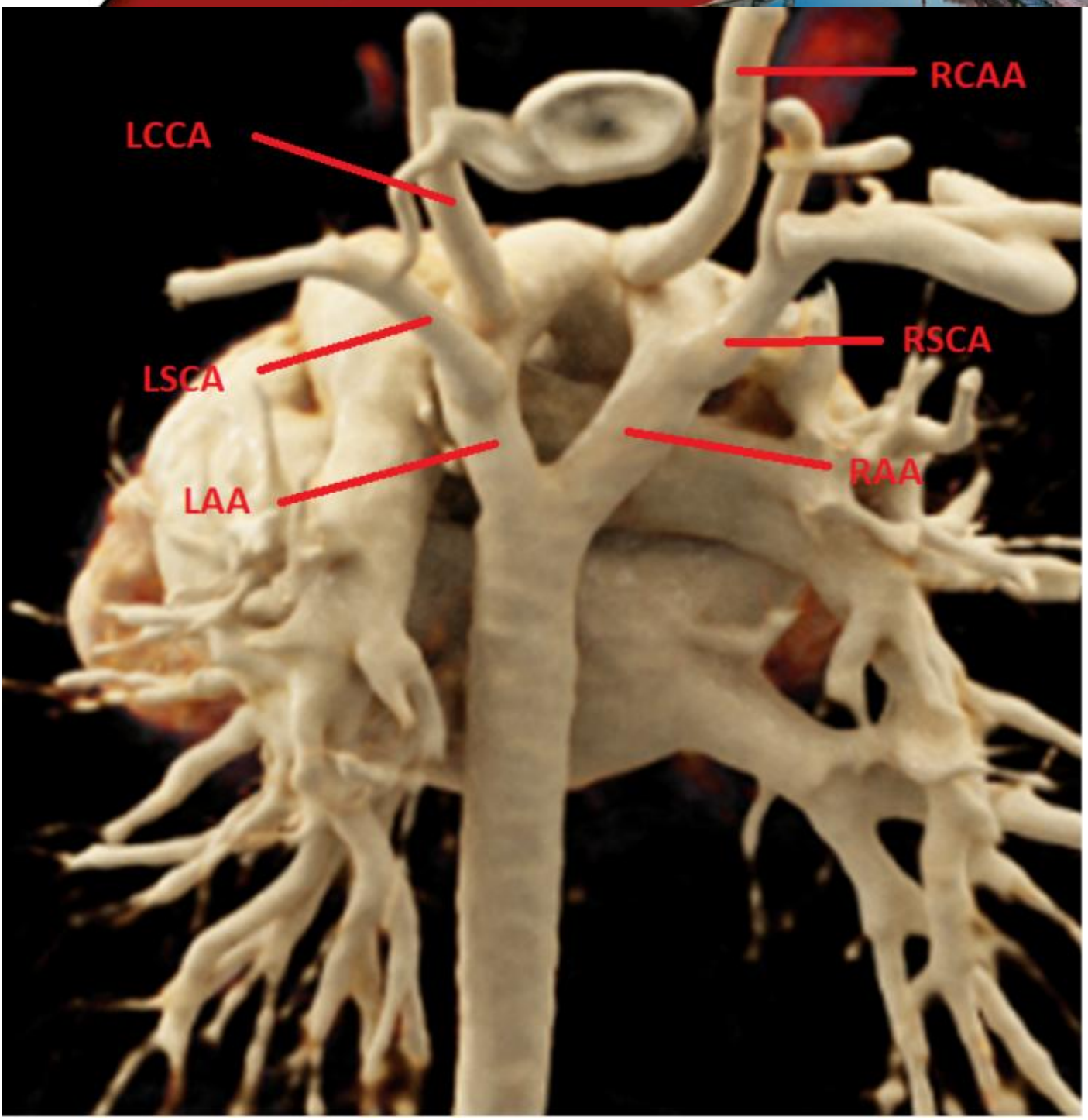


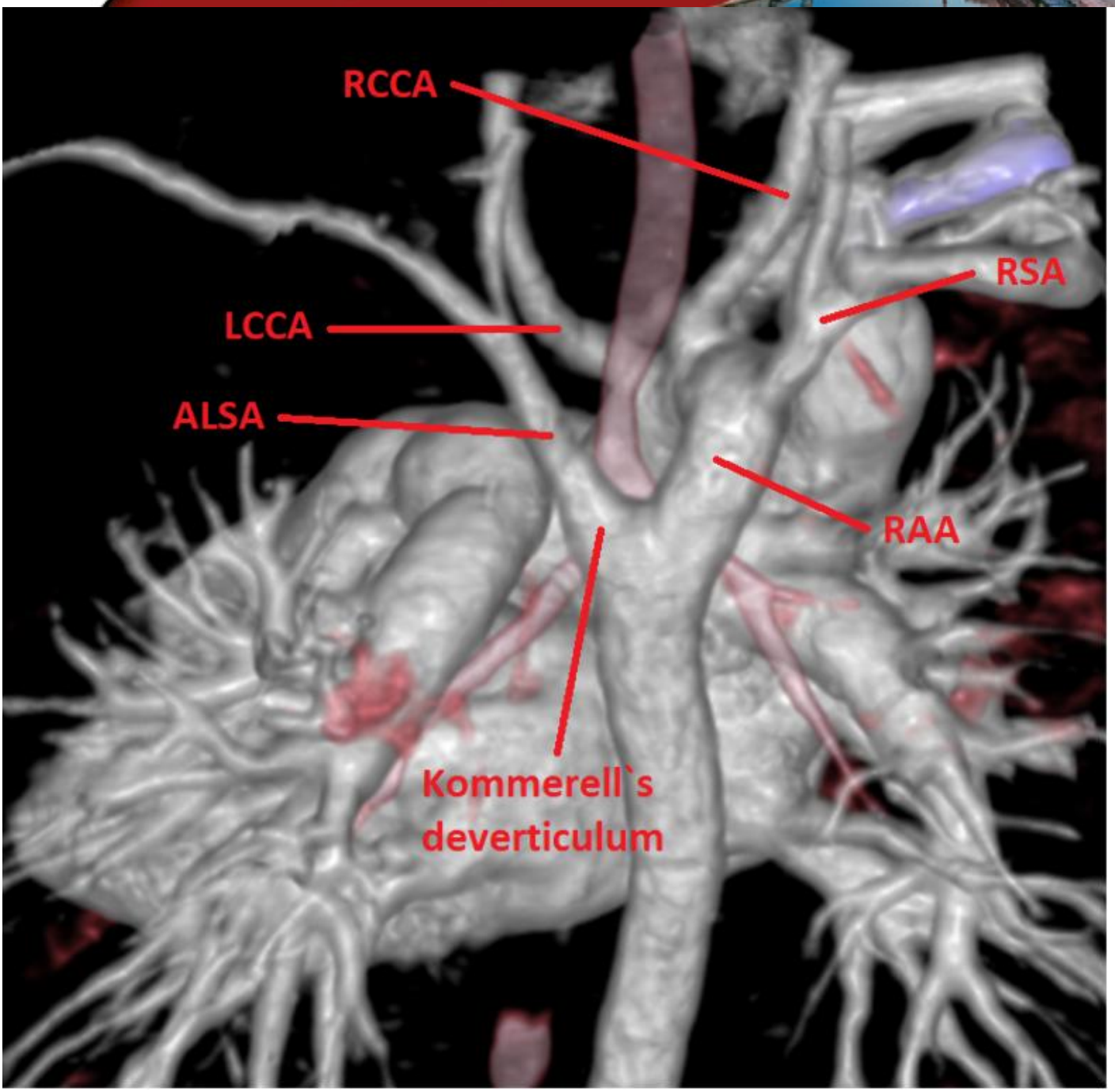
P-092 / #172

FAMILY HISTORY OF VASCULAR RINGS. CLINICAL CASE.

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Background and Aim: One of the variants of congenital pathology of the aortic arch is vascular rings, which are considered a rare pathology with a prevalence of about 1%. The course of the disease may be completely asymptomatic or accompanied by severe respiratory symptoms and/or dysphagia, especially in the case of complete vascular rings. Non-cardiological manifestation of cardiac disease often leads to incorrect treatment strategy and delayed surgical correction. The aim of the study was to present a case of a family history of a complete vascular ring.
Methods: Analysis of data obtained during a clinical examination of a 17-year-old girl who sought medical attention due to pain in the heart area at rest. She had no symptoms of shortness of breath or arrhythmia, and her ECG was normal. The girl underwent an echocardiogram. She had normal-sized heart chambers and a normal left ventricular ejection fraction (68%). However, her aortic arch appeared abnormal. Two symmetrical aortic arches were visualized with antegrade blood flow. During a follow-up interview, the patient said that she had difficulty swallowing pills or solid food. Similar symptoms were reported by the girl's mother, which led to her mother also being examined.
Results: The diagnoses in both cases were confirmed after CT angiography, which revealed two variants of complete vascular rings. The girl was diagnosed with double aortic arch with equal functioning of the left and right arch (Fig. 1), in the mother - right-sided aortic arch with aberrant left subclavian artery with aneurismal dilatation (Kommerell's diverticulum) and left arterial ligament (Fig. 2). In both cases, there was compression of the trachea and esophagus and surgical correction is necessary. In both cases, surgical correction is indicated to relieve compression of the trachea and esophagus.


RCAA
LCCA
RSCA
LSCA
RAA
LAA



Conclusions: Congenital vascular rings represent an uncommon clinical condition encountered by pediatricians and family doctors, which makes the initial diagnostic alertness for this anomaly relatively low. However, due to the potential severity of complications associated with this disorder, vascular rings should consistently be considered among the differential diagnoses in children presenting with wheezing, stridor, dysphagia, or signs of bronchial obstruction.



P-093 / #1184

OUTCOMES OF ANOMALOUS ORIGIN OF CORONARY ARTERIES FROM THE PULMONARY ARTERY: A MONOCENTER STUDY

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Background and Aim: Anomalous origin of the coronary arteries from the pulmonary artery represents a rare group of congenital heart diseases with potentially life-threatening outcomes. They are mainly represented by ALCAPA and, more rarely, ARCAPA. The aim of this study was to evaluate the clinical course of this condition.
Methods: We conducted a retrospective descriptive study between January 2004 and June 2025, including all patients followed for a confirmed anomalous origin of the coronary arteries from the pulmonary artery.
Results: Eleven patients were included: nine cases of ALCAPA and two cases of ARCAPA. In the ALCAPA group. The infantile ALCAPA form, characterized by heart failure symptoms during the first year of life (mean age 4.25 months; range: 2 weeks–6 months), poorly developed collateral circulation, and a dilated left ventricle (LV) with systolic dysfunction, was noted in six patients. Severe mitral regurgitation was documented in two patients in this group. Clinical presentation was less severe in the non-infantile ALCAPA group, with a mean age of 6.5 years (range: 1.5–14 years), well-developed collateral circulation, and preserved LV systolic function. Surgical reimplantation of the left coronary artery into the aorta was performed in seven patients at a mean age of 4 years (range: 6 months–7 years), with no associated mitral valve procedure. One non-operated patient died suddenly at the age of 18 years. The mean postoperative follow-up was 5.7 years, with progressive recovery of LV ejection fraction in 80% of cases. One late postoperative sudden cardiac death occurred 10 years after surgery. In the ARCAPA group, the coronary anomaly was associated with pulmonary stenosis in an 11-year-old patient and with a ventricular septal defect complicated by pulmonary arterial hypertension in a 1-month-old infant. Both patients underwent direct reimplantation of the right coronary artery into the ascending aorta, with repair of associated lesions, at the ages of 12 years and 6 months, respectively. Severe RCA stenosis was documented 8 years after surgery in the first patient.
Conclusions: In ALCAPA patients, surgical repair leads to significant improvement in LV systolic function. Careful and long-term coronary monitoring is mandatory during postoperative follow-up, given the persistent risk of sudden cardiac death.



P-094 / #731

BEYOND THE VSD: A CASE OF RIGHT VENTRICULAR DIVERTICULUM

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Background and Aim: Non-apical true right ventricular diverticulum is a very rare congenital anomaly, characterized by a localized outpouching of right ventricle wall. A true diverticulum contains all three layers of the heart wall — the endocardium, myocardium, and epicardium. Clinical understanding is limited as only few similar case reports have been documented.
Methods: Dynamic evaluation of the patient's clinical findings and diagnostic tests from the neonatal period to toddler age.
Results: The patient was referred to a pediatric cardiologist due to a systolic heart murmur heard after birth and mild respiratory distress. Echocardiography revealed a perimembranous ventricular septal defect (VSD), along with a suspected right ventricular diverticulum and a hypoplastic tricuspid valve. Diuretics were initiated for heart failure. To further clarify the diagnosis, a CT scan of the heart was performed, which showed perimembranous VSD and right ventricular diverticulum in size of 16x11 mm. At the age of 4 months, the patient was hospitalized for surgery. Prior to the procedure, transesophageal echocardiography (TEE) showed a wide VSD (~8 mm), a peak gradient (PG) of 97 mmHg, and a left-to-right shunt. A non-apical true right ventricular diverticulum was visualized to the right of the tricuspid valve anterior leaflet, though visualisation was incomplete. The patient underwent VSD repair with a xenopericardial patch. During surgery, the VSD was surrounded by fibrotic elements of the tricuspid valve septal leaflet. The diverticulum in the right ventricle was normal in wall thickness and participated in systole, so no intervention was needed. Post-surgery, TEE showed a residual flow (~1 mm) at the VSD patch, normal tricuspid valve flow, and a right ventricular diverticulum (~1.5 x 1 cm) with normal myocardial pulsations. The patient's condition stabilized, and at the age of 3 years old follow-up showed age-appropriate development and normal heart function.
Conclusions: This case presented a ventricular septal defect in combination with a rare additional pathology—a right ventricular diverticulum. The VSD repair was successful without complications. Long-term follow-up shows a stable clinical course, normal cardiac function, and no need for pharmacologic therapy, thrombus prevention, or arrhythmia management.



P-096 / #501

COMPUTER SIMULATIONS PREDICT SIGNIFICANTLY DIFFERENT FLOW RATIOS IN PATIENTS WITH NORMAL AND ANOMALOUS AORTIC ORIGIN OF A CORONARY ARTERY

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Background and Aim: Anomalous aortic origin of a coronary artery (AAOCA) is a leading cause of myocardial ischemia in the young. Factors leading to impaired coronary flow remain to be completely established, especially in the most common right (R)-AAOCA. In patients with AAOCA, the ratio of RCA to left (L) CA flow can be predicted non-invasively using CTA data for computer simulations. This ratio is likely indicative of risk of myocardial ischemia. We hypothesize that the flow ratio is smaller in patients with R-AAOCA compared to normal controls. We also hypothesize that the ratio is smaller for high-risk R-AAOCA compared to low-risk R-AAOCA.
Methods: Data from 14 R-AAOCA and 7 patients with normal coronary anatomy were included. R-AAOCA patients were separated into high- and low-risk groups. High-risk (n=7) had presence of ischemia on exercise stress test (EST) and/or stress perfusion imaging (SPI). Low-risk (n=7) had negative EST/SPI. Computational simulations were performed to predict coronary flow. Meshes of the aorta and main coronaries were created from CTA. Fluid-structure interaction simulations were run using SimVascular. A pressure gradient was simultaneously imposed across the LCA/RCA and the flow at a gradient of 15 mmHg through each CA was recorded. The ratio of RCA to LCA flow was calculated for each patient. A two-sample t-test was used to determine significantly different flow ratios between groups.
Results: The ratio of RCA to LCA flow was significantly higher ($p<0.001$) in normal patients (mean ratio=0.78) compared to R-AAOCA patients (mean ratio=0.22). On average, the RCA flow was 78% of the LCA flow in the normal cohort compared to 22% in the R-AAOCA cohort. The flow ratio for the high-risk R-AAOCA patients (mean ratio=0.26) was larger than the ratio in the low-risk R-AAOCA patients (mean ratio=0.19) and approaching statistical significance ($p=0.057$).
Conclusions: Normal patients have a significantly higher ratio of RCA to LCA flow compared to R-AAOCA, consistent with our understanding that R-AAOCA has obstruction to flow. Unexpectedly, the flow ratio for high-risk R-AAOCA was larger compared to low-risk R-AAOCA, suggesting that ischemia may occur when the flow is higher through the



anomalous RCA (due to larger myocardial area supplied) compared to those with lower flow ratio.

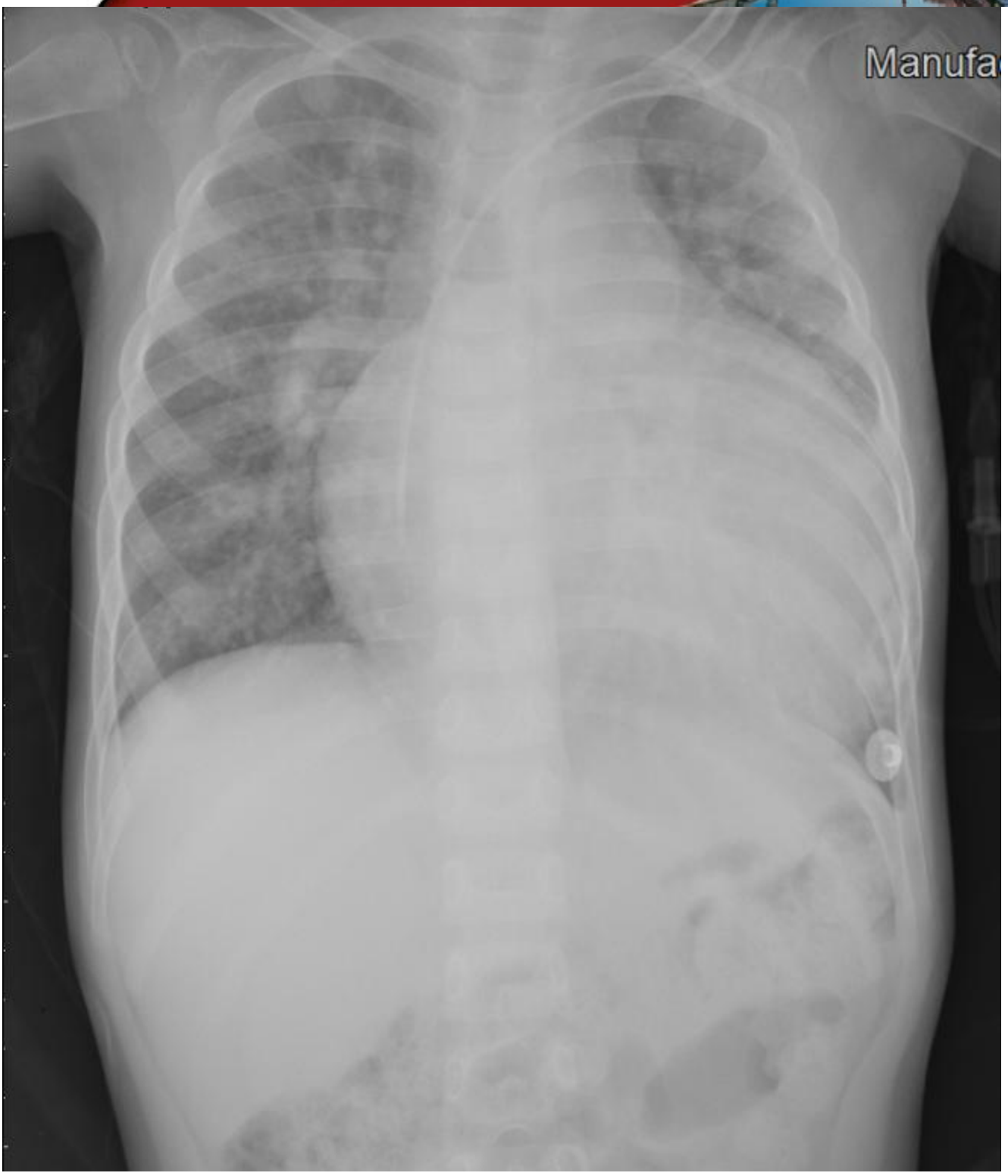


P-097 / #744

CLINICAL CASE: TOTAL ANOMALOUS PULMONARY VENOUS CONNECTION WITHOUT SEPTAL DEFECTS.

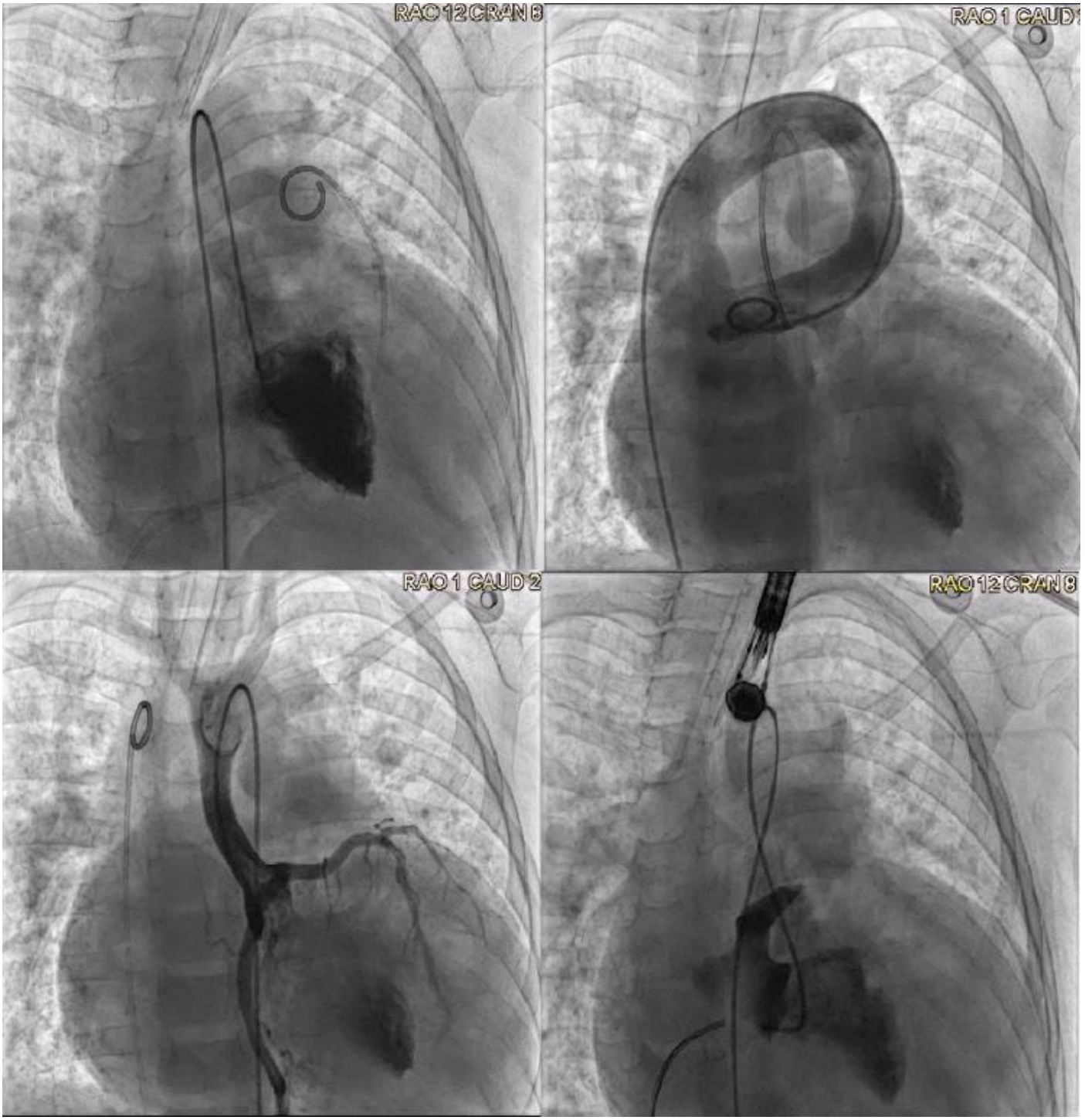
María Rosas Ismerio[1], Diana Paz Huox[2], Juan Calderón Colmenero[1], Jose García Montes[2], William Calero Portero[1]
[1]Instituto Nacional de Cardiología Ignacio Chávez, Pediatric Cardiology, Tlalpan, Mexico, [2]Instituto Nacional de Cardiología Ignacio Chávez, Hemodinámica, Tlalpan, Mexico

Background and Aim: To analyze the case of a pediatric patient with Total Anomalous Pulmonary Venous Connection (TAPVC) without septal defects.
Methods: We present the case of a 3-year-old female patient whose symptoms began at 8 months of age with generalized cyanosis, which worsened during crying. At 2 years old, she developed functional-class deterioration manifested by fatigue and diaphoresis both at rest and with minimal physical activity. Currently Ross functional class II with oxygen saturations ranging from 78% to 83%. Chest radiography demonstrated cardiomegaly with global chamber enlargement, a left-sided aortic arch, and increased pulmonary blood flow. Transthoracic echocardiography revealed supracardiac-type total anomalous pulmonary venous connection draining into a vertical vein, then into the innominate vein and superior vena cava, with suspected intact interatrial septum; a large patent ductus arteriosus; hypoplasia of the left atrium and left ventricle; hypoplasia of the aortic annulus, root, and ascending aorta. A contrast-enhanced chest CT was performed, confirming **hypoplastic left heart syndrome** (severe left atrial hypoplasia, a left ventricle with no antegrade flow through the aorta, and hypoplasia of the aortic annulus and ascending aorta) secondary to **supracardiac-type TAPVC in the absence of an interatrial communication**, with ductus arteriosus–dependent systemic
perfusion.



Results: A diagnostic cardiac catheterization was performed prior to planned flow-redirection surgery. Demonstrating absence of interatrial communication, retrograde flow through the patent ductus arteriosus with opacification of the ascending aorta and coronary circulation, left ventricular angiography showed decreased mobility and

contractility, with virtually no antegrade flow into the aorta. Therefore, she was not a candidate for cardiovascular surgery.



Conclusions: Total anomalous pulmonary venous connection is a congenital heart disease in which pulmonary venous return drains into the systemic circulation through a septal defect, a configuration essential for patient survival. A nearly constant associated



malformation is the presence of an interatrial communication, ranging from a patent foramen ovale or small defect to a large atrial septal defect or even a common atrium.



P-098 / #317

MITRAL VALVE REPLACEMENT IN PEDIATRICS: 57 YEARS OF EXPERIENCE IN A REFERENCE CENTER

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Background and Aim: A total of 86 patients who underwent surgery for mitral pathology between 1966 and 2023 were analyzed. Of these, 69.8% were female, and the median age was 13 years (range: 6 months to 18 years). The most frequent diagnoses were mitral regurgitation (33.7%), rheumatic etiology (17.4%), and congenital mitral regurgitation (11.6%). Valve repair was performed in 13 patients (15.1%); among them, 6 (46.1%) required reintervention with prosthetic replacement, with no early mortality. In total, 12 patients (13.9%) required reintervention. The most commonly used prostheses were the pyrolytic carbon bileaflet valve (25.6%), the ball-and-cage mechanical valve (20.9%), the convex–concave tilting-disc valve (16.3%), and the toroidal tilting-disc valve (12.8%). Early mortality was 25.6%, and 45.4% occurred in patients with mitral regurgitation and congenital mitral regurgitation.
Methods: A descriptive cross-sectional study was conducted in patients who underwent Mitral valve replacement between 1966 and 2023. Data collection was performed retrospectively using institutional records. Demographic variables (sex, age, weight, and preoperative diagnosis), surgical variables (valve repair or prosthetic replacement, type of valve used), and early mortality (<30 days) were included. Variables were expressed as absolute and relative frequencies.
Results: A total of 86 patients who underwent surgery for mitral pathology between 1966 and 2023 were analyzed. Of these, 69.8% were female, and the median age was 13 years (range: 6 months to 18 years). The most frequent diagnoses were mitral regurgitation (33.7%), rheumatic etiology (17.4%), and congenital mitral regurgitation (11.6%). Valve repair was performed in 13 patients (15.1%); among them, 6 (46.1%) required reintervention with prosthetic replacement, with no early mortality. In total, 12 patients (13.9%) required reintervention. The most commonly used prostheses were the pyrolytic carbon bileaflet valve (25.6%), the ball-and-cage mechanical valve (20.9%), the convex–concave tilting-disc valve (16.3%), and the toroidal tilting-disc valve (12.8%). Early mortality was 25.6%, of which 45.4% occurred in patients diagnosed with mitral regurgitation and congenital mitral regurgitation.
Conclusions: Mitral valve replacement in children remains associated with high early



mortality. Valve repair shows variable outcomes and a high reintervention rate, while the type of prosthesis has evolved over time, with the pyrolytic carbon bileaflet valve being the most frequently used.



P-099 / #919

SURGICAL MANAGEMENT OF CONGENITAL ATRIOVENTRICULAR VALVE DEFECTS THROUGH A MINIMALLY INVASIVE APPROACH

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Background and Aim: Congenital atrioventricular valve (AVV) disease presents a wide spectrum of pathologies and anatomical variations. With the advances in minimally invasive techniques, a right lateral minithoracotomy (RLMT) has become the standard approach at our institution. In this study, we aimed to evaluate early and mid-term outcomes of pediatric AVV surgery performed via RLMT.
Methods: A retrospective, single-center study was conducted, including all patients aged <18 years who underwent AVV surgery through RLMT between January 2015 and July 2025. Primary and secondary outcomes were in-hospital mortality and postoperative residual AVV disease, respectively.
Results: The cohort included 63 patients, 25 of whom were male (39.7%). Median age and weight were 5 years (interquartile range=3-8) and 18.3 kg (13.5–24.9), respectively. Preoperative pathology involved the left AVV in 55/63=87.3%, right AVV in 1/63=1.6%, and both valves in 7/63=11.1% patients. The most common diagnoses were partial atrioventricular canal (47/63=74.6%) and mitral valve dysplasia (11/63=17.5%). Comorbidities were present in 18/63=28.6% patients, most frequently Trisomy 21 (17.4%). Median cardiopulmonary bypass and cross-clamp times were 73.5 (55–101) and 51 (38–78) minutes, respectively. No conversions to sternotomy or in-hospital deaths occurred, and valve repair was achieved in 60/63=95.2% of cases: two who received valve replacement had a severely dysplastic and no repair was attempted. Postoperative complications occurred in 6/63=9.5% patients; 1/63=1.6% of patients required reoperation for residual disease during the index hospitalization. Median ICU and hospital stays were 1 (1–2) and 6 (5–7) days, respectively. At discharge, 4/63=6.3% patients had moderate disease of one AVV. During a median follow-up of 2 years (0.8–4.2), 3/63=4.7% patients required reoperation on the AVV: one for progression of rheumatic disease and two for a severely dysplastic left AVV. No late death occurred in our cohort.
Conclusions: Minimally invasive AVV surgery via RLMT provides safe and effective treatment for a broad range of congenital AVV pathologies, achieving high repair rates, low



complication and reoperation rates, and excellent early recovery. These findings suggest that RLMT represents a reliable alternative to median sternotomy in appropriately selected pediatric patients.

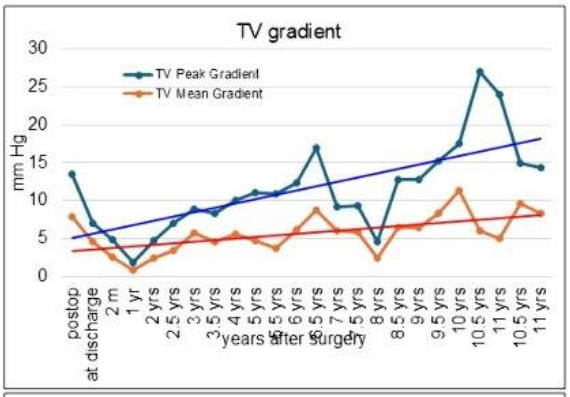


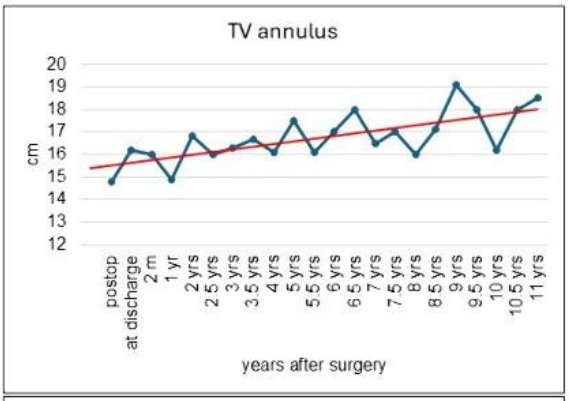
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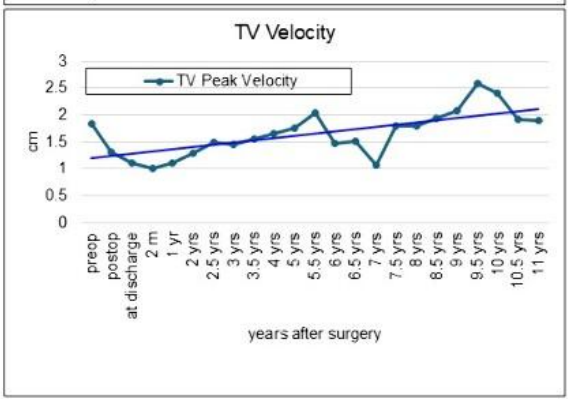
CASE REPORT: 10 YEAR OUTCOME OF CUSTOM HAND-SEWN BIOLOGICAL EXTRA-CELLULAR MATRIX (ECM) TRICUSPID VALVE.

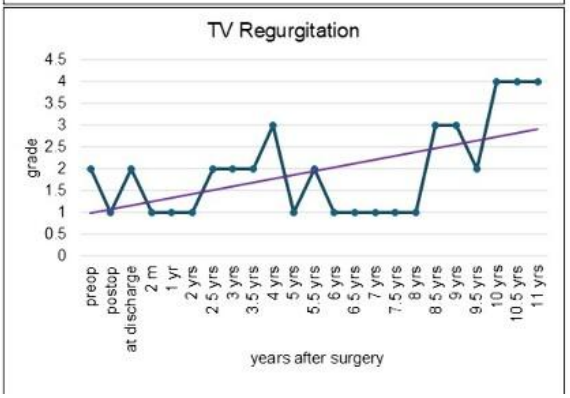
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Background and Aim: Tricuspid valve (TV) replacement in children faces multiple problems with material durability, need for re-replacement to accomodate for growth and morbidity associated with anticoagulation. New biologic materials such as extra-cellular matrix (ECM) has potential for remodeling into valve-like tissue and growth potential. We describe a case report on an 18 year old patient who had a novel hand sewn tricuspid valve prosthesis (TVP) made of ECM material in place for 12 years without any intervention. The report focuses on the echocardiographic function of the valve and correlating it with growth of the patient.
Methods: Review of the patient's clinical charts, operative reports, serial echocardiographic reports and cardiac catheter reports. The TV annulus were re-analyzed by the author (KCC). Descriptive reports of the TVP function and the echocardiographic function parameters are presented in graphical format to demonstrate the trend..
Results: There is an increase in the patient's BSA from 0.72 to 1.01 m^2. The TVP remained functional throughout the 12 years. However, the peak and mean gradient increased progressively over the years from 6.96, 4.52, to 14.41, 8.36 mmHg respectively. The TV annulus shows a progressive increase in diameter from 14.8 to 18.5 mm. The degree of tricuspid regurgitation increased significantly after 8 years to moderate to severe. The TVP did not demonstrate any
calcification.









Conclusions: This case report demonstrates the "natural" history of the first human experience with ECM TVP over 12 years. The valve remains functional throughout the 12 years with initial evidence of mild TV stenosis and regurgitation. The gradient increased over time with occurrence of significant tricuspid regurgitation after 8.5 years. It is encouraging that the TV annulus increased with time. Compared to standard commercial bio-prosthetic valve, the ECM TVP demonstrates more durability and growth potential for 12 years despite the progressive increase of TV gradient and TV regurgitation. Furthermore the TVP did not develope calcification. Reference 1. Bibevski, S., Levy, Alexandra and Scholl, F. Mitral valve replacement using handmade construct in an infant. Interactive Cardiovascular and Thoracic Surgery 2017; 24: 639-640



P-101 / #1468

DIAGNOSTIC DISCORDANCE IN INCOMPLETE ATRIOVENTRICULAR SEPTAL DEFECTS AND ITS IMPACT ON SURGICAL OUTCOMES

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Background and Aim: Incomplete atrioventricular septal defects (AVSDs) encompass a heterogeneous spectrum, including partial AVSD, transitional AVSD, and isolated left atrioventricular valve cleft with primum atrial septal defect (ASD). Accurate preoperative subtype classification is critical for surgical planning; however, discrepancies between preoperative echocardiographic diagnosis and intraoperative surgical findings are frequently encountered. The clinical impact of such diagnostic discordance on postoperative and long-term outcomes remains incompletely defined. This study assesses the frequency of diagnostic discordance and its association with perioperative and postoperative outcomes, with a focus on subtype-specific predictors of the postoperative course.
Methods: We reviewed 172 patients who underwent surgical repair of incomplete AVSD at a single institution between November 2000 and February 2025, including transitional AVSD(n=74), partial AVSD(n=71), and primum ASD with isolated left atrioventricular valve cleft(n=27). Demographic, echocardiographic, operative (coronary sinus drainage, fenestration, and concomitant left atrioventricular valve repair), and clinical outcome data were analyzed. Preoperative echocardiographic diagnoses were compared with intraoperative surgical diagnoses to determine diagnostic concordance or discordance and assess its impact on clinical outcomes.
Results: Baseline characteristics were largely similar across subtypes; however, transitional AVSD was associated with a higher prevalence of syndromic diagnoses (52.7%vs33.8%vs22.2%,p=0.008) and greater preoperative ventricular dilation (LVIDd Z-score −0.88vs−1.70 vs −1.70,p=0.031). Diagnostic discordance occurred most frequently in partial AVSD(74.6%), followed by primum ASD with isolated left atrioventricular valve cleft (37.0%) and transitional AVSD(13.5%)(p<0.001). Transitional AVSD repairs were associated with longer cardiopulmonary bypass and cross-clamp times, prolonged ventilation, and longer hospital stay (all p<0.05). Residual shunt was more frequent in transitional AVSD both early postoperatively and at last follow-up (p<0.01). Mortality was low with one death observed in the partial AVSD group, reintervention rates were similar across



subtypes(p=0.643), and follow-up duration differed modestly between groups(p=0.047).

Characteristic	AVSD diagnosis			
	Transitional AVSD (n = 74)	Partial AVSD (n = 71)	Primum ASD + Mitral Cleft (n = 27)	*P* value*
Male sex; n (%)	33 (44.6)	31 (43.7)	15 (55.6)	0.5468
Clinical Characteristics				
Premature birth, n (%)	14 (18.9)	11 (15.5)	3 (11.1)	0.6988
Presence of Down Syndrome; n (%)	29 (39.2)	20 (28.2)	5 (18.5)	0.1196
Presence of any chromosomal abnormality inclusive of both trisomy 21 and others; n (%)	31 (41.9)	22 (31.0)	6 (22.2)	0.1363
Presence of any syndrome inclusive of both heterotaxy, Down and others; n (%)	39 (52.7)	24 (33.8)	6 (22.2)	**0.0080**
Preoperative Characteristics				
Pre-op level of left AV valve regurgitation; n (%)				0.8712
No	14 (18.9)	9 (12.7)	3 (11.1)	
Trivial	16 (21.6)	17 (23.9)	6 (22.2)	
Mild	29 (39.2)	30 (42.2)	10 (37.0)	
Moderate	13 (17.6)	12 (16.9)	8 (29.6)	
Severe	2 (2.7)	3 (4.2)	0 (0.0)	
Pre-op level of right AV valve regurgitation; n (%)				0.1753
No	19 (25.7)	9 (12.7)	8 (29.6)	
Trivial	19 (25.7)	29 (40.8)	11 (40.7)	
Mild	30 (40.5)	26 (36.6)	7 (25.9)	
Moderate	5 (6.7)	7 (9.9)	1 (3.7)	
Severe	1 (1.4)	0 (0.0)	0 (0.0)	
Pre-Op LVIDd Z score; median (IQR)	-0.88 (-1.63 - 0.16)	-1.70 (-1.98 - -0.46)	-1.70 (-2.25 - -0.36)	**0.0314**
Pre-Op LVIDs Z score; median (IQR)	-0.49 (-1.5 - 0.32)	-1.30 (-1.68 - -0.46)	-1.10 (-1.90 - -0.42)	**0.0353**
Pre-Op Fractional Shortening (FS); median (IQR)	38.20 (35.15 - 42.30)	38.15 (34.75 - 42.17)	42.00 (35.60 - 45.45)	0.2705
Operative Characteristics				
Age at surgery (weeks) ; median (IQR)	29.64 (18.18 - 77.89)	75.57 (49.14 - 241.64)	134.00 (55.29 - 258.86)	**1.66×10^{-6}**
Weight at surgery (kg); median (IQR)	6.96 (5.31 - 9.55)	10.20 (7.27 - 17.30)	12.60 (9.75 - 19.45)	**6.60×10^{-5}**
Height at surgery (cm); median (IQR)	67.00 (58.00 - 79.50)	78.00 (71.00 - 104.00)	95.00 (78.50 - 106.50)	**7.34×10^{-6}**
Mismatch in diagnosis of cardiologist and surgeon; n (%)	10 (13.5)	53 (74.6)	10 (37.0)	**7.57×10^{-13}**
Procedural Characteristics				
Fenestration of ASD in primary surgery; n (%)	16 (21.6)	10 (14.1)	2 (7.4)	0.2135
Cardiopulmonary bypass (minutes); median (IQR)	87.50 (69.75-107.00)	83.00 (69.00-99.50)	72.00 (64.50-88.00)	**0.0181**
Cross-clamp time (minutes); median (IQR)	53.0 (40.0 - 64.0)	49.0 (35.5 - 65.0)	41.0 (33.0 - 51.0)	**0.0152**
Days of ventilation; median (IQR)	0.56 (0.09 - 1.24)	0.29 (0.00 - 0.65)	0.27 (0.00 - 0.55)	**0.0218**
Post-operative complications; n (%)	26 (35.1)	20 (28.2)	9 (33.3)	0.6585
Mortality; n (%)	0 (0.0)	1 (1.4)	0 (0.0)	0.5698
Length of hospital stay (days); median (IQR)	5.0 (4.0 - 7.0)	4.0 (3.0 - 5.5)	4.0 (3.0 - 4.5)	**0.0252**
Early Postoperative Results				
Presence of residual shunt; n (%)	44 (59.5)	23 (32.4)	4 (5.6)	**3.28×10^{-5}**
Presence of left AV valve regurgitation; n (%)				0.1845
No	8 (10.8)	3 (4.2)	3 (11.1)	
Trivial	17 (23.0)	22 (31.0)	4 (5.6)	
Mild	40 (54.1)	35 (49.3)	19 (70.4)	
Moderate	7 (9.5)	11 (15.5)	1 (3.7)	
Severe	2 (2.7)	0 (0.0)	0 (0.0)	
Presence of right AV valve regurgitation; n (%)				0.2015
No	16 (21.6)	10 (14.1)	9 (33.3)	
Trivial	27 (36.5)	35 (49.3)	13 (48.1)	
Mild	28 (37.8)	24 (33.8)	5 (18.5)	
Moderate	3 (4.1)	2 (2.8)	0 (0.0)	
Cardiac readmission; n (%)	12 (16.2)	6 (8.5)	3 (11.1)	0.4003
Presence of re-operation/re-intervention specific to the studied cardiac pathology; n (%)	10 (13.5)	6 (8.5)	3 (11.1)	0.6432
Follow-Up Results				
Length of follow-up (years); median (IQR)	9.77 (2.40 - 14.53)	6.10 (1.36 - 10.20)	9.88 (6.45 - 10.52)	**0.0466**
Presence of residual shunt on last follow-up; n (%)	23 (31.1)	8 (11.3)	2 (7.4)	**0.002824**
Level of last follow-up left AV valve regurgitation; n (%)				0.9835
No	6 (8.1)	5 (7.0)	3 (11.1)	
Trivial	16 (21.6)	19 (26.8)	6 (22.2)	
Mild	39 (52.7)	35 (49.3)	14 (51.9)	
Moderate	13 (17.6)	12 (16.9)	4 (14.8)	
Level of last follow-up right AV valve regurgitation; n (%)				0.3710
No	15 (20.3)	7 (9.9)	7 (25.9)	
Trivial	33 (44.6)	38 (53.5)	12 (44.4)	
Mild	23 (31.1)	25 (35.2)	8 (29.6)	
Moderate	3 (4.1)	1 (1.4)	0 (0.0)	
Last follow-up LVIDd Z score; median (IQR)	-0.25 (-1.03 - 0.52)	-0.54 (-1.30 - -0.02)	-0.71 (-1.58 - -0.21)	0.2598
Last follow-up LVIDs Z score; median (IQR)	-0.065 (-0.83 - 0.96)	-0.37 (-1.00 - 0.40)	-0.29 (-0.91 - 0.07)	0.1914
Last follow-up Fractional Shortening (FS); median (IQR)	35.10 (32.80 - 38.80)	36.95 (33.10 - 39.50)	35.40 (33.15 - 38.20)	0.4393

Table 1. Comparison of characteristics according to AVSD diagnosis

Conclusions: Long-term outcomes after incomplete AVSD repair are favorable, with low mortality and acceptable reintervention rates. Subtype-specific risk stratification remains



important, as transitional AVSD is associated with greater anatomical complexity, higher residual shunt rates, and prolonged recovery. The high rate of diagnostic discordance, particularly between partial and transitional AVSD, reflects inherent challenges in preoperative classification and suggests that a simplified, clinically oriented nomenclature may improve communication, surgical planning, and outcome prediction.



P-102 / #389

POSTOPERATIVE CHANGES IN MITRAL VALVE REGURGITATION IN ALCAPA PATIENTS

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Background and Aim: Anomalous left coronary artery from pulmonary artery (ALCAPA) is a rare congenital cardiac anomaly primary managed through coronary translocation procedures. Controversy exists regarding the optimal management of concomitant mitral regurgitation during the initial surgical intervention.
Methods: this retrospective case series includes 15 consecutive patients who underwent surgical repair between April 2008 & November 2023. Two surgical approaches were employed, the direct reimplantation as well as the Takeuchi intrapulmonary tunnel repair. Clinical data including preoperative and postoperative echocardiography as well as demographic data were collected from our prospectively managed database. The primary outcome was relationship between postoperative mitral regurgitation severity and clinical outcomes. Secondary outcomes were reoperation rates and overall mortality.
Results: Six (40%) males and 9 (60%) females with a median age of 10 months (54 days-56 years) were identified. Eight patients were under one year at the time of operation. Median follow-up was 308 days. Comorbidities were identified in 3 (20%) and one patient underwent prior cardiac surgery. Preoperative echocardiographic assessment revealed severe left ventricular dysfunction in 10 (66.7%) patients. Preoperative mitral regurgitation varied considerably from none-trivial in 4, mild in 4, moderate in 4 and severe in 3 patients respectively. Two patients presented with circumflex artery from right pulmonary artery as ALCAPA variant. Direct reimplantation was performed in 9 patients while intrapulmonary tunneling in 6 patients. One patient needed ECLS therapy as bridge to operation. No concurrent mitral valve surgeries were performed in all cases. Subsequent mitral valve annuloplasty followed by mechanical valve replacement was performed in one patient. Last follow-up echocardiography mitral valve surgery shifted favorably to none-trivial in 7, mild in 4, and moderate in 1 patient(s). Mortality occurred in 3 patients in whom mitral valve regurgitation was severe at last echocardiography, of whom two patients presented with severe and one with moderate regurgitation preoperatively.
Conclusions: Successful revascularization improving left ventricular function leads to favorable effects on mitral valve function. Severe mitral valve regurgitation is a strong indicator of advanced myocardial dysfunction and correlates with mortality. Concomitant



mitral valve surgery at the timing of presentation presents a persistent challenge, due to the functional nature of valve incompetence.



P-103 / #604

SURGICAL MELODY VALVE IMPLANTATION FOR PEDIATRIC MITRAL VALVE DISEASE (VALVE IN SLEEVE TECHNIQUE)

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Background and Aim: Recent case series documented the concept of an expandable cardiac bioprotheses in children with severe mitral valve disease not suitable for valve repair. Melody® valve (stented bovine jugular vein graft) demonstrated acceptable mid-term function when implanted in mitral position in small children. There is still concern about the potential risk of initial graft failure, left ventricular outflow tract obstruction (LVOTO), and need for re-dilatation. We describe a novel valve-in-sleeve technique which is intended to mitigate the risk of LVOTO and allow larger prostheses implantation.
Methods: Between May 2023 and May 2024, Melody® valve was surgically implanted in 3 infants at our institution
Results: Ages of the 3 babies at operation ranged from 7 mo. to 21 mo. Body weight 4.5 kg to 11.0 kg. Indication was congenital mitral valve dysplasia and sever mitral stenosis with muscularization of subvalvular apparatus in 2, and severe left AV valve insufficiency after complete atrioventricular septal defect repair in 1. After resection of the anterior mitral leaflet, a Gore-Tex stretch tube was sutured to the mitral annulus. The Melody® valve was shortened by folding the proximal and distal triangular struts. The prosthesis was successfully inserted and balloon-expanded within the Gore-Tex sleeve in a supra-annular position at 16 mm (1) and 18 mm (2) without complications. A 4.0 mm fenestration was created at the atrial level. An intraoperative echocardiogram demonstrated excellent Melody® valve function with no LVOTO. Clinical recovery and subsequent somatic growth were remarkable. Serial echocardiograms confirmed stable mean gradients between 3.0 and 8.0 mmHg at 18-25 months follow-up, with optimal prosthetic leaflet motility and preserved valve competence. No valve needed re-dilatation at follow-up.
Conclusions: Valve-in-sleeve technique seems a promising modification of Melody® valve implantation in mitral position, which can accommodate for larger prostheses, preventing LVOTO and stent fracture. Creation of a fenestration at atrial level allows the potential for late trans-septal dilatation. Longer follow-up is necessary to validate the outcome of this novel technique.



P-106 / #601

PROGNOSTIC VALUE OF LEUKO-GLYCEMIC INDEX AS A MARKER OF IMMEDIATE POSTOPERATIVE EVENTS AFTER REPAIR OF COMPLETE ATRIOVENTRICULAR SEPTAL DEFECT IN INFANTS WITH DOWN SYNDROME

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Background and Aim: The prognostic value of the leuko-glycemic index (LGI) as a marker of postoperative outcomes in pediatric cardiac patients is not known. This study aimed to determine the predictive value of LGI in predicting composite outcomes, including prolonged mechanical ventilation, after the repair of a complete atrioventricular septal defect in infants with Down syndrome.
Methods: Design: An ambidirectional cohort study Setting: A single tertiary cardiac care center. Participants: Patients with Down syndrome and a complete atrioventricular septal defect. Interventions: Postoperative LGI was calculated by multiplying the total leukocyte count by the serum glucose level (mg/dL) and dividing by 1000. Prolonged mechanical ventilation was defined as a duration greater than 24 hours. Data collected included patient demographic characteristics and intraoperative cardiopulmonary bypass parameters. Preoperative and postoperative LGI values were calculated. Other variables collected included the Vasoactive Inotrope Score (VIS) on admission to the pediatric intensive care unit (PICU), postoperative lactate values [on admission, 2 hrs and 4 hrs postoperatively], duration of mechanical ventilation, need for non-invasive ventilation, duration of vasopressor administration, incidence of renal failure, intensive care unit stay, and total hospital stay. Renal failure was defined based on KDIGO guidelines.
Results: A total of 110 patients were enrolled but 104 patients completed the study. A statistically significant correlation between postoperative LGI and prolonged mechanical ventilation (p=0.042). A postoperative LGI cutoff value of >1640.16 was associated with the need for prolonged mechanical ventilation. [area under the ROC curve (AUC) : 0.659 (95% CI: 0.548 - 0.771)] with a sensitivity of 47.50% and a specificity of 81.25% (p=0.005). A cutoff LGI value of >2657.88 was found to differentiate patients who developed renal failure , with an AUC of 0.723 (95% CI: 0.537-0.908), a sensitivity of 53.85%, and a specificity of 94.51% (p = 0.019) with an acceptable threshold
Conclusions: The LGI, a cost-effective and straightforward index, could be a valuable prognostic tool to stratify children in the immediate postoperative period after complete



atrioventricular septal defect correction. High LGI values may identify patients who could benefit from greater monitoring and early therapeutic strategies to reduce the duration of mechanical ventilation and the incidence of acute kidney injury.



P-107 / #1442

IDENTIFICATION OF THE OPTIMAL CANDIDATE FOR PULMONARY ARTERY BANDING AS A BRIDGING PROCEDURE FOR ATRIOVENTRICULAR SEPTAL DEFECT REPAIR

Yu Matsuo
Iwate medical university, Pediatric Cardiology, shiwa, Japan

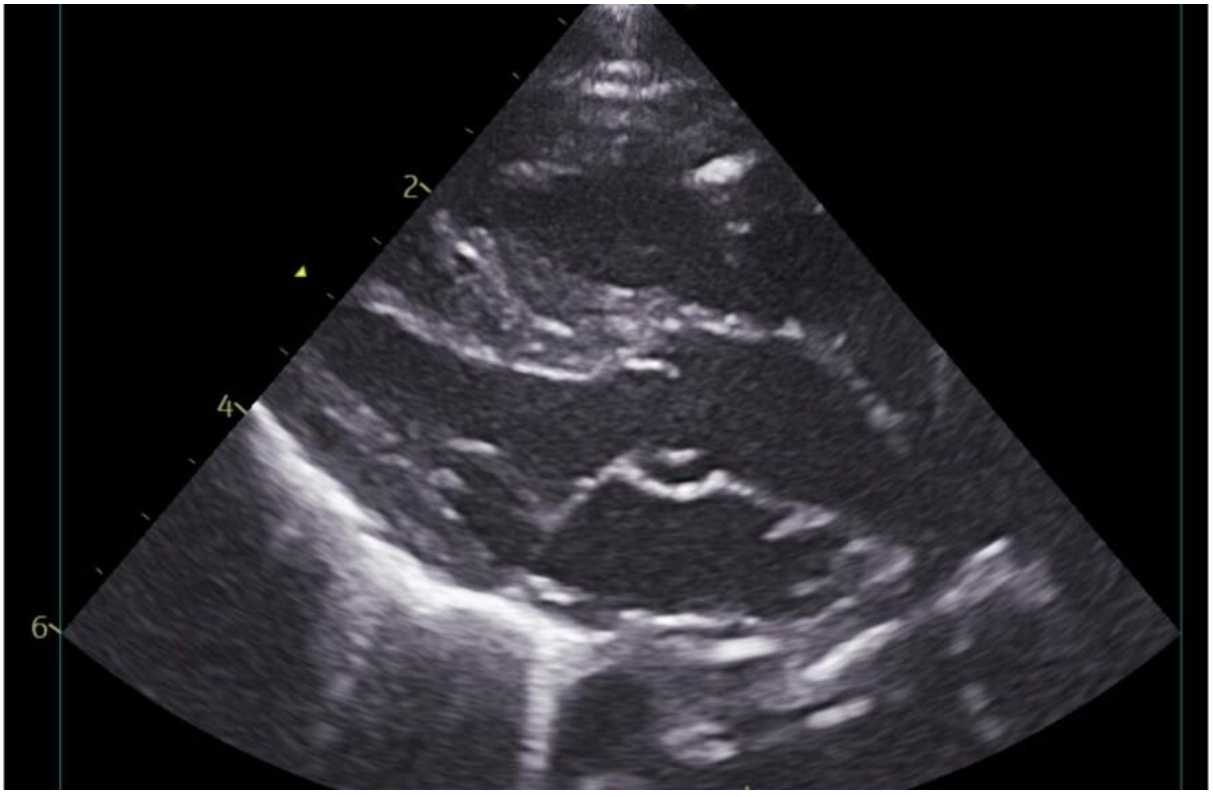
Background and Aim: Background: The hemodynamic impact of pulmonary arterial banding (PAB) on atrioventricular defects (AVSD) is controversial. While previous studies of total repair after PAB reported comparable survival to primary repair, its outcome can be further ameliorated if candidates are properly selected. Since relative natriuretic peptide deficiency is associated with unfavorable outcomes in heart failure, we hypothesized that plasma natriuretic peptides (NP) can identify patients with AVSD who are potentially benefiting from PAB.
Methods: As an institutional protocol, all patients with AVSD underwent PAB before total repair. Consecutive 23 patients, including 12 unbalanced cases, underwent PAB, and all patients, except two with leukemia and immune deficiency, successfully underwent biventricular repair. Because the clinical course differed during the interstage between PAB and repair, we analyzed the relationship between preoperative hemodynamics and the impact of PAB.
Results: The patients' age and body weight at PAB were 1.8±1.9 months and 3573±1159 g, respectively. Body size and age were not associated with unfavorable outcomes, defined as longer ICU or hospital stays or development of pericardial effusion. However, the existence of severe AVVR and elevated plasma NP levels before the procedure were associated with a short ICU stay (p=0.03), which was supported by the marked improvement in AVVR (p = 0.04) attributable to a reduction in preload (p = 0.003) and increased systemic output (p = 0.04, ANCOVA). Meanwhile, patients with low NP had a long ICU stay, indicating worsening AVVR after PAB (p = 0.03) due to excessive ventricular afterload. As NP was independent of the preoperative severity of AVVR after adjustment for volume loading, unfavorable outcomes after PAB in patients with mild AVVR appeared to be affected by the NP value relative to volume loading rather than by changes in AVVR.
Conclusions: Our results highlight that PAB benefits patients with severe AVVR and high plasma NP levels. Since AVVR and plasma NP are independent, and since responses of AVVR against PAB are variable, identification of the relative shortage of NP may contribute to patient selection, and PAB benefits more on the clinical outcome in patients with AVSD.

P-108 / #347

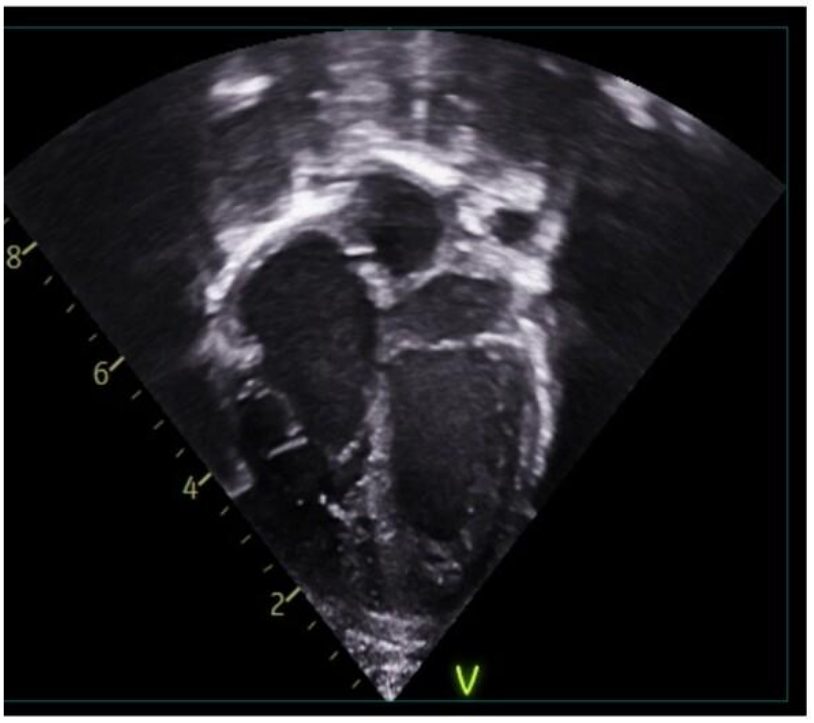
RARE ASSOCIATION OF TRANSPOSITION OF THE GREAT ARTERIES, EBSTEIN ANOMALY AND INCESSANT ARRHYTHMIAS IN A NEWBORN

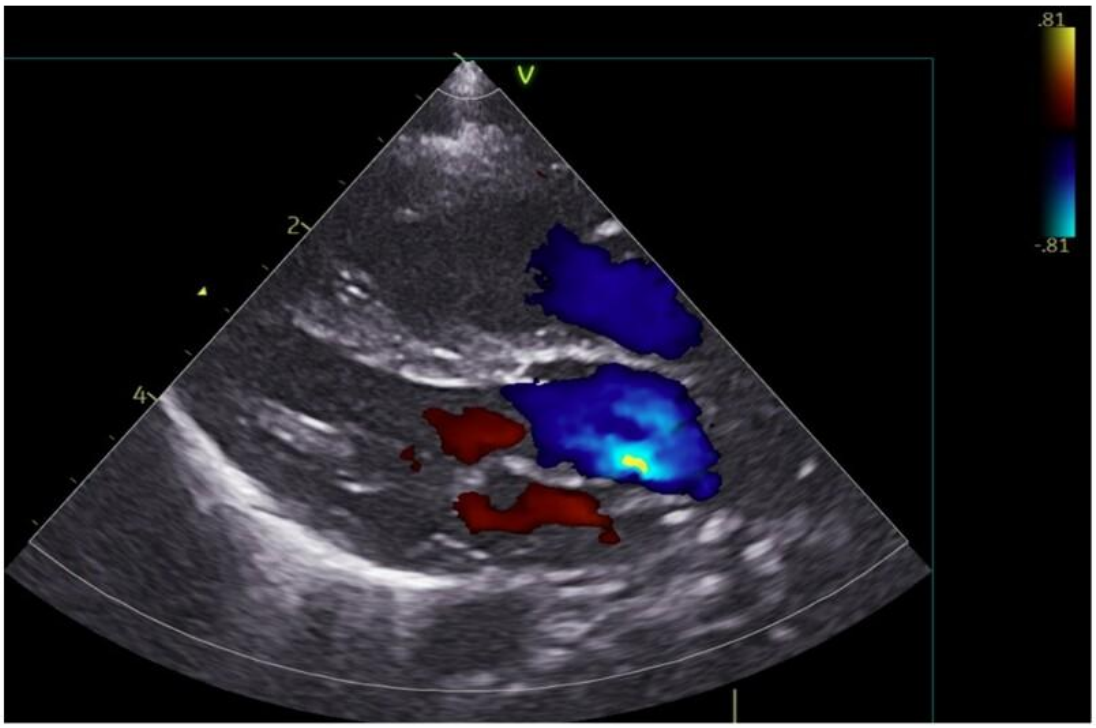
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Background and Aim: The coexistence of transposition of the great arteries and Ebstein anomaly is extremely rare and may be complicated by arrhythmias related to accessory pathways. We present a prenatally diagnosed patient in whom early supraventricular tachycardia due to Wolff–Parkinson–White syndrome and postoperative incessant atrial arrhythmias significantly complicated management.
Methods: We present the extremely rare coexistence of transposition of the great arteries and Ebstein anomaly and incessant atrial arrhythmias and the newborn ´s medical and operative treatment.
Results:




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Prenatal echocardiography revealed transposition of the great arteries (Image 1 and 2) and severe Ebstein anomaly (Image 3 and 4). Caesarean section was performed due to twin pregnancy and prostaglandin E1 infusion was commenced immediately. Echocardiography confirmed a non-restrictive interatrial communication. On day one of life, the infant developed narrow-complex supraventricular tachycardia at 240 beats per minute, with electrocardiographic features of Wolff–Parkinson–White syndrome. Supraventricular tachycardia was initially stabilized with beta-blocker therapy. An arterial switch operation was performed in the neonatal period as the definitive corrective intervention for transposition of the great arteries. The Ebstein anomaly was not surgically addressed, as the tricuspid valve function was normal. Postoperatively, the patient developed recurrent, incessant atrial tachyarrhythmias, alternating between atrial flutter and supraventricular tachycardia, necessitating escalation from beta-blocker monotherapy to intravenous amiodarone and subsequently digoxin, accompanied by intensive rhythm surveillance and rate control. Progressive stabilization was achieved, culminating in the restoration and maintenance of sinus rhythm. The patient was discharged on 25th postoperative day.
Conclusions: This case highlights the rarity and difficulties in managing diagnosed transposition of the great arteries with Ebstein anomaly, particularly in the presence of accessory-pathway–mediated arrhythmias. Early beta-blocker therapy, timely arterial switch operation, avoidance of unnecessary atrial septostomy, and postoperative



escalation to amiodarone and digoxin were essential for achieving a favorable outcome. Awareness of this rare association is vital for coordinated perinatal and postoperative care.



P-109 / #1540

NEOARTIC DILATATION AFTER NORWOOD PROCEDURE – MANAGMENT AND TREATMENT

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Background and Aim: Background: Neoaortic dilatation after Norwood procedure in hypoplastic left heart syndrome (HLHS) is a common complication. This issue is caused by few factos: abnormal aortic geometry, reduced elasticity, increased pressure flow, weakness of vessel walls -pulmonary artery used to aortic arch reconstruction is not designed for high systemic pressure. Progressive dilatation of neoarta leads to valve regurgitation and left pulmonary artery (LPA)compression. Aim: The aim of this study was the analysis of three cases of HLHS patients severe neoartic dilatation.
Methods: Material and Methods: We present three cases of significant neoartic dilatation in teenagers with HLHS. First patient 16-years old boy– Norwood operation with homograft patch used for aortic arch reconstruction. Patient without regular medical care due to social problems. We found huge 77mm neoaortic aneurysm. In remaining two cases direct anastomosis of aorta nad pulmonary aretery was perfomed during Norwood operation. In all patients we found left lung hypoperfusion due to LPA compression by enlarged neoaorta. Second case 13-years old boy with maximal aortic diameter 51m. Third case , 18-years boy neoaorta 48mm. The main indication for operation in both cases was fast progression of neoartic dilatation 4-5mm per year and neoaortic valve rgurgitation.
Results: Patients were treated with betablockers to reduce systemic pressure. All patients were qualified for Bentall operation. Patient with aortic aneurysm died due to aneurysm rupture before operation. In autopsy we found numerous of calcifications in very thin wall of aneurysm. Remining two patients had Bentall procedure with transitory neurological complications. After two years of operation they are doing well with no valve regurgitation and ascending aorta diameter of 31 and 32 mm.
Conclusions: 1 Neoaortic dilatation after Norwood procedure is a common and potentially fatal complication 2. Patients with HLHS need lifelong monitoring of neoartic diameter 3. Bentall operation is a method of choice in treament of severe neoaortic dilatation with valve regurgitation. 4. Proper time of intervention before progression of valve incompetance allows for valve-sparing operations 5. The criteria for intervention are individual. The most important seems to be the dynamics of neoartic dilatation progess.



P-110 / #773

PULMONARY GRAFT FUNCTION LONG TERM AFTER ROSS AND ROSS KONNO OPERATION.

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Background and Aim: Ross and Ross-Konno operations are optional treatments for aortic valve dysfunction. Their advantages are especially important in the pediatric population. One significant problem after the Ross operation is that we change one valve defect into two valves defects after biological valve implantation in the pulmonary position. It seems that some patients tolerate this well for years without the need of reinterventions and reoperations, but in others biological valve durability is shorter than expected. In this study we focused on pulmonary conduit function long-term after Ross and Ross-Konno operation, the frequency of catheter interventions and reoperations related to the right ventricle outflow tract and their potential risk factors.
Methods: We retrospectively reviewed all the Ross (167 patients; 77.7%) and Ross-Konno procedures (48 patients;22.3%) performed in the Polish Mother's Memorial Hospital between the years 1995 and 2022. 53 patients were qualified for the operation because of aortic stenosis, 21 due to aortic insufficiency, and in the rest of the 141 both left ventricle outflow tract stenosis and aortic regurgitation were present. In most of the cases pulmonary homograft was used for right ventricle outflow tract reconstruction (169 patients,78.5%), 29 patients had implanted Contegra (13.5%), 14 patients Cor-Matrix (6.5%) and in the remaining 3 cases the Biopulmonic biological valve was used (1.5%).
Results: The overall mortality was 3.2% and the mean follow-up was 11 years. 30 patients required reoperation, 14 of them had a pulmonary graft replacement procedure. Catheter interventions were performed in 18 patients – 16 of them had transcatheter implantation of the pulmonary valve. In the Cox regression model the type of the implanted graft was the independent risk factor for the reoperations and catheter interventions – for the pulmonary homograft risk was significantly lower (HR: 0.17; 95%CI: 0.08-0.35) in comparison to the other type of pulmonary grafts (HR: 6.03; 95%CI: 2.84-12.82 p<0.001)
Conclusions: Ross and Ross-Konno operations are good surgical options for aortic dysfunction in the pediatric population. In an experienced centre they ensure low mortality rate, good long-term results and relatively low risk of reinterventions. In our experience the pulmonary homograft is the best option among available grafts.



P-111 / #584

LONG-TERM SURGICAL AND CLINICAL OUTCOMES FOLLOWING NEONATAL BALLOON AORTIC VALVULOPLASTY: A COMPARATIVE ANALYSIS OF CRITICAL VERSUS SEVERE AORTIC STENOSIS

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Background and Aim: Percutaneous balloon aortic valvuloplasty (BAV) and surgical aortic valvotomy (SAV) are first-line treatments for neonates with severe and critical aortic stenosis (AS). However, the optimal initial management and its long-term implications, particularly regarding the timing of subsequent surgical interventions and left ventricular systolic and diastolic function, remain subjects of debate. This study aims to evaluate the long-term clinical and surgical outcomes of neonates undergoing BAV as primary therapy, with a specific focus on comparing trajectories between critical and severe disease phenotypes
Methods: We retrospectively analyzed patients undergoing BAV for neonatal AS. Patients were stratified into two groups based on disease severity at presentation: Group 1 (Critical AS) defined as by systemic ductal dependence, left ventricular (LV) dysfunction with no or grade 1 endocardial fibroelastosis, unicuspid unicommissural valve; and Group 2 (Severe AS) defined by the absence of ductal dependence and preserved LV function. Patients with hypoplastic left heart syndrome were excluded. We analyzed the first surgical procedure required post-BAV and compared between groups the incidence of adverse events (death or univentricular palliation), the number of aortic valve re-interventions, the time interval from BAV to first surgery (freedom from surgery), and left ventricular function at latest follow-up.
Results: Of 82 patients treated between 1990 and 2025, 27 (33%) had critical AS (Group 1) and 55 (67%) severe AS (Group 2). Mean follow-up was 10.5 years. The type of first surgical procedure is shown in Figure 1. Group 1 had a significantly higher incidence of death/univentricular palliation (14 vs. 0, $p<0.001$), required more surgical interventions (2.0 ± 0.9 vs. 1.2 ± 0.7, $p=0.035$), and had a shorter interval from BAV to first surgery (33 ± 99 vs. 79 ± 80 days, $p=0.002$). No significant difference was observed in left LV systolic function between groups at latest follow-up (62.5% vs. 65.7%, $p=0.455$). No patient developed heart



failure with preserved ejection fraction secondary to LV diastolic dysfunction.

Conclusions: Critical AS is associated with worse surgical outcomes compared to severe AS following neonatal BAV. However, among patients who achieve a biventricular pathway, long-term LV systolic and diastolic function remains preserved and comparable between the two groups.



P-113 / #1517

TETRALOGY OF FALLOT: HOW LATE IS LATE?

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Background and Aim: In the UK, complete repair of Tetralogy of Fallot (TOF) is typically performed before 1year. Due to widespread prenatal screening and newborn examination, late diagnosis and delayed repair have become uncommon in the UK, with surgery beyond 18 months now rare. Nevertheless, previous studies suggest that even patients with late diagnosis can achieve excellent surgical outcomes, with near-zero early mortality and approximately 10% early re-intervention rates. This study aimed to review the outcomes of TOF patients with substantially delayed complete repair managed at a tertiary paediatric cardiac surgical centre over a 20-year period.
Methods: We conducted a retrospective review of TOF repairs between 2005 and 2025 at the sole paediatric cardiac surgical centre serving Northwest-England, North Wales, and the Isle of Man. We selected patients who underwent complete repair after three years to define a cohort with substantial delay. Of 82 patients undergoing TOF repair beyond eighteen months, fifteen were older than three years at the time of surgery. Data were collected on timing of diagnosis, paediatric intensive care unit (PICU) length of stay, need for re-intervention, and neurodevelopment outcomes at 2 follow-up.
Results: 4 of 15 patients (27%) had a late diagnosis; all were born outside UK. Postoperative morbidity was low, with no patient requiring more than 3 days in PICU (mean 1.6 days). Five patients (33%) required one or more re-interventions. One patient underwent three re-interventions: right ventricular outflow tract obstruction resection with branch pulmonary artery (PA) reconstruction 2 years post-repair, right PA balloon dilatation 6 years post-repair and bilateral branch PA balloon dilatation 10 years post-repair. The mean time to first re-intervention was 9 years (minimum 2 years). Neurodevelopment assessment at two-year follow-up was predominantly normal, with only 3 patients (20%) demonstrating learning difficulties; one with Trisomy 21 and one with CHARGE syndrome.
Conclusions: Patients in this cohort demonstrated outcomes comparable to those repaired earlier in life. Neurodevelopmental outcomes were largely preserved despite delayed repair. Late diagnosis remains rare in the UK and occurred exclusively in children born abroad. Re-intervention rates appear lower in more recent surgical eras, and delayed repair was not associated with increased immediate postoperative morbidity.



P-114 / #866

COMBINED TRICUSPID VALVE REPLACEMENT AND BIDIRECTIONAL GLENN SHUNT IN AN ADULT PATIENT WITH EBSTEIN ANOMALY: A CASE REPORT

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Background and Aim: Ebstein anomaly is a rare congenital malformation of the tricuspid valve and right ventricle, characterized by apical displacement of the septal leaflet, adherence of the valve leaflets to the ventricular walls, and atrialization of the right ventricle. Most patients undergo surgical intervention in childhood or early adulthood; reaching advanced age without surgery is uncommon and poses significant challenges, as there is limited evidence to guide optimal management in this context. Therefore, we describe a 73-year-old patient with long-standing Ebstein anomaly, severe tricuspid regurgitation, and right heart dilation who underwent surgical correction.
Methods: This is a case presentation of a 73-year-old patient with long-standing Ebstein anomaly, severe tricuspid regurgitation, and right heart dilation who underwent surgical correction.
Results: Case presentation A 73-year-old female, diagnosed with Ebstein anomaly at seven years of age, was admitted for elective surgical repair due to syncope and exertional dyspnea. She underwent tricuspid valve replacement, bidirectional Glenn shunt, and patent foramen ovale closure. The combined strategy aimed to offload the right ventricle while ensuring durable tricuspid competence. Postoperative recovery was uneventful, and early imaging confirmed good prosthetic valve function, patent Glenn shunt, and improved clinical status.
Conclusions: This case demonstrates that surgical treatment of Ebstein anomaly remains a viable option even at advanced ages, and that adjunctive bidirectional Glenn can help offload the right ventricle, supporting favorable recovery. Further research is necessary in this population as more patients with congenital heart disease are presenting at increasingly older ages.



P-115 / #1549

OUTCOMES OF OZAKI PULMONARY VALVE RECONSTRUCTION IN PATIENTS WITH TETRALOGY OF REPAIR CORRECTION

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Background and Aim: Tetralogy of Fallot is the most common congenital cyanotic heart disease which requires surgical correction. In patients of TOF with inadequate pulmonary annulus where transannular patch is required, pulmonary valve (PV) reconstruction helps to prevent free pulmonary regurgitation and right ventricular failure. Multiple options to restore pulmonary valve competence like monocusp reconstruction, graham nunn bicuspid reconstruction are available but all fails in long term. As ozaki aortic valve reconstruction gives better long term outcome and freedom from reintervention, we decided to compare the function of ozaki PV reconstruction with native preserved annulus, freedom from reintervention and its effect on right ventricular function.
Methods: This study is a prospective cohort study with convenient sampling. Patients diagnosed with tetralogy of fallot and small pulmonary annulus who are planned to undergo intracardiac repair with TAP and those willing to giving consent to ozaki pulmonary valve reconstruction. All these patients underwent postoperative echocardiogram and cardiac MRI to assess the function of neo pulmonary valve and right ventricular function, flow pattern, right ventricular stress, volume, function. Control group are those who underwent tetralogy of fallot who underwent intracardiac repair with preserved native pulmonary valve.
Results: A total of 10 patients underwent ozaki PV reconstruction. There was no periop mortality (0%). The median ICU stay was 3 days (interquartile range 2-5), median hospital stay was 6 days. The median follow up was 24 months and longest follow up was 48 months. There was no infective endocarditis of the valve. All the total 10 patients who underwent ozaki PV reconstruction were asymptomatic at one year followup. Postoperative echocardiogram showed median peak gradient across the valve of 10mmHg (IQR 22 -6) and trivial pulmonary regurgitation in 2 patients and no regurgitation in 8 patients. The flow pattern of the ozaki PV was laminar without turbulence and comparable to native pulmonary valve with reduced stress and good right ventricular function.
Conclusions: Ozaki pulmonary valve reconstruction is an effective technique to provide pulmonary valve competence and will preserve normal right ventricular function with good midterm outcome and freedom from reoperation but requires long term followup.



P-116 / #826

EFFECTIVENESS OF A HOME MONITORING PROGRAMME IN REDUCING INTERSTAGE MORTALITY AND ENHANCING MEDIUM-TERM SURVIVAL IN HYPOPLASTIC LEFT HEART SYNDROME

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Background and Aim: Hypoplastic left heart syndrome (HLHS) is a rare congenital heart disease characterised by the underdevelopment of left-sided cardiac structures, which necessitates multi-stage surgical palliation. The interstage period, particularly between the Norwood (Stage I) and Glenn (Stage II) operations, is associated with significant mortality. A Home Monitoring Programme (HMP) was designed to improve outcomes during this vulnerable phase. This study evaluates HMP's impact on interstage and medium-term survival in Wales.
Methods: A retrospective cohort study was conducted for patients diagnosed in Wales with HLHS between 2001-2023. Patients were categorized into two groups: a non-HMP group managed before 2014 and an HMP group enrolled in the programme thereafter. Data included demographic and clinical characteristics, HLHS subtype classified by valvular patency and left ventricular morphology, associated genetic/chromosomal abnormalities, and outcomes including mortality at each surgical stage. Survival analysis was performed using the Kaplan-Meier method and log-rank test, while Cox regression was used to assess risk factors for mortality.
Results: Of the 210 patients diagnosed with HLHS, 58 live births with complete follow-up data were included in the analysis. Across all surgical stages, HMP patients demonstrated significantly better preserved right ventricular function and a lower incidence of moderate-to-severe aortic and tricuspid regurgitation compared to the non-HMP group. Interstage mortality between Stage I and II was significantly reduced in the HMP group compared to the non-HMP cohort (0% vs. 16.6%, p=0.002). The overall medium-term survival in the non-HMP group plateaued at approximately 75% at 5 and 10 years, following a steep initial decline within the first 2 years. In contrast, the HMP group demonstrated 100% survival in the first five years and approximately 85% survival over the subsequent five years. While preoperative clinical characteristics were similar, the HMP group showed improved survival outcomes and fewer long-term

complications.

Figure 1. Echocardiography outcomes post each surgical stage in HMP and Non-HMP groups



Figure 2. Kaplan-Meier Survival Curve for the HMP and non-HMP Groups

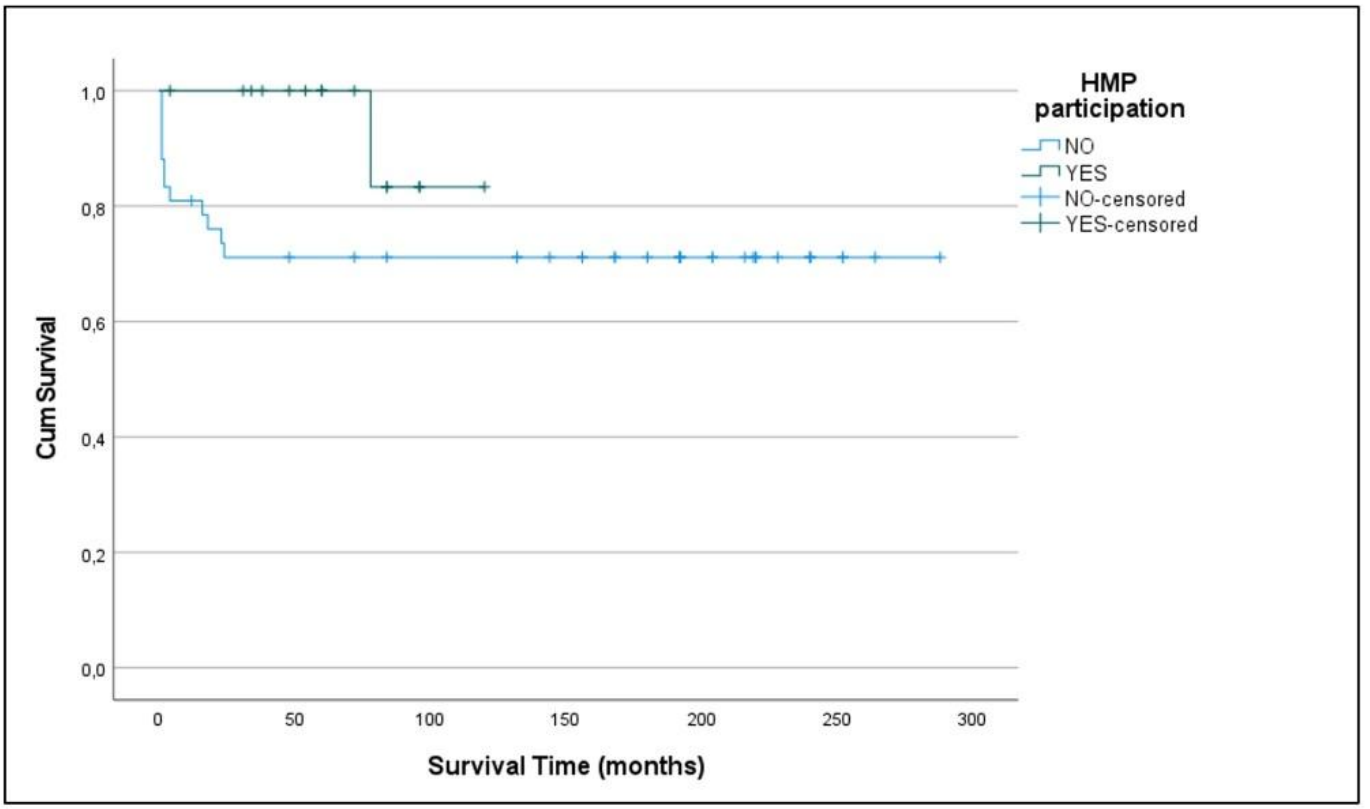


Table. Mortality Outcomes Across Surgical Stages in HMP and Non-HMP Groups

Patients	Stage 1		Stage 2		Stage 3		Total	
	Non-HMP	HMP	Non-HMP	HMP	Non-HMP	HMP	Non-HMP	HMP
Pre-Stage	42	16	37	16	36	16	42	16
Post-Stage	7 (16.6%)	0	1 (2.7%)	0	1 (2.8%)	1	9 (21.4%)	1 (6.2%)

Conclusions: Implementation of the HMP has effectively reduced interstage mortality and significantly improved medium-term survival in our HLHS cohort. These findings also highlight the benefits of recent surgical and interstage management advances and the



need for continued optimization of long-term management strategies in children with HLHS.



P-119 / #463

FACTORS INFLUENCING EARLY CLINICAL OUTCOMES IN FONTAN CIRCULATION"

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Background and Aim: In recent years, surgical survival rates have improved significantly. Advances in
surgical techniques, a better understanding of Fontan physiology, and improvements in both
immediate and long-term postoperative care have contributed to this progress.
Surgical mortality associated with the Fontan procedure is now close to 1%, and transplant-free survival rates are excellent: 95% at 5 years and 90% at 10 years. These outcomes reflect the tremendous advancements in the management of single-ventricle physiology over time.
Aim:
to identify various factors in the immediate post operative period following Fontan completion and
thus enumerate prognosticating factors in early post operative outcome following Fontan Completion
Primary :
1. To assess the early complications in Fontan circulation and to explore the association of these
factors to outcomes.
Secondary :
1. To enumerate age wise early complications in Fontan Circulation
2. To assess the various factors associated with morbidity and mortality in Fontan Circulation
Methods: Study area:
Out-patient and in patient department of Pediatric Cardiology, Narayana Health, Bengaluru, Karnataka, India between
Study Duration :
January 2023- January 2024: 1 year
Study design:
The research is planned as a retrospective and prospective observational study.
Results: There was no significant co relation with pre op parameters attributable to early complications



• However patients in presence of AVM and significant Veno venous collaterals had more mortality

• Early complications in patients had increased hours of ventilation, Duration of ITU stay , length of hospitalisation and prolonged chest tube drainage

• Lastly post Fontan completion in follow up patients had significantly better weight and height gaining.

• Most common long term complication in our study was again effusion.

Conclusions: Early complications correlated with increased hours of mechanical ventilation, extended durations of intensive therapy unit (ITU) stays, and longer overall hospitalization.

There was no significant co relation with pre op parameters attributable to early complications

Follow-Up Improvements: Post-Fontan completion, patients demonstrated significant improvements in weight and height, indicating positive growth outcomes despite the early complications experienced.

Need for Individualized Management: The findings emphasize the necessity for tailored management strategies for patients undergoing Fontan procedures to enhance postoperative outcomes and optimize longterm care.



P-120 / #885

RIGHT VERTICAL AXILLARY MINI-THORACOTOMY FOR SINGLE VENTRICLE PALLIATION

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Background and Aim: Over the last decades, minimally invasive techniques have become increasingly applied as a surgical strategy for congenital low-risk lesions. However, their use for single ventricle palliation remains rare. We report our initial experience with a minimally invasive bidirectional cavopulmonary connection (MIS BCPC) via a right vertical axillary mini-thoracotomy (RVAMT) in infants with single ventricle physiology.
Methods: We retrospectively reviewed five infants who were scheduled for a stage II MIS BCPC via a RVAMT at our institution since January 2022.
Results: Four infants presented with tricuspid atresia, subpulmonary stenosis, and concordant ventriculo-arterial connections, while one had dextrocardia, levo-malposition of the great arteries, a right-dominant unbalanced ventricle, and subpulmonary stenosis. At the time of surgery, the mean age was 5 months (range 3-8 months) and mean weight 6.4 kg (range 5.5 – 8.4 kg). No child had a previous palliative procedure. Four infants underwent elective BCPC, atrial septectomy and main pulmonary artery ligation via RVAMT. One infant presented with low arterial saturations during anesthetic induction and underwent BCPC via sternotomy. Three infants (2 RVAMT, 1 sternotomy) underwent an additional setup for catheter-based Fontan-completion (anastomosis of PA-RA junction, patch implantation at PA-RA junction, implantation of a Gore-Tex ring to the IVC). BCPC via RVAMT was achieved in all four cases. Three children were extubated in the OR. Two children, who had previously undergone MIS BCPC with an additional Fontan setup, underwent surgical revision with pulmonary artery patch plasty through the same approach; in one, a second revision via sternotomy was necessary to address residual pulmonary stenosis. The mean hospital stay was 12 days (range 3 to 36 days). All infants are currently progressing well and awaiting Fontan completion (mean follow-up time of 13 months, range 1 – 26 months).
Conclusions: A minimally invasive BCPC performed via a right vertical axillary mini-thoracotomy is feasible. RVAMT also provides a viable option to treat residual pulmonary artery stenosis. The setup for future interventional Fontan completion appears prone to PA distortion and needs refinement. This strategy may enable the avoidance of sternotomy and reduce the overall number of surgical interventions in select patients with single-ventricle physiology.



P-121 / #1273

BIVENTRICULAR CONVERSION FOR FAILED FONTAN CIRCULATION: OUTCOMES AND CLINICAL INSIGHTS FROM A CASE SERIES

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Background and Aim: To evaluate the outcomes of biventricular conversion following Fontan takedown in patients with failing Fontan circulation.
Methods: This was a retrospective single-center study. Eligible patients were those who underwent Fontan takedown combined with biventricular conversion due to failing Fontan circulation between 2017 and 2024. Patients who received 1.5 ventricle repair were included.
Results: A total of four patients were enrolled. All patients had a biventricular cardiac morphology and had previously undergone fenestrated extracardiac conduit surgery. All procedures were performed as single-stage conversions. **Patient 1** was a 12-year-old girl. She had a three-year history of protein-losing enteropathy before one and a half ventricle conversion. Postoperatively, she required seven days of ECMO support and failed to wean from mechanical ventilation due to heart failure. This patient ultimately succumbed to a profound fungal infection at 74 days. **Patient 2** was a 4-year-old boy. He had a one-year history of protein-losing enteropathy before biventricular conversion. The patient was mechanically ventilated for 1,931 hours after operation, and were hospitalized in ICU for 94 days. A permanent pacemaker was implanted 10 months postoperatively. The postoperative follow-up, which spanned 6 years, revealed LV EDVi of 60.5 ml/m^2 and CI of 3.2 L/(min·m^2). **Patient 3** was a 9-year-old boy. He had a one-month history of cyanosis before biventricular conversion. Postoperatively, he required ECMO support for 1 day due to bleeding, mechanical ventilation for 151 hours, ICU stay of 22 days. One and a half years after surgery, the valved RV-PA conduit was replaced. The patient was followed up for 3 years, with LV EDVi of 72 ml/m^2 and CI of 4.3 L/(min·m^2). **Patient 4** was a 14-year-old boy. He had a one-year history of cyanosis before biventricular conversion. Postoperatively, he required mechanical ventilation for 45 hours, ICU stay of 7 days. The patient was followed up for 1 year, with LV EDVi of 56.5 ml/m^2 and CI of 2.8 L/(min·m^2).
Conclusions: Patients with biventricular morphology who have undergone Fontan surgery may still develop severe comorbidities. Preoperative protein-losing enteropathy appears to be associated with a less favorable prognosis; therefore, patients with moderate manifestations of Fontan failure should be evaluated for biventricular conversion.



P-122 / #197

DISCHARGE GUIDANCE FOR SOUTH ASIAN PARENTS OF CHILDREN WITH CONGENITAL HEART DISEASE UNDERGOING TREATMENT IN ENGLAND

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Background and Aim: Congenital heart disease (CHD) is the most common birth anomaly in England, but rates are 1.5 times higher among Asian and Black children than those of White ethnicities. In the most disadvantaged UK neighbourhoods, over half of affected children are Asian British or Black British. British Asian children have a 1.5 times higher mortality risk from CHD. Existing studies addressing parental challenges in caring for children with CHD have mainly focused on White populations. Our research aims to explore the experiences of South Asian parents of children under two years with CHD who have undergone cardiac interventions within their first year and the health care professionals caring for them.
Methods: Stage 1 included a rapid systematic review aimed at synthesising evaluations of parental knowledge about CHD and identifying gaps regarding discharge planning and education. A systematic search was conducted in PubMed, including only quantitative studies published in English since 1990. No restrictions on study populations were applied.
Results: A total of 683 records were identified. Screening resulted in 15 articles involving 2226 participants being eligible for data synthesis. No study targeting South Asian populations was identified. Findings revealed that parents generally had limited understanding of CHD management, with 10% to 65% reporting good or above-average knowledge (6 studies). Knowledge was particularly poor regarding early warning signs of deterioration (<50% scoring well, 4 studies) and prevention of endocarditis (1%-30% scoring well, 4 studies). One study reported improvements in mothers' knowledge over a one-year period, but endocarditis knowledge remained poor compared to the baseline assessment at hospitalisation. The narrative synthesis highlighted parents' educational needs regarding medication management, recognition of deterioration, understanding of their child's heart condition, preventing endocarditis, and appropriate physical activities. Significant gaps remain in understanding effective methods for information delivery and to what extent existing materials and discharge education meet carers' needs. In England, discharge planning and education practices vary across hospitals, and discharge information is mainly available in English.
Conclusions: Findings reveal unmet needs for discharge information and education and



underscore the importance of nurse-led interventions to enhance communication and address post-discharge care inequalities among ethnically diverse families.



P-123 / #21

ENHANCING RESUSCITATION READINESS: IMPLEMENTATION AND STAFF TRAINING FOR THE MODIFIED ZOLL DEFIBRILLATOR IN A PEDIATRIC INTENSIVE CARE UNIT

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Background and Aim: Advanced defibrillation devices are essential for improving resuscitation outcomes in pediatric intensive care. The Pediatric Intensive Care Unit (PICU) transitioned from the Lifepak defibrillator to a modified Zoll defibrillator, offering enhanced functions and user-friendly features. This transition occurred during a period of high nursing turnover, with nearly 80% of the staff newly recruited, which created challenges in ensuring operational readiness and safe clinical use of the device.
Methods: A structured educational program was implemented using the Plan–Do–Study–Act (PDSA) cycle in collaboration with the Biomedical Department. **Plan:** Designed interactive training sessions supported by competency checklists and real-time evaluations. **Do:** Conducted 10–12 training sessions that combined theoretical instruction, device demonstrations, and hands-on practice, with opportunities for immediate feedback and troubleshooting. **Study**: Monitored staff performance through competency signoffs, documenting operational difficulties and recording feedback on training effectiveness. **Act:** Refined training content and arranged targeted refresher sessions to strengthen confidence and reinforce proper use of the device.
Results: At the start, many nurses struggled with the Zoll defibrillator's advanced features and different interface, particularly during emergency simulations. With repeated guided practice, staff demonstrated steady improvement in accuracy, speed, and confidence. Competency assessments confirmed that most participants achieved operational proficiency. Staff also reported greater comfort and preparedness for resuscitation scenarios, reducing anxiety during high-pressure situations.
Conclusions: Applying the PDSA model to structured training enabled the successful integration of the modified Zoll defibrillator in the PICU. This approach improved staff competency, reduced errors, and enhanced resuscitation preparedness. The cycle of planning, testing, evaluating, and refining training proved valuable in promoting consistency, safety, and sustainability in the adoption of advanced medical technology



P-125 / #617

INCIDENCE OF CONGENITAL MALFORMATIONS IN FETUSES WITH A PRENATAL DIAGNOSIS OF SINGLE UMBILICAL ARTERY

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Background and Aim: A single umbilical artery (SUA) is the most common developmental anomaly of the umbilical cord and is associated with a wide spectrum of congenital malformations. This study aimed to determine the prevalence of congenital malformations in fetuses diagnosed with SUA and to compare isolated and non-isolated SUA cases to identify associated risk factors.
Methods: This retrospective study included 200 fetuses with SUA between September 2012 and December 2025. Cases were categorized into isolated SUA (n = 102) and non-isolated SUA with at least one additional systemic anomaly (n = 98). Maternal variables included age, pregnancy type (singleton vs. multiple), smoking status, consanguinity, use of assisted reproductive technologies, and presence of maternal cardiac disease and neonatal outcomes, congenital anomalies, and genetic findings were also documented.
Results: Among 7,948 pregnancies evaluated during the study period, SUA was identified in 200 cases (2.54%). The mean gestational age at first evaluation was 24.64 ± 3.87 weeks, and mean birth weight was 2908 ± 693 g. Excluding 18 terminated pregnancies with undetermined sex, 46.7% were male and 53.3% female. Of 200 SUA cases, 98 (49%) had at least one associated anomaly. Cardiac defects were most common (39.5%), of which 54.4% were major and 45.5% minor. Isolated cardiac anomalies were present in 28 cases, an additional single extracardiac anomaly in 15, and multiple anomalies in 32. Additional anomalies included CNS (10%), GUS (10.5%), and GIS (8%) abnormalities. Specific defects—renal agenesis (2.5%), esophageal atresia (1.5%), anorectal malformations (3%), omphalocele (2%), and diaphragmatic hernia (1.5%)—were significantly elevated compared with population rates ($p < 0.001$). Karyotype analysis performed in 45 cases identified genetic abnormalities in 21 (46.6%). DM was significantly more common in non-isolated SUA ($p = 0.027$), and GDM was more frequent in SUA cases with cardiac anomalies ($p = 0.01$).
Conclusions: Fetuses with SUA demonstrate significantly higher rates of congenital malformations compared with the general population. Maternal diabetes mellitus appears to be an important risk factor, particularly in cases with additional anomalies or congenital heart disease. Fetal echocardiography is recommended for all SUA cases, and genetic evaluation is advised when SUA is accompanied by other anomalies.



P-127 / #824

UNUSUAL CAUSES OF FETAL BRADYCARDIA...I KNOW ITS NOT ALWAYS BLOCKED ATRIAL ECTOPICS OR COMPLETE HEART BLOCK, BUT WHAT ELSE COULD IT BE?

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Background and Aim: Increased awareness of fetal bradyarrhythmia, along with advances in fetal echocardiography, have led to more detailed analysis of fetal arrhythmia. Whilst the majority of fetal bradycardia can be attributed to sinus bradycardia, blocked atrial ectopics or complete heart block (CHB), we describe two cases with more unusual causation. We aim to highlight these aetiologies to aid other clinicians in their diagnosis with anticipated potential for optimising postnatal care.
Methods: Retrospective analysis of two unusual cases of fetal bradycardia referred to the Fetal Cardiology team for quaternary assessment.
Results: The first case was referred due to suspected atrial ectopics and intermittent bradycardia. It was challenging to demonstrate the nature of the ectopics due to their intermittent nature. From initial assessment at 29 weeks, a 2:1 atria:ventricular arrangement was evident. Slight variability in the inter-atrial intervals suggested either functional 2:1 AV block or regular blocked atrial ectopics with an underlying rate similar to the intrinsic sinus rate. Serial measurements of IVRT and %IVRT/cardiac cycle (with values above normal range), along with rhythm variability, raised the possibility of long QT syndrome. This was suspected from the postnatal phenotype and genetic testing confirmed heterozygous pathogenic de novo KCNH2 gene variant. The second patient had fetal echo findings consistent with sinus bradycardia in the context of significant family history of tuberous sclerosis. At the last fetal cardiology review there was suspicion of a rhabdomyoma on the roof of the right atrium (hypothesised to be in close proximity to the SA node) which was confirmed postnatally. Figure 1: SVC-Ao Dopplers showing the 2:1 A:V block in Case
1

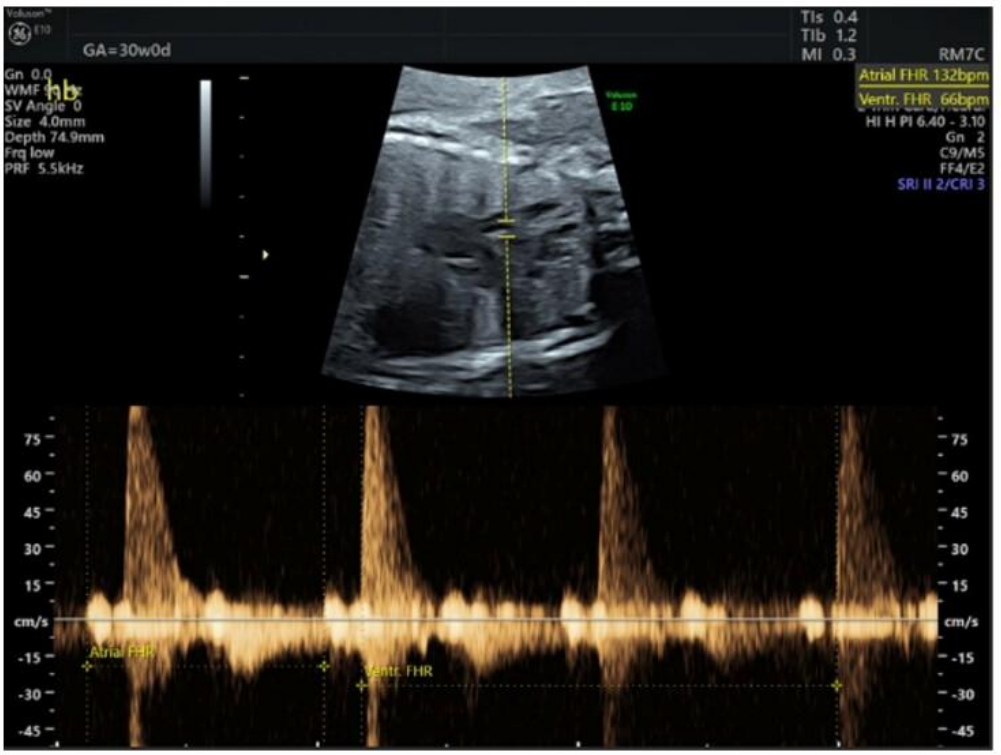


Figure 2: M-mode demonstrating sinus bradycardia with 1:1 AV conduction in Case 2



Conclusions: Whilst blocked ectopics, sinus bradycardia and CHB remain the primary



cause of fetal bradycardia, long QT syndrome and tumours around the conduction tissue are important to consider. Careful history taking and detailed fetal echocardiography can support such diagnoses, but correlation with postnatal phenotype/genotype is important. Antenatal consideration of such diagnoses allows consideration of invasive prenatal testing, which if positive, can aid in not only counselling but appropriate delivery planning and early initiation of essential postnatal care.



P-129 / #579

FETAL ARRHYTHMIAS: DIAGNOSIS, MANAGEMENT, AND POSTNATAL FOLLOW-UP. FOURTEEN YEARS' EXPERIENCE AND LITERATURE REVIEW

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Background and Aim: This single-center study describes our series of fetal arrhythmias and postnatal outcomes.
Methods: Between January 2010 and December 2024, we identified 32 SVT: 59.4% sustained, 40.6% non-sustained, and 10 CAVB, including two twin pregnancies.
Results: The SVT was 75% AVRT, 9.4% EAT, and 15.6% AF. 56% received a 1° line therapy, 44% a 2 line, 15% immediate delivery. Comparing flecainide for AVRT and sotalol for AF versus digoxin, the old therapy, we found greater efficacy (p 0.049). Among treated fetuses, 50% restored SR (p 0.042). Looking at the sustained SVT group, 17/19 received therapy: 9/19 fetuses without HF and 10/19 with HF. 42% of sustained SVT presented SR restoration: 55% in the no HF vs 20% in the HF group with 5/10 drug resistance, and 1 in utero death. A significant relationship between sustained SVT and HF (p 0.002) and management and HF (p 0.017) was observed. 61% of non-sustained SVT presented spontaneously SR restoration. We observed: 3 complete AVB (18.2%), 7 2:1 AVB (63.6%), and 2 SR cases. All received steroids, plus a 2° line therapy, plasmapheresis-IVIG infusion before 2017 versus hydroxychloroquine-aspirin after. The AVB progress over time, regardless the treatment. 40 were the newborns (90%): 31 SVT and 9 AVB, 1 SR. Post-natal diagnoses were concordant with fetal diagnosis (p 0.001). 52% of fetuses with SR in utero restoration remained in SR postnatally, 48% show SVT at birth. 54.8% of cases did not require any antiarrhythmic, 45.2% needed one or more therapies; 4 patients needed intensive care, 2 neonatal deaths. 31% did not receive postnatal prophylaxis; none presented recurrences. 24% with SR at birth started prophylaxis then stopped at 1 year; again, no recurrences. 27.5% continued prophylaxis beyond one year of age. The AVB newborn 6/9 cases of III degree AVB. All underwent PM implantation, except for one. Two developed PM cardiomyopathy.
Conclusions: Our results confirmed that the persistence of SVT is the key determinant of in utero HF, significantly influencing outcomes. The in utero management strategies for



fetal SVT have evolved over the years, and showing improved efficacy. Regarding CAVB, in utero treatment does not seem to influence newborn outcomes.



P-130 / #51

EFFECTIVE MANAGEMENT OF NEONATAL MULTIPLE CARDIAC RHABDOMYOMAS COMPLICATED BY INTRACTABLE ARRHYTHMIAS: A CASE REPORT ON THE ROLE OF SIROLIMUS AND CATHETER ABLATION

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Background and Aim: Abstract: Fetal or neonatal cardiac rhabdomyoma is a benign, smooth muscle tumor of the myocardium consisting of immature myocytes. It is well recognized that about 50 to 60% of cardiac rhabdomyomas are associated with tuberous sclerosis, which is inherited via an autosomal-dominant Mendelian system. The remaining 40 to 50% of cases of neonatal cardiac rhabdomyoma occur in patients without tuberous sclerosis. Seventy-five percent of affected patients are under one year old, with an approximate incidence in newborns of 0.02 to 0.08%. We report a case of a preterm male born at 34 weeks and admitted to the NICU following an antenatal scan that revealed neonatal rhabdomyoma. The mother had a history of tuberous sclerosis and neurocutaneous manifestations. This case report describes the management of a 34-week, IVF-conceived infant who presented with supraventricular tachycardia (SVT) in the setting of cardiac rhabdomyoma. Despite medical therapy, atrial arrhythmias persisted. Catheter ablation and surgical debulking of the atrial mass were undertaken. The patient exhibited no extracardiac manifestations and experienced no side effects from medications. The patient was weaned off antiarrhythmic drugs, discharged on propranolol, and scheduled for follow-up appointments.
Methods: Patient Selection Criteria for inclusion in the case report: neonate, diagnosed with cardiac rhabdomyomas, experiencing arrhythmias. **Clinical Assessment** Initial evaluation of the patient's symptoms, including details of the arrhythmias (type, frequency, duration). Diagnostic imaging techniques used to identify the presence and extent of rhabdomyomas. **Treatment Protocol: Sirolimus Administration:** Dosage, route of administration, and duration of treatment. Monitoring parameters for efficacy and side effects. **Catheter Ablation:** Description of the ablation procedure, including the technique used and specific arrhythmias targeted. Pre- and post-procedure assessments to evaluate success and complications. **Follow-Up** Schedule and type of follow-up assessments to monitor the patient's condition after treatments (e.g., repeat imaging, arrhythmia monitoring). **Ethical Considerations** A statement regarding informed consent from father was taken
Results: from follow-up and data in system



Conclusions: • Sirolimus is a viable first-line therapy for symptomatic cardiac rhabdomyomas (CRHMs), potentially avoiding surgery. • Ablation should be reserved for arrhythmias unresponsive to medical management. • In neonates with TSC-associated CRHMs, sirolimus effectively reduces tumor burden, while ablation addresses refractory arrhythmias.



P-132 / #1502

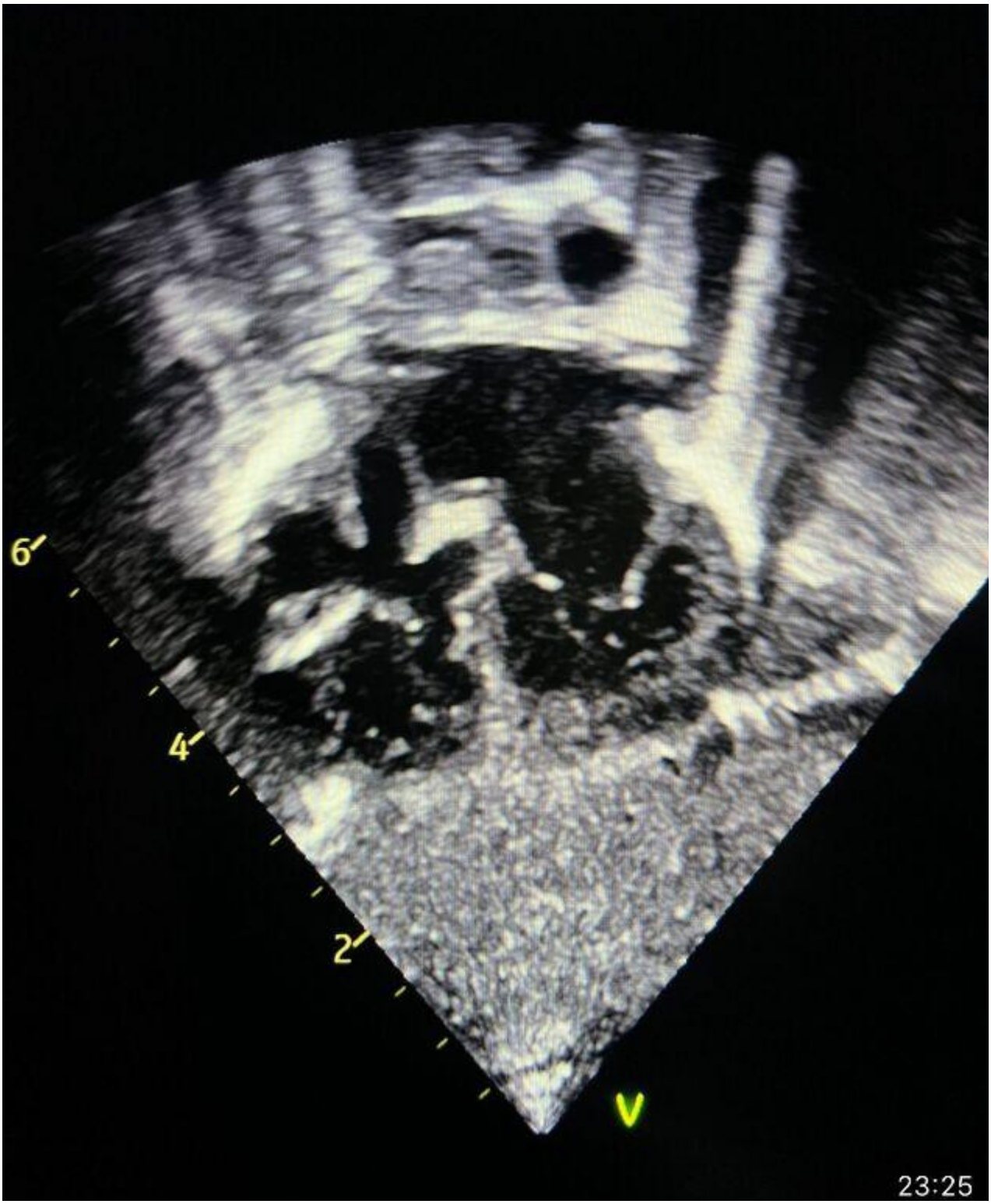
FETAL ECHOCARDIOGRAPHIC DIAGNOSIS OF PERSISTENT RIGHT VENOUS VALVE MIMICKING A RIGHT ATRIAL MASS

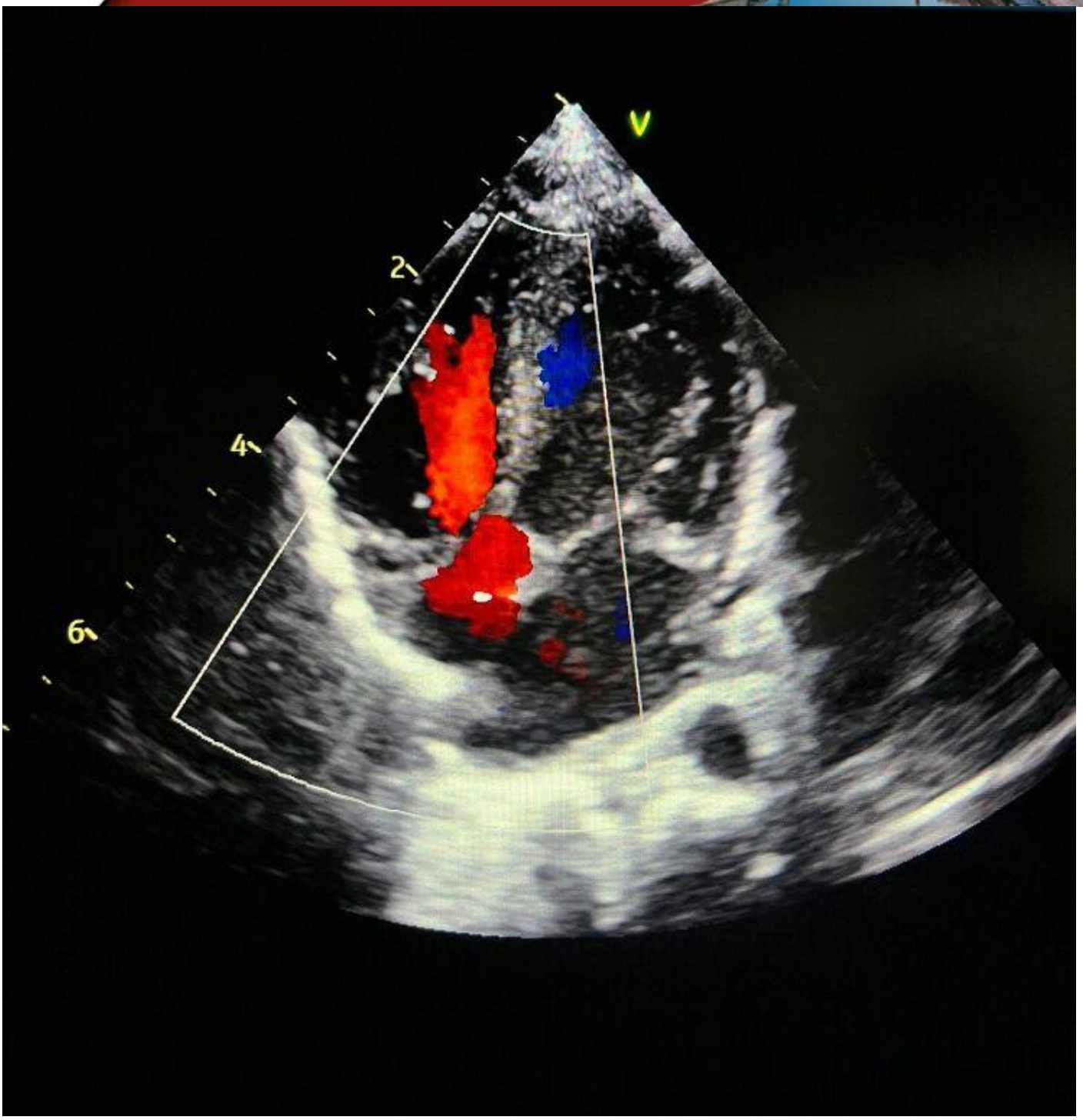
Fiorella Fratta[1], Carmela Morelli[1], Fortuna Del Gaizo[1], Laura Di Pietto[2], Ludovica Spinelli Barrile[1], Beneamino Tormettino[3], Antonia Giudicepietro[4], Paolo Volpe[4], Mario Giordano[5], Raffaella Marzullo[1], Gabriella Gaudieri[2], Francesca Ripoli[1], Marialuisa Ricciardiello[5], Raffaella Esposito[1], Maria Giovanna Russo[2]
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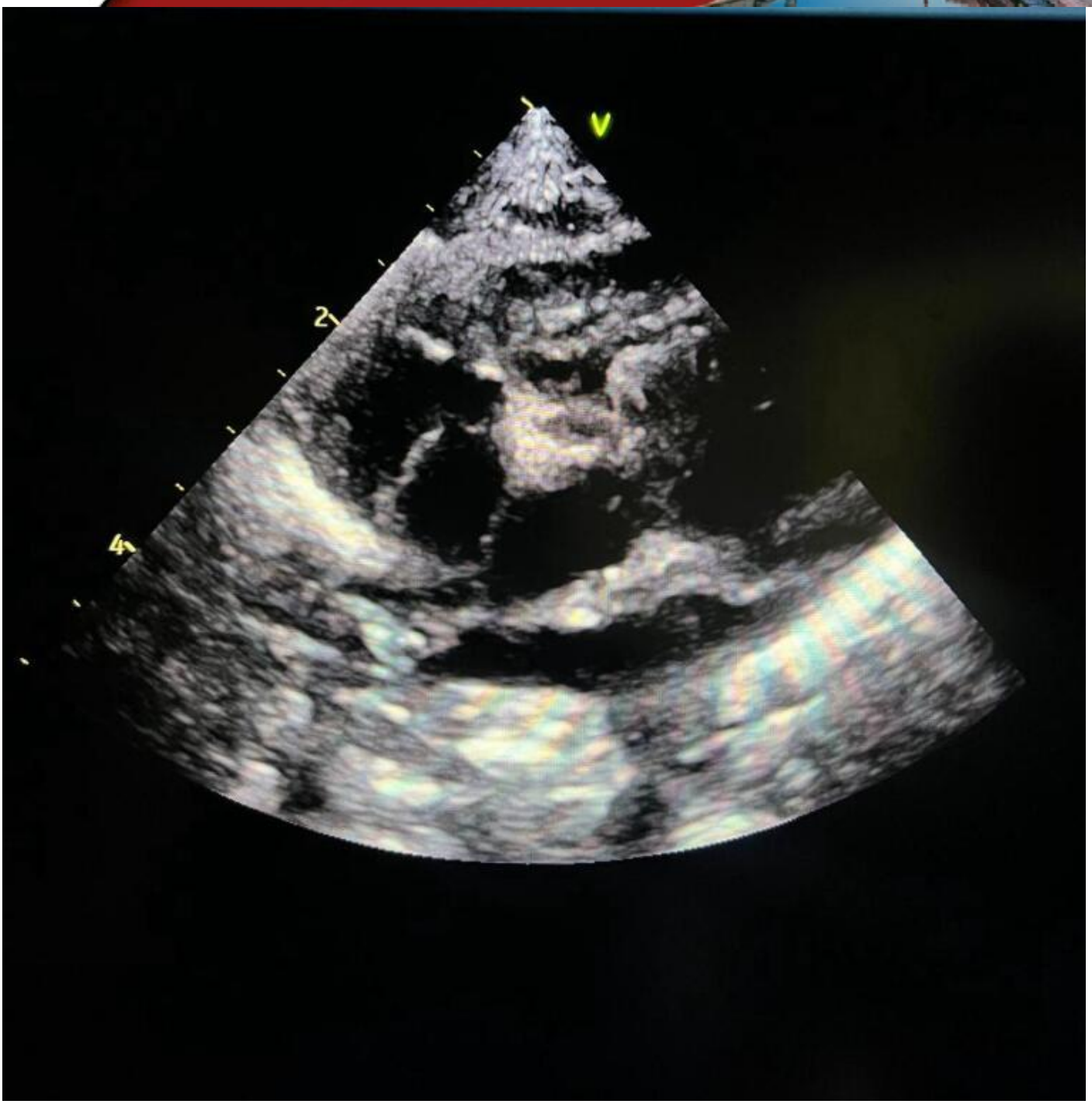
Background and Aim: Persistent right venous valve (PRVV) is a rare embryological remnant caused by incomplete regression of the right venous valve after birth. Although usually considered a benign anatomical variant, PRVV may represent a diagnostic challenge when identified during fetal or neonatal life, as it can mimic pathological intracardiac masses. In this setting, fetal echocardiography plays a pivotal role in distinguishing PRVV from true cardiac pathology and in guiding perinatal management.
Methods: We report the case of a fetus referred for targeted fetal echocardiography after detection of an echogenic mass within the right atrium during routine obstetric ultrasound screening. At 27 + 3/7 weeks' gestation, fetal echocardiography confirmed a non-vascular echogenic structure within the right atrium. Detailed evaluation demonstrated normal cardiac anatomy with preserved biventricular systolic function and no evidence of fetal heart failure, hydrops, or tricuspid inflow obstruction. The morphology and anatomical location of the lesion were consistent with a membranous structure rather than a true intracardiac mass, suggesting a remnant of the right venous valve. Serial fetal echocardiographic examinations showed persistence of the finding without progression or hemodynamic impact, allowing appropriate prenatal counseling and delivery planning. The infant was delivered at 39 + 3 weeks' gestation by emergency cesarean section for non-reassuring fetal heart rate tracing and showed good postnatal adaptation. Initial postnatal echocardiography identified two right atrial structures consistent with remnants of a persistent right venous valve, without significant obstruction to atrial inflow or outflow. At 48 hours of life, the neonate developed brief, self-limited episodes of oxygen desaturation associated with a bidirectional shunt at the level of the foramen ovale. No signs of right-

sided obstruction or ventricular dysfunction were observed. Under close monitoring, desaturation episodes progressively resolved and conservative management was continued.

Results:




V
2
4
6



This case highlights the central role of fetal echocardiography in the differential diagnosis of fetal right atrial masses and in the management of PRVV.

Conclusions: Although PRVV and related membranous remnants may have potential hemodynamic implications during the transitional neonatal period, the majority of reported cases follow a benign clinical course. Early prenatal identification enables appropriate risk stratification, delivery planning, and targeted postnatal surveillance



P-134 / #641

OUTCOMES FOLLOWING FOETAL DIAGNOSIS OF VENTRICULAR DISPROPORTION IN A NATIONAL TERTIARY MATERNAL FOETAL-MEDICINE UNIT

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Background and Aim: Approximately 500 children are born annually in Ireland with congenital heart disease, with Coarctation of the Aorta comprising 5–8% of cases. Ventricular disproportion on foetal echocardiography may indicate left-sided obstructive lesions such as coarctation of the aorta but is often a false-positive finding. Despite improved antenatal detection, prenatal diagnosis of coarctation remains challenging. This study aims to assess the prevalence of true coarctation in foetuses with ventricular disproportion in our tertiary maternity centre. Our secondary aim is to describe their neonatal and genetic outcomes, to improve antenatal counselling and prognostication.
Methods: This was a retrospective cohort study using electronic healthcare records of foetuses identified with ventricular disproportion on antenatal ultrasound between January 2018 and March 2025 in a single tertiary maternity hospital in Ireland. Foetal and neonatal echocardiograms were reviewed along with neonatal characteristics, genetic testing where present and neonatal outcomes.
Results: 55 foetuses with ventricular disproportion were identified in the above period. Isolated RV-LV disproportion was noted in 30/55 (55%), while 25/55 (45%) had additional cardiac anomalies. One termination of pregnancy and two intra-uterine deaths were excluded from final outcome analysis. There were three perinatal/neonatal deaths with one coarctation confirmed on post-mortem examination. 39/52 (75%) neonates with antenatal disproportion had cardiac anomalies on postnatal follow-up. 9/52 had confirmed coarctation of the aorta (17%), one in the isolated RV-LV disproportion cohort, and the remainder in the additional cardiac anomalies group. 10/52 (19%) had a hypoplastic aortic arch and a further 8/52 (15%) had hypoplastic left-heart structures including Shone's Complex/Variant. Non-cardiac anomalies were detected in 22/55 (40%). Genetic testing was performed in 16/55 (29%), with confirmed antenatal genetic diagnoses in 13/16 (81%). Trisomy 21 (6/13) was the single most common genetic diagnosis in this cohort followed by Turner's Syndrome (2/13)
Conclusions: Our study shows a high prevalence of congenital cardiac disease in foetuses with antenatal ventricular disproportion. Coarctation prevalence in our study was higher when additional cardiac anomalies were identified on foetal echocardiogram compared to



ventricular disproportion alone. Interestingly, there was a high diagnostic yield in our cohort for those with ventricular disproportion undergoing genetic testing, highlighting the importance of genetic testing to aid prognostication.



P-135 / #163

PERINATAL OUTCOMES IN DOUBLE OUTLET RIGHT VENTRICLE

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Background and Aim: Double outlet right ventricle (DORV) represents a complex and heterogeneous group of congenital heart defects. The aim of this study was to describe a series of prenatally diagnosed DORV cases and identify factors associated with neonatal mortality and a univentricular outcome.
Methods: A retrospective descriptive cohort study was performed. Measures of frequency, central tendency and dispersion were calculated, and associations were assessed using Fisher's exact test and the Fisher-Freeman-Halton test.
Results: Among 51 patients with prenatal diagnosis of DORV, 11 were excluded: 1 termination of pregnancy, 1 fetal demise, 3 revised diagnoses, and 6 lost to follow-up. Forty patients were included. Mean maternal age was 31.98 ± 4.91; maternal comorbidities were present in 35%, and obesity in 17.5%. Cesarean delivery occurred in 72.5% at a median of 38 weeks (IQR 2). Mean birthweight was 2969.5 ± 691.6 grams, with prematurity in 20% and low birthweight in 17.5%. The distribution of anatomical types of DORV was as follows: transposition of the great arteries-like: 13/40 (32.5%, 10 with Taussig-Bing), Tetralogy of Fallot-like: 9/40 (22.5%), VSD-like: 7/40 (17.5%), and non related VSD (nrVSD)-like: 11/40 (27.5%, 8 with heterotaxy syndrome (HS)). Genetic syndromes and extracardiac anomalies were present in 45% (18/40), and in 31.2% (10/32) after excluding HS. Neonatal mortality was associated with HS (p = 0.03), as was a univentricular outcome (p = 0.00). Among the 33 (82.5%) patients surviving the neonatal period, 6 (18.2%) had a univentricular outcome. A univentricular outcome was associated with VSD-type and nrVSD-type anatomy (p = 0.05), and with genetic syndromes and extracardiac malformations (p = 0.000), even after excluding HS.
Conclusions: In this series of patients with DORV, almost half had associated genetic syndromes and extracardiac anomalies. Mortality and a univentricular outcome were higher among patients with HS. After excluding cases with HS, a univentricular outcome remained associated with a VSD-type or a nrVSD-type, as well as with genetic syndromes and extracardiac malformations.



P-137 / #669

FEASIBILITY OF CORONARY ARTERIES' ASSESSMENT IN FETUSES WITH TRANSPOSITION OF THE GREAT ARTERIES - A PILOT STUDY

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Background and Aim: Imaging the coronary arteries is an important part of the preoperative evaluation of newborns with transposition of the great arteries (TGA) because their anatomical variability can significantly impact the surgical approach and complexity. Our goal was to determine whether visualization of the coronary arteries in TGA is possible in the prenatal period.
Methods: This was a prospective pilot study conducted at a single tertiary fetal cardiology unit. We attempted to assess the coronary arteries during fetal echocardiographic studies in all consecutive patients diagnosed with TGA. The anatomy of the coronary arteries was described according to the Leiden convention and verified intraoperatively.
Results: The assessment of coronary arteries was attempted in 15 fetuses diagnosed with various forms of TGA in 2024-2025. The results of the prenatal and intraoperative assessments were fully concordant in 10 patients (67%). Discrepancies included: the origin of the circumflex artery (Cx) in three patients, the origin of the right coronary artery (R) in one patient, and separate ostia of the R and Cx in one patient. Detailed data are presented in Table 1.



Patient	TGA - anatomical type	Prenatal coronary assessment	Time of prenatal assessment [weeks of pregnancy]	Intraoperative coronary assessment	Concordance
1	TGA	1LCx-2R	37	1LCx-2R	1
2	TGA VSD	1LCx-2R	36	1LCx-2R	1
3	TGA VSD	1L-2CxR	35	1L-2CxR	1
4	TGA	1LCx*-2R	33	1LCx*-2R	1
5	TGA	1LCx	36, 38	1LCx-2R	0 – R not visualized
6	TGA	1LCx-2R	37	1LCx-2R	1
7	TGA VSD	1L-2CxR	37	1L-2Cx,R	0 – separate ostia
8	TGA	1LCx-2R	35	1L-2CxR	0 – Cx origin
9	TGA	1LCx-2R	32	1LCx-2R	1
10	TGA	1LCx-2R	36, 38	1LCx-2R	1
11	TGA	1LCx-2R	34, 37	1LCx-2R	1
12	TGA VSD LVOTO	1L-2CxR	34	1LCx-2R	0 – Cx origin
13	TGA	1LCx-2R	30, 36	1LCx-2R	1
14	TGA	1L-2CxR	34	1L-2CxR	1
15	TGA VSD	1LCx-2R	36	1L-2CxR	0 – Cx origin

Conclusions: Assessment of the coronary arteries in fetuses with TGA is possible after 30 weeks of pregnancy, however it is more challenging and less reliable than postnatally. Suspicion of coronary artery variants should be verified postnatally, especially in cases of high-risk anatomy.



P-138 / #61

PRENATAL DIAGNOSIS AND THE MANAGEMENT OF COMPLEX CARDIAC MALFORMATIONS: A CASE REPORT

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Background and Aim: Prenatal diagnosis of congenital heart disease allows optimal delivery planning and immediate postnatal management, which are crucial in lesions requiring urgent intervention such as transposition of the great arteries. the aim is to present a case diagnosed in Albania during late gestation, emphasizing the vital role of prenatal detection and coordinated international management in optimizing survival chances.
Methods: The data included in this study were collected from medical documentation archived in the health institutions where the patient was treated and include: obstetric records, fetal echocardiography reports and follow-up. The data analysis was carried out qualitatively, chronologically following the course of diagnosis and in utero transfer to the specialized center abroad.
Results: We report the case of a 32-year-old primigravida from Kosovo whose fetus was diagnosed at 38 + 3 weeks' gestation with TGA and intact ventricular septum during a fetal echocardiographic examination performed in Shkodër, Albania. In view of the need for immediate postnatal intervention and the lack of local pediatric cardiac surgery, an in-utero transfer to a specialized Italian center was recommended.
Conclusions: This case highlights how prenatal diagnosis enables timely planning, safe delivery, and early postnatal management of complex CHD. In resource-limited countries, strengthening prenatal screening and cross-border referral networks can be lifesaving.



P-139 / #1428

PRENATAL CARDIOMYOPATHY AND ATRIAL TACHYCARDIA ASSOCIATED WITH A TNNI3K VARIANT: FIRST REPORTED CASE.

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Background and Aim: Fetal cardiomyopathy with atrial arrhythmia is rare and presents therapeutic challenges. Variants in *TNNI3K*—a cardiac-specific kinase implicated in conduction disease with or without dilated cardiomyopathy— have increasingly been identified, although many remain classified as variants of uncertain significance (VUS).
Methods: A case report of a primigravida and her fetus who developed a cardiomyopathy and atrial tachycardia.
Results: Case: A primigravida was referred at 21+2 weeks' gestation for suspected fetal atrial abnormality. Fetal echocardiography demonstrated an aneurysmal atrial septum and two small muscular VSDs with normal SNP array on amniocentesis. By 26 weeks, there was an evolving cardiomyopathy with right-sided chamber dilatation, thinned and hypertrabeculated RV myocardium, and biventricular systolic dysfunction. At 32 weeks, the fetus developed a sustained atrial tachyarrhythmia-atrial rate 200bpm with 2:1 AV block. Ventricular dysfunction worsened. Transplacental anti-arrhythmics were deemed unsuitable due to the combination of low ventricular rate and cardiomyopathy. A 4-gram loading dose of Magnesium Sulphate (MgSO4) was administered for fetal neuroprotection due to reduced movements with potential need for premature delivery. Completion of the infusion coincided with conversion to sinus rhythm. After discussion, MgSO4 infusion was continued at dose 1gm/hr without side effects in the mother. At 35 weeks (3 weeks on MgSO4), recurrent atrial tachycardia with 2:1 block and absent fetal movements prompted emergency caesarean delivery. Postnatally, there was persistent atrial tachycardia and biventricular dysfunction. After multiple anti-arrhythmic strategies, sinus rhythm was restored with ivabradine and cardiac function normalised.: A genetic cardiomyopathy panel was performed using trio whole-genome sequencing (WGS; R135), which identified a heterozygous missense variant of uncertain significance in *TNNI3K*: c.1616C>T p.(Thr539Ile).
Conclusions: This represents the first reported prenatal case of fetal cardiomyopathy in which a *TNNI3K* VUS was identified and broadens the phenotypic spectrum associated with *TNNI3K* variants. *TNNI3K* variants may be a cause of fetal cardiomyopathy with



arrhythmia, although further cases and functional data are required to confirm variant pathogenicity.



P-140 / #11

POSTNATAL OUTCOMES IN CONGENITAL AORTIC VALVE ABNORMALITIES ARE PREDICTED BY ASCENDING AORTIC MEASUREMENTS AND AORTIC VALVE MORPHOLOGY.

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Background and Aim: To identify predictors of postnatal outcomes in fetuses with congenital aortic valve abnormalities.
Methods: This retrospective study (2020-2025) assessed fetuses from 20 weeks' gestation to term with abnormal aortic valve morphology, ascending aortic dilatation, or abnormal valve flow. Measurements included aortic annulus, root, ascending aorta, valve area in parasternal short axis, and LV dimensions. 4D spatiotemporal image correlation (STIC) imaging evaluated ascending aorta flow. Exclusions were fetuses under 20 weeks, those with other major heart defects, or without measurable valve area.
Results: Among 12 fetuses with abnormal aortic valves, 10 had bicuspid aortic valve (BAV): 5 type 0 (no raphe), 2 type 1 (one raphe), 3 type 2 (two raphe); 2 had unicuspid acommissural (three raphe) valves. Type 0 BAV fetuses had normal ascending aortic dimensions but also showed anomalies such as persistent LSVC, abnormal ductus venosus, VSD, ventricular disproportion, and, in one case, coarctation. BAV with a normal valve area (n=9/10), compared with 31 age-matched controls, showed similar immediate postnatal outcomes and did not require interventions. The valve area in normal fetuses was measured as 0.07 ± 0.04 <25 weeks, 0.15 ± 0.03 at 25-30 weeks, and 0.23 ± 0.05 >30 weeks. Two fetuses with unicuspid acommissural aortic valve developed critical aortic stenosis, absent forward flow, severe left ventricular dysfunction, and progressed to fetal hydrops and in-utero demise. A fetus with type 1 BAV required balloon dilatation at 6 months of age. Type 0 BAV was linked to normal ascending aorta size and laminar flow, whereas types 1 and 2 BAV were associated with aortic dilation and abnormal helical flow on 4D STIC imaging. Aortic valves lacking forward flow (n=2) still showed normal aortic dimensions.
Conclusions: Ascending aortic size, valve area, and flow characteristics predict in-utero and immediate postnatal outcomes in fetuses with BAV. Types 1 and 2 BAV show abnormal ascending aorta size and flow patterns compared to type 0. Unicuspid acommissural valves have the worst prognosis.



P-141 / #1501

PARENTAL REFLECTIONS ON PRENATAL COUNSELING FOR THE FIRST YEAR OF LIFE IN SEVERE CONGENITAL HEART DISEASE

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Background and Aim: Congenital heart disease (CHD) is increasingly detected in pregnancy, creating the opportunity to counsel prospective parents about the treatment options and the trajectories they face as a family. In this qualitative interview study, we aimed to identify parent-reported experiences in prenatal counselling regarding the first year of life including the perioperative period for CHD. The objective was to identify key elements in the prenatal counseling that help parents to prepare for the first year of live.
Methods: Parents of children aged 1–3 years, who had received prenatal counselling at our tertiary care center and whose child underwent cardiac surgery or intervention including intensive care (IC) admission within the first year of life, were interviewed. Thematic analysis was performed using Atlas.ti until data saturation was reached.
Results: Interviews (N=18) identified seven themes related to parent experiences and support needs. Overall, prenatal counselling was perceived positively (N=17). Participants valued the multidisciplinary approach, the illustrative drawings made during consultations, and the prenatal IC visits most. These aspects gave them a sense of control and a means to cope with uncertainty. Most parents were satisfied with the amount of information provided during pregnancy, noting that detailed knowledge of aspects of the surgery and IC was not necessary for living through the pregnancy. However, preferences were highly individual, with some parents expressing a desire to receive repetitive information about details, including potential worst-case scenarios, even after the decision of continuation of the pregnancy (N=4). Support systems were considered important. Most parents valued peer contact, with some preferring prenatal, some postnatal, yet a few choose not to participate. The first year of life was experienced as highly challenging and, for many, traumatic.
Conclusions: The psychological impact on parents of children with severe CHD is substantial, beginning during pregnancy and extending through the first year of life, which was experienced as highly challenging and traumatic. The key elements that must be



offered to parents during pregnancy are clarifying the anatomy, a visit to the IC, and a multidisciplinary approach. Most parents were highly satisfied with the information provided during prenatal counselling; however, a minority expressed a desire for more detailed information.



P-142 / #1449

HAEMODYNAMIC EVALUATION OF LANDRACE-YORKSHIRE PRETERM PIGLETS SUPPORTED ON A PUMPED ARTIFICIAL PLACENTA SYSTEM

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Background and Aim: Recent advancements in artificial placenta(AP) technology have been limited by haemodynamic instability in small fetal piglets (~600g), which are intended to represent the clinical target of extremely premature infants (<23weeks gestation). Larger animal models demonstrate superior stability, suggesting a critical mismatch between fetal size and AP circuit size. This study aimed to investigate the impact of fetal size on haemodynamic stability on the AP.
Methods: Nine Landrace-Yorkshire fetal pigs (1123±149g) at 107 days gestation (115days term)were supported on AP with a prototype centrifugal pump (Paragon Neonatal PMP, Chalice Medical Ltd) for 6:23±1:12 hours:min. The umbilical cord was cannulated using customized 12-gauge and 10-gauge cannulas for the umbilical arteries (UA) and umbilical vein (UV), respectively. UV flow and heart rate(HR) were continuously monitored and recorded. Serial fetal echocardiograms were performed before circuit initiation (Hour 0; n=4) and during AP support at hours 1–2(n=4), 3–4 (n=5), and 5–6(n=5). Echocardiogram acquisitions were analysed to measure chamber dimensions, left ventricle(LV) and right ventricle(RV) wall thickness(WT), ejection fraction(EF), eccentricity index(EI), and global longitudinal strain(GLS) using 2D speckle tracking. Rank-based linear mixed model was employed to assess changes over time.Data are presented as mean±SD and $P<0.05$ considered statistically significant.
Results: Following transient subphysiologic UV flow in the first 10 minutes of transition onto AP (101 ± 23.8 ml/min/kg), UV flow stabilized by hour 1 (156.1 ± 40.5 ml/min/kg) and remained stable over time ($P = 0.780$; Fig 1a). HR was stable throughout AP support (171 ± 33 bpm; $P=0.141$; Fig. 1b). RVWT increased by hour 5-6 compared to baseline ($P=0.016$) while LV volume and diameter decreased by hour 3-4 compared to either baseline or hour 1-2 (Table 1). LVEF, LVGLS and RVGLS were not different throughout AP support (Table

1).

Table 1. Summary of ventricular function, size, and strain by echocardiography.

Variable	Baseline (H-1)	Hours 1-2	Hours 3-4	Hours 5-6	*P*
ED_LVWALL (cm)	0.23 ± 0.04 (n=4)	0.26 ± 0.06 (n=5)	0.28 ± 0.03 (n=5)	0.3 ± 0.06 (n=5)	0.199
ED_SEPTUM (cm)	0.27 ± 0.04 (n=4)	0.27 ± 0.05 (n=5)	0.31 ± 0.05 (n=5)	0.32 ± 0.07 (n=5)	0.63
ED_RVWALL (cm)	0.22 ± 0.04^{a} (n=4)	0.24 ± 0.03^{ab} (n=5)	0.28 ± 0.03^{ab} (n=5)	0.3 ± 0.05^{b} (n=5)	**0.016**
ES_LVWALL (cm)	0.3 ± 0.06 (n=4)	0.32 ± 0.02 (n=4)	0.35 ± 0.05 (n=5)	0.38 ± 0.06 (n=5)	0.082
ES_SEPTUM (cm)	0.33 ± 0.07 (n=4)	0.36 ± 0.08 (n=4)	0.39 ± 0.06 (n=5)	0.4 ± 0.08 (n=5)	0.445
ES_RVWALL (cm)	0.3 ± 0.06 (n=4)	0.32 ± 0.02 (n=4)	0.35 ± 0.06 (n=5)	0.38 ± 0.06 (n=5)	0.066
LVEDV (ml)	1.87 ± 0.42 (n=4)	2.08 ± 0.84 (n=4)	1.43 ± 0.27 (n=5)	1.62 ± 0.32 (n=5)	0.102
LVEDd (cm)	2.36 ± 0.16^{ab} (n=4)	2.56 ± 0.38^{a} (n=4)	2.16 ± 0.13^{b} (n=5)	2.41 ± 0.26^{ab} (n=5)	**0.037**
LVESV (ml)	0.82 ± 0.09^{a}(n=4)	0.97 ± 0.4^{a} (n=4)	0.55 ± 0.08^{b} (n=5)	0.52 ± 0.13^{b} (n=5)	**0.003**
LVESd (cm)	1.92 ± 0.06^{ab}(n=4)	2.04 ± 0.12^{a}(n=4)	1.62 ± 0.26^{b}(n=5)	1.92 ± 0.15^{ab}(n=5)	**0.008**
LVSV (ml)	1.04 ± 0.39 (n=4)	1.12 ± 0.62 (n=4)	0.88 ± 0.21 (n=5)	1.17 ± 0.1 (n=5)	0.467
LV EDV_Ecc ratio	1.07 ± 0.08 (n=2)	1.04 ± 0.03 (n=3)	1.09 ± 0.13 (n=2)	1.31 ± 0.41 (n=3)	0.379
LV ESV_Ecc ratio	1.13 ± 0.11 (n=2)	1.04 ± 0.06 (n=3)	1.02 ± 0.03 (n=3)	1.13 ± 0.12 (n=3)	0.239
LVEF	40.51 ± 6.93 (n=4)	48.58 ± 1.63 (n=4)	49.95 ± 17.02 (n=5)	35.95 ± 13.22 (n=4)	0.109
LVGLS (%)	-19.06 ± 3.79 (n=4)	-18.03 ± 4.57 (n=4)	-20.57 ± 5.18 (n=5)	-16.96 ± 3.75 (n=4)	0.163
RVGLS (%)	-19.62 ± 2.24 (n=4)	-18.7 ± 1.72 (n=3)	-19.84 ± 2.49 (n=5)	-19.44 ± 3.21 (n=5)	0.685

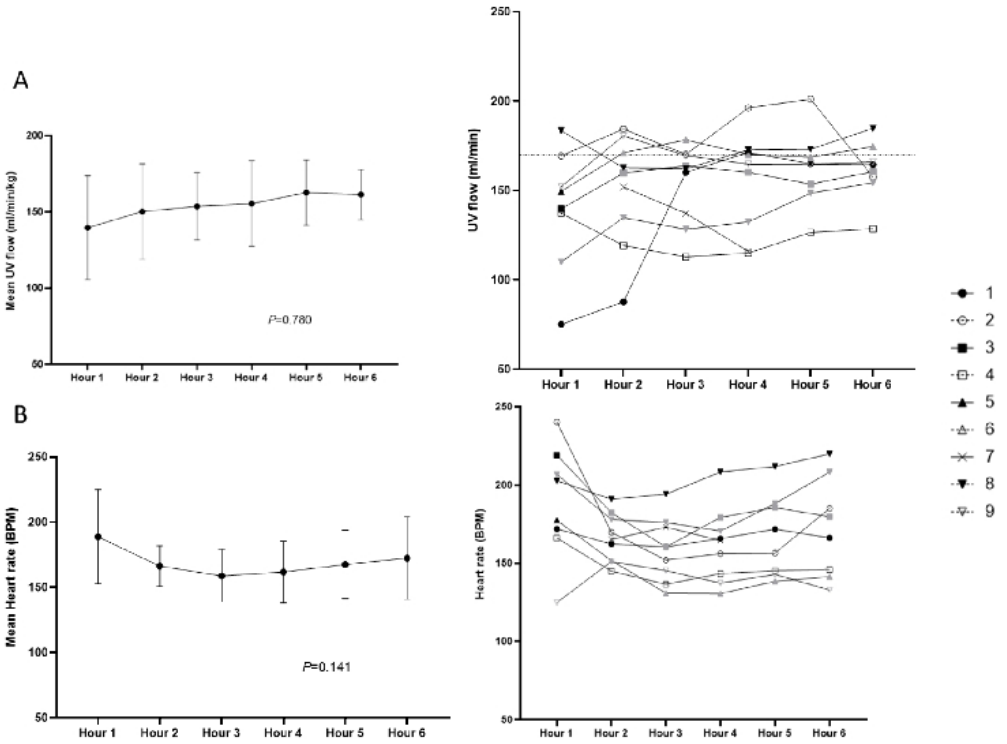


Fig 1. Umbilical vein flow (A) and heart rate (B) over AP support presenting the mean of all subjects (Left) and individual subjects (Right).

Conclusions: Improved haemodynamic stability and physiologic UV flows of larger fetal



piglets contrast with past reports of subphysiologic UV flow in smaller fetuses, suggesting that larger fetuses are more robust and better tolerate exposure to the AP circuit. While global ventricular function is preserved, changes in LV volumes and RVWT suggest the need for continued miniaturization and optimization of the AP circuit to better suit smaller fetuses.



P-143 / #683

MULTIPLE MUSCULAR VENTRICULAR SEPTAL DEFECTS: FETAL DIAGNOSIS, CONTEMPORARY MANAGEMENT, AND ASSOCIATED GENETIC PHENOTYPES

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Background and Aim: Multiple muscular ventricular septal defects (mVSDs) represent a significant diagnostic and therapeutic challenge in pediatric cardiology and surgery. They can be isolated or associated with other congenital heart defects. Management strategies are historically linked to substantial morbidity. However, contemporary outcomes and the prevalence of associated genetic and cardiomyopathic phenotypes remain poorly characterized. This study aimed to analyze the natural history of patients with mVSDs from fetal diagnosis to treatment, specifically investigating potential associations with left ventricular non-compaction (LVNC) and cardiomyopathies.
Methods: We conducted a single-center retrospective review of fetal and postnatal databases (2010–2025), including all patients with a fetal diagnosis of mVSDs. Fetal and postnatal echocardiograms, clinical reports, and management strategies were comprehensively analyzed.
Results: A cohort of 53 fetuses and neonates was analyzed. mVSDs were isolated in 33 patients (62%) and associated with other congenital heart defects (CHD) in 20 patients (38%). Genetic syndromes or confirmed chromosomal abnormalities were identified in 7 patients (13%). Among patients with isolated mVSDs (n=33), 5 met echocardiographic criteria for left ventricular non-compaction (LVNC). Of these, 2 were genetically diagnosed with an 8p23.1 microdeletion encompassing the GATA4 gene, a locus associated with cardiomyopathy and various CHD. Within this isolated mVSD group, 13 patients (39%) underwent intervention: primary surgical repair (n=2) or initial pulmonary artery banding (PAB, n=11) within the first two months of life. Following PAB, subsequent definitive closure was achieved surgically in 4 patients and via transcatheter device in 4 others. In the cohort with mVSDs associated with other cardiac defects, PAB was the initial intervention for all patients with hemodynamically significant lesions. There were no deaths. Complete atrioventricular block occurred in 2 patients (3.8%). A non-hemodynamically significant residual shunt was present in 25% of patients following intervention.
Conclusions: At our center, significant mVSDs are primarily managed with PAB, followed by tailored surgical or transcatheter closure. Comprehensive genetic evaluation is



essential, given the possible association between mVSDs, echocardiographic findings of LVNC, and underlying cardiomyopathies.



P-144 / #918

FETAL CMR: LOVE IT OR LIST IT?

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Background and Aim: Fetal echocardiography remains the gold standard for the prenatal diagnosis of congenital heart disease (CHD) due to its wide availability, safety, and reproducibility. However, recent technological advances have enabled the clinical application of fetal cardiac magnetic resonance imaging (CMR) as an emerging diagnostic tool, particularly in cases where echocardiography alone is inconclusive. The aim of this study was to evaluate the clinical utility and feasibility of fetal cardiac CMR as an adjunctive diagnostic modality to fetal echocardiography in prenatal assessment of CHD.
Methods: Women screened at our centre for suspected fetal CHD by fetal echocardiography between July 2023 and October 2025, and requiring further diagnostic evaluation with fetal CMR, were included. Fetal cardiac CMR scans were performed during the third trimester of pregnancy using a 1.5-Tesla scanner (Achieva, Philips Healthcare)
Results: A total of 19 patients were included in the study. Indication for fetal CMR included vascular ring (8/19, 42.1%), aortic arch anomalies (AAA) with or without coarctation (CoA) (5/19, 26.3%) and complex CHD (6/19, 31.6%). The results are summarized in Table 1. A good concordance between fetal echocardiography and CMR was observed in assessing vascular rings and complex CHD, while diagnosis of aortic arch anomalies appeared more challenging mainly in reason of CoA. Table 1. Results are expressed as mean (SD) or n (%)

	Vascular Ring	**Aortic Arch Anomalies**	**Complex CHD**	**p-value**
Maternal age (yrs)	32.4 (6.56)	33.6 (3.15)	35.8 (4.04)	0.532
Fetal echo (g.w)	22.7 (3.82)	28.0 (3.87)	25.8 (5.07)	0.097
Fetal CMR (g.w)	29.7 (1.25)	33.0 (3.56)	31.6 (2.41)	0.238



Concordance (n, %)	8 (100)	2 (40%)	6 (100)	

Conclusions: Fetal cardiac CMR is a valuable tool in prenatal diagnosis and, in complex cases, it adds useful information to fetal echocardiography, offering important insights for CHD diagnosis and characterisation and ultimately contributing to the optimisation of pregnancy monitoring and perinatal management.



P-145 / #927

FETAL HYDROPS DUE TO RESISTANT SVT - A UNIQUE WAY OF MANAGMENT

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Background and Aim: Fetal SVT when prolonged leads to hydrops and may cause fetal demise. Transplacental therapy can be ineffective in a hydropic fetus. Premature delivery before 28 weeks carries high morbidity and mortality.
Methods: 24 year primigravida at 25 weeks of gestation presented with fetal tachycardia with hydrops. Heart rate was 220 bpm with severe biventricular dysfunction. M-mode across atria and ventricle and LVOT-MV doppler showed identical atrial and ventricular rates with 1:1 conduction. It was regular tachycardia with atrial rate of 220/minute, probably SVT. There was large pleural effusion, mild pericardial effusion and ascites. Mother was started on digoxin with full digitalising dose along with fleicainide 100mg twice a day. Heart rate remained same at the end of 48hours with no change in hydrops. Fleicainide was increased to 100mg thrice a day. After 24 hours, fetal heart rate reduced to 197 per minute but arrhythmia persisted. Mother had extreme fatigue and vomiting due to fleicainide. There was no ECG changes in mother. Fleicainide was replaced by Sotalol at 80 mg thrice daily dose. Maternal ECG after 48 hours showed QT prolongation of 500ms. FHR remained at 200 per minute with increasing pericardial effusion and severe ventricular dysfunction. Hence maternal intravenous amiodarone was given at 150 mg loading dose over 1 hour followed by 650 mg over 24 hours.
Results: Within one hour of loading dose, sinus rhythm was achieved. Baby had short runs of SVT and intravenous therapy was continued for 48 hours followed by oral tablets. At the end of 48 hours stable sinus rhythm of 120 beats per minute was achieved. Hydrops resolved over 7 days. At 31 weeks of gestation, fetus had reduced movements with sinus rate of 100 per minute. Emergency LSCS was performed and 1.5 kg baby was delivered. Baby had hypothyroidism requiring treatment. At 15 days of life baby had 1 episode of SVT for which oral propranolol was started. At 6months follow up baby is doing well with no recurrences.
Conclusions: Maternal intravenous amiodarone can be a safer compared to intrauterine therapy and effective than transplacental therapy for fetal tachycardia with hydrops in emergent situations



P-146 / #1191

A RARE ASSOCIATION OF EXTRAHEPATIC PERSISTENT RIGHT UMBILICAL VEIN, COMPLEX CARDIAC MALFORMATIONS, AND TRISOMY 21: PRENATAL DIAGNOSIS AND POSTNATAL OUTCOME

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Background and Aim: Background Extrahepatic persistent right umbilical vein (PRUV) is an uncommon venous anomaly that is frequently associated with major congenital heart defects and chromosomal abnormalities. Its coexistence with an unbalanced atrioventricular septal defect (AVSD) and aortic coarctation represents an exceptionally rare and high-risk constellation with major prognostic implications.
Methods: This case report describes the rare prenatal and postnatal evaluation of a fetus with complex congenital cardiac anomalies.
Results: Case Presentation We report the case of a 39-year-old multigravida referred at 26 + 6 weeks' gestation for suspected fetal cardiac anomalies. Fetal echocardiography revealed cardiomegaly, hydrops fetalis, pericardial effusion, and features suggestive of right atrial isomerism, including a midline liver and an extrahepatic PRUV with agenesis of the ductus venosus. Cardiac evaluation demonstrated an unbalanced AVSD with marked right ventricular dominance, hypoplasia of left-sided cardiac structures, a common atrium, a single atrioventricular valve with severe regurgitation, biventricular hypertrophy, and hypoplasia of the aortic root and isthmus. Invasive prenatal genetic testing was declined. Spontaneous preterm delivery occurred at 32 + 6 weeks' gestation. The neonate developed severe respiratory distress and cyanosis, requiring intensive care support. Postnatal echocardiography confirmed the prenatal findings and demonstrated progressive aortic coarctation and a large patent ductus arteriosus with significant pulmonary overcirculation, leading to cardiorespiratory failure. Genetic testing confirmed trisomy 21. Surgical repair of the aortic coarctation with pulmonary artery banding was performed, allowing transient improvement and partial weaning from ventilatory and hemodynamic support. However, the infant developed acute cardiogenic shock and died on postoperative day 15 despite maximal resuscitative efforts.
Conclusions: Conclusion This case illustrates an exceptionally severe and prognostically unfavorable association of extrahepatic PRUV, unbalanced AVSD, and aortic coarctation in the context of trisomy 21. The combination results in profound fetal and postnatal circulatory compromise, often beginning in utero with the development of hydrops, and is



associated with an extremely poor outcome. These findings underscore the critical importance of meticulous prenatal echocardiographic assessment to enable accurate prognostication, informed parental counseling, and coordinated perinatal and postnatal management.



P-147 / #548

PRENATAL DETECTION OF AORTIC COARCTATION: DIAGNOSTIC PERFORMANCE AND PERINATAL OUTCOMES IN A TEN-YEAR COHORT

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Background and Aim: Prenatal diagnosis of aortic coarctation (CoA) remains one of the most challenging tasks in foetal cardiology due to subtle anatomical markers and postnatal ductus-dependent physiology. Early identification enables tailored perinatal planning, timely initiation of prostaglandin therapy, and improved neonatal stabilization. Refining prenatal risk stratification is therefore essential to optimize outcomes. To evaluate the diagnostic accuracy of prenatal suspicion of CoA in foetuses referred for morphological echocardiography and to characterize associated anomalies and perinatal outcomes over a ten-year period.
Methods: We conducted a retrospective observational study including all pregnancies with suspected CoA assessed at our foetal cardiology unit from 2015 to 2025. Cardiac and extracardiac anomalies, chromosomal/genetic diagnoses, degree of suspicion (high vs. low), pregnancy outcomes, and neonatal evolution were analysed. In parallel, all neonates diagnosed with CoA postnatally during the same period without prior prenatal suspicion were identified.
Results: Among 72 pregnancies with suspected CoA (including six twin gestations), 23 foetuses had additional congenital heart defects—most commonly ventricular septal defect, atrioventricular canal, and aortic stenosis. Twenty-one foetuses presented major extracardiac anomalies, including 15 chromosomal or genetic syndromes. There were two foetal deaths and 16 pregnancy terminations. Fifty-four newborns were evaluable postnatally: 35 had confirmed CoA, while 19 were unaffected. High prenatal suspicion showed a positive predictive value (PPV) of 80.5% (33/41), whereas low suspicion yielded a PPV of 23.1% (3/13). Among neonates with confirmed CoA, 24 had a favourable evolution; 11 died (2 pre-operative and 9 post-operative), all presenting additional cardiac anomalies. Only three cases of CoA were missed prenatally among >40,000 births during the study



period.

Conclusions: - **High-grade prenatal suspicion demonstrates strong diagnostic accuracy**, supporting its use in perinatal decision-making. **- Coexisting cardiac, extracardiac, and genetic anomalies significantly influence both diagnostic complexity and neonatal outcomes**. - **Structured prenatal screening programs are highly effective**, with very few missed cases in a large birth cohort, underscoring the value of coordinated foetal–neonatal management.



P-148 / #205

TRENDS IN PRENATAL DIAGNOSIS OF CRITICAL CONGENITAL HEART DEFECTS

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Background and Aim: Congenital heart defects (CHD) are the most prevalent congenital anomalies, with 20% to 25% classified as critical (CCHD). Despite the absence of a national screening program for CHD in Bulgaria, the number of fetal medicine specialists is on the rise, leading to an increase in prenatal screenings for CHD. This study evaluates advancements in fetal echocardiography screening in Bulgaria from 2015 to 2024.
Methods: We conducted a retrospective analysis of neonates diagnosed with CCHD and admitted to the Pediatric Cardiology Clinic at the National Heart Hospital in Sofia, Bulgaria, between January 2015 and December 2024. We compared the number of prenatally diagnosed cases across two five-year periods: January 2015 to December 2019 (Period 1) and January 2020 to December 2024 (Period 2).
Results: Over the 10-year study period, a total of 307 neonates presented in critical condition. The predominant clinical manifestations included severe hypoxemia, acute heart failure, and cardiogenic shock. The diagnoses were distributed as follows: coarctation of the aorta (n=98, 32%), transposition of the great arteries (n=84, 27%), single ventricle and complex CHD (n=63, 20.5%), pulmonary atresia (n=27, 8.5%), critical aortic stenosis (n=21, 7%), and critical pulmonary valve stenosis (n=14, 5%). In Period 1, 194 neonates with CCHD were admitted to the hospital compared to 113 in Period 2 ($p<0.01$). Prenatal diagnosis rates improved slightly, with only 15% (29 out of 194) of patients in Period 1 receiving a prenatal diagnosis, compared to 22% (25 out of 113) in Period 2 ($p=0.1$).
Conclusions: The significantly lower number of neonates with CCHD admitted during the second period may result from improved recognition of severe cases, leading to pregnancy terminations. While there is a trend towards improved prenatal diagnosis of CCHD in Bulgaria, the rates remain suboptimal. Implementing routine fetal echocardiography screening is expected to enhance detection during fetal life, ultimately improving perinatal and postnatal care and clinical outcomes.



P-150 / #1529

THE DYNAMICS OF CALCULATED WAVEFORM INDICES OF THE DUCTUS VENOUS BLOOD FLOW IN CASES WITH FETAL CONGENITAL HEART DEFECTS

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Background and Aim: The unique fetal circulation, with its ductus venosus, significantly accelerates the flow of oxygenated blood from the umbilical cord to the inferior vena cava, then from the right to the left atrium through the foramen ovale, and then into the left ventricle and systemic circulation, bypassing the tricuspid valve and right ventricle. This process provides the highest oxygenation of any organ to the myocardium (via the coronary arteries) and to the brain (via the brachiocephalic vessels). The presence of cardiac pathology in the fetus can have a negative impact on the functional parameters of fetoplacental hemodynamics, including the measurable parameters of blood flow in the ductus venosus. The aim of this study was to evaluate the dynamics of angle-independent indices in the ductus venosus of fetuses with congenital heart defects (CHD).
Methods: In a cross-sectional study, we analyzed: pulsatility index (PIV), peak velocity index (PVIV), preload index (PLI), and the ratio of peak systolic velocity to peak late diastolic velocity (S/a) ratio in the ductus venosus in the total study cohort consisting of 171 fetuses with CHD, including 47 fetuses with right heart defects (group 1) and 124 fetuses with other forms of defects (group 2). A comparative analysis of the obtained indices was conducted in three gestational intervals: 18-21 weeks, 22-29 weeks, 30-40 weeks of pregnancy.
Results: In the general group and the 2nd group, a decrease in all indices in each subsequent gestational interval ($p<0.001$), typical for a healthy population, was noted. In the 1st group, no significant changes were found in any of the studied indices between gestational intervals ($p>0.05$). The number of observations with PIV, PVIV, PLI, and S/a values >95th percentile did not differ significantly between the subgroups in the first two gestational intervals ($p>0.05$) and was significantly higher in the 1st group at ≥30 weeks of pregnancy, amounting to PIV (37.5% vs 8.5%), PLI, and S/a (31.2% vs 6.8%), respectively ($p\leq0.02$).
Conclusions: The presence of right-sided fetal heart disease causes changes in the hemodynamics of oxygenated blood flow through the venous duct, which potentially increases the risk of hypoxic complications, including antenatal ischemic myocardial injury.



P-151 / #1358

PRENATAL ECHOCARDIOGRAPHIC DIAGNOSIS OF CRISS-CROSS HEART: FROM FETAL DETECTION TO OPTIMISED NEONATAL OUTCOME

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Background and Aim: A criss-cross heart is a rare congenital cardiac anomaly characterised by abnormal ventricular rotation, which causes the blood flow entering it to cross paths at the atrioventricular valves. It is frequently associated with complex malformations, making prenatal diagnosis challenging. Advances in fetal echocardiography now allow accurate in utero detection, enabling early family counselling, delivery planning, and timely postnatal intervention.
Methods: We described an antenatally diagnosed criss-cross heart that was successfully managed with appropriate planning in the early postnatal period
Results: Case Summary
A 31-year-old primigravida with hypothyroidism, conceived via in vitro fertilization, was referred at 21 weeks' gestation for suspected congenital heart disease. Fetal echocardiography demonstrated a large inlet ventricular septal defect (VSD), transposition of the great arteries (TGA), pulmonary atresia (PA), and possible double inlet left ventricle (DILV). Serial scans at 30 and 35 weeks confirmed a superior–inferior ventricular arrangement consistent with criss-cross heart. At 38+6 weeks, a male infant (3.6 kg) was delivered via elective caesarean section with good Apgar scores. Shortly after birth, he developed mild respiratory distress, requiring 1 hour of CPAP. Prostaglandin E1 infusion was initiated immediately. Postnatal echocardiography confirmed criss-cross heart with TGA, PA, bilateral proximal branch pulmonary artery stenosis, and a large vertical patent ductus arteriosus (PDA). CT angiography on day 13 delineated the anatomy, and PDA stenting was successfully performed on day 14. He was discharged well on dual antiplatelet therapy at day 18.
Conclusions: Conclusion
Prenatal diagnosis of a criss-cross heart is feasible with detailed fetal echocardiography, enabling precise perinatal management and early intervention, which may improve neonatal outcomes.



P-153 / #434

ASSESSMENT OF PEAK OXYGEN CAPACITY ON CARDIOPULMONARY EXERCISE TEST IN CHILDREN WITH UNIVENTRICULAR CIRCULATION AND ITS COMPARISION IN CHILDREN WITH BIVENTRICULAR CIRCULATION: A PROSPECTIVE STUDY

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Background and Aim: The Fontan procedure represents the standard palliative approach for children with single-ventricle physiology, allowing survival into adulthood often accompanied by progressive multisystem morbidity. Exercise intolerance is an established prognostic marker in congenital heart disease (CHD), and cardiopulmonary exercise testing (CPET) offers an objective means of evaluating functional capacity. This study aimed to assess and compare peak oxygen consumption (VO_2 peak) during CPET in Fontan survivors (univentricular circulation) and patients with repaired biventricular simple CHDs like Atrial septal defect and ventricular septal defect repaired. Additionally, Fontan survivors were sub-grouped based on VO_2 peak to identify factors associated with impaired exercise performance.
Methods: A cross-sectional observational study was conducted on 30 children (4–18 years), comprising 15 post-Fontan patients and 15 age- and sex-matched children with repaired simple biventricular CHDs. All underwent CPET using a standardized ramp protocol on a cycle ergometer with metabolic gas analysis. Six-minute walk test (6MWT), ventilatory anaerobic threshold (VAT), and echocardiographic parameters were recorded. Fontan patients were further subgrouped into well-functioning (VO_2 peak >18 ml/kg/min) and impaired (VO_2 peak <18 ml/kg/min) cohorts for comparative assessment
Results: Mean VO_2 peak did not differ significantly between Fontan and biventricular groups (17.59±5.24 vs. 16.58±2.95 ml/kg/min; p=0.49), with both achieving approximately 45% of predicted peak VO_2. However, Fontan patients demonstrated significantly reduced submaximal performance, including lower 6MWD (487.33±89.24 vs. 550.0±37.03 m; p=0.01), lower VO_2 at VAT (p=0.02), and diminished peak heart rate and oxygen saturation (p=0.01 and p=0.001 respectively). Subgroup analysis showed significantly higher VO_2 peak in the well-functioning Fontan cohort (22.30±1.70 vs. 13.47±3.32 ml/kg/min; p<0.001). Better performers had higher % predicted O_2 pulse, whereas elevated intraoperative Fontan pressures were associated with impaired exercise capacity (p=0.01). Echocardiographic ventricular function showed poor correlation with exercise performance.
Conclusions: Fontan survivors demonstrated impaired submaximal and maximal exercise capacity, whereas patients with repaired biventricular CHDs primarily exhibited reduced maximal capacity, likely due to deconditioning. VO_2 peak effectively differentiated well- and



poorly functioning Fontan patients, highlighting CPET as a valuable tool for early detection of physiological decline. In resource-limited settings, the 6MWT offers a feasible alternative for functional surveillance.



P-154 / #1183

OUTCOMES OF ATRIAL SEPTAL DEFECT CLOSURE IN CHILDREN BELOW THREE YEARS OF AGE

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Background and Aim: Typically, atrial septal defects (ASD) are electively closed above 3 years of age, but earlier repair may be beneficial in symptomatic patients at a younger age in patients with genetic syndromes, chronic lung disease, or pulmonary hypertension (PH). We aimed to describe our institutional experience with early ASD closure in patients below 3 years of age.
Methods: In this single-center retrospective cohort study, patients below 3 years of age who underwent ASD closure between June 1, 2018, and September 30, 2025 were included. The patients who underwent ASD closure at < 1 year were compared to those who underwent closure between 1-3 years of age. Key outcomes included duration of invasive ventilation and course in intensive care unit.
Results: Our single center data included 24 patients who underwent early ASD closure (7 fenestrated), median age being 26.4 months (8.9, 31.3). Of the included patients, 13 (54%) were preterm, 12 (50%) had genetic syndromes and 8 (33%) had pulmonary hypertension (**table 1**). Most common indications for early ASD closure included failure to thrive and pulmonary hypertension (**table 2**). Compared to patients (n=16) who underwent closure between 1-3 years of age, patients who underwent closure at < 1 year (n =8) had higher need for pre-operative respiratory support [5 (63%) vs 2 (13%); p = 0.02], higher incidence PH at baseline [4 (50%) vs 1 (6%); p <0.01], higher duration of invasive ventilation [3.5 (1.8, 8) vs 1(1); p <0.01] and had higher frequency of failed extubation [3 (38%) vs 0; p = 0.03] (**table 3)**. Median age at follow-up was 29.6 months, weight (kg) improved from 9.1 (4.8, 11.3) to 10.9 (8.2, 13.6) [p = 0.03]. One patient died on follow up after one year post ASD closure due to pneumonia (**table 4**).



Table 1. Baseline patients' characteristics at time of surgery.

Baseline Characteristics	N = 24
Females	11 (45.8%)
Age at closure (months)	26.4 (8.9, 31.3)
Weight (kg)	9.1 (4.8, 11.3)
Weight z-score	-2.5 (-3.9, -1)
Genetic diagnosis	12 (50%)
Trisomy 21	4 (16.7%)
On respiratory support	7 (29.2%)
Mode of respiratory support	
- CMV	1
- CPAP	1
- HFNC	1
- LFNC	4
Prematurity (<37 weeks GA)	13 (54.2%)
- <30 weeks	4 (16.6%)
- 30-33 weeks	2 (8%)
- 33-36 weeks	7 (29%)
- >37 weeks	11 (45%)
BPD diagnosis	3 (13%)
Other CLD	4 (16.6%)
Pulmonary Hypertension	8 (33.3%)
Medications	
- Diuretics	11 (45.8%)
- Sildenafil	2 (8.3%)
- Bosentan	0
- Sildenafil and bosentan	3 (12.5%)

BPD, bronchopulmonary dysplasia; CLD, chronic lung disease; CPAP, continuous positive airway pressure; CMV, conventional mechanical ventilation; HFNC, high-flow nasal cannula; LFNC, low-flow nasal cannula.



Table 2. Cardiac findings and indication for ASD closure

Characteristics	Patients n=24
ASD type	
- Secundum	21 (83%)
- Sinus venosus	3 (12.5%)
Echocardiogram findings	
- ASD size from subxiphoid longitudinal view (cm)	1.3 (0.97, 1.5)
- RVEDD (cm)	2.2 (1.8, 2.8)
- RVEDD (z-score)	+ 5.5 (4.2, 6)
- RV:LV diameter at end-systole	1.7 (1.3, 2.1)
- RV FAC (%)	46 (41, 50)
Other cardiac findings	10 (41%)
- PAPVD	2
- Mild to moderate pulmonary stenosis	2
- Non-apex forming LV	1
- Small muscular VSD	1
- Tiny PDA	1
Indication for ASD closure	
- Respiratory symptoms	6 (25%)
- Failure to thrive	7 (29%)
- Pulmonary hypertension	7 (29%)
- Non-apex forming LV	1 (4%)
- Asymptomatic	3 (12.5%)

FAC, fractional area change; RVEDD, right ventricle end-diastolic diameter; LV, left ventricle; PAPVD, partial anomalous pulmonary venous drainage; PDA, patent ductus arteriosus; VSD, ventricular septal defect



Table 3. Comparison between patients (< 1 year) and (1-3 years) with ASD closure

Characteristics	< 12months n= 8	> 12months n= 16	*p* value
Need for respiratory support prior to surgery	5 (63%)	2 (13%)	**0.02**
Genetic diagnosis	6 (75%)	6 (38%)	0.1
BPD/CLD	3 (38%)	2 (13%)	0.2
Pulmonary Hypertension			
- At baseline	4 (50%)	1 (6%)	**<0.01**
- At follow-up	2/8 (25%)	1 (6%)	0.2
Surgical approach			
- Thoracotomy	1 (13%)	6 (38%)	0.35
- Sternotomy	7 (88%)	10 (63%)	0.35
CICU details			
- Length of stay (days)	7 (4, 13.8)	4.5 (1, 7.5)	0.1
- Invasive Ventilation days	3.5 (1.8, 8)	1 (1)	**<0.01**
- PHTN crisis	2 (25%)	0 (0)	0.33
- Infection	3 (38%)	2 (13%)	0.29
- Arrhythmia	2 (25%)	2 (13%)	0.58
- Tamponade or cardiac arrest	1 (12%)	1 (6%)	1
- Failed extubation	3 (38%)	0	**0.03**

BPD, bronchopulmonary dysplasia; CLD, chronic lung disease; CICU, cardiac intensive care unit; PHTN, pulmonary hypertension



Table 4. Characteristics on follow-up

Characteristics	Before surgery n=24	Follow-up n=24	*p* value
Age (months)		29.6 (11.8, 35.1)	
Weight (kg)	9.1 (4.8, 11.3)	10.9 (8.2, 13.6)	**0.03**
Weight (z-score)	-2.5 (-3.9, -1)	-1.4 (-2.2, -0.8)	**0.05**
Need for respiratory support	7 (29%)	4 (16%)	0.49
Pulmonary Hypertension	8 (33%)	3 (12.5%)	0.16
Cardiac readmissions		4 (16 %)	
Respiratory readmissions		6 (25%)	
Alive at last follow-up		23 (95%)	

Conclusions: ASD closure in patients <3 years of life can be safely performed with positive impact on growth parameters and possible benefit on respiratory parameters.



P-155 / #845

DUCHENNE MUSCULAR DYSTROPHY: CARDIAC OUTCOMES, SINGLE CENTRE EXPERIENCE

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Background and Aim: To review a single institute experience of the cardiac aspects of children with outcomes in individuals with Duchenne Muscular Dystrophy (DMD).
Methods: 25-year (2001-2025) retrospective review from a single tertiary paediatric cardiology centre. We identified all cases with confirmed diagnosis of DMD and tracked their cardiac presentation and progress. Female DMD carriers were excluded. Mortality was identified through Office of National Statistics (ONS).
Results: We identified 316 individuals with DMD during this period. In the initial period, genetics were unknown but the recent cohort, diagnosis is confirmed almost exclusively on genetic variants. The unit is currently monitoring 125 patients who are ≤17 years of age. We identified 6 females who were manifesting carriers/DMD due to unusual genetic variants. The oldest surviving individual in our case series is 37 years old with 14 (4.4%) individuals being ≥30 years. Caucasian (71, 58.2%) & South Asian (54, 16.7%) were the dominant ethnicities. We tracked the age of starting medication and the nature and type of medication. Due to standardised pathways established in 2005, most individuals were on dual or triple cardiac therapy. Medication was started by 12 years of age and in majority, a combination of ACEi/ARB & beta-blockers were used; spironolactone was added as the third cardiac medication. 184 (34.4%) patients in our cohort have died (median age: 20.0 years, range: 2.1-33.8 years). 33 (30.3%) died while they were still in paediatric monitoring. In our present cohort, 4 children have died, 2 due to cardiac causes, 1 with respiratory failure and a 2-year-old with SIDS. We have not had any individual who was accepted for a heart transplant, and increasingly over the past 10 years, palliative care pathways have become more established. Over the decades, data shows a lower age of presentation and initiation of cardiac medication.
Conclusions: This study highlights the importance of having an established DMD/neuromuscular-cardiac programme working closely with other specialists and shows the changes in practice over the past quarter century.



P-156 / #822

MORBID OBESITY-INDUCED PAEDIATRIC HYPERTENSION AND HEART FAILURE: A CASE HIGHLIGHTING THE PIVOTAL ROLE OF LIFESTYLE INTERVENTION AND PREVENTION

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Background and Aim: Hypertension in children and adolescents is an underrecognized but increasingly common condition, frequently associated with obesity, obstructive sleep apnea, and unhealthy lifestyle habits. If not detected early, it can progress to serious cardiovascular complications, including heart failure. Early identification and lifestyle-based prevention strategies are essential to reduce long-term morbidity. This case underscores the growing need for awareness, screening, and timely intervention in the pediatric population.
Methods: A 14-year-old male presented with severe generalized edema, significant shortness of breath with orthopnea, and profound fatigue. His medical history was notable for longstanding morbid obesity (weighing 216 kg with a BMI of 57.5 kg/m^2), early-onset sleep apnea, smoking, heavy energy-drink consumption, and highly irregular sleep patterns, with no previous medical follow-up. He had a family history of maternal hypertension. On admission, he exhibited hypoxemia (SpO_2 85% on room air), severe hypertension (193/83 mmHg), and bilateral basal crackles. Laboratory testing revealed elevated NT-proBNP (1670 pg/mL), hyperinsulinemia, and transient prerenal azotemia. Echocardiography confirmed congestive heart failure (NYHA class IV), showing mild left ventricular dysfunction, pulmonary hypertension, right-sided chamber dilation. Polysomnography further demonstrated oxygen desaturation to 38% during apneic events, confirming obstructive sleep apnea. Management included dobutamine, diuretics (furosemide and spironolactone), lisinopril, bisoprolol, non-invasive ventilation, and surgical evaluation for severe edema. Over the course of hospitalization, the patient gradually improved, with resolution of renal abnormalities, normalization of NT-proBNP, and a significant weight reduction to 170 kg by discharge.
Results: He was released with a structured care plan consisting of a hypocaloric, normoproteic diet, adequate hydration, daily physical activity of at least 30 minutes,



smoking cessation, continued pharmacotherapy, and nightly non-invasive ventilation. At one-year follow-up, he had lost a total of 100 kg (reaching 116 kg), demonstrated normalized laboratory values, and showed complete resolution of prior echocardiographic abnormalities, including normalization of left ventricular function. Blood pressure control improved sufficiently to allow gradual tapering of antihypertensive therapy, but he was advised to continue nightly non-invasive ventilation.

Conclusions: This case highlights the potential for untreated pediatric obesity to progress to hypertensive heart failure but also demonstrates the remarkable capacity for cardiovascular recovery when aggressive lifestyle modification and appropriate medical management are implemented.



P-157 / #1249

ISOLATED PERSISTENT LEFT SUPERIOR VENA CAVA IN CHILDREN: ELECTROPHYSIOLOGICAL RISK BEYOND A BENIGN VARIANT

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Background and Aim: Isolated persistent left superior vena cava (PLSVC) is traditionally regarded as a benign venous anomaly in the absence of associated structural heart disease. However, the marked coronary sinus (CS) dilatation accompanying PLSVC raises concern regarding its potential impact on cardiac electrophysiology. Data addressing ventricular repolarization abnormalities and electrophysiological risk in pediatric patients with isolated PLSVC remain limited. This study aimed to systematically evaluate ventricular repolarization abnormalities and cardiac electrophysiological balance indices in children with isolated PLSVC and their association with coronary sinus dimensions.
Methods: In this case–control study, 26 children with isolated PLSVC were compared with 26 age- and sex-matched healthy controls. All participants underwent standardized transthoracic echocardiography and 12-lead electrocardiography. Coronary sinus diameter was measured in the apical four-chamber view at end-diastole and indexed to body surface area. Electrocardiographic evaluation focused on established non-invasive arrhythmogenic risk markers, including P-wave dispersion, QTc dispersion, Tp–e dispersion, Tp–e/QT, Tp–e/QTc, QT/QRS, and QTc/QRS ratios. Group comparisons and correlation analyses were performed using appropriate statistical methods.
Results: Demographic characteristics and conventional echocardiographic parameters, including left ventricular dimensions, z-scores, and systolic function, were comparable between groups (all $p>0.05$).
Children with isolated PLSVC demonstrated significantly increased P-wave dispersion, QTc dispersion, and Tp–e dispersion compared with controls (all $p<0.001$). In addition, QT/QRS and QTc/QRS ratios—reflecting cardiac electrophysiological balance—were significantly higher in the PLSVC group (both $p<0.001$).
Coronary sinus diameter and indexed measurements were markedly increased in patients with PLSVC ($p<0.001$). Notably, the indexed coronary sinus measurement in the parasternal long-axis view (CS PLAX index) showed a significant positive association with the QTc/QRS ratio, indicating a relationship between relative coronary sinus dilatation and impaired cardiac electrophysiological balance. One patient with isolated PLSVC developed documented supraventricular tachycardia during follow-up, providing supportive clinical



context for electrophysiological vulnerability.

Conclusions: Despite preserved cardiac structure and systolic function, children with isolated PLSVC exhibit significant abnormalities in ventricular repolarization and cardiac electrophysiological balance. The association between indexed coronary sinus dilatation and QTc/QRS ratio challenges the perception of isolated PLSVC as a purely benign condition and suggests that selected patients may warrant closer rhythm-oriented evaluation.



P-158 / #1318

INVESTIGATING DAPAGLIFLOZIN FOR DIASTOLIC DYSFUNCTION IN SINGLE-VENTRICLE HEART DISEASE: A PILOT STUDY

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Background and Aim: Diastolic dysfunction is a critical determinant of outcomes and quality of life in patients with a functionally single ventricle, yet treatment options remain limited. This pilot study assessed the potential effects of the SGLT2 inhibitor dapagliflozin on echocardiographic parameters of diastolic function in this complex patient population.
Methods: We enrolled 10 pediatric patients (median age 9.4 years) with confirmed diastolic dysfunction (end-diastolic pressure >12 mm Hg via catheterization), including 5 post-Fontan and 5 pre-Fontan patients. Dapagliflozin was administered at a weight-adjusted dose (5 mg for <30 kg, 10 mg for ≥30 kg). Patients underwent serial echocardiographic assessments over a median follow-up of 5.1 months [Q1=4.3; Q3=7.2], with measurements tailored to systemic ventricular morphology (RV or LV).
Results: Preliminary analysis at 3 months of therapy demonstrated directional improvements in key diastolic parameters, including the E/A ratio, isovolumetric relaxation time (IVRT), and deceleration time (DT). However, these changes did not reach statistical significance, likely due to the small cohort size. The planned repeat hemodynamic assessment via elective catheterization at 12 months will provide the primary endpoint data on changes in ventricular filling pressure.
Conclusions: Initial observations from this pilot study suggest a potential signal of improved diastolic function with dapagliflozin in single-ventricle patients. While no definitive trends were established, the findings support the feasibility and rationale for a larger, prospective study to evaluate the impact of SGLT2 inhibition on diastolic performance in this high-risk group.



P-160 / #828

A CASE REPORT: STREPTOCOCCUS VIRIDANS SEPSIS OF DENTAL ORIGIN MIMICKING ENDOCARDITIS IN A HIGH-RISK PEDIATRIC PATIENT.

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Background and Aim: Infectious endocarditis is a known and severe complication in the pediatric cardiac patient population, particularly in cases of congenital heart disease and those following severe surgical intervention. The diagnosis of infectious endocarditis can be challenging in cases presenting with a fever of unknown origin due to non-specific and overlapping symptoms. This case outlines the diagnostic complexity in the instance of a patient with 22q11.2 microdeletion, truncus arteriosus, and a history of previous endocarditis, presenting with Streptococcus viridans sepsis.
Methods: A multidisciplinary team, including a pediatric cardiologist, an infectious disease specialist and a cardiac surgeon, was consulted. Upon admission, blood cultures were ordered, and the patient was put on an empiric broad-spectrum antibiotic. Since the clinical suspicion of infectious endocarditis was high, a PET/CT scan was performed to identify potential primary infection sites. Since the patient had previously undergone extensive cardiac surgeries, a transesophageal echocardiogram (TEE) was performed for imaging of the cardiac graft and valves to detect vegetations. Lastly, a bronchoscopy was used to investigate a finding of the PET/CT. After these diagnostic steps failed to unveil an active infection site, the oral cavity was identified as a potential primary source of the infection, due to severe dental caries. An oral and maxillofacial surgeon was consulted, and the examination revealed primary dentition with multiple carious teeth. Considering the course of the disease and infection risk, extraction of the carious teeth was indicated.
Results: The blood cultures returned positive for Streptococcus viridans, however, the diagnostic workup did not confirm endocarditis. The PET/CT showed metabolic activity in the left lung but no cardiac involvement. Both the TEE and bronchoscopy also failed to show vegetation or a primary bacterial infectious site. 2 days after the extraction, no more febrile episodes were observed, and the patient was discharged from the hospital 22 days after admission. The final diagnosis was determined to be Streptococcus viridans-induced sepsis without a confirmed primary source.
Conclusions: The patient was successfully treated for Streptococcus viridans sepsis



without a confirmed primary source. This case highlights the diagnostic complexities of navigating endocarditis and sepsis in high-risk pediatric patients.



P-164 / #881

CHARACTERESTICS AND PROGNOSIS OF INFECTIVE ENDOCARDITIS IN CHILDREN

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Background and Aim: Background: Pediatric infective endocarditis (IE) is uncommon but carries substantial morbidity and mortality. Its clinical presentation is heterogeneous and differs from that of adults. Objectives: To describe the epidemiological, clinical, bacteriological, echocardiographic, and outcome features of pediatric IE; to assess in-hospital prognosis; and to identify factors associated with in-hospital mortality.
Methods: We conducted a retrospective, descriptive, single-center study including 50 patients hospitalized with definite or probable IE between January 2000 and December 2024.
Results: A total of 50 children was included. Mean age was 12.2 ± 4.2 years; the male-to-female ratio was 0.92. Underlying heart disease included rheumatic heart disease in 24 cases (48%) and congenital heart disease in 14 (28%); 12 patients (24%) had IE on a structurally normal heart. Among congenital lesions, ventricular septal defect was most frequent (21.4%), followed by repaired tetralogy of Fallot (14.2%). Four cases of prosthetic-valve IE were observed. Blood cultures were positive in 27 patients (54%), predominantly Staphylococcus spp. (59.2%). Echocardiography demonstrated vegetations in 45 patients (90%). Nine patients (18%) died. On analytical evaluation, heart failure, ischemic stroke, and the absence of known underlying cardiopathy (structurally normal heart) were associated with in-hospital mortality.
Conclusions: Pediatric IE remains a high-burden condition. Timely diagnosis, high-quality microbiological sampling, early treatment optimization, and proactive medicosurgical planning are crucial determinants of hospital outcome.



P-165 / #379

THE USE OF STEROIDS IN THE TREATMENT OF PROTEIN LOSING ENTEROPATHY AFTER THE FONTAN OPERATION: CASE REPORT

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Background and Aim: Protein-losing enteropathy (PLE) is a life-threatening complication after the Fontan operation. It occurs in 5-12% patients and the 5-year survival rate after diagnosis is about 81%. The pathophysiology remains poorly understood and treatment is difficult. Steroids are considered an effective treatment option and have been associated with improved survival.
Methods: We present two children who developed PLE after Fontan surgery and showed rapid clinical and biochemical improvement during steroid therapy.
Results: Girl with transposition of the great arteries, double-inlet left ventricle, hypoplastic right ventricle, interventricular septal defect, pulmonary artery stenosis. PLE was diagnosed at the age of 3 years 4 months, 7 months after the Fontan procedure (extracardiac tunnel with fenestration). Ventricular function was good, atrioventricular valve regurgitation (AVV) was mild. No significant arrythmias were detected. Ligation of the aortopulmonary collateral vessels was performed; the Fontan tunnel pressure was 11 mmHg and systemic ventricle end-diastolic pressure (EDP) was 9 mmHg. Lymphatic imaging revealed no abnormalities. Due to lack of improvement after diuretics and sildenafil, steroid therapy was initiated. Total protein and albumin levels increased after 3 weeks, and fecal A1AT normalized after 1 year. Over four years of follow-up, the steroid dose was significantly reduced. However, the girl developed growth retardation as a treatment-releted complication and every attempt to discontinue steroids has resulted in a recurrence of protein loss. Boy with hypoplastic left heart syndrome. PLE with severe ascites and pleural effusion was diagnosed at the age of 2 years 6 months, 2,5 months after Fontan operation (extracardiac tunnel with fenestration). In echo ventricular function was preserved, AVV was mild. He received sildenafil, bosentan, diuretics and albumin infusions. Cardiac catheterization revealed no obstruction in the Fontan circuit; Fontan pressure was 14 mmHg and an EDP 8 mmHg. Due to persistent symptoms, prednisone was started, leading to an increase in protein and albumin levels after **7 days** and their normalization with complete resolution of fluid accumulation within **4 week.** Transition from prednisone to budesonide and lymphatic MRI are planned.
Conclusions: Steroid therapy enables rapid improvement in PLE after Fontan procedure;



however, long-term treatment carries a risk of complications, and discontinuation frequently leads to reccurence of protein loss.



P-166 / #1425

LEFT PULMONARY ARTERY SLING COMPLEX: A 32-YEAR SINGLE CENTRE EXPERIENCE AND DIAGNOSTIC PITFALLS

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Background and Aim: Left Pulmonary artery sling (LPAS) is a rare congenital vascular anomaly frequently associated with tracheobronchial compression, complex airway abnormalities and/or complex congenital heart anomalies (CHA). Early diagnosis and timely surgical intervention are crucial for optimal outcomes. We aimed to review our centre experience with LPAS.
Methods: A 32-year retrospective review of all patients with LPAS referred to our large tertiary centre between 01/1993 and 12/2025 was performed. Clinical presentation, diagnostic performance of imaging modalities, associated CHA, and surgical outcomes were evaluated.
Results: Twenty patients were identified. Mean age at diagnosis was 1.6 years (Median 0.4 years),12 (60%) was male. Additional CHA were present in nine patients (45%) and included multiple ventricular septal defects, sinus venosus atrial septal defect, aortic coarctation, bilateral superior vena cava, and scimitar syndrome. Syndromic associations were identified in four (20%), including Trisomy 21, VACTERL association, and Emanuel syndrome; all syndromic patients had LPAS with complete tracheal rings. Only 6 (30%) patients exhibited classic airway symptoms of stridor, noisy breathing, wheeze, respiratory distress. Three others (15%) presented with acute cardiorespiratory arrest, highlighting LPAS as a silent, yet life-threatening anomaly. Persistent chest radiograph abnormalities were observed in two patients (10%). Diagnosis was established following failure to wean from mechanical ventilation in three patients (15%) Importantly, a large PDA with right-to-left shunting was present in three patients (15%) and contributed to diagnostic delay by virtue of a '*Ductal Trap*'. Surgical interventions for LPA sling were performed in 18 patients and 5 had additional sliding tracheoplasty for tracheal rings and stenosis. Interventions for associated CHA occurred in 6/18 (33%). There were postoperative deaths, additionally two patients were palliated due to lethal syndromes and severe neurological insults.
Conclusions: In our series, only 30 % patients with LPAS presented with classic non life-threatening airway symptoms. A high index of suspicion should be maintained in patients presenting with acute respiratory arrest, failure to wean from mechanical respiratory



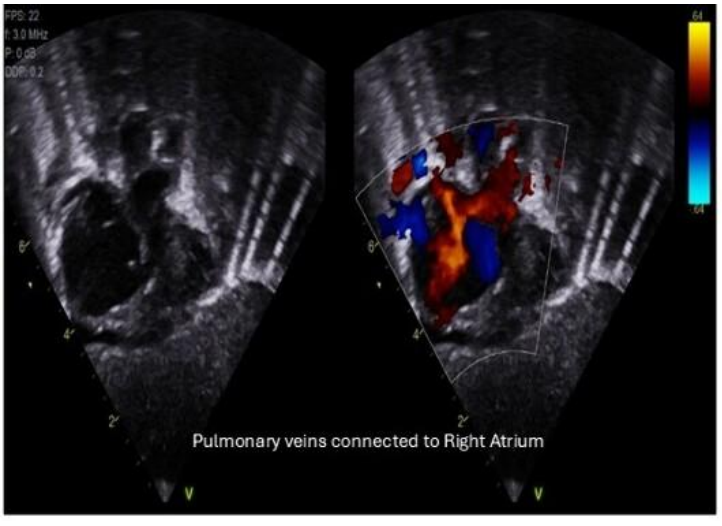
support and persistent chest X-ray abnormalities. A '*Ductal Trap'* is an echocardiographic diagnostic pitfall that can mask the diagnosis.

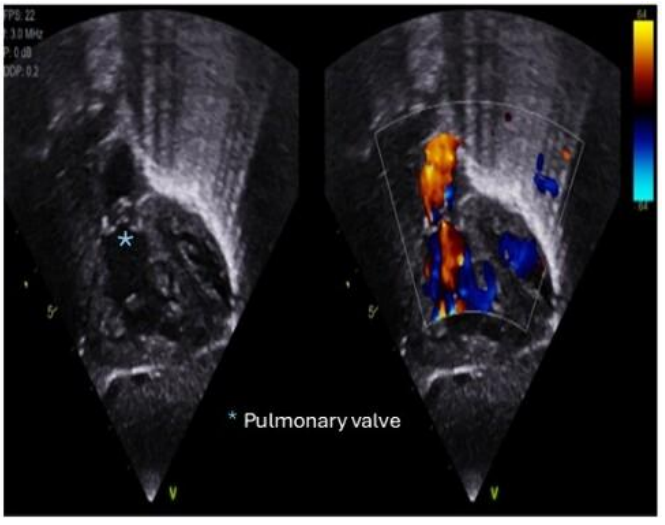
P-167 / #715

A RARE CASE OF INTRACARDIAC TOTAL ANOMALOUS PULMONARY VENOUS CONNECTION (TAPVC) TO THE RIGHT ATRIUM (RA) ASSOCIATED WITH DYSPLASTIC PULMONARY VALVE AND PULMONARY STENOSIS: A CASE REPORT.

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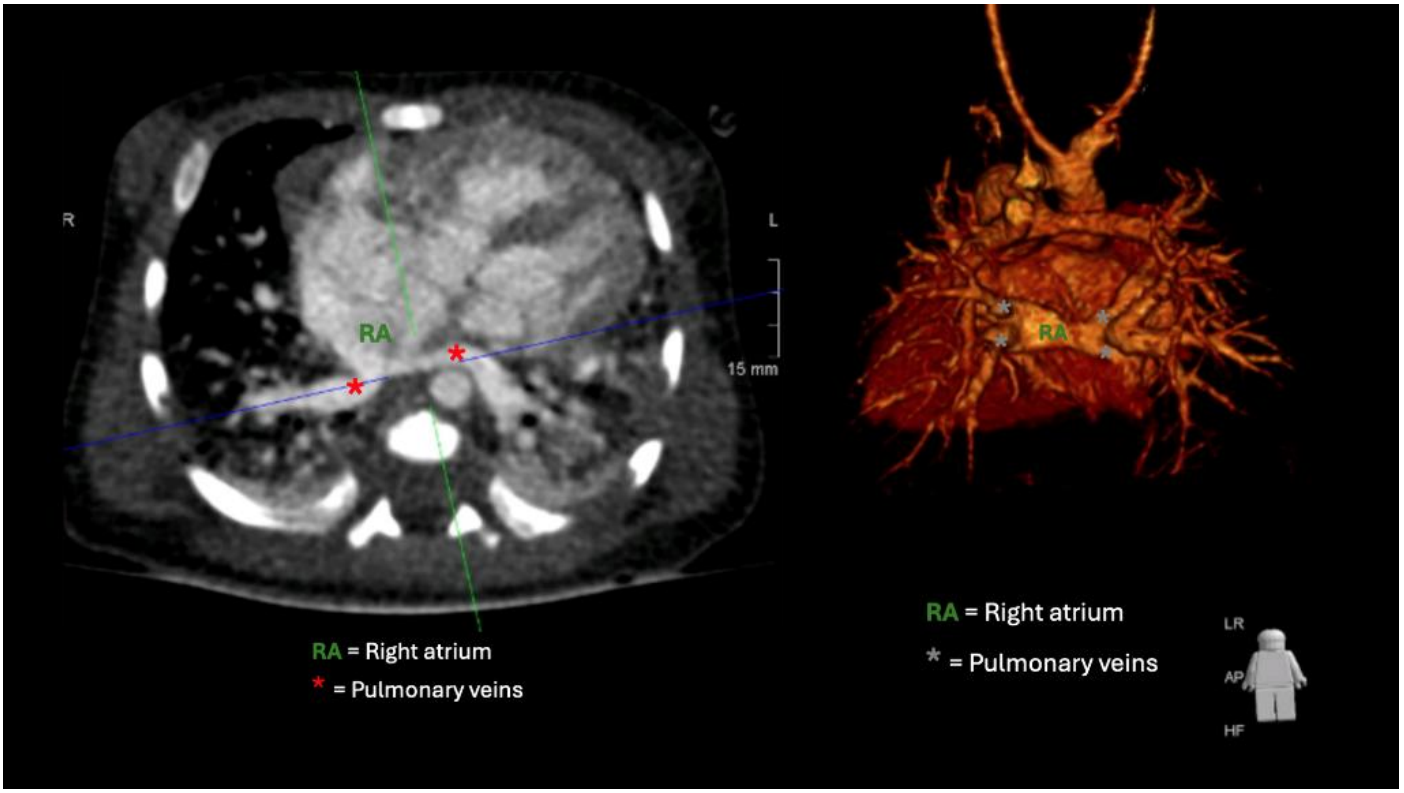
Background and Aim: Total anomalous pulmonary venous connection (TAPVC) is an uncommon congenital heart defect in which all pulmonary veins drain into the systemic venous circulation instead of the left atrium. Intracardiac TAPVC typically drains via the coronary sinus; however, direct drainage of all pulmonary veins into the right atrium is exceptionally rare, particularly in the absence of atrial isomerism. This report describes a highly unusual form of intracardiac TAPVC associated with a dysplastic pulmonary valve, mild pulmonary stenosis, a large atrial septal defect (ASD), and a patent ductus arteriosus (PDA), diagnosed antenatally and confirmed through multimodal imaging.
Methods: Antenatal fetal echocardiography raised suspicion of intracardiac TAPVC. Postnatal diagnostic evaluation included transthoracic echocardiography, chest radiography, laboratory investigations, and cardiac-gated CT imaging. CT was used to define the pulmonary venous anatomy, assess for obstruction, delineate associated structural anomalies, and guide surgical planning.





Results: Postnatal imaging confirmed that all four pulmonary veins drained directly into

the posterior right atrium through two main confluences. The left pulmonary veins formed a common confluence with an accessory upper vein; the right pulmonary veins comprised a separate confluence, with the right lower vein draining independently. No pulmonary venous obstruction was identified. Additional findings included a small left atrium and ventricle, dilated right-sided chambers, mildly hypoplastic aortic root, dysplastic tri-leaflet pulmonary valve, and mild pulmonary stenosis. The neonate developed persistent respiratory distress by day three of life, prompting further evaluation and subsequent surgical correction at two weeks of age. Repair included right atrial baffle creation using autologous pericardium, pulmonary valvotomy, ASD closure, and PDA ligation. Postoperative recovery was uncomplicated, with echocardiography confirming unobstructed pulmonary venous return and improved pulmonary valve function



Conclusions: This case represents an extremely rare variant of intracardiac TAPVC with direct drainage of all pulmonary veins into the right atrium and associated dysplastic pulmonary valve disease. Early antenatal detection, detailed anatomical assessment using cardiac CT, and timely surgical intervention enabled successful repair with a favourable outcome. Long-term follow-up remains essential to monitor cardiac function and growth.



P-168 / #1497

NUTRITIONAL STATUS OF PATIENTS WITH FUNCTIONALLY UNIVENTRICULAR HEARTS UNDERGOING STAGED PALLIATION BEGINNING WITH NORWOOD SURGERY – A SINGLE-CENTER STUDY

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Background and Aim: Malnutrition is a common problem among children with congenital heart defects. Those with functionally univentricular hearts who require staged surgical palliation are particularly at risk. This study aimed to analyze the nutritional status of patients who underwent single-ventricle palliation beginning with Norwood surgery at our center between 2016 and 2025.
Methods: Medical records were reviewed retrospectively to collect data on the following: 1) nutritional status, as determined by WHO weight-for-age Z-scores, at four time points: birth, discharge after the Norwood procedure, the Glenn procedure, and the last follow-up; 2) the need for a nasogastric or gastrostomy tube at discharge after the Norwood and Glenn procedures.
Results: From January 2016 to October 2025, 135 patients (94 [70%] boys) underwent Norwood procedure at our center. The initial diagnosis was HLHS in 119 (88%) patients, DILV or TA in 12 (9%), and other in 4 (3%). 45 patients (33%) died, including 33 (24%) during the first hospitalization; 18 were lost to follow-up. The nutritional status of the patients is summarized in Table 1. The percentage of patients with a weight-for-age Z-score below -2 was 77% at post-Norwood discharge, 37% at admission for the Glenn procedure, and 21% at the last follow-up. Nasogastric or gastrostomy tubes were used in 48% of patients after the Norwood procedure and in 22% of patients after the Glenn procedure. The frequency of use increased in subsequent years. Hypercaloric formulas were inconsistently used by a minority of patients.

Table 1

	Number of patients	Min	Max	Mean	SD
Weight-for-age Z-score at birth	99	-3.28	2.95	-0.05	1.15



Table 1

	Number of patients	Min	Max	Mean	SD
Weight-for-age Z-score at post-Norwood discharge	99	-5.38	0.45	-2.82	1.19
Weight-for-age Z-score at the Glenn procedure	75	-4.38	1.25	-1.59	1.24
Weight-for-age Z-score at the last follow-up	80	-5.43	1.98	-1.28	1.38
Z-score change from birth till post-Norwood discharge	99	-5.33	-0.41	-2.76	0.93
Z-score change in the interstage period	75	-1.41	5.13	1.24	1.06

Conclusions: The prevalence of malnutrition is high in patients undergoing staged palliation for a functionally univentricular heart defect, especially after Norwood surgery. However, the nutritional status of individual patients tends to improve over time. Hypercaloric formulas should be used more frequently.



P-170 / #829

ECHOCARDIOGRAPHIC CHANGES IN OVERWEIGHT AND OBESE CHILDREN AND ADOLESCENTS

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Background and Aim: This study aimed to identify which echocardiographic measurement and calculation methods of LV mass index (LVMI) best correlate with the degree of obesity and to determine the prevalence of LV hypertrophy, systolic and diastolic dysfunction in obese children.
Methods: Data from a prospective project on pediatric obesity was used. Children (10–18 years) with obesity, no pharmacological treatment or secondary causes were included and underwent transthoracic echocardiography using the same system. LV mass index (LVMI) was calculated using PLAX M-mode (LV mass indexed to height$^{2.7}$), PLAX 2D and PSAX M-mode (BSA-indexed LVMI converted to height$^{2.7}$). PLAX M-mode LV mass was evaluated using Pediatric Heart Network z-scores. LV hypertrophy definitions included sex-specific pediatric thresholds and clinically significant LVH (≥51 g/m$^{2.7}$). Diastolic function was assessed by E/A and E/E' ratios, systolic function by PLAX M-mode EF and global longitudinal strain (GLS). Obesity categories followed American Academy of Pediatrics recommendations.
Results:

Prevalence of Left Ventricular Hypertrophy Across LVMI Methods

Method	Valid n	LVH n (%)*	LVH ≥51 g/m$^{2.7}$ n (%)	Association With Obesity Severity (χ^2 p)
PLAX M-mode	75	**22 (29.3%)**	**6 (8.0%)**	**0.023**
PLAX 2D	46	**9 (19.6%)**	**3 (6.5%)**	



Prevalence of Left Ventricular Hypertrophy Across LVMI Methods

Method	Valid n	LVH n (%)*	LVH ≥51 g/m$^{2.7}$ n (%)	Association With Obesity Severity (χ^2 p)
				0.28
PSAX M-mode	41	**16 (39.0%)**	**9 (22.0%)**	0.13
LV mass z-scores > 2	75	**16 (21.3%)**		0.54

76 patients were included; 62% (n = 47) were female. The median age was 13.2 years (IQR 11.84–15.79). Overall, 3.9% (n = 3) were overweight, 21.1% (n = 16) obese, 43.4% (n = 33) severely obese class II, and 31.6% (n = 24) class III. Prevalence of Left Ventricular Hypertrophy (LVH) is shown in the table. Using PLAX M-mode LVMI indexed to height$^{2.7}$, LVH increased with obesity severity (6.3%, 24.2%, 50.0%; χ^2 p = 0.023). Z-score–defined LVH showed no association with obesity (p=0.54). Systolic and diastolic function was preserved. Mean EF was 65.9 ± 6.1%, median GLS was –20.1% (IQR –22.4 to –18.2). The Median E/A ratio was 1.60 (IQR 1.30–1.90), median E/E' 6.68 (IQR 6.05–7.58). Across obesity categories, E/A differed significantly from 1.85 to 1.40 (p = 0.016).
Conclusions: In children with obesity, LV hypertrophy is common—best detected using PLAX M-mode. Systolic and diastolic function remains preserved.



P-171 / #1521

AZATHIOPRINE THERAPY IN AN ADOLESCENT WITH CHRONIC MYOCARDITIS AND STEROID-RELATED ADVERSE EFFECTS: A CASE REPORT

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Background and Aim: The optimal pharmacological treatment of chronic myocarditis in pediatric patients remains unclear, making clinical management challenging. Prolonged corticosteroid therapy is often required but may result in significant adverse effects. Evidence supporting immunosuppressive strategies beyond steroids is limited.
Methods: We present the case of a 17-year-old female who presented to our tertiary referral pediatric centre in August of 2022 with chest pain. The patient was later diagnosed with lymphocytic myocarditis Despite prior treatment with intravenous immunoglobulins persistent symptoms and ongoing disease activity necessitated continuous corticosteroid therapy. Prolonged steroid use led to the development of Cushing-like features. Consequently, azathioprine was introduced at a low dose (0.35g per kilogram) in combination with prednisone and gradually uptreatated at 30-day intervals (currently at 1g per kilogram). Treatment safety and efficacy were monitored through weekly laboratory testing including complete blood count and liver function tests, monthly electrocardiography (ECG), echocardiography (ECHO), and serum troponin measurements.
Results: Weekly blood monitoring demonstrated no evidence of myelosuppression or hepatotoxicity. After two months of combined azathioprine and prednisone therapy, ECG showed normalization . Echocardiography revealed significant improvement in cardiac structure and function: left ventricular ejection fraction (Simpson method) increased from 43% to 56.7%, fractional area change improved from 38% to 47%, and tricuspid annular plane systolic excursion increased from 14 mm to 20 mm. Left ventricular mass increased from 80 g to 117 g. Serum troponin levels declined from 63.2 ng/L to 29.9 ng/L. Clinically, the patient reported marked improvement in exercise tolerance and reduction in fatigue. No azathioprine-related adverse events were observed. Further plans assume complete steroid taper.
Conclusions: Azathioprine was well tolerated and associated with clinical, biochemical, and echocardiographic improvement in an adolescent with incessant myocarditis complicated by steroid-related adverse effects. These findings suggest azathioprine may represent a safe and effective steroid-sparing option in selected pediatric patients with



recurrent or persistent myocarditis. Further studies are warranted to confirm these observations.



P-172 / #732

MALNUTRITION AS A PREDICTOR OF PERI- AND POSTOPERATIVE OUTCOMES IN CHILDREN WITH CONGENITAL HEART DEFECTS- A SINGLE CENTRE RETROSPECTIVE COHORT STUDY.

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Background and Aim: Malnutrition in the population of patients with congenital heart defects (CHD) is one of the main causes of mortality in this group. A recent systematic review of 21 studies (83 023 participants) found that malnourished children undergoing surgery for CHD had significantly longer length of hospital and Intensive Care Unit stays, and longer duration of mechanical ventilation compared with those who were well-nourished. The aim of this study was to determine the difference in peri- and postoperative outcomes in the malnourished patients compared to the well-nourished control.
Methods: In this retrospective cohort study, we included patients who in year 2024 underwent cardiac surgery at Children's Clinical Hospital of Medical University of Warsaw. Patients with prematurity or confirmed genetic disorder were excluded from the analysis. Our main outcome was time of mechanical ventilation in the postoperative period compared between malnourished and properly nourished patients. Malnutrition was defined as: BMI < - 2 Z-score for age and WHO growth charts were used as reference.
Results: We included 114 patients into final analysis (45,6% male, mean age: 4,46 years), 110 patients were excluded. 35 patients (30%) were included into malnourished group. The mean length of hospital stay was 925 h in the malnourished group versus 782,5 h in the control group (MD 142.50, 95% CI [-172.32, 457.34]); the mean length of mechanical ventilation was 170,7 h in the malnourished group versus 158,1 h in the control group (MD 12.64, 95% CI [-188.13, 213.41]), the mean time of catecholamine infusion in the perioperative period was 418.1 h in the malnourished group versus 159.1 h in the control group (MD 258.95, 95% CI [-33.20, 551.11]).
Conclusions: Although we observed a visible trend towards longer hospital stay, time of mechanical ventilation and catecholamine use in the perioperative period in the malnourished group of patients, the results were not statistically significant probably due to heterogeneity of the group and insufficient sample size. This highlights a need for future research in this area. Despite the lack of statistical significance in this study, proper nutrition is of paramount importance in the preoperative period.



P-173 / #249

HYPERTHYROIDISM-INDUCED PROLONGED QT INTERVAL IN AN ADOLESCENT: A REVERSIBLE AND CLINICALLY IMPORTANT PRESENTATION

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Background and Aim: Prolongation of the corrected QT interval (QTc) is associated with an increased risk of malignant ventricular arrhythmias. While hypothyroidism is a well-recognized cause of QT prolongation, the effects of hyperthyroidism on ventricular repolarization in the pediatric population remain poorly characterized. Hyperthyroidism-induced QT prolongation is rare in children but clinically important, particularly because pediatric patients are frequently exposed to QT-prolonging medications. We aimed to describe an adolescent with Graves disease presenting with marked QTc prolongation that resolved with the restoration of euthyroidism, and to highlight the importance of thyroid evaluation in unexplained QT prolongation.
Methods: A detailed clinical, biochemical, electrocardiographic, and echocardiographic assessment was performed. Serial ECGs and 24-hour Holter monitoring were used to evaluate QTc dynamics over the course of treatment. Thyroid function tests, autoimmune markers, family history, and parental ECGs were reviewed to exclude secondary causes and congenital long QT syndrome.
Results: A 17-year-old male with poorly controlled Graves disease presented with dizziness, weight loss, and sinus tachycardia. Electrolytes and echocardiographic findings were normal. ECG revealed a markedly prolonged QTc of 560 ms. Thyroid function tests confirmed severe thyrotoxicosis, and methimazole with propranolol was initiated. Despite clinical improvement, Holter monitoring continued to show QT prolongation without arrhythmias. On follow-up after four months, the patient had been biochemically euthyroid for two weeks. QTc normalized to 440 ms, and repeat Holter monitoring demonstrated no dysrhythmias. Normal parental ECGs and complete QTc recovery excluded congenital long QT syndrome. The case illustrates a reversible form of acquired QT prolongation secondary to uncontrolled hyperthyroidism.
Conclusions: Hyperthyroidism should be recognized as a reversible cause of QTc prolongation in adolescents. Failure to identify this association may lead to misdiagnosis, unnecessary genetic testing, inappropriate exercise restriction, and anxiety for families. Serial ECG monitoring and avoidance of QT-prolonging medications are essential during



thyrotoxic states. This case underscores the importance of including thyroid function testing in the diagnostic workup of adolescents presenting with unexplained QT prolongation. Further studies are needed to better define the impact of hyperthyroidism on ventricular repolarization in the pediatric population.



P-174 / #1338

SIGMOID INTERVENTRICULAR SEPTUM IN AN ASYMPTOMATIC PEDIATRIC PATIENT WITH DOUBLE VUS MUTATIONS

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Background and Aim: A sigmoid interventricular septum that is a morphological change where the upper part of the interventricular septum bulges into the left ventricle, forming an "S" or sigmoid shape is a rare finding in childhood. It remains challenging to identify if it represents an early onset phenotype of hypertrophic Cardiomyopathy (HCM) or it is a benign cardiac anatomical variant.
Methods: We describe an asymptomatic 11-year-old child with unremarkable personal and family history who was referred to the pediatric cardiology clinic for suspected subaortic stenosis.
Results: Cardiac auscultation revealed no cardiac murmur at rest and the electrocardiogram was normal for age. Transthoracic echocardiography demonstrated a localized subaortic septal thickening with sigmoid morphology (11mm, z-score 2.13), causing mild turbulence at left ventricular outflow track (LVOT) at rest (v=1.6m/sec, grad=10mmHg), which progressed to severe dynamic obstruction during exercise stress test (v= 6.8 m/sec, grad=180mmHg) that produced an ejection systolic heart murmur, without symptoms or documented arrhythmias. Cardiac MRI revealed subtle mid-septal late gadolinium enhancement. Targeted (phenotype-based) genetic testing did not manage to identify specific genes already known to cause HCM, while genetic analysis using whole exome sequencing identified two heterozygous mutations of unknown significance (VUS) in



TTN (c.104281C>T) and ACTN2 genes (C.1348G>A). Clinical significance of these alterations remains unclear. Regarding TTN mutation, variants in this region may be relevant for neuromuscular disorders, but have not been definitely shown to cause cardiomyopathy. The patient was enrolled in close follow-up and two years later, this isolated basal septal hypertrophy remains unchanged.

Conclusions: The isolated interventricular sigmoid septal hypertrophy in children and adolescents may be either benign or precede overt hypertrophy. As HCM exhibits marked genetic heterogeneity and only 30% of patients meeting clinical criteria for HCM carry a pathogenic sarcomere gene, interpreting a double VUS in such a case creates uncertainty to definite diagnosis. Long term surveillance and periodic reevaluation of genetic data in such cases even in asymptomatic children is recommended.



P-176 / #741

RECURRENT IDIOPATHIC PERICARDITIS-TWO YEARS OF EXPERIENCE OF UNIVERSITY CHILDREN'S HOSPITAL-SOFIA, BULGARIA

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Background and Aim: Recurrent pericarditis is characterized by repeated episodes of acute pericardial inflammation. In children and adolescents the resulting morbidity can be substantial. The etiology is multifactorial, with autoimmune or autoinflammatory mechanisms accounting for the vast majority of cases. Even after extensive screening, a high proportion of cases remain idiopathic. Clinical phenotypes vary widely: from highly symptomatic serositis to mild, smoldering attacks. The advent of novel biologic therapies has markedly improved long-term outcomes for these patients. Aim: to describe the characterictics of serositis in patients diagnosed with recurrent pericarditis between December 2023 and Decmber 2025.
Methods: Demographic, clinical, hematoligical and instrumental parameters of children with recurrent pericrditis were recorded. We performed complete microbiological screening, electrocardiography, X-ray, echocardiography, markers of cardiac myocytolysis initially and then regularly during follow-ups, along with genetic testing in cases of suspected underlying genetic predisposition.
Results: Four patients with recurrent pericarditis (one girl and three boys; sex ratio 1:3) with a mean age of 13.3 years (range 10–17) were admitted over a two-year period. All presented with severe serositis, including pleuritis, high fever, chest pain and markedly elevated acute-phase reactants. Three patients (75 %) developed cardiac tamponade and required surgical drainage. None showed clinical or laboratory evidence of myocardial involvement. Mitral-valve prolapse was documented in 75 % of the cohort. Comprehensive screening failed to uncover an underlying disease. Each child received high-dose steroids, non-steroidal anti-inflammatory drugs, colchicine, and diuretics. In 50% of the cases drug-induced hypercortisolism was registered. Recurrences of serositis occurred in all patients, ranging from four episodes over five months to more than ten episodes over two years. All demonstrated steroid dependence and colchicine resistance. Hydroxychloroquine was trialed in one patient without effect. Long-term remission was achieved in one patient with Anakinra.
Conclusions: Recurrent pericarditis poses a considerable diagnostic and therapeutic



burden. A large proportion of cases are idiopathic, and no definitive curative therapy exists. Corticosteroids remain the cornerstone of inflamation control, but prolonged use leads to significant side effects. Consequently, targeted immunomodulatory strategies should be incorporated into routine clinical practice.



P-177 / #929

INTRACARDIAC EXTRAMEDULLARY LESIONS IN ACUTE LYMPHOBLASTIC LEUKEMIA WITH SILENT PULMONARY EMBOLISM.

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Background and Aim: Extramedullary lesions of pediatric acute lymphoblastic leukemia (ALL) can present as tumorous masses outside the bone marrow and, in rare cases, may involve the cardiac chambers. The clinical course and optimal management of intracardiac extramedullary ALL lesions remain unclear. We report a rare pediatric case of intracardiac extramedullary ALL complicated by asymptomatic pulmonary embolism.
Methods: A 14-year-old girl was diagnosed with ALL at the age of 12. At initial diagnosis, systemic evaluation including chest computed tomography and echocardiography revealed multiple intracardiac masses, approximately 20 mm in size, located in the right atrium and right ventricle, raising suspicion of extramedullary involvement. Due to her poor general condition, surgical intervention was deferred, and chemotherapy for ALL was prioritized. The patient was followed with serial echocardiography and electrocardiography.
Results: During follow-up, no significant change in the size of the intracardiac masses was observed, and the patient's clinical condition remained stable. After achieving remission, pulmonary perfusion scintigraphy was performed for the first time, 1 year and 6 months after leukemia onset, revealing a segmental perfusion defect in the right lower lobe. The patient was subsequently diagnosed with asymptomatic pulmonary embolism. Given the persistence of multiple intracardiac masses, surgical resection was performed, and several nodular lesions were successfully removed.
Conclusions: Pulmonary embolism associated with intracardiac extramedullary lesions of ALL may be life-threatening, even in the absence of symptoms. To prevent tumor detachment and embolization, early surgical resection should be considered in selected patients, in conjunction with systemic treatment of the underlying malignancy.



P-178 / #1547

PREVALENCE OF ALBUMINURIA IN PATIENTS AFTER THE FONTAN PROCEDURE: A SINGLE-CENTER PRELIMINARY STUDY.

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Background and Aim: Background:
Patients after the Fontan procedure are at increased risk of developing multisystem complications, including renal involvement. Chronic kidney disease in this population may manifest as reduced glomerular filtration rate or early markers of renal injury, such as albuminuria. **Aim:**
The aim of this study was to assess the prevalence of albuminuria among patients after the Fontan procedure followed at our center.
Methods: Methods:
This single-center preliminary study constitutes part of an ongoing evaluation of renal injury markers in patients after the Fontan procedure. To date, 40 patients have been included. Albuminuria was defined as an elevated urinary albumin-to-creatinine ratio.
Results: Results:
Albuminuria was identified in 12 of 40 patients (30%). The study cohort comprised 14 females and 26 males; albuminuria was present in 3 female patients. Among patients with albuminuria, the time elapsed since the Fontan procedure ranged from 8 to 15 years. Five patients had undergone a fenestrated Fontan procedure, while the remaining patients had a non-fenestrated extracardiac tunnel. In 14 patients (35%), the systemic ventricle was a left ventricle, and albuminuria was present in 2 of these patients (14%). All patients demonstrated preserved glomerular filtration rate. None of the patients with albuminuria had developed plastic bronchitis or protein-losing enteropathy
Conclusions: Conclusions:
Albuminuria is a frequent finding in patients after the Fontan procedure despite preserved glomerular filtration rate and the absence of major Fontan-related complications. These preliminary results suggest that albuminuria may serve as an early marker of renal involvement, underscoring the importance of routine renal surveillance in this population.



P-179 / #827

ASYMPTOMATIC REFFERRED FOR CARDIOSURGERY – ROUTINE CHECK UP AS LIFE - SAVING FOR ALCAPA SURVIVOR

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Background and Aim: ALCAPA is rare congenital heart disease and requires life-long monitoring. We present a case of 10-years old girl admitted to the Department of Pediatric Cardiology for routine control after cardiac corrective surgery and found to have life-threatening condition.
Methods: A case report - description of unexpected routine follow up
Results: A 10-year-old girl was admitted to the Department of Pediatric Cardiology for a routine control visit after cardiac surgery 8 years prior. In the third year of her life, the girl was admitted to the hospital in critical condition and was diagnosed with an anomalous left coronary artery from the pulmonary artery. She underwent surgical correction left coronary artery reimplantation. A follow-up coronary angiography showed that the operation was successful. During the checkup the patient did not report any symptoms. On physical examination a heart murmur of mitral regurgitation was found. During diagnostics the electrocardiogram showed an anterolateral myocardial infarction pattern, with abnormally deep Q waves in aVL lead and inverted T waves in leads I and aVL. Echocardiography revealed mitral regurgitation, normal ejection fraction of left ventricle (61% Simpson method); however, it was not possible to obtain a clear image of the coronary vessels. Coronary angiography revealed occlusion of the left coronary artery with retrograde perfusion via collateral circulation. The computed tomography confirmed the abnormal origin of the LMCA from the aorta and showed its proximal segment dividing into the LAD and Lcx. Adenosine resonance imaging showed extensive subendocardial ischemia in regions supplied by the LMCA. An intramural area of myocardial necrosis/fibrosis in the anterior apical segment was confirmed. The patient was referred for coronary artery bypass grafting (LIMA-to-LAD graft). Shortly after the operation, she left the hospital in good clinical condition with acetylsalicylic acid and heart failure treatment.
Conclusions: Asymptomatic patients who have undergone coronary artery surgery require regular monitoring and high-quality imaging, especially if echocardiography does not reveal the anatomy of the coronary vessels. Cardiac CT and CMR imaging with adenosine are



crucial for a complete understanding of the anatomy before surgery. The postoperative course was uneventful, the patient was discharged home after 8 days in good general condition.



P-180 / #1407

A SINGLE-CENTER EXPERIENCE IN THE MANAGEMENT OF PATIENTS WITH HETEROTAXY SYNDROME

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Background and Aim: Heterotaxy syndrome (HS) is a congenital disorder with abnormal arrangement of thoracic and abdominal organs, often associated with complex intracardiac and extracardiac malformations. Surgical feasibility depends on the type of isomerism, associated anomalies, and the patient's clinical condition. This study summarizes the experience in diagnosis, management, and outcomes of HS patients treated at a single center from 2013 to 2025.
Methods: A retrospective analysis of 144 HS patients was performed. Diagnostics included prenatal echocardiography, transthoracic and transesophageal echocardiography, computed tomography, and magnetic resonance imaging. Patients were classified into right isomerism (RI) and left isomerism (LI). Surgical strategies and outcomes were analyzed separately.
Results: 144 pediatric patients were diagnosed with HS; prenatal diagnosis was established in 60 cases (41.7%). LI was identified in 87 patients (60.4%), RI in 57 (39.6%).

In LI, common cardiac anomalies included atrioventricular septal defect (AVSD) in 25 (28.7%), interruption of the inferior vena cava in 24 (27.6%), double outlet right ventricle (DORV) in 10 (11.5%), transposition of the great arteries (TGA) in 9 (10.3%), pulmonary atresia (PA) in 7 (8%), and total anomalous pulmonary venous connection (TAPVC) in 5 (5.7%).

In RI, AVSD was present in 48 (84.2%), TAPVC in 41 (71.9%), PA in 22 (38.6%), DORV in 21 (36.8%), and TGA in 11 (19.3%).

Biventricular correction was achieved in 26 LI patients (29.9%) with no postoperative mortality. Single-ventricle palliation was required in 19 (21.8%); operative mortality was observed in 2 patients (10.5%). Remaining LI patients did not require surgery.

In RI, biventricular repair was not feasible. Single-ventricle palliation was performed in 26 patients (43.8%), with operative mortality in 2 (7.7%).

Long-term outcomes could not be fully assessed due to the ongoing war and limited follow-



up data.

Conclusions: HS is associated with marked anatomical heterogeneity requiring an individualized management approach. RI is characterized by complex intracardiac anatomy, which limits the feasibility of biventricular repair. In contrast, anatomical variants observed in LI are more favorable for biventricular correction, and some patients with left isomerism do not require surgical treatment.



P-181 / #86

IMPACT OF INTRODUCING INFLIXIMAB ON TREATMENT COURSE AND OUTCOMES IN REFRACTORY KAWASAKI DISEASE

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Background and Aim: Infliximab (IFX) was approved in Japan in 2015 for the treatment of refractory Kawasaki disease (KD). At our institution, IFX has been used as a third-line or later option when clinically indicated. This study aimed to evaluate the impact of introducing IFX on treatment courses and clinical outcomes in KD.
Methods: Among 78 patients who received acute-phase KD treatment at our institution since 2010, 31 who required therapy beyond two courses of intravenous immunoglobulin (IVIG), with or without prednisolone and aspirin, were included. Patients were categorized into the Pre group (before IFX introduction) and the Post group (after IFX introduction). The Post group was further divided into Post-IFX(–) and Post-IFX(+). Clinical variables, including duration of fever, post-defervescence hospital stay, total hospital stay, and the incidence of coronary artery lesions (CAL), were compared.
Results: The Pre group consisted of 11 patients, and the Post group consisted of 20 patients, including 8 in Post-IFX(–) and 12 in Post-IFX(+). Treatment initiation occurred earlier in the Post group (4 [3–5] days) than in the Pre group (5 [3–7] days) (p=0.037). In the Post-IFX(+) group, 4 patients (25%) required additional therapy after IFX administration. Compared with the Pre group, the Post group demonstrated significantly shorter total hospital stay (29 [15–72] vs. 23.5 [13–40] days, p=0.020) and post-defervescence hospital stay (17 [9–48] vs. 7.5 [3–22] days, p=0.001), although the duration of fever did not differ significantly. Within the Post group, Post-IFX(+) tended to show shorter total hospital stay (27.5 [15–40] vs. 17 [13–36] days, p=0.051) and showed significantly shorter post-defervescence hospital stay (12.5 [4–22] vs. 7 [3–12] days, p=0.044) compared with Post-IFX(–). The incidence of CAL did not differ among groups (18% in Pre and 25% in Post). In Post-IFX(+), two patients (17%) developed CAL, one of whom already had CAL prior to IFX administration.
Conclusions: The introduction of IFX as a treatment option may help reduce total hospital stay in refractory KD without increasing the incidence of CAL. IFX may contribute to maintaining defervescence and facilitating earlier transition to outpatient management.



P-183 / #609

TWO RARE DISEASES PRESENTING WITH ALARMING CARDIAC CLINICAL PRESENTATION

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Background and Aim: Introduction: Paraganglioma (PGL), rare neuroendocrine tumor with morbidity due to norepinephrine secretion, leading to hypertension, palpitations, lethal tachyarrhythmias, angina, stroke, syncope. Cardiac involvement is 1-2%. Exact anatomical location and treatment are challenging. Complex of "spotty skin pigmentation, presents as recurrent cardiac myxomas, endocrine overactivity, and schwannomas". This is Carney complex (Cc), an autosomal dominant, multiple neoplasia syndrome. **Aim:** present two rare cases that had severe cardiac clinical presentations and discuss their cardiac management.
Methods: Population-Methods: Case I 16-year-old athlete. Evaluated after mild covid-19 infection. Mild elevated BP thought as "white coat effect", no other pathology was present. Failed to reach previous exercise tolerance on training. Thorough investigation: Echo-2D, c-MRI, positron emission tomography/CT and Coronary angiography detected 7 lymph nodes and a 4x3cm2 tumor lying on right main coronary artery at right AV grove were detected. Lymph node biopsy proved PGL diagnosis. Case II, 15-year-old asymptomatic 4th child of family presented transient acute cerebral stroke. Further evaluations by Echo-2D, c-MRI revealed multiple myxomas in LA, RV, LV. PMH: seminoma left testis at 4 years old.
Results: Case I: under α-adrenoceptor, β-adrenoceptor blockers 2 weeks prior surgery by mid-thoracotomy the mass was extracted from the (R) AV groove and coronary artery that was the dominant coronary vessel. Rapid biopsy confirmed diagnosis and local infiltration coronary vessel. 2 cm resection and end to end anastomosis of the coronary vessel with interrupted sutures 8.0, completed the repair. Case II: after neurological recovery was



operated by mid-sternotomy. Six myxomas were extorted. Biopsy established diagnosis of myxomas. Recurrency involving RV, LV present after 18 months. New operation performed. Second recurrence two years later. Operation was repeated. New recurrency a year after, involving 3 large myxomas in LV. As third recurrency is extremely rare, a full internal medicine investigation set the diagnosis of Cc. The patient is on double anticoagulation treatment and followed up by specialist team of endocrinologists for further management.
Conclusions: Conclusion: Cardiovascular and CNS symptoms may hide severe cardiac diseases and must always be thoroughly investigated.



P-184 / #606

WHEN PAEDIATRIC CARDIOLOGY BECOMES GLOBAL: OUR EXPERIENCE WITH NGOS.

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Background and Aim: Although diagnosis of heart disease in children can be nowadays achieved using small, portable ultrasound devices, the challenge lies in the step after the initial diagnosis: how and where to proceed for surgical repair, that will include a vast chain of specialists such as cardiac surgeons, perfusionists, anesthesiologists, pediatric intensive care physicians, cardiologists, nurses, all of them with a very specific training in the field of pediatric cardiology. This infrastructure is not available to many affected children around the world. Non-governmental organizations (NGOs) try to step in when governments and health authorities fail. The aim of this study is to describe a single-centre retrospective case series of international paediatric patients that have received cardiac treatment by our staff through NGO support.
Methods: All cases of paediatric patients supported by non-profit organizations, who underwent treatment by our staff between 16/05/2016 and 31/07/2025 were included.
Results: A total of 66 patients were included. 12/66 (18%) were treated in their home country by our staff through a charitable mission, 54/66 (82%) travelled to our institution. The home countries were diverse: 20/66 (20%) from the American continent, 46/66 (70%) from the African continent. Ages ranged from 4 months to 16 years (mean 3.1 y) and 15/66 were under 1 year of age. 3/66 were treated within 36 h of arrival due to the severity of symptoms. Time between acceptance and arrival was 78 days (21-240) and time between arrival and intervention was 26 days (1-101). Hospital stay was 9.5 +/- 6 days. 4/66 (6%) needed a re-do, 2/66 (3%) had an additional cardiac catheterization procedure, and 3/66 (4,5%) received ECMO support. Mortality was 0%. Four children (6%) will require a second intervention in the future (conduit replacements).
Conclusions: The mean age of intervention is higher than in more privileged countries, due to late diagnosis and delay to access help. Transfers are long and can destabilize the child, especially in cyanotic situations. There is a need to optimize resources and accept children with realistic possibilities of good long-term results. Tackling pediatric heart disease worldwide will require global solidarity.



P-185 / #668

TMEM70-LINKED MITOCHONDRIAL CARDIOMYOPATHY WITH TENDENCY TO RESOLUTION

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Background and Aim: Mitochondrial diseases (MDs) comprise multisystem disorders from oxidative phosphorylation defects, affecting 20-40% of children with cardiac involvement, primarily hypertrophic cardiomyopathy with high mortality rate. TMEM70 deficiency, a rare Complex V defect (<100 cases), causes neonatal encephalo-cardio-myopathy with hypotonia, HCM, lactic acidosis, hyperammonemia, and up to 50% first-year mortality. We report favorable HCM evolution in a preterm Roma girl.
Methods: This case presents a 4-year-old female (Roma ethnicity), born prematurely, low birth weight from undispensarized pregnancy. Neonatal cardiac evaluation for systolic murmur, transthoracic echocardiography confirming severe left ventricular HCM with LVOT obstruction. Propranolol treatment was initiated. Metabolic screening ruled out Fabry/Pompe diseases; molecular karyotype evidenced parental consanguinity. Diagnostic 3B-Exome sequencing identified pathogenic homozygous TMEM70 variant. Serial TTE was performed to assess HCM progression as well as clinical monitoring for neurologic status, growth and metabolic parameters.
Results: Neonatal echocardiography revealed severe LV hypertrophy with dynamic LVOT obstruction, responsive to propranolol. The early course included a 3-month NICU stay for prolonged sepsis. Frequent acute respiratory infections occurred in the first 2 years with desaturations and lactic acidosis with hyperammonemia. No metabolic decompensations happened after age 2 years. Persistent features included global neurodevelopmental delay, generalized hypotonia, severe failure to thrive, and a bird-like dysmorphic facial appearance, consistent with the characteristics of this genetic mutation. By age 4, HCM evolved to non-obstructive/non-progressive, permitting propranolol discontinuation. With no established treatment for mitochondrial cardiomyopathy, our patient now benefits from anaplerotic therapy (carnitine, riboflavin, Q10 coenzyme) providing alternative substrates for the Krebs cycle. Our patient also benefits from ongoing neurological and rehabilitation follow-up and treatment. Notably, she has shown clinical improvement and has acquired independent walking.



Conclusions: Multidisciplinary care, encompassing early genetic diagnosis, neurological and rehabilitation follow-up, serial echocardiography, enabled our patient with TMEM70 mutation to achieve good overall outcome despite its high neonatal mortality risk and characteristic features. The hypertrophic cardiomyopathy notably ameliorated from obstructive to non-progressive, highlighting the value of integrated approaches in mitochondrial HCM.



P-186 / #821

JOINING FORCES FOR BETTER PAEDIATRIC CARDIAC CARE: ESTABLISHMENT OF A NATIONAL REGISTRY FOR CONGENITAL HEART DISEASE AND INHERITED CARDIAC CONDITIONS

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Background and Aim: National and international collaboration for rare conditions is of the utmost importance for improvement of patient care, scientific knowledge and public awareness. Large multicentre registries often form the backbone for these collaborations. Till date, systematic and centralized registration of paediatric patients with Congenital Heart Disease (CHD) and Inherited Cardiac Conditions (ICC) across experts centres in Belgium is lacking, hampering multi-centre research, collaboration and identification of patients for potential clinical trials.
Methods: All major expert centres in Belgium and Luxembourg joined forces to establish a multi-centre registry for rare CHD and ICC. The initiative named, **'The Belgian Paediatric Cardiology Registry' (BePCaR)** is endorsed by the Research Working Group (RWG) of the Belgian Association of Paediatic Cardiology (BAoPC). Different research projects, initiated by members of the BAoPC, will be accommodated to improve crucial knowledge gaps.
Results: As Rome wasn't build in one day, neither was the BePCaR; several hurdles were to be overcome. Initially, a consensus on the governance of a centralised REDCap database was to be found within the RWG of the BAoPC. Given easier maintenance, data control, and robustness for future changes in comparison with a federated system. Secondly, establishing a legal and ethical framework – by extensive discussion with different ethical



committees and legal units. Whereas, this framework is currently lacking in Belgium and Europe. Lastly, constructing a multi-usage REDCap database according to the FAIR-principles. Not only findability and accessibility are assured – by using an open REDCap server. But also interoperability and reusability will be guaranteed by consistent data coding and automated data transformation – empowered by collaborating with local statistical and technical experts. Fostering opportunities for sharing and interchanging data with other international initiatives, because only by working together paediatric cardiac care will keep on advancing.

Conclusions: In order to improve lifelong outcomes of paediatric heart patients further data-driven insights are needed. A multi-centre collaboration with involvement of different legal, ethical an technical parties was established. From 2026 onwards, patient data will be collected. Hence, the BePCaR platform will be crucial for ongoing improvements in clinical and scientifical outcomes for paediatric patients globally.



P-187 / #643

A FRAMEWORK FOR MANAGING PAEDIATRIC FUNCTIONAL CARDIAC SYMPTOMS

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Background and Aim: Functional cardiac symptoms (FCS), such as non-cardiac chest pain, orthostatic intolerance and syncope-like events are increasingly encountered by paediatric cardiologists. Children with congenital heart disease often have early-life medical trauma, neurodevelopment delays, and altered autonomic reactivity, predisposing them to FCS. Despite the clinical need, there is no standardised approach to managing FCS. We provide a structured framework to treat paediatric FCS.
Methods: Aberrant stress-system activation and/or dysregulation is a key pathway for FCS. Traditional clinical approaches, which prioritise exclusion of structural/organic heart disease, fail to adequately address the dysregulated physiology underpinning FCS. We designed a management framework grounded in stress-system physiology. We used established practices in mind-body medicine to develop our framework.
Results: Our clinical framework is arranged under the acronym, CARDIOFSS. Our framework is structured to guide physicians through the initial management of FCS. *Calm* the system by recognising the features of a dysregulated stress system and providing validation. Provide reassurance by explaining the mechanisms of symptoms with statements such as, “This is your body’s stress system overreacting and causing symptoms. Your heart is functioning well.” And, “Your heart is strong but is reacting to excess stress signals”. *Assess* stress-systems patterns with targeted investigations of functional indicators such as a standing-test for orthostatic changes and hyperventilation tests. *Re-frame* the presentation by providing a “rule-in” diagnosis rather than a diagnosis of exclusion. Accompany the “rule-in” diagnosis with an explanation of how stress-systems aberrancy causes symptoms. *De-escalate* family-unit anxiety with diagnostic clarity and a management roadmap. *Introduce* physiological regulation strategies such as pleasurable exercise, breathing control and adequate hydration. *Organise* early referrals to appropriate interdisciplinary services such as physiotherapy, pain specialists, occupational therapy and psychology. *Follow* functional outcomes such as activity tolerance and school attendance. Avoid unnecessary repetition of imaging/investigations that can promote



anxiety. *Set* expectations for recurrence and long-term recovery to contain fears of relapse and chronic illness. *Sustain* gains with gradual reintegration rather than prolonged restriction. Empower the child by encouraging a graded return to activities avoiding illness identification/fear-based avoidance.

Conclusions: Our comprehensive management framework helps physicians "rule-in" FCS and provides a structured approach to treating stress-system dysregulation



P-188 / #899

EPIDEMIOLOGY, CLINICAL CHARACTERISTICS AND LONG-TERM MORBIDITY OF RHEUMATIC FEVER: A 30-YEAR RETROSPECTIVE COHORT STUDY IN SOUTH WALES

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Background and Aim: Acute Rheumatic Fever (ARF) is a serious immune-mediated sequela of Group A Streptococcus infection, often leading to Rheumatic Heart Disease (RHD), a major cause of acquired heart disease in children globally. Despite a decline in incidence in high-income countries, RHD remains the most critical prognostic factor. This study aimed to assess the epidemiology, clinical characteristics, and long-term morbidity in pediatric patients diagnosed with ARF in South Wales.
Methods: This observational, analytical study included 55 patients diagnosed with ARF aged 0-18 years at the University Hospital of Wales between January 1994 and August 2025. Data collected included demographics, clinical manifestations, echocardiographic findings, treatment modalities, and long-term outcomes. Valvular involvement was assessed using standardized Doppler criteria, and carditis severity was classified as silent, mild, moderate, or severe. Statistical analysis involved chi-square, Mann–Whitney U, and regression models.
Results: The median age of the cohort was 11 (IQR: 4-28) years, with a median follow-up period of 6 (IQR: 1-37) years. Carditis was the most frequent major criterion (78.2%), followed by chorea (38.2%). Among the 40 patients with valve involvement, the mitral valve was most frequently affected (97.5%), followed by the aortic valve (47.5%) and tricuspid valve (2.5%). Multiple valve involvement was present in 47.5% of patients. At initial presentation, carditis was mild in 20 patients (46.5%), moderate in 11 (25.6%), silent in 8 (18.6%), and severe in 4 (9.3%). During follow-up, 25% of patients with silent or mild carditis progressed to moderate or severe disease. ICU/HDU requirement was significantly associated with the absence of chorea, severe mitral insufficiency, severe carditis, and use of anti-congestive therapy. Cardiac surgery was performed in 18.6% of patients. Most patients received oral penicillin V for secondary prophylaxis with 89% adherence, resulting in a low recurrence rate of 3.6%. The overall mortality rate was 5.5%.



Figure. Echocardiographic Findings in Pediatric Patients with Acute Rheumatic Fever: Cardiac Involvement, Valve Morphology, and Regurgitation Severity

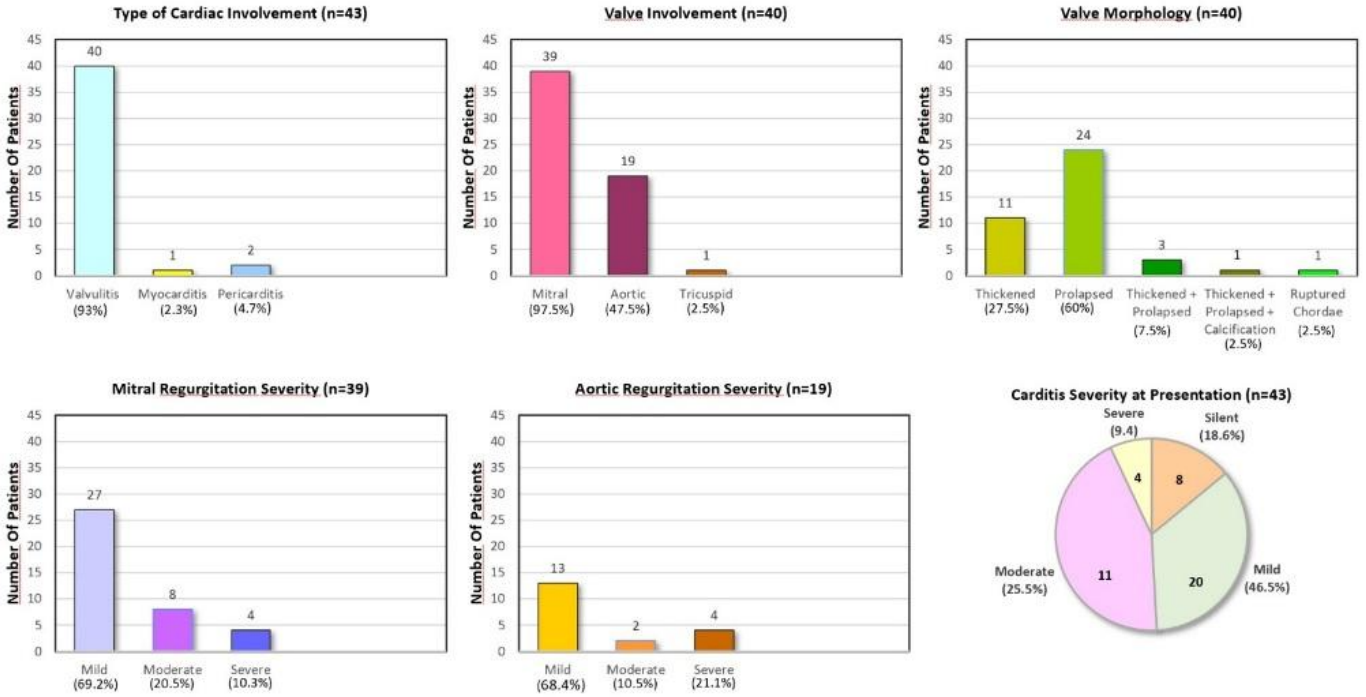




Table. Distribution of Clinical Variables Based on ICU/HDU Requirements

Variables	Need for ICU/HDU (No)	Need for ICU/HDU (Yes)	Test	*p*-value
Acute Rheumatic Fever (ARF) Diagnosis				
No	12ᵃ (100.0%)	0ᵃ (0.0%)		0.178
Yes	35ᵃ (81.4%)	8ᵃ (18.6%)		
Arthritis				
No	35ᵃ (85.4%)	6ᵃ (14.6%)		1.000
Yes	12ᵃ (85.7%)	2ᵃ (14.3%)		
Chorea				
No	26ᵃ (76.5%)	8ᵇ (23.5%)		**0.018**
Yes	21ᵃ (100.0%)	0ᵇ (0.0%)		
Erythema Marginatum				
No	43ᵃ (84.3%)	8ᵃ (15.7%)		1.000
Yes	4ᵃ (100.0%)	0ᵃ (0.0%)		
Subcutaneous Nodules				
No	44ᵃ (84.6%)	8ᵃ (15.4%)		1.000
Yes	3ᵃ (100.0%)	0ᵃ (0.0%)		
Fever				
No	24ᵃ (96.0%)	1ᵇ (4.0%)		0.059
Yes	23ᵃ (76.7%)	7ᵇ (23.3%)		
Arthralgia				
No	36ᵃ (85.7%)	6ᵃ (14.3%)		1.000
Yes	11ᵃ (84.6%)	2ᵃ (15.4%)		
Elevated ESR and/or CRP				
No	22ᵃ (95.7%)	1ᵃ (4.3%)		0.120
Yes	25ᵃ (78.1%)	7ᵃ (21.9%)		
Prolonged PR Interval				
No	45ᵃ (86.5%)	7ᵃ (13.5%)		0.382
Yes	1ᵃ (50.0%)	1ᵃ (50.0%)		
Upper limit of normal	1ᵃ (100.0%)	0ᵃ (0.0%)		
Mitral Regurgitation Severity				
None	16ᵃ (94.1%)	1ᵃ (5.9%)		**0.041**
Mild	19ᵃ (90.5%)	2ᵃ (9.5%)		
Moderate	5ᵃ (83.3%)	1ᵃ (16.7%)		
Severe	1ᵃ (25.0%)	3ᵇ (75.0%)		
Mild-moderate	4ᵃ (80.0%)	1ᵃ (20.0%)		
Moderate-severe	2ᵃ (100.0%)	0ᵃ (0.0%)		
Aortic Regurgitation Severity				
None	31ᵃ (88.6%)	4ᵃ (11.4%)		0.112
Mild	12ᵃ (92.3%)	1ᵃ (7.7%)		
Moderate	1ᵃ (50.0%)	1ᵃ (50.0%)		
Severe	2ᵃ (50.0%)	2ᵃ (50.0%)		
Mild-moderate	1ᵃ (100.0%)	0ᵃ (0.0%)		
Severity of Carditis (Initial Application)				
Silent	10ᵃ (100.0%)	0ᵃ (0.0%)		**0.012**
Mild	23ᵃ (88.5%)	3ᵃ (11.5%)		
Moderate	13ᵃ (86.7%)	2ᵃ (13.3%)		
Severe	1ᵃ (25.0%)	3ᵇ (75.0%)		
Anti-congestive treatment				
No	39ᵃ (100.0%)	0ᵇ (0.0%)		**<0.001**
Yes	8ᵃ (50.0%)	8ᵇ (50.0%)		

(Findings for categorical variables are presented as n (%). Different superscript letters (a, b) indicate statistically significant differences between groups ($p<0.05$) based on pairwise comparisons)

Conclusions: Despite the low-risk setting of South Wales, ARF remains a disease with significant long-term morbidity, particularly due to cardiac involvement. Our findings emphasize the importance of rigorous echocardiographic screening and adequate



secondary antibiotic prophylaxis in reducing the risk of ARF recurrence and thereby preventing the development and progression of RHD.



P-189 / #39

PERFORMANCE OF THE SINGLE LEFT VENTRICLE IN PEDIATRIC FONTAN CIRCULATION: THE ROLE OF ATRIAL AND VENTRICULAR STRAIN

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Background and Aim: Fontan circulation leads to progressive myocardial and atrial dysfunction. Conventional echocardiography often underestimates early changes, whereas speckle-tracking echocardiography (STE) provides sensitive measures of deformation. This study assessed left ventricular (LV) and left atrial (LA) strain in pediatric Fontan patients with single LV (SLV) anatomy, stratified by ejection fraction and cardiac morphology.
Methods: Twenty-two Fontan patients (mean age: 5 years) with SLV underwent STE analysis of LV global and segmental longitudinal strain and LA reservoir (LASr), conduit (LAScd), and contractile (LASct) strain. Patients were grouped by LV ejection fraction (preserved vs. reduced) and by diagnosis: double inlet LV (DILV), tricuspid atresia with pulmonary stenosis and ventricular septal defect (TA+PS+VSD), unbalanced atrioventricular canal (AVC).
Results: Global LV longitudinal strain did not differ significantly between preserved and reduced LVEF groups. LASr showed a non-significant trend toward higher values in reduced LVEF (p=0.094), suggesting compensatory atrial adaptation. Across morphologies, most LV indices were comparable; however, patients with TA+PS+VSD demonstrated significantly higher basal anterior strain than unbalanced AVC (adjusted p=0.008) and a tendency toward greater apical inferoseptal strain compared with DILV (p=0.058).
Conclusions: In pediatric SLV Fontan patients, GLS does not clearly differentiate ventricular performance, while atrial reservoir strain may reflect compensatory adaptation. Morphology-specific differences in regional strain highlight heterogeneity within SLV physiology. Incorporation of atrial and segmental strain into routine assessment may



improve surveillance and risk stratification. *Acknowledgement*:"This work was supported by the George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu-Mureș Research Grant number 795/6/22.01.2025"



P-190 / #497

CLINICO-ETIOLOGICAL SPECTRUM & MANAGEMENT OF PAEDIATRIC SYNCOPE RETROSPECTIVE STUDY FROM TERTIARY PEDIATRIC CARDIAC OUTPATIENT DEPARTMENT

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Background and Aim: Syncope, transient loss of consciousness due to global cerebral hypoperfusion, is a common pediatric presentation with diverse etiologies. Neurocardiogenic syncope is the most common etiology among pediatric population according to various studies and is benign in nature. Cardiac syncope can be life threatening and hence all syncope in children need thorough investigations driven by the presenting history. Assess the clinical and etiological characteristics of paediatric patients presenting with syncope as the primary complaint
Methods: Retrospective study of 47 patients aged 5-18y who presented with syncope as the primary presenting complaint to our pediatric cardiology OPD between Dec 2022 – Jul 2024 Exclusions – Baseline cyanosis, Presyncope only, Proven Neurological disorder, Trauma Diagnostics – ECG, ECHO (for all cases) & HUTT, Holter monitoring, Cardiac MRI, Cardiac Catheterization, MRI Brain, EEG (when indicated) Patients were classified into Neurocardiogenic, Cardiac, Neurological, Psychogenic and Indeterminate forms
Results: Cardiac syncope was the most common etiology at our centre followed by NCS. Exertional syncope seen in 15 cases is a red flag for cardiac etiology. Long QT (n=3)/ Brugada (n=1) were identified in the arrhythmia cohort and initiated on betablockers. 5 children had LTEs in the cardiac syncope cohort. 3 underwent PPI and 1 child needed ICD. Postural changes & prolonged standing (n=10) were associated with NCS, managed with hydration and fludrocortisone (n=6). Epilepsy (n=3), Vestibular Migraine (n=2) contributed to the neurological causes.
Conclusions: Cardiac syncope was most common in our study, likely due to referral bias at our cardiac center. A detailed history is key to diagnosis. ECG and echocardiography are essential for detecting serious conditions like CHD, CMP, arrhythmias and pulmonary hypertension. HUTT helps in distinguishing NCS from psychogenic causes, while EEG and brain MRI can delineate anoxic seizures from epilepsy. Syncope in children is not always benign and a thorough diagnostic approach is crucial for identifying the etiology.



P-192 / #156

EARLY CARDIOPULMONARY FITNESS IMPAIRMENT ACROSS STAGES OF PEDIATRIC CKD

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Background and Aim: Children with chronic kidney disease (CKD) are at high cardiovascular risk, yet cardiopulmonary fitness is rarely assessed in this population. Maximal oxygen uptake (VO_2max) is a powerful prognostic marker, and Z-score–based evaluations may improve risk stratification.
Methods: In this prospective multicenter study, children aged 6–17 years with CKD stages 2 to 5 were categorized according to KDIGO criteria. Cardiopulmonary exercise testing (CPET) was performed using a standardized cycle ergometer protocol. VO_2max was expressed as Z-scores based on contemporary pediatric reference values. Impaired fitness was defined as VO_2max Z-score < –1.64. Multivariable linear regression identified predictors of VO_2max.
Results: Eighty-eight patients (mean age 11.8 ± 3.8 years, 67% male) were enrolled; 77 completed valid CPET. Mean VO_2max Z-score was –1.8 ± 2.1 and 56% had impaired fitness. A significant, stage-dependent decrease in VO_2max was observed across CKD stages (Jonckheere–Terpstra trend test, $P < 0.001$). In multivariable analysis, higher VO_2max was independently associated with lower hypertension risk, higher diastolic blood pressure, better pulmonary function (FEV_1), lower VE/VCO_2 slope, and higher ventilatory anaerobic threshold (VAT). These parameters explained 80% of VO_2max variability.
Conclusions: Cardiopulmonary fitness is significantly reduced in children with CKD with a stage dependent effect, even at early stages. VO_2max impairment is linked to clinical and functional parameters that are commonly assessed by CPET and amenable to therapeutic intervention. These findings support early screening and the development of tailored rehabilitation strategies, including hybrid, multidisciplinary programs targeting hypertension, ventilatory efficiency, and physical deconditioning in pediatric CKD.



P-193 / #690

3D ATLAS OF HUMAN EMBRYONIC HEART DEVELOPMENT

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Background and Aim: Mouse models are widely used to investigate the developmental mechanisms leading to congenital heart defects. The mouse heart anatomy is very similar to that of human. However, the developmental timing is very different. It remains unclear whether some heart developmental processes diverge between the two species. Human heart development remains challenging to study due to the scarcity of available samples. While recent technological advances have provided insights into the development of several human organs, a detailed description of normal human heart development comparative to recent advances in mouse heart development is still lacking.
Methods: Here, we established an atlas of human heart development during the embryonic period. We collected and generated 3D images using high-resolution episcopic microscopy of human embryos at Carnegie stages 12 to 23, from the Human Development Cell Atlas (HUDECA) collection and the Human Developmental Biology Resource (HDBR) database.
Results: We compared human anatomy to mouse embryos imaged with the same modality between E10.5 and E16.5. We identified developmental features that are specific to humans, such as right ventricular growth, outflow tract curvature and tricuspid valve formation.
Conclusions: This study provides a new atlas of human cardiac development within the mouse frame of reference, and identifies which defects can be reliably modelled in mouse systems.



P-194 / #447

DESMOPLAKIN CARDIOMYOPATHY IN THE PEDIATRIC POPULATION: WE ONLY FIND WHAT WE LOOK FOR!

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Background and Aim: We report three pediatric cases of DSP-related cardiomyopathy with a myocarditis-like presentation, identified in the Piedmont region, Northern Italy.
Methods:

	Patient 1	**Patient 2**	**Patient 3**
Patient demographics	Caucasian female 15 y-o	Caucasian female 16 y-o	Caucasian female 14 y-o
Family history of SCA/SCD	**N**egative	Negative	Negative
Clinical onset	Acute	Subacute	Acute
Chest pain	Yes	Yes	Yes
LVEF	Normal	Normal	Normal
Cardiac markers	Peak-Troponin	Peak-Troponin	Peak-Troponin
PCR	Negative	Negative	Negative
Myocarditis-related viral serologies	Negative	Negative	Negative



ECG	Incomplete BBBD, ST-segment elevation in the inferior and lateral precordial lead; diffuse low voltage in precordial leaks	Normal	Incomplete BBBD
ECG Holter	Sporadic isolated monomorphic ventricular extrasystoles, with a LBBB morphology, and very rare supraventricular ectopic beats	Rare, isolated monomorphic ventricular ectopic beats that coincided with episodes of dyspnea	Very rare isolated ventricular premature complexes (5) of different morphologies. A single run of a 4-beat non-sustained VT
Cardiac MRI	Hemi–ring-like pattern LGE	Basal-inferior and inferoseptal LGE	Basal anterolateral, septal, mid-inferior and inferolateral LGE ring-like pattern
DSP mutation	Heterozygous c.8294C>T in exon 24	Heterozygous c.3799C>T in exon 23	Heterozygous c.3799C>T in exon 23
Classification*	LP	P	P

Table 1: Summary of the main demographic, clinical, laboratory, and instrumental characteristics of the presented patients

Results: All our patients were diagnosed with desmoplakin-related NDLVC; desmoplakin gene mutations as a distinct genetic and phenotypic entity within the NDLVC spectrum. Despite the small sample size, our findings indicate that chest pain with consistently elevated cardiac enzyme levels, in the absence of inflammatory markers, was the most commonly reported presenting symptom. Echocardiography showed normal biventricular function and no chamber dilatation in these patients. Significant ECG abnormalities, including marked ST-segment elevation and diffusely low voltage in the precordial leads, were noted only in the first patient.

Conclusions: Although rare, DSP-related cardiomyopathy should be considered in young individuals presenting with acute myocardial inflammatory syndromes, such as myocarditis-like manifestations, especially when infectious or autoimmune causes are not identified. CMR is the gold standard for suspect the diagnosis. Timely and accurate diagnosis is crucial for guiding clinical management and implementing long-term



surveillance strategies to reduce the risk of life-threatening arrhythmias and sudden cardiac death.



P-195 / #298

MULTI-DRUGS RESISTANT AUTOIMMUNE MYOCARDITIS IN INFANT: A CASE REPORT

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Background and Aim: Acute myocarditis (AM) is an important cause of heart failure and mortality in children and adults. We describe a case of a 1-year old girl with relapsing autoimmune myocarditis multi-resistant to conventional immunosuppressive therapy.

Methods:

Case report: A 1-year old girl was referred to our hospital for an incidental finding of heart enlargement at chest X-Ray performed for respiratory infection. Echocardiogram showed dilated cardiomyopathy (DCM) with biventricular involvement, severe systolic dysfunction and severe mitral regurgitation (MR). hsTNT and NTproBNP were high, genetic test and metabolic screening resulted normal. Endomyocardial biopsy (EMB) was performed and showed the presence of lymphocytic myocarditis, virus negative (figure 1). Anti-heart antibodies (AHA) were negative. Patients started corticosteroids and azathioprine with clinical and instrumental improvement. After few months, she showed a complete recovery, but after cortisone tapering DCM reappeared. She performed a second EMB that was no diagnostic and a cardiac magnetic resonance (CMR) confirmed the presence of AM with oedema and fibrosis. She was treated with corticosteroids, Mycophenolate Mofetil (MMF) and Cyclosporine, with cardiac recovery. When the cortisone was tapered, the patient presented again ventricular dysfunction. She was hospitalized, EMB was repeated and confirmed the presence of lymphomonocytic infiltration with necrosis and fibrosis. CMR showed extensive fibrosis (figure 2). She was treated with cortisone, MMF and Tacrolimus. Ventricular function recovered and the child remained stable for a long time with low cortisone dose. After 2 years, EBM was repeated and resulted negative; while AHA were positive. MMF was continued, while Tacrolimus and cortisone were discontinued.



After 1 month, she presented again biventricular dysfunction with severe MR, and she experienced ventricular fibrillation with cardiac arrest. She was resuscitated and treated with ECMO. After few days, she presented cerebral bleeding and brain death. Autopsy showed the presence of lymphomonocytes myocardial infiltration with necrosis and fibrosis.

Results: These patients are very rare and the management remain challenging.

Conclusions: This is the younger case reported in literature with autoimmune myocarditis multi-resistant to combined immunosuppressive therapy. These patients are very rare and the management remain challenging. A multidisciplinary approached for targeted advanced therapy is demanded.

P-196 / #710

POSTOPERATIVE DYNAMICS OF MONOCYTES AND MACROPHAGES ACROSS DIFFERENT BIOLOGICAL COMPARTMENTS AFTER PEDIATRIC CARDIAC SURGERY WITH CARDIOPULMONARY BYPASS

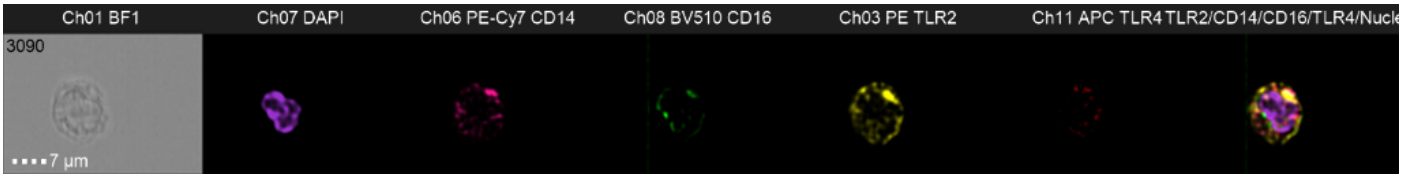
Louise Carl[1], Moritz Merbecks[1], Tobias Rubner[2], Judith Schenz[3], Tsvetomir Loukanov[4], Steffen Schmitt[2], Matthias Gorenflo[1]
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Background and Aim: Pediatric cardiac surgery with cardiopulmonary bypass induces a multifaceted sterile immune response driven by tissue damage, blood-foreign surface interaction, ischemia-reperfusion and hypothermia. Monocytes and macrophages are key regulators of this early immune response across different biological compartments. However, the postoperative dynamics of these cell populations in infants remain insufficiently characterized. This study aims to describe early postoperative compartment-specific changes in circulating and tissue-associated monocyte and macrophage populations following congenital heart surgery.
Methods: In this prospective observational study, leukocytes and a total of 176 biomaterial samples (blood, drainage fluid, tracheal aspirate and urine) were collected from infants (<2years) at six points in time up to 48hours after congenital heart surgery with

cardiopulmonary bypass. At the time of analysis, 11 patients had been included, and patient recruitment was ongoing. Immune phenotyping was performed using 20-parameter spectral-flow-cytometry and ImageFlow. Cytokines and damage-associated molecular patterns were quantified by immunoassays. The project is supported by the German Heart Foundation, Frankfurt a.M.

Results: Preliminary analyses from the first 11 patients demonstrated consistent postoperative, compartment-specific modulation of monocyte and macrophage populations (regarding to the surface expression of CD11b, CD14, CD16, CD64, CD163, CCR2, MMR, HLA-DR, PD-1, PD-L1, SLAN, TLR-2, TLR-4), as well as distinct cytokine profiles (G-CSF,GM-CSF,IFNγ, IL-1β,IL-1RA, IL-2,IL-4,IL-6,IL-8,IL-10, IL-12(p40),IL-17F, MCP-1,MIP-1β, TNFα,IL-33) and DAMP release (HMGB1, HSP70, S100A8/A9) in the early postoperative phase. Postoperative drainage fluid yielded sufficient numbers of viable monocytes for high-dimensional immunophenotyping. While circulating monocytes were still proportionally higher in peripheral blood than in drainage fluid 4 hours after thoracic closure (median 2.1%vs.0.3%, p=0.032), the proportion of viable monocytes in drainage fluid increased markedly over the postoperative course, resulting in comparable levels in blood and drainage fluid by 12 hours (median 1.6%vs.2.7%, p=0.348).

Conclusions: The study demonstrates that pediatric cardiac surgery with cardiopulmonary bypass induces dynamic postoperative immunological alterations. We achieved to obtain monocytes and macrophages of sufficient quality and quantity for immunophenotyping from the drainage secretion. This revealed distinct differences in the phenotypic characteristics of the leukocytes obtained from the different compartments. Further inclusion of patients could reveal correlations between clinical symptoms of a sterile immune response and potentially diagnostic and therapeutically targetable immunological key points.





P-199 / #639

CASE REPORT: MUTATION IN TNNI3: ARRHYTHMOGENIC FIRST PRESENTATION WITHOUT SIGNS OF STRUCTURAL CARDIAC CHANGES

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Background and Aim: Carriers of a heterozygous *TNNI3* p.Arg204Cys pathogenic variant have a heterogeneous phenotype. Approximately 3% of hypertrophic cardiomyopathy cases are attributed to *TNNI3* variants. Rarely *TNNI3* variants can also cause restrictive or dilatative cardiomyopathy. Although paediatric onset has been described, most patients are diagnosed in early adulthood. Initial manifestations typically involve structural abnormalities or sudden cardiac death due to arrhythmias favoured by preexisting structural changes, such as hypertrophy or dilatation. Here, we report an atypical first presentation of a *TNNI3* pathogenic variant with a sudden cardiac collapse due to ventricular fibrillation, occurring in the absence of any detectable structural changes in echocardiography or cardiac MRI.
Methods: A 10-year-old male experienced ventricular fibrillation resulting in sudden cardiac collapse during warm-up for soccer practice. He was successfully resuscitated with a single automated external defibrillator (AED) shock. Echocardiography and cardiac MRI showed no structural abnormalities including hypertrophy, dilatation, fibrosis or oedema. Hemodynamic assessment by diagnostic cardiac catheterization was normal.
Results: Molecular genetic panel testing revealed a heterozygous, autosomal-dominant *TNNI3* c.610C>T [p.(Arg204Cys)] pathogenic variant. This variant is known to be associated with both recessive and dominant disease and is in a hotspot for pathogenic missense variants. Functional studies point to an increased calcium sensitivity, causing hypertrophic cardiomyopathy. Subsequent therapy included betablocker and implantation of a cardioverter defibrillator (ICD). Over the past three months, the patient has made a full recovery, with no arrhythmic events recorded.
Conclusions: To the best of our knowledge, this is the first reported case presenting with ventricular fibrillation in the absence of structural abnormalities on echocardiography or cardiac imaging. Atypical first manifestations can occur and should be considered in



families with multiple affected members to guide risk stratification and implementation of preventive measures also in phenotype negative patients.

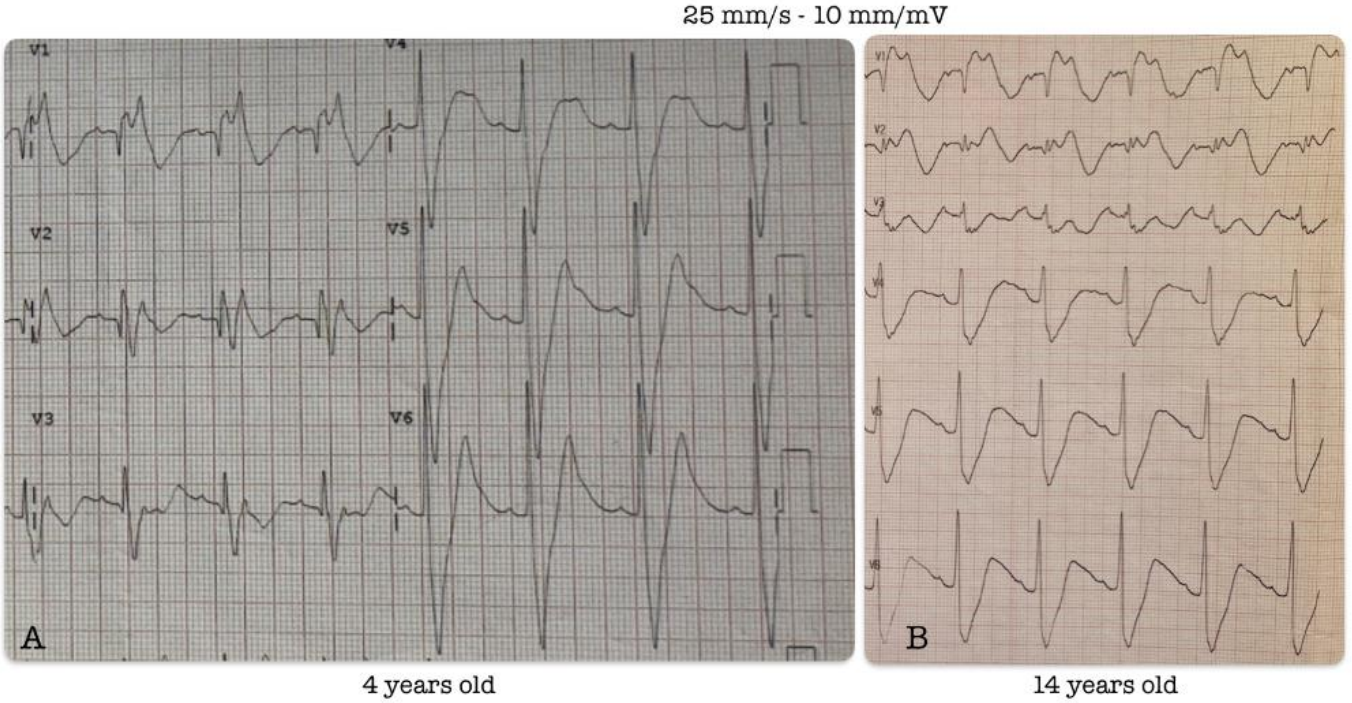


P-200 / #767

PHENOTYPIC OVERLAP BETWEEN TRPM4-MEDIATED CONDUCTION DISEASE AND BRUGADA SYNDROME IN A CHILD: IMPLICATIONS FOR MANAGEMENT

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Background and Aim: TRPM4 mutations are commonly linked to progressive conduction disease but may phenotypically resemble Brugada syndrome or coexist as a digenic trait, thereby complicating diagnosis in pediatric patients. TRPM4, a gene that encodes calcium-activated non-selective cation channels found in Purkinje fibers, is identified as a novel contribution to the spectrum.
Methods: The patient's data were retrospectively gathered from medical records. Parental consent was acquired for the anonymous utilisation of the data for medical education purposes.
Results: We report a male patient who was first evaluated at 1.5 years of age after a febrile convulsion. At age 3, ECG showed marked conduction delay, ventricular fascicular block, and intermittent ventricular ectopy, despite normal echocardiography and cardiac MRI. Provocation testing revealed nonsustained polymorphic ventricular tachycardia following ajmaline infusion, progressing to electromechanical dissociation requiring prolonged resuscitation. The patient was treated with quinidine and later received an implantable cardioverter-defibrillator. Despite therapy, he experienced recurrent appropriate shocks, predominantly during febrile illnesses. Serial electrophysiological studies showed progressive conduction delay and, at age 18, late potentials in the right ventricular epicardium requiring radiofrequency ablation. Progressive QRS widening and systolic dysfunction developed over time, culminating in severe heart failure and death at age 19. Whole-exome sequencing identified a heterozygous TRPM4 c.542C>T (p.Thr181Ile) variant.



Conclusions: This case highlights that *TRPM4* mutations may mimic a Brugada-like phenotype but typically manifest with progressive conduction disease. Ajmaline testing in such patients worsens conduction delay without producing a proper type 1 Brugada pattern. Early genetic testing is essential for accurate diagnosis and management of pediatric patients with Brugada-like ECG findings.



P-202 / #846

THE "BLACK BOX" OF CLINICAL REPORTING: HOW LACK OF GRANULAR VITAL SIGN DATA IMPEDES META-ANALYTIC RESEARCH IN DUCHENNE MUSCULAR DYSTROPHY

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Background and Aim: Meta-analyses are critical for accumulating small-sample studies to identify clinical trends. However, their utility is strictly limited by the quality of the data reported.
Methods: This review analysed 22 published studies on Duchenne Muscular Dystrophy (DMD) to evaluate the feasibility of conducting a meta-analysis on fundamental physiologic parameters, like blood pressure (BP), weight, age, and drugs used.
Results: The search resulted in 137 studies after abstract screening, 45 were included for full-text reading. Only 22 studies reported drug therapies and BP values and were included in further analysis. The completeness of the reported characteristics was as follows: Age 20/22 (90.9%), Weight 13/22 (59.1%), BP 7/22 (31.8%), SBP 11/22(50%), DBP 11/22 (50%), drugs 15/22 (68%). Among the anthropometric measures evaluated in the 22 studies, 95% (21/22) studies lacked one or more measures. Trends between weight, age, and hemodynamic markers were rarely available at the individual or stratified group level, making it impossible to correlate independent risk factors.
Conclusions: Despite the clinical importance of monitoring hemodynamic and anthropometric changes in DMD, a systematic screen revealed a critical deficiency of usable data. The dataset demonstrates severe "reporting heterogeneity," particularly in basic characteristics like weight or SBP/DBP. This reductive reporting prevents researchers from secondary quantitative results synthesis, performing secondary analyses or meta-analyses to detect subtle physiological shifts, limits the detection of real-world effects, and thus impedes advancing evidence-based care in rare diseases. Such practices also lead to potential selection bias. The peer-review process should screen for studies with less rigorous reporting standards. Future publications must prioritize Open Science principles (IPD meta-analyses), including the provision of supplementary raw datasets or standardized reporting of anthropometric and physiological variables.



P-203 / #1532

PROGNOSTIC PERFORMANCE OF EXISTING DIAGNOSTIC CRITERIA FOR PEDIATRIC LEFT VENTRICULAR NON-COMPACTION: A MULTICENTER RETROSPECTIVE COHORT STUDY

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Background and Aim: Left ventricular non-compaction (LVNC) diagnosis relies on multiple echocardiographic criteria, including Chin, Jenni, Paterick, and Stollberger. Previous studies have reported poor inter-criteria agreement ranging from 53-77%, with only 30% of patients meeting all criteria. However, their prognostic utility in pediatric patients remains inadequately validated. We aimed to evaluate the prognostic performance of these four diagnostic criteria and identify predictors of major adverse cardiac events in pediatric LVNC.
Methods: We retrospectively enrolled 413 pediatric patients meeting at least one of the four diagnostic criteria from multiple institutions between 2013 and 2025 in Japan. The primary endpoint was major adverse cardiac events (MACE), defined as a composite of death, heart transplantation, implantable cardioverter-defibrillator implantation, heart failure hospitalization, or out-of-hospital cardiac arrest. Prognostic accuracy of each criterion was assessed using receiver operating characteristic analysis with area under the curve (AUC). Univariate Cox proportional hazards analysis was performed to identify prognostic predictors.
Results: Patients were 55.2% male with median age at diagnosis of 3 months (IQR 0-80.3). Pathogenic genetic variants were identified in 49.9%, and 19.2% had family history of cardiomyopathy. Mode of presentation included clinical symptoms (38.7%), fetal screening (14.0%), and school cardiac screening (9.0%). Positivity rates varied substantially: Chin 54.6%, Jenni 42.9%, Paterick 46.5%, and Stollberger 40.9%. Notably, only 13.0% met all four criteria, demonstrating poor inter-criteria agreement. During median follow-up of 7.5 months, MACE occurred in 20.6%, with mortality of 6.3% and heart failure hospitalization of 19.0%. All criteria showed limited prognostic accuracy with AUC values below 0.7: Chin 0.602 (sensitivity 0.615, specificity 0.589), Jenni 0.513, Paterick 0.609, and Stollberger 0.540. Cardiac dysfunction, defined as LVEF<50% or LVDd Z-score>+2, was the strongest predictor of MACE (HR 4.48, 95%CI 2.35-8.55, P<0.001). LVEF (HR 0.955 per 1% increase, P<0.001) and LVDd Z-score (HR 1.198 per unit increase, P<0.001) were also significant



predictors.

Conclusions: Existing morphological criteria demonstrate limited prognostic value in pediatric LVNC, with poor inter-criteria concordance. Cardiac function emerged as the most powerful prognostic determinant, highlighting the inadequacy of morphological assessment alone. Development of pediatric-specific risk stratification integrating functional parameters with morphological, clinical, and genetic factors is warranted.



P-204 / #424

FETAL HYDROTHORAX EVOLVING INTO CHYLOTHORAX ASSOCIATED WITH PULMONARY VALVE STENOSIS AS AN EARLY MARKER OF RASOPATHY

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Background and Aim: Neonatal chylothorax is most commonly reported as a postoperative complication of thoracic or cardiac surgery. However, pleural effusions detected prenatally—initially diagnosed as fetal hydrothorax—may represent early manifestations of congenital lymphatic disorders associated with RASopathies, particularly Noonan syndrome. This report presents a preterm infant with fetal hydrothorax that evolved into postnatally confirmed chylothorax combined with progressive critical pulmonary valve stenosis.
Methods: A female infant was delivered at 29+1 weeks of gestation by cesarean section due to polyhydramnios and generalized fetal edema. Prenatal ultrasonography demonstrated isolated right-sided hydrothorax without established etiology. Postnatally, pleural drainage was performed and the fluid was analyzed. Serial echocardiography, chest imaging, dysmorphic assessment, nutritional management, pharmacological therapy, and genetic testing were applied throughout hospitalization.
Results: At birth the infant required intensive resuscitation and mechanical ventilation. Massive right-sided pleural effusion necessitated immediate drainage. Biochemical analysis of the pleural fluid confirmed chylothorax on day 4 of life. Management included prolonged chest drainage, somatostatin infusion up to 10 µg/kg/h, temporary cessation of enteral feeding, fat-free parenteral nutrition, and staged re-introduction of defatted human milk and medium-chain triglycerides. A recurrence of chylothorax required reinstatement of dietary restriction and octreotide therapy.
Concurrently, echocardiography revealed progression from mild to severe pulmonary valve stenosis with gradients up to 100 mmHg, resulting in qualification for balloon valvuloplasty. Dysmorphic facial and skeletal features were present. Although first-tier genetic testing for *PTPN11* mutations was negative, the combined phenotype strongly suggested an underlying RASopathy, prompting extended molecular diagnostics.
Conclusions: This case illustrates that fetal hydrothorax may precede postnatal chylothorax as a manifestation of congenital lymphatic dysfunction rather than representing an isolated transient finding. When associated with pulmonary valve stenosis, early suspicion for Noonan syndrome or other RASopathies is warranted. Recognizing this association facilitates early multidisciplinary management and targeted genetic evaluation.



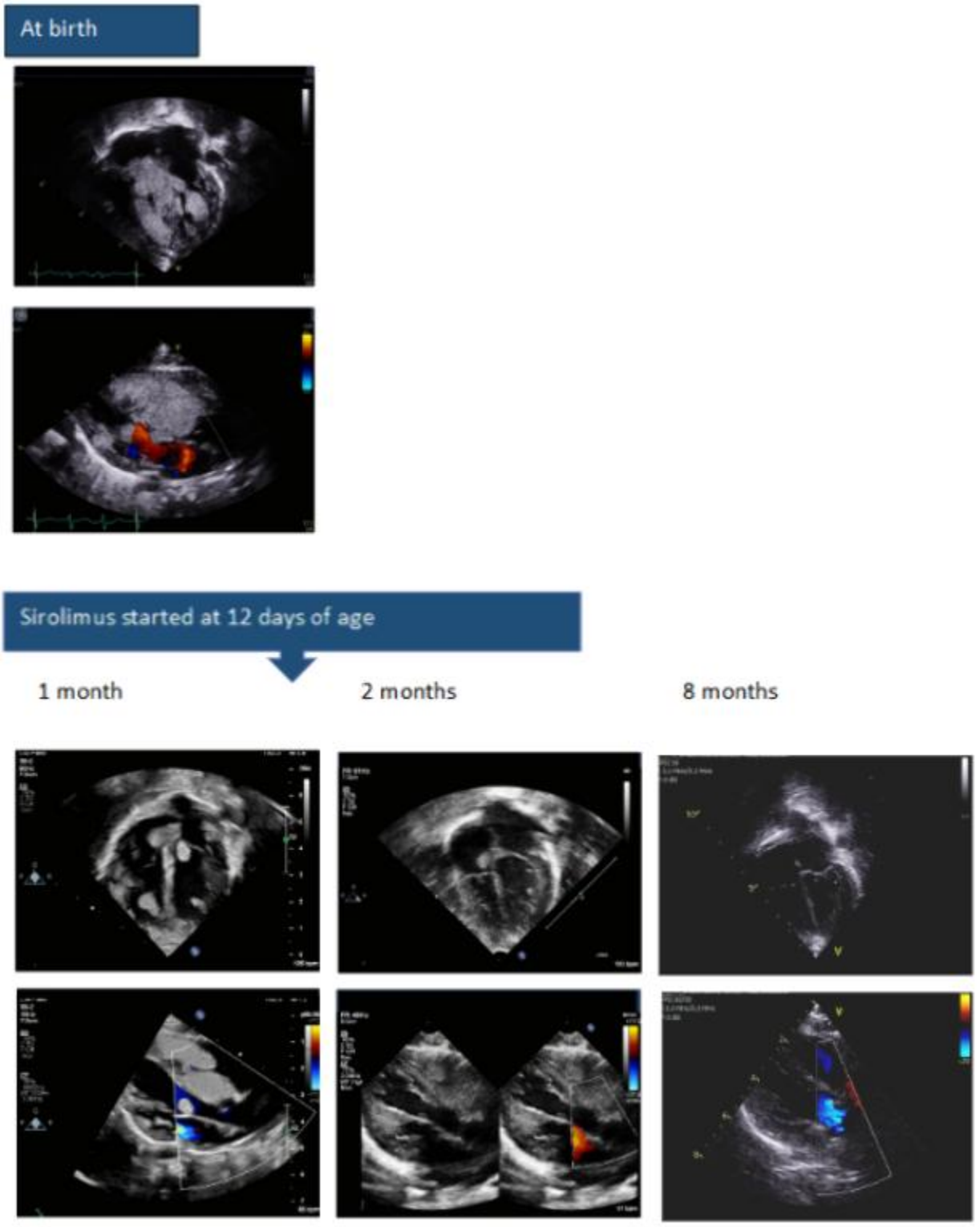
P-205 / #220

MTOR INHIBITION IN PAEDIATRIC TUBEROUS SCLEROSIS COMPLEX: A CASE OF CARDIAC RHABDOMYOMA REGRESSION AND RECURRENCE

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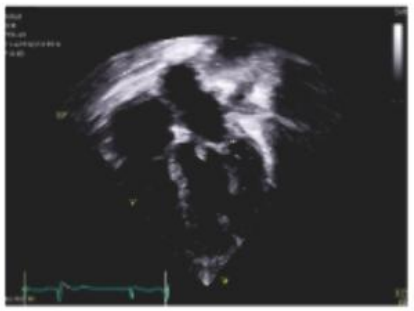
Background and Aim: Tuberous sclerosis complex (TSC) is a genetic disorder often characterized by the development of benign tumors, including cardiac rhabdomyomas (CRs), which can lead to significant complications in affected children. In the current literature, sirolimus, an mTOR inhibitor, has been documented to effectively reduce the size of CRs in infants with TSC, however, there remains uncertainty around the ideal treatment length. The available evidence is often confounded by factors such as age at treatment initiation, existing comorbidities, and the natural history of rhabdomyomas, complicating the assessment of therapy duration. This abstract describes a child with TSC who presented with significant cardiac rhabdomyomas. Treatment with sirolimus led to a temporary reduction in tumor size, but discontinuation of therapy resulted in re-enlargement of the masses. These findings highlight concerns regarding the durability of sirolimus's therapeutic effects in such cases.
Methods: Data were retrospectively reviewed, including echocardiograms, ECGs, and treatment records. Changes in rhabdomyoma size and arrhythmia burden were assessed before, during, and after sirolimus therapy. Identifying information was removed to maintain patient confidentiality.
Results: We describe a 4-year-old child diagnosed with multiple cardiac rhabdomyomas detected on antenatal echocardiography. After birth, significant left and right ventricular outflow tract obstruction was confirmed, and genetic testing identified a pathogenic TSC2 mutation. Initial ECG and Holter recordings were abnormal, demonstrating 2:1 atrioventricular block, junctional rhythm, and frequent atrial and ventricular ectopy. Sirolimus therapy, initiated at 12 days of age, led to marked regression of the rhabdomyomas, as evidenced by serial echocardiograms showing reduced tumour size and improved cardiac function. Correspondingly, the ectopic burden significantly decreased following mTOR inhibition. However, after cessation of sirolimus, the rhabdomyomas enlarged again, accompanied by the recurrence of conduction abnormalities and increased ectopy. Re-initiation of sirolimus therapy resulted once more in tumour regression on and improvement in the arrhythmic

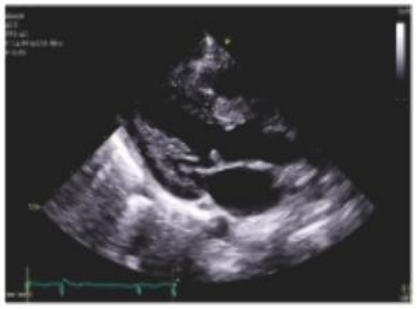
profile.


At birth
Sirolimus started at 12 days of age
1 month
2 months
8 months

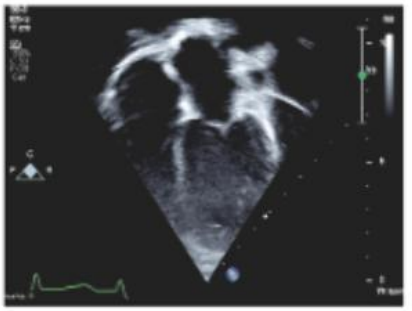


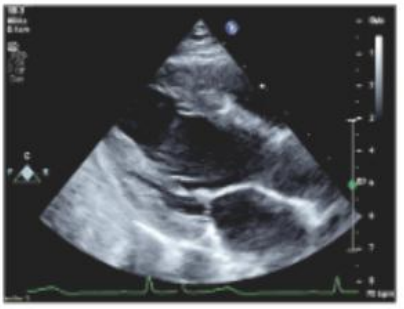
1 year after Sirolimus was discontinued





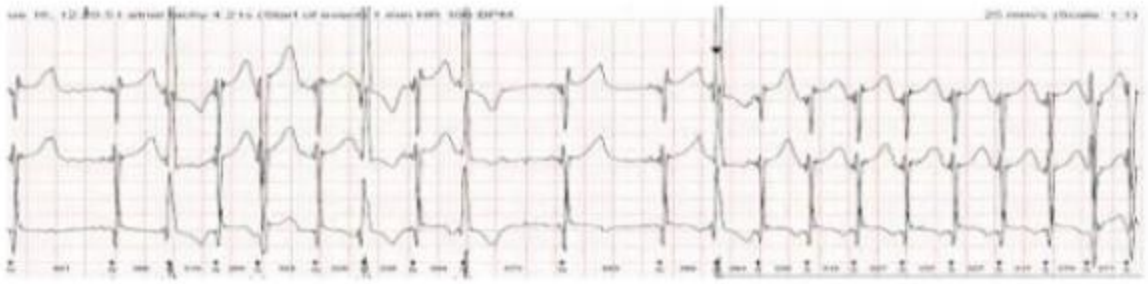
2 months after Sirolimus re-initiated

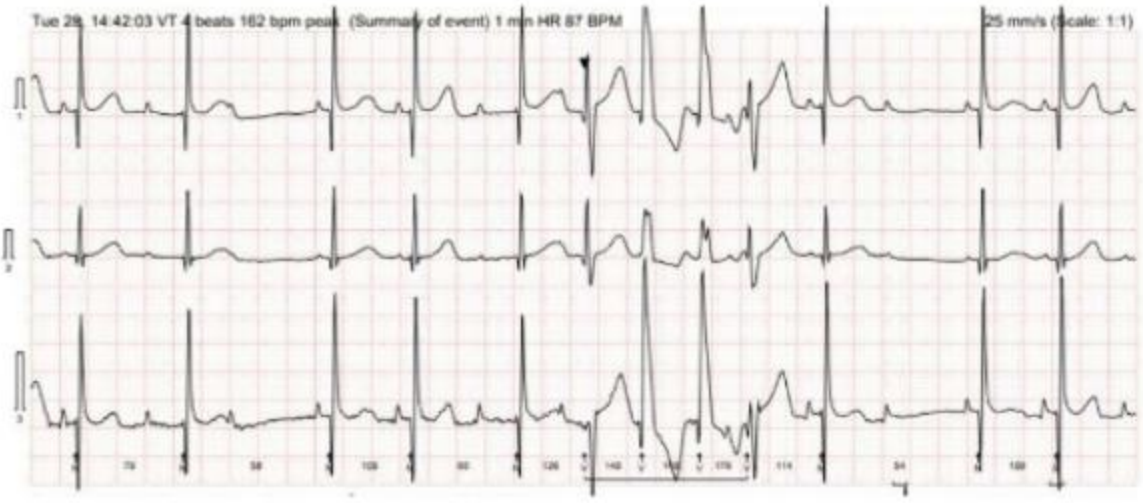




Various types of arrhythmias on 24 ECG recordings







Conclusions: This case underscores the efficacy of sirolimus as a therapeutic agent in managing cardiac rhabdomyomas, however, the lack of evidence-based guidelines regarding the optimal duration of therapy highlights a significant area for further research.



Careful consideration must be given to treatment continuity and follow-up care to manage the possibility of tumor resurgence after therapy discontinuation.



P-206 / #1335

A RARE CASE OF SIMULTANEOUS TTN AND RYR MUTATIONS LINKED TO A NEAR – DROWNING INCIDENT IN AN OTHERWISE HEALTHY TEENAGER

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Background and Aim: Mutations of the ryanodine receptor encoded by RYR2 gene are known to cause CPVT, while TTN gene mutations have been primarily linked to dilated cardiomyopathy. We describe an interesting case of a 15-year old male who presented with a near drowning episode and was found to carry mutations in both RYR2 and TTN gene.
Methods: A 15-year-old teenager suffered a cardiac arrest during swimming (near-drowning episode) as a first clinical manifestation. CPR was immediately performed and ventricular fibrillation was detected to an automated external defibrillator. Three life–saving defibrillation shocks were given that led to the restoration of sinus rhythm.
Results: First electrocardiogram showed sinus rhythm with normal QTc interval (360 msec), while the echocardiogram revealed mildly dilated left ventricle (LVDd=53 mm, z-score 2.6), with mildly impaired ventricular systolic function. Cardiac MRI confirmed left ventricular dilatation, with affected systolic function (EF=47%, GLS: -15.1%). 24-hour ECG recording revealed a few atrial and ventricular monomorphic ectopic systoles without episodes of ventricular tachycardia. Exercise test was negative for ischemia with good exercise tolerance and a drop in blood pressure in the final stage. Although the patient was an athlete with free medical history, his family history was positive for sudden cardiac death, both on the father's and mother's side. He was treated with subcutaneous defibrillator implantation. Genetic testing revealed heterozygosity in the RYR2 gene (c.6997C>T) as well as heterozygosity in the TTN gene (c.13787C>T and c.51703C>T). Both alterations have been classified as Variants of Unknown Significance (VUS) and targeted genetic testing of his parents was also recommended.
Conclusions: This case highlights the complexity of genetics to interpret clinical phenotype. The co-occurrence of mutations in multiple genes in the same individual



though is a rare finding, could potentially lead to a more aggressive clinical phenotype and worse prognosis. Although VUS mutations have not been classified as pathogenic in population databases, genetic findings could not be ignored in a teenager with ventricular fibrillation. TTN gene is a common cause of familial DCM, while co-existence with RYR2 may contribute to early onset of phenotype or separately cause malignant arrhythmias.



P-208 / #1427

EARLY-ONSET LONG QT SYNDROME ASSOCIATED WITH A KCNQ1 VARIANT: CLINICAL AND GENETIC INSIGHTS FROM A MULTIGENERATIONAL FAMILY

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Background and Aim: Long QT syndrome (LQTS) is an inherited cardiac channelopathy characterized by QT interval prolongation and an increased risk of malignant ventricular arrhythmias and sudden cardiac death. Phenotypic expression is variable, even within the same family. This abstract describes the clinical and genetic characteristics of a multigenerational family affected by LQTS and emphasizes the importance of early diagnosis and systematic familial screening.
Methods: Following the diagnosis of LQTS in a 3-year-old girl presenting with recurrent syncope, systematic familial screening was performed. Clinical evaluation included electrocardiography with measurement of the corrected QT interval (QTc), clinical risk assessment using the Schwartz score, and genetic testing for known LQTS-associated genes. Family history was reviewed across four generations to identify affected individuals and sudden cardiac death events.
Results: The index patient, a 3-year-old girl, experienced recurrent syncope during physical activity. ECG revealed a QTc of 500 ms and a Schwartz score of 7. Genetic testing identified the c.605-28A>G variant in the KCNQ1 gene. Beta-blocker therapy was initiated, and recommendations to avoid strenuous activity and QT-prolonging medications were given. Familial screening identified additional affected relatives: the asymptomatic father with QTc >500 ms, a cousin diagnosed at 21 years after childhood-onset exertional syncope previously misdiagnosed as epilepsy, and his asymptomatic 2-year-old son with QTc prolongation (476 ms). Family history revealed sudden death at 18 years during physical exertion in a distant relative. The KCNQ1 variant was initially classified as a variant of uncertain significance (VUS) and later reclassified as possibly pathogenic.
Conclusions: This multigenerational case series highlights the importance of early recognition of LQTS and systematic familial screening. The early onset in the index patient and consistent clinical phenotype across generations support the



pathogenicity of the KCNQ1 variant and underscore the need for proactive evaluation of at-risk family members.



P-210 / #428

PHENOTYPIC VARIABILITY IN LOEYS-DIETZ SYNDROME - CASE SERIES

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Background and Aim: Loeys-Dietz Syndrome (LDS) is a rare autosomal dominant multisystemic connective tissue disease resulting from mutations altering the transforming growth factor-β (TGF-β) pathway. Phenotypically LDS overlaps considerably with Marfan syndrome, presenting craniofacial dysmorphic features, skeletal, cutaneous and vascular abnormalities. We present herein three patients with variable phenotypic features and different genes' mutations.
Methods: Complete physical examinations, ECG, ecocardigraphy, computed tomography angiography and genetic aortic dilatation genes panel were effectuated.
Results: Case 1. A 13-years-old male presented to our department after an episode of syncope. Physical examination revealed mild dysmorphic features (dolichocephaly, hypertelorism), thoracolumbar scoliosis, arachnodactyly, increased joint laxity, high arched palate, and bifid uvula. Electrocardiography found monomorphic ventricular premature contractions and Holter ECG monitoring revealed rare ventricular premature contractions (bigeminy, trigeminy). Transthoracic echocardiography showed aortic root dilatation and mild mitral regurgitation. Computed tomography angiography detected tortuosity of the neck vessels and no other vascular dilataions. Genetic testing revealed a pathogenic heterozygous mutation of the *TGFB2* gene, associated with LDS. Case 2. A 9-years-old female, with various skeletal abnormalities was hospitalized in our department for complete cardiologic evaluation. Physical examination revealed dysmorphic features (dolichocephaly, hypertelorism, down slanting palpebral fissures, exotropia), increased joint laxity, arachnodactyly, camptodactyly, talipes equinovarus, thoraco-lumbar kyphoscoliosis, high arched palate, malar hypoplasia, micrognathia, and bifid uvula. Transthoracic echocardiography showed aortic root dilatation. Computed tomography angiography detected tortuosity of the cerebral vessels and no other vascular dilatations. Genetic testing revealed heterozygous mutations of the *TGFBR2* and *FBN2* gene, with uncertain significance. Case 3. A 3-months-old male was hospitalized for bronchiolitis. Chest X-ray revealed cardiomegaly, and a complete cardiologic evaluation was indicated. Physical examination revealed mild dysmorphic features (dolichocephaly, hypertelorism, down slanting palpebral fissures, increased joint laxity and micrognathia. Transthoracic



echocardiography showed important aortic root dilatation. Genetic testing revealed heterozygous mutations of the *TGFBR1* gene, associated with LDS.

Conclusions: The diagnosis of LDS is established on characteristic clinical findings and/or by the identification of a heterozygous pathogenic variant.



P-211 / #262

CELLULAR RESPONSES TO CHRONIC HYPOXIA AND SUBSEQUENT REOXYGENATION IN CONGENITAL HEART DISEASE

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Background and Aim: Congenital heart defects present the most common organ anomalies worldwide. Despite substantial progress in diagnostics as well as surgical and interventional treatment strategies most affected children remain chronically ill throughout their life. Later complications and reinterventions continue to pose a significant clinical challenge. Thus, a deeper understanding of the underlying pathomechanisms is essential for the development of improved treatment strategies. Clinical observations indicate that reoxygenation of cyanotic hearts during cardiopulmonary bypass is associated with greater myocardial injury compared with acyanotic defects – a phenomenon known as surgical reoxygenation injury of the myocardium. This project will focus on analysing the effects of chronic hypoxia and reoxygenation injury on a cellular level.
Methods: AC16 cells and induced pluripotent stem cell-derived cardiomyocytes will be exposed to defined hypoxic conditions for up to seven days, followed by a reoxygenation phase under normoxic conditions for up to five days. Subsequent analyses will characterise phenotypical alterations using complementary approaches: Morphological changes will be assessed by fluorescent microscopy and expression levels of key cardiac structural and functional proteins, such as troponin, tropomyosin or voltage-gated calcium channels, will be quantified by immunoblotting. Physiological functions will be investigated by measuring evoked Ca^{2+} transients and sarcomere shortening. Furthermore, reactive oxygen species and mitochondrial stress will be evaluated. Transcriptomic changes will finally be examined by bulk RNA sequencing and proteins-of-interest will be further investigated by downregulation via small hairpin RNAs.
Results: The data collection is currently ongoing. This abstract presents the rationale, design and expected contribution of our project.
Conclusions: The planned experiments aim to provide new insights into the mechanisms of hypoxia-induced and reoxygenation-related injury on a cellular level. The data will support the development of improved treatment strategies in the context of restoring physiological oxygenation in children with congenital cyanotic heart defects.



P-213 / #56

ARC SYNDROME WITH CLASSIC TRIAD AND UNUSUAL COMPLEX CONGENITAL HEART DISEASE DUE TO A NOVEL VIPAS39 SPLICE-SITE VARIANT: A CASE REPORT

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Background and Aim: Arthrogryposis–renal dysfunction–cholestasis (ARC) syndrome is a rare autosomal recessive disorder due to VPS33B or VIPAS39 variants and is usually fatal in infancy. Congenital heart disease (CHD) is uncommon in ARC and typically limited to simple septal defects. We aimed to (i) report a neonate with ARC type 2 caused by a novel VIPAS39 splice-site variant (c.837-2A>G) and (ii) highlight an unusually complex CHD phenotype with associated multisystem features, emphasizing diagnostic and management implications.
Methods: Single-patient case report from a tertiary pediatric cardiac center. Data were prospectively collected from clinical records and multidisciplinary evaluations. Investigations included biochemical profiling, hepatobiliary imaging with intraoperative cholangiography, brain MRI, renal ultrasound, transthoracic echocardiography, cardiac CT angiography, and **whole-exome sequencing** with clinical variant interpretation. Institutional approval and parental written consent for publication were obtained.
Results: A **1-month-old male**, first child of consanguineous parents, presented with jaundice, dehydration, polyuria, poor feeding, and failure to thrive. He exhibited the **classic ARC triad** (arthrogryposis with hip flexion contractures; renal tubular dysfunction with Fanconi-like features; low-GGT cholestasis with biopsy-proven ductopenia). Additional findings included **nephrogenic diabetes insipidus** responsive to hydrochlorothiazide, and **brain MRI** showing diffuse thinning of the corpus callosum. Cardiac imaging revealed **right atrial isomerism, d-transposition of the great arteries, ventricular septal defect, supracardiac total anomalous pulmonary venous drainage, pulmonary stenosis,** and **persistent left superior vena cava**—a constellation representing, to our knowledge, the **most complex CHD phenotype reported in ARC**. **Whole-exome sequencing** identified a **novel homozygous VIPAS39 splice-site variant (c.837-2A>G)**, confirming ARC type 2. Management was multidisciplinary and supportive; a **palliative balloon atrial septostomy** achieved balanced circulation. The infant remains under follow-up.
Conclusions: This case broadens the **genotypic and phenotypic spectrum** of ARC type 2 by linking a **novel VIPAS39 splice-site variant** with **nephrogenic diabetes insipidus** and **exceptionally complex CHD**. Early **genetic testing** should be prioritized in neonates with cholestasis and multisystem involvement to avoid unnecessary



interventions (e.g., biliary surgery) and to guide counseling in consanguineous families. Recognition that **ARCS2 can include severe, non-septal CHD** supports comprehensive cardiac imaging and coordinated **multidisciplinary care** in this population.



P-214 / #1484

AN UNUSUAL CASE OF FETAL PERICARDIAL EFFUSION

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Background and Aim: A pregnant woman at 31 + 5 weeks of gestation came to our attention after obstetric monitoring revealed a pericardial effusion. Fetal echocardiography showed a significant circumferential pericardial effusion, with a maximum thickness of 11 mm at the right atrium, and early signs of right atrial collapse. Marked hyperechogenicity of the right and left outflow tracts was also observed, with normal intracardiac anatomy. Fetal heart rate was normal (140 bpm).
Methods: The patient underwent an urgent cesarean section at 32 + 1 weeks' gestation due to abnormal fetal cardiotocography. The neonate was admitted to the intensive care unit, where she presented high blood pressure values from the first hours of life. The echocardiography confirmed the presence of a slight effusion film, associated with significant hyperechogenicity of the outflow tracts and arterial vessels with normal intracardiac anatomy. Upon further diagnostic investigation, the patient presented thickening and hyperechogenicity of the arterial walls in several districts, including the coronary arteries, the supra-aortic trunks and the main abdominal organs.
Results: The patient had high blood pressure since birth, with episodes of hypertensive crisis and subendocardial ischemia. She therefore developed heart failure and required inotropic support. After stabilization of blood pressure values with antihypertensive polytherapy, the patient showed gradual improvement of ventricular function. Genetic analysis was carried out, which showed the presence of generalized arterial calcification of infancy (GACI) syndrome. Enzyme replacement therapy with INZ-701 was therefore started at 40 days of life, with weekly infusions of the drug. This therapy achieved good control of blood pressure and phosphocalcium metabolism. The patient was therefore discharged from the hospital at the age of 3 months, with the continuation of enzyme therapy at home with weekly subcutaneous infusions of the drug.
Conclusions: At the control CT angiography at 2 years of age, a reduction in vascular



calcifications was shown, with an improvement in ventricular function at the latest echocardiograms.



P-215 / #1181

COMPARISON OF LEFT ATRIAL STRAIN PARAMETERS AFTER DOXORUBICIN THERAPY IN PEDIATRIC PATIENTS WITH LEUKEMIA AND HEALTHY CHILDREN: A CROSS-SECTIONAL CASE–CONTROL STUDY

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Background and Aim: This study aimed to compare left atrial strain parameters (reservoir, conduit, and contraction phases) in pediatric leukemia patients treated with doxorubicin and age- and sex-matched healthy children, and to assess the potential value of left atrial strain for detecting early subclinical cardiotoxicity.
Methods: This single-center, cross-sectional case–control study included 22 pediatric patients with acute lymphoblastic leukemia who had received a cumulative doxorubicin dose of 240 mg/m^2 and 25 healthy controls. All participants underwent comprehensive echocardiographic evaluation, including two-dimensional, M-mode, color, and Doppler imaging. Left ventricular ejection fraction and structural parameters were assessed. Left ventricular global longitudinal strain (GLS) and left atrial strain values during reservoir, conduit, and contraction phases were measured using two-dimensional speckle-tracking echocardiography. Intergroup comparisons were performed using appropriate statistical tests. Spearman correlation analysis was used to evaluate associations between strain parameters, follow-up duration, GLS, and ejection fraction.
Results: The groups were similar in age, but body weight was lower in the leukemia group. Left atrial reservoir strain was 39.4 ± 7.8% in patients and 48.9 ± 6.5% in controls (p = 0.353). Conduit strain showed a borderline difference (25.1 ± 6.3% vs. 32.4 ± 7.1%; p = 0.078), while contraction strain was similar between groups (14.3 ± 4.5% vs. 16.4 ± 3.8%; p = 0.325). Left ventricular GLS did not differ (−19.1 ± 2.2% vs. −20.4 ± 2.0%; p = 0.983). Correlations were weak for atrial strain parameters (r = 0.02 to −0.19) and GLS versus follow-up duration (r = 0.04). Left ventricular wall thickness and end-diastolic diameter were significantly lower in patients (0.50 ± 0.10 cm vs. 0.63 ± 0.13 cm, p = 0.0006; 3.65 ± 0.45 cm vs. 3.92 ± 0.42 cm, p = 0.039), whereas ejection fraction was similar (68.1 ± 3.8% vs. 68.0 ± 4.9%; p = 0.93)
Conclusions: At a mean follow-up of 48 months after a cumulative doxorubicin dose of 240 mg/m^2, left atrial strain parameters and GLS were comparable between pediatric leukemia survivors and healthy controls, suggesting no overt subclinical systolic or



diastolic dysfunction. However, reduced left ventricular structural measurements highlight the importance of long-term strain-based follow-up in this population.



P-216 / #746

FAMILIAL AGGREGATION OF CONGENITAL HEART DEFECTS, RESTRICTIVE CARDIOMYOPATHY, AND CONGENITAL MYOPATHY IN THE CONTEXT OF RYR3 AND FLNC GENE MUTATIONS

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Background and Aim: Restrictive cardiomyopathy(RCM) is the rarest phenotype among pediatric cardiomyopathies, accounting for approximately 2.5-3% of cases. The response to medical therapy is limited, and the mortality rate is high-63% at 3 years after diagnosis and 75% at 6 years.
Methods: We present the case of an 11-year-old male patient who presented for dyspnea on moderate exertion. Family history:
– parents confirm consanguinity(first cousins);
– one brother with aortic coarctation, one with a ventricular septal defect, one with aortic valve dysplasia, and two healthy brothers;
– two additional cases of congenital heart disease on the maternal side: one newborn who died shortly after birth(child of the aunt) and one affected boy(child of the uncle). Clinical examination:Turkish ethnicity, irregular facial hyperpigmentation(cheeks, chin, forehead), pterygium colli, kyphoscoliosis, synophrys, short nose with concave nasal bridge, rhythmic heart sounds with a gradeIII/VI systolic murmur, umbilical hernia, distal muscular atrophy, restricted joint mobility, macroorchidism, global developmental delay. Echocardiography: restrictive diastolic filling pattern, left ventricular systolic function at the lower limit of normal, large atrial septal defect with predominantly left-to-right shunt, marked biatrial enlargement(right atrium Zscore+6.2, left atrium Zscore+4), suspected pulmonary hypertension; in the suprasternal view a vessel with a parallel course to the descending



aorta is visualized-suggestive of a partial anomalous pulmonary venous return draining into the left brachiocephalic venous trunk(LBVT). ECG: P waves 5 mm in amplitude and 140milliseconds(ms) duration, PR=180ms, incomplete right bundle branch block. Treatment: furosemide 10mgx3/day, lisinopril 2.5mgx1/day, and aspirin 75mgx1/day. Neurological assessment: marked axial hypotonia with musculoskeletal abnormalities at the scapular girdle(winged scapula) and at the spine with a kyphotic posture, suggesting a congenital myopathy/dystrophy of the limb-girdle type.

Results: CTangiography:partial anomalous pulmonary venous return (a segmental vein(s.v.) from the right upper lobe joining a s.v. from the right lower lobe and a vein from the lingula, forming a common venous collector) draining into the LBVT. Genetic testing: homozygous variants in RYR3 and FLNCgenes(both classified as variants of uncertain significance).

Conclusions: The association of RYR3 and FLNC mutations has not been previously reported in the literature, this may explain the coexistence of RCM, this particular pattern of anomalous pulmonary venous return and the congenital myopathy.



P-217 / #344

CIRCULATING MIR-144/451 LEVELS ARE AGE-DEPENDENT AND DOWNREGULATED IN PATIENTS WITH CONGENITAL HEART DISEASES

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Background and Aim: Congenital heart disease (CHD) is one of the most common congenital anomalies worldwide and a major cause of neonatal morbidity. Circulating microRNAs (miRNAs) have emerged as promising non-invasive biomarkers due to their ability to reflect underlying molecular processes. The miR-144/451 cluster, highly expressed in erythroid cells, has been implicated in key cardiovascular and erythropoietic pathways, including myocardial stress responses, fibrosis, inflammation, and ischemia, making it a biologically relevant candidate for investigation in CHD. This study aimed to characterize the expression of miRNAs within this cluster in paediatric CHD and to evaluate their potential as early biomarkers.

Methods: In this exploratory case–control study, peripheral whole-blood samples were obtained from a cohort of paediatric CHD patients and age-matched healthy controls. Expression of the miRNAs included in the miR-144/451 cluster (miR-144-3p, miR-144-5p, miR-451a, miR-4732-3p and miR-4732-5p) was quantified by RT-qPCR using 10 µL of whole blood and standardized normalization protocols. Participants were stratified into two age groups (neonates vs. children aged 1–20 years). Group differences were analyzed using non-parametric statistical tests. Associations between miRNA expression and CHD status were examined through receiver operating characteristic (ROC) curves, and a logistic regression model was generated to assess combined predictive performance.

Results: Expression of miRNAs in the miR-144/451 cluster was strongly age-dependent. Healthy neonates displayed significantly higher levels compared with healthy children aged 1–20 years. Neonates with CHD showed markedly reduced expression of miR-144-3p and miR-451a at birth relative to healthy neonates. ROC analyses indicated a moderate to strong association between these miRNAs and CHD status, and a combined logistic regression model integrating both miRNAs suggested high concordance and enhanced discriminatory capacity, supporting their potential as early biomarkers of disease.



Conclusions: miR-144-3p and miR-451a levels are altered in neonates with CHD. Their dysregulation at birth suggests early postnatal molecular disturbances associated with CHD and highlights these miRNAs as potentially involved in disease-related pathways.

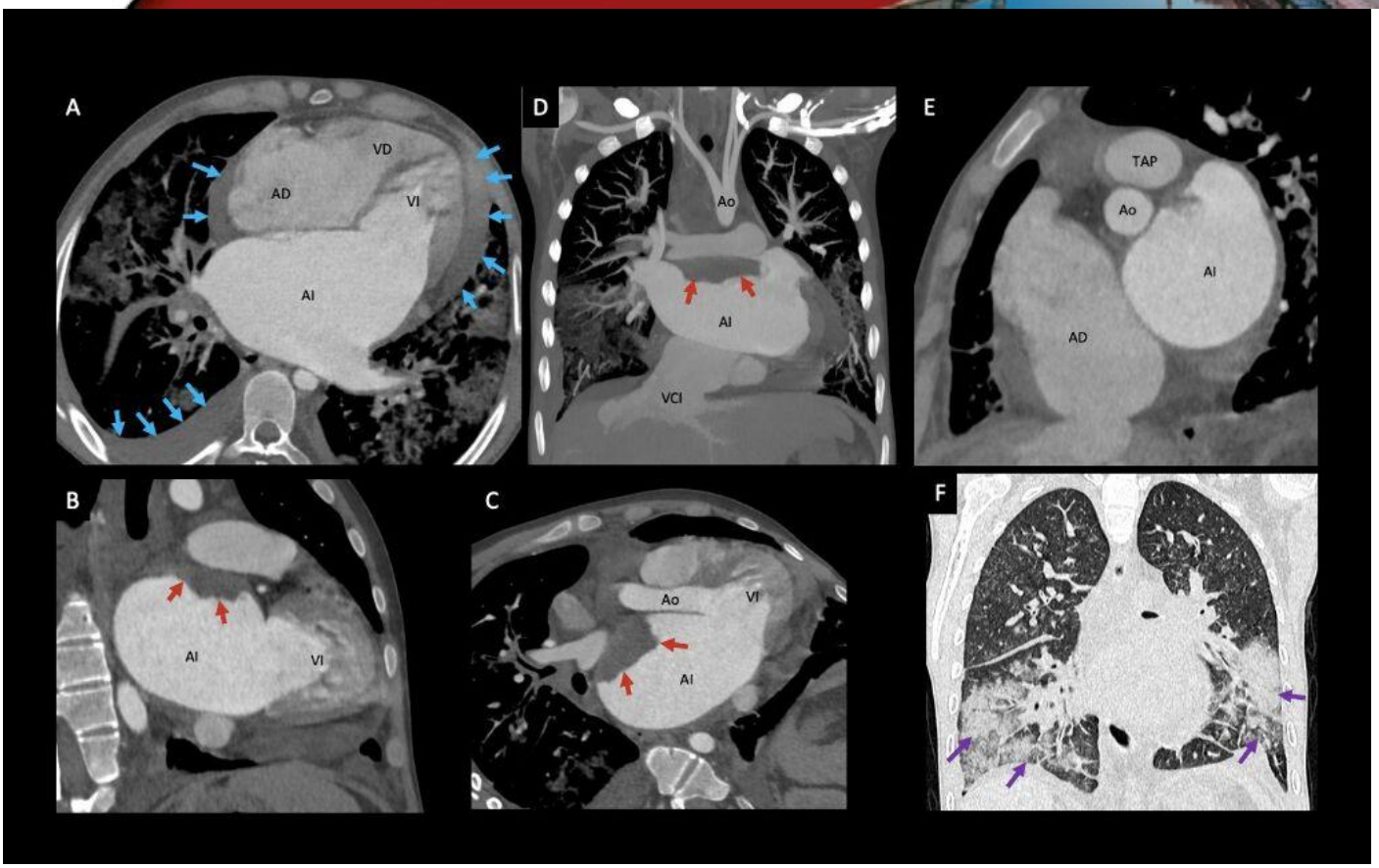


P-218 / #726

UNKNOWN ETIOLOGY OF RESTRICTIVE CARDIOMYOPATHY IN A PEDIATRIC PATIENT, A DIAGNOSTIC CHALLENGE: A CASE REPORT

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Background and Aim: Restrictive cardiomyopathy (RCM) in the pediatric population remains a significant cause of morbidity and mortality. Its low incidence in this population and non-specific symptoms leads to a delay in diagnosis and treatment, resulting in poor prognosis. This paper is presented to highlight the challenges still faced in the diagnosis of this rare phenotype of cardiomyopathy in children, and progression when not identified on time.
Methods: We describe a case of a 17-year-old Hispanic boy. No relevant family genetic history, with a 2-year history of shortness of breath at moderate exertion, hemoptysis and cough. Upon arrival to our institution, he presented with heart failure symptoms.
Results: Echocardiogram showed biatrial dilation severe tricuspid and mitral insufficiency and biplane ejection fraction of 45.3%, pulmonary systolic arterial pressure of 76mmHg; electrocardiogram showed typical atrial flutter with a 3:1 conduction. Chest tomography reported multiple bilateral peribronchovascular ground-glass opacities, mediastinal lymphadenopathy. The magentic resonance confirmed the biatrial dilation with a restrictive pattern, in addition to bilateral alveolar consolidation. Combining these findings led to a diagnosis of restrictive cardiomyopathy. Histological testing was conducted for the detection of cardiac amyloidosis, reporting a negative Congo red and Thioflavin T stain of periumbilical fat biopsy. As well as genetic testing for TTN and SCN5A mutations, that were reported with uncertain significance. A quadruple therapy for heart failure was initiated, along with diuretics and anticoagulation therapy. With little improvement, the patient was admitted to our institution in October 2025 with worsening symptoms of heart failure and presented sudden cardiac arrest 5 days after admittance. A postmortem evaluation was conducted dismissing possible causes like inborn errors of metabolism, amyloidosis, sarcoidosis, or genetic causes. The analysis of the pulmonary infiltrates by electron microscopy is still
pending.



Conclusions: In this case, a diagnosis of Restrictive Cardiomyopathy was established, with no previous family genetic history, and at the moment no confirmed etiology. We consider this a relevant case, as it remains a rare presentation of cardiomyopathy in the pediatric population and highlights the difficulty in its diagnosis and the delays that we face due to its non-specific symptoms, that result in poor prognosis and death.



P-219 / #847

THE HEMODYNAMIC PARADOX IN DUCHENNE MUSCULAR DYSTROPHY: INTRINSIC HYPOTENSION, VASCULAR STIFFNESS, AND PHARMACOLOGICAL CHALLENGES

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Background and Aim: Blood pressure (BP) management in Duchenne Muscular Dystrophy (DMD) is complicated by conflicting physiological forces. Cardiomyopathy is a leading cause of morbidity and mortality which often requires multi-drug therapy. Hypotension remains a poorly understood phenomenon in the DMD population, complicating the therapeutic balance between cardiac protection and hemodynamic stability.
Methods: We reviewed cross-sectional studies, retrospective longitudinal cohorts, and case reports on novel pharmacotherapy in confirmed DMD patients, including 3 studies for final analysis.
Results: First study of 31 patients (104 BP visits-recordings). In age group <=17y in 31/71(43.6%) recordings, were classified as low_BP (both SBP and DBP below 5th percentile for age and height). At >=18y 4/33(12.1%) had low BP. Of the total 35 low_BP events, 17(48.6%) were on heart failure medications, and 20(57%) were on oral corticosteroids. Younger age (p=0.008) showed a significant correlation with low_BP (r=-0.26). Second study, 43 DMD patients had lower height and weight, but higher BMI due to steroids, and presented lower central SBP compared to normal cohort. Approximately 2/3rd were on cardiac medications (ACEi alone or with beta blocker; indications prophylactic or therapeutic not specified), and chronic systemic steroid therapy (7.6 years on average). DMD vs normal showed that while NIBP was not significantly different, it was found that central SBP in (93.9±6.6 vs 99.7±9.3) and central DBP in (65.7±5.9 vs 67.1±5.6) constituted a small but significant difference. Third study comparing 28 DMD adolescent males and 31 healthy adolescents (aged 11-17), the DMD group presented lower- weight, height, and resting SBP (98.85±8.41) compared to healthy adolescents (107.41±12.37). Medication use was not reported.
Conclusions: Hypotension in DMD is multifactorial and an intrinsic pathology, often overlooked. Although baseline BP is low, necessary cardiac medications can worsen this phenotype, creating a narrow therapeutic window. Furthermore, low central SBP as compared to peripheral raises a question where central SBP might represent a more



accurate measure of blood pressure - it is intriguing to consider if central SBP should be assessed when treating patients with medications.



P-220 / #544

CYTOMEGALOVIRUS-ASSOCIATED MYOCARDIAL DYSFUNCTION IN A PRETERM NEONATE: RAPID BIVENTRICULAR RECOVERY WITH TARGETED INODILATOR THERAPY

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Background and Aim: Congenital cytomegalovirus (CMV) infection is an uncommon cause of neonatal ventricular failure, particularly in preterm infants, and evidence guiding optimal inotropic support remains limited. Few published cases demonstrate rapid normalisation of biventricular function. We report the haemodynamic course, biomarker trends, and echocardiographic recovery following targeted inodilator therapy, aiming to highlight early management strategies in neonatal viral myocardial dysfunction.
Methods: A 32+0-week, 1.39kg male infant was delivered via emergency caesarean section for abnormal cardiotocography. Initial echocardiography demonstrated severe right-ventricular (RV) dysfunction (fractional area chnage [FAC] 15%) and moderate left-ventricular (LV) impairment (ejection fraction [EF] 35%). Laboratory, virological and echocardiographic measures were prospectively collected. Dobutamine up to 5µg/kg/min achieved minimal functional improvement. Milrinone (0.5µg/kg/min) was commenced following transfer to a tertiary neonatal cardiac unit. Antiviral therapy (ganciclovir followed by valganciclovir) was introduced upon confirmation of congenital CMV infection.
Results: At presentation, pro-BNP exceeded 35,000 pg/mL and troponin-T was 415 ng/L. Blood CMV PCR was postive with peak viral load 6.5 x 10^5 copies/mL. Serial echocardiography showed progressive RV improvement by day 5, preceding viral suppression, with complete biventricular recovery by day 16 (RV FAC 15% → 35%; LVEF 35% → 65%). The infant required mechanical ventilation for 6 days, was weaned through non-invasive respiratory support, and was on room air at day 16. Cranial and abdominal imaging remained normal, and discharge occurred at corrected term with preserved cardiac function.
Conclusions: Congenital CMV infection should be considered in preterm neonates presenting with unexplained biventricular dysfunction. In this case, early cardiology-guided initiation of milrinone was associated with rapid restoration of ventricular performance when catecholamine support was insufficient. Structured viral testing and targeted inodilator therapy may inform management pathways for neonatal myocardial failure of suspected infectious origin.



P-221 / #1524

MEK INHIBITION AS A NEW STRATEGY FOR LVOTO CONTROL: EARLY EXPERIENCE WITH TRAMETINIB IN NOONAN SYNDROME

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Background and Aim: Cardiac manifestations of Noonan syndrome are mostly structural heart defects, such as severe progressive hypertrophic cardiomyopathy with LVOTO and lymphatic malformations, as well as pulmonary stenosis. Based on insights from RAS/MAPK-associated cancer therapies, inhibition of MEK1/2 and mTOR have shown promising results by stopping and reversing the process of the cell proliferation. We present our observations and results of two female patients, under 3 years of age, with Noonan syndrome of different genetic background with hypertrophic cardiomyopathy, who have been treated with trametinib, MEK-inhibitor, from March 2025. to March 2026. as a part of one-year therapy conducted in University Clinical Hospital Centre Zagreb, Croatia.
Methods: Two female patients with Noonan syndrome, under 3 years of age, first heterozygous for pathogenic variant of RIT1 gene, with severe form of hypertrophic cardiomyopathy, subpulmonary and pulmonary stenosis, mild subaortic obstruction, was followed by cardiac decompensation with pleural effusion, second heterozygous for pathogenic variant c.770C>G in the RAF1 gene, with asymmetrical hypertrophic cardiomyopathy of left ventricle and severe intracavitary obstruction. She had paroxysms of SVT, fatigue and poor food tolerance. Novel therapy with MEK inhibitor, trametinib, has been started in March of 2025., based on pediatric oncological protocol of Quebec Cancer Network-Cancer Care Ontario which we modified. Initial dose was 0.0125 mg/kg/dose once a day.
Results: Follow-up consisted of physical examination, ECG, chest x-ray, cardiac ultrasound, with evaluation of LVOTO gradient and RVOT flow, LV strain. Laboratory testing was conducted every month, LDH and creatin kinase levels were increased, proportionally to diminishing of the myocardial hypertrophy. NTproBNP showed decreasing dynamics in both patients. Echocardiographic findings showed decreasing of LVOTO gradient up to 50% with better myocardial dyastolic function and contractility. Overall, both patients had withdrawal of all clinical symptoms without developing any side effect so far.
Conclusions: Regarding our results and clinical course up to now, MEK inhibitor is showing promising perspective in younger patients, for LVOTO treatment and improvement of global cardiac function, of those with Noonan-related hypertrophic cardiomyopathy. Our



observations and experience are just a small piece of a much greater picture, where MEK inhibitors can be the answer for uncontrolled proliferation of cardiomyocytes.



P-223 / #898

THE EVIDENCE OF HYPOXIA IN PATIENTS WITH PATENT DUCTUS ARTERIOSUS: INSIGHTS FROM HIF-1A LEVELS

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Background and Aim: Children with complex cyanotic congenital heart disease (CHD) and those with pulmonary hypertension (PH) commonly experience hypoxia. Hypoxia-inducible factor 1 alpha (HIF-1α) is a key regulator of cellular responses to low oxygen, and its levels are elevated in these conditions. However, HIF-1α concentrations in non-cyanotic CHD, such as patent ductus arteriosus (PDA), remain largely unknown. We aimed to evaluate serum HIF-1α levels in patients with PDA and compare them with those in healthy children and in patients with complex CHD after Fontan palliation.
Methods: Eighty children were assigned to three groups: PDA group (n = 34), Fontan group (n = 23), and healthy controls (n = 23). Complete blood counts, serum HIF-1α levels, and baseline clinical characteristics were collected. Multiple regression analysis was performed to identify predictors of HIF-1α variability. Receiver operating characteristic (ROC) curves were analyzed to evaluate the ability of selected variables to predict increased HIF-1α levels.
Results: Mean (SD) HIF-1α levels were highest in the PDA group, 0.89 (0.63) ng/mL, followed by the Fontan, 0.58 (0.29) ng/mL,and control groups, 0.52 (0.25) ng/mL, $p = 0.03$. In the CHD cohort, hemoglobin, age, and red blood cell count formed the best predictive model, explaining 53.9% of HIF-1α variance ($p < 0.01$). Hematocrit <36.6% and hemoglobin <12.9 mg/dL showed the best diagnostic accuracy for identifying HIF-1α > 1.1.
Conclusions: Children with PDA, even without PH, exhibit biochemical evidence of hypoxia as reflected by elevated HIF-1α. Further research is needed to clarify the clinical relevance of HIF-1α in non-cyanotic CHD.



P-225 / #1454

SILENT NIGHT, LETHAL GENE? A SUDDEN UNEXPLAINED NOCTURNAL CARDIAC ARREST TRANSIENTLY RESUSCITATED

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Background and Aim: Over a century of research in sudden unexplained nocturnal death syndrome (SUNDS) has implicated approximately 33 genes, including cardiac ryanodine receptor (RyR2). Gain-of-function RyR2 can classically cause exercise or stress-induced catecholaminergic polymorphic ventricular tachycardia (CPVT), but variants have been associated with sudden death during sleep, suggesting arrhythmic mechanisms potentially related to REM sleep–associated sympathetic activation. Emerging evidence further supports calcium release deficiency syndrome (CRDS) as a distinct RyR2-related ryanodinopathy, mechanistically and phenotypically different from CPVT, characterized by impaired calcium release and arrhythmias not triggered by adrenergic stress.
Methods: A previously healthy 12-year-old girl, with no relevant personal or familial cardiovascular history, was found at home in ventricular fibrillation–related cardiorespiratory arrest shortly after falling asleep. Prolonged resuscitation resulted in a transient return of spontaneous circulation. On ICU admission, she was hemodynamically unstable, intubated, and mechanically ventilated, with severe neurological impairment (GCS score of 5, decerebrate posturing, bilaterally midriatic pupils). Despite preserved cerebral perfusion without significant edema on CT imaging, she developed refractory cardiogenic shock with metabolic acidosis, elevated lactate, anuria, and recurrent pulseless ventricular tachycardia requiring repeated defibrillation. Despite maximal supportive therapy, she suffered fatal asystole 24 hours after admission.
Results: Alternative etiologies, including drug intoxication, congenital heart disease, myocarditis, pulmonary thromboembolism, and structural cerebral abnormalities, were excluded. Genetic testing performed in the ICU identified a heterozygous RyR2 variant (c.12289A>T, p.Asn4097Tyr), classified as a variant of uncertain significance. Retrospectively, this case raises the question of whether the observed phenotype is compatible with CPVT triggered by REM sleep–related catecholamine release or with the



recently described entity, calcium release deficiency syndrome; however, no pathogenic loss-of-function variants affecting the same gene have been reported in the literature to date.

Conclusions: The diagnosis of CRDS remains uncertain in patients with unexplained ventricular fibrillation when neither exercise stress testing nor long-burst, long-pause, short-coupled ventricular extra stimulus electrophysiology protocol cannot be performed, as in this fatal case. This evolving spectrum complicates genotype–phenotype correlations and highlights the diagnostic challenges in patients with unexplained sudden nocturnal death and ultra-rare RyR2 variants.



P-226 / #1513

CARDIAC ALLOGRAFT VASCULOPATHY - TO DELAY THE UNAVOIDABLE

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Background and Aim: Cardiac allograft vasculopathy (CAV) is the leading cause of late morbidity and mortality in heart transplant recipients. It is characterized by diffuse, concentric intimal thickening of the coronary arteries. Once established, CAV predicts graft dysfunction and failure. Retransplantation is the only definitive treatment for advanced CAV; however, outcomes are inferior compared with primary transplantation, with lower survival and higher rates of recurrent CAV. In pediatric patients, retransplantation is further limited by donor scarcity and prior antigen sensitization. Although the diffuse nature of CAV often limits the feasibility of percutaneous coronary intervention (PCI), revascularization may prolong graft survival and delay retransplantation.
Methods: This is a single-center case report.
Results: We report a 17-year-old female with dilated cardiomyopathy secondary to parvovirus B19 myocarditis who underwent orthotopic heart transplantation at 2 years of age. Ten years post-transplant, she presented with exertional fatigue and syncope. Coronary angiography demonstrated diffuse disease of the left main coronary artery (LMCA), proximal left anterior descending artery (LAD), and an ostial circumflex lesion of ~75%. The right coronary artery (RCA) showed 50% mid-segment stenosis. Percutaneous coronary angioplasty was performed on the LMCA, LAD, and circumflex arteries, with drug-eluting stents placed in the LMCA and LAD. Immunosuppression was modified to include sirolimus, and dual antiplatelet therapy was initiated. Two years later, follow-up angiography revealed progression, including LAD stenosis distal to the stent, in-stent restenosis, and worsening RCA disease. Additional stents were placed in the LAD and RCA. Four years later, the patient again presented with exertional syncope. Angiography showed severe in-stent restenosis of the LAD, in-stent restenosis of the RCA, and distal RCA occlusion. Repeat angioplasty and stenting of the LAD were performed, while the RCA lesion was not amenable to intervention. Following this procedure, the patient was relisted for heart transplantation.
Conclusions: Percutaneous revascularization in pediatric patients with CAV can provide temporary symptom relief and prolong graft function but is associated with high restenosis and disease progression. In this population, PCI may serve as a palliative strategy to delay retransplantation, which is valuable given donor scarcity and the challenges of repeat



transplantation. Careful patient selection, timely relisting, and long-term surveillance remain essential.



P-227 / #1320

BUILDING SCOTLAND'S FIRST PRETERM PDA DEVICE-CLOSURE SERVICE: A CLINICALLY GOVERNED, MULTIDISCIPLINARY IMPLEMENTATION PATHWAY

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Background and Aim: Preterm patent ductus arteriosus (PDA) remains a common and high-risk condition in neonatal care, with transcatheter device closure increasingly adopted in selected infants. We aimed to establish Scotland's first preterm PDA device-closure service, prioritising patient safety, multidisciplinary governance, and sustainable service delivery across neonatal and cardiac teams.
Methods: A staged implementation strategy was employed, centred on stakeholder engagement, evidence translation, and high-reliability pathway design. Key steps included: (1) early relationship-building with the regional neonatal network to align priorities and define shared outcomes; (2) formal presentation of evidence and service concept at centre-level continuing medical education and subsequently at the Scottish cardiology conference to secure professional buy-in; (3) development of a comprehensive multidisciplinary guideline detailing referral criteria, imaging, consent, device selection, anticoagulation and antibiotic protocols, ventilation and thermal strategies, transport readiness, complication escalation pathways, post-procedural monitoring, and audit metrics; (4) early co-design with cardiac anaesthesia and neonatal teams to identify and mitigate latent safety threats; and (5) simulation-based "dry runs" encompassing transport, admission flow, equipment checks, cath lab setup, and emergency role allocation.
Results: The programme resulted in a unified, end-to-end clinical pathway with clearly defined decision points, responsibilities, and escalation triggers. Cross-site readiness improved through standardised referral and transfer processes, while shared simulation and rehearsal strengthened multidisciplinary cohesion and team confidence. The initiative translated an evidence-based concept into a fully governed, operational service model with embedded quality assurance and feedback mechanisms.
Conclusions: The successful establishment of a preterm PDA device-closure service requires robust clinical leadership and implementation strategy alongside technical expertise. A relationship-first approach, early integration of anaesthesia and neonatal services, and meticulous multidisciplinary pathway design supported by rehearsal can



facilitate safe adoption, enhance team engagement, and embed a resilient neonatal–cardiac service model.



P-228 / #901

INTERSTAGE OUTCOMES UNDER STANDARDIZED HOME MONITORING AFTER SHUNT, PDA STENTING, OR RVOT STENTING PALLIATION

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Background and Aim: Structured home monitoring programs (HMP) are used to reduce interstage risk in infants with shunt-dependent circulation. This study compared the incidence of adverse events (mortality, unplanned readmissions, and reinterventions) during the interstage period between stent-based approaches and surgical shunts.
Methods: Infants after systemic-to-pulmonary (SP) shunt, ductal stenting (DS), or RVOT stenting who participated in our standardized HMP between 2013 and 2022 were enrolled. Due to the high intrinsic risk for adverse events, patients with HLHS were excluded. Routinely assessed HMP parameters included oxygen saturation daily, weight monitoring, and triggers for readmission.
Results: A total of 170 consecutive patients were included (SP shunt n=95, ductal stenting n=59, RVOT stenting n=16). Interstage mortality was low and did not differ between groups (p=0.11), with two in-hospital deaths and one death at home (DS=2, RVOT=1). Median interstage duration tended to be shortest after SP shunt (89 days) compared with DS (112) and RVOT stenting (132; p=0.065). At least one unplanned readmission occurred most frequently after DS (66.1%), followed by RVOT stenting (50.0%) and SP shunt (47.4%; p=0.072). However, readmissions per 100 interstage days were similar across the strategies (0.56 vs. 0.50 vs. 0.46; p = 0.34). Desaturation was the predominant trigger for unplanned readmission, followed by infections (SP shunt: 59.4% and 24.6% of readmission events; DS: 86.5% and 5.8%; RVOT stent: 63.6% and 18.2%). Reinterventions (surgical or catheter-based) were less frequent after SP shunt (13.7%) than after DS (37.3%) or RVOT stenting (43.8%; p<0.001). Corresponding reintervention rates were 0.14, 0.25, and 0.29 per 100 interstage days (p=0.094). Differences in reintervention profiles were largely attributable to catheter-based procedures (11.6% vs 33.9% vs 43.8%; p<0.001), whereas surgical reinterventions were less frequent and did not differ significantly between groups (2.1% vs 6.8% vs 0%; p=0.27). In competing-risk analyses, the cumulative interstage incidence of reinterventions was higher after DS (p=0.001) and RVOT stenting (p=0.006) compared with SP

Figure 1 – Reasons for unplanned readmissions

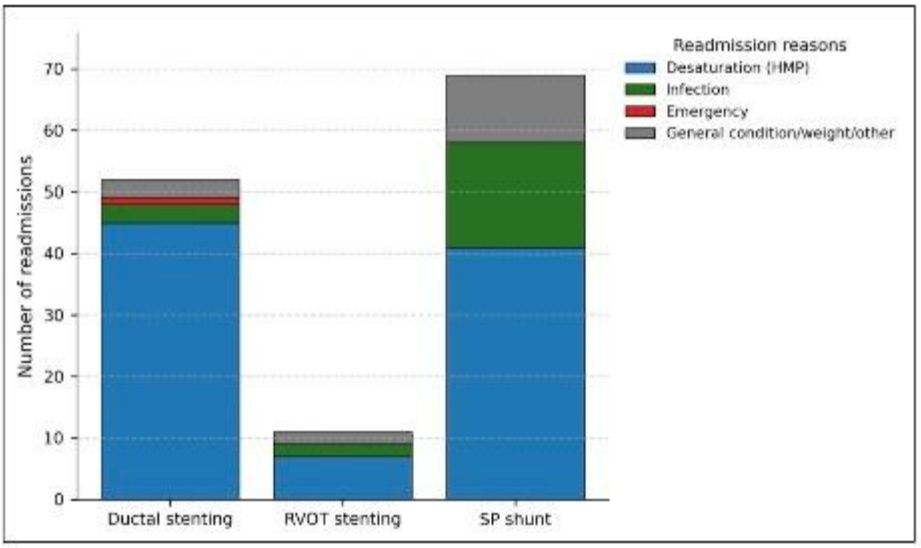
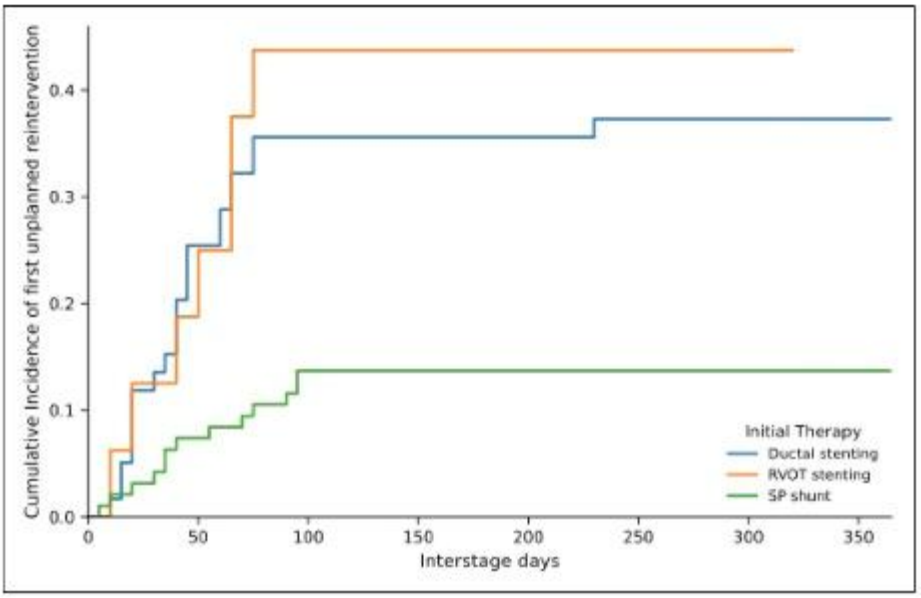


Figure 2 – Cumulative Incidence function of unplanned reinterventions



Global p-value: p = 0.00073
Ductal stenting vs SP shunt: p = 0.0018, RVOT stent vs SP shunt: = 0.006

shunts.

Conclusions: Patients after DS and RVOT stent face similar interstage complications as infants after SP shunt. Furthermore, the stent groups demonstrated a higher rate of reinterventions and unexpected readmissions, suggesting these patients have a high need for a standardized HMP as well.



P-230 / #410

PREDICTORS OF RE-INTERVENTION FOLLOWING BALLOON PULMONARY VALVULOPLASTY IN INFANTS WITH SEVERE PULMONARY STENOSIS: A RETROSPECTIVE COHORT STUDY FROM THE NATIONAL HEART CENTER, OMAN

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Background and Aim: This study aimed to identify predictors of re-intervention in Omani infants undergoing BPV and to set a scoring system to identify those at high risk for reintervention.
Methods: We conducted a retrospective analysis of 62 infants who underwent BPV at the National Heart Center, Oman (2017-2023). Demographic, echocardiographic, procedural, and outcome data were analyzed using multivariate logistic regression.
Results: The re-intervention rate was 14.5% (9/62). Suprapulmonary stenosis (85.7% vs 5.6%, $p<0.001$) and post-BPV gradient reduction <20 mmHg (66.7% vs 5.9%, $p<0.001$) were significant predictors. Multivariate analysis confirmed suprapulmonary stenosis as an independent predictor (aOR=32.7, 95% CI:1.9-561.8, $p=0.016$). Use of undersized balloon, small pulmonary valve size, and younger age at intervention showed no significant association with re-intervention.
Conclusions: Anatomical (suprapulmonary stenosis) and hemodynamic (gradient reduction) factors predict re-intervention risk. We propose a practical scoring system for risk stratification in clinical practice.



P-231 / #1504

EARLY OUTCOMES AND LONG-TERM FOLLOW-UP OF MELODY TPV: A MONOCENTRIC RETROSPECTIVE OBSERVATIONAL STUDY

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Background and Aim: Melody TPV is the first percutaneous valvular bio-prosthesis approved for trans-catheter pulmonary valve implantation (TPVI). We describe our experience about Melody TPV implantation in patients with congenital heart disease (CHD).

Methods: This is an observational retrospective single-centre study. All patients undergone Melody TPV implantation were included. The early outcomes analysed were: procedural failure, death of patient, life-threating adverse events. The long-term outcomes analysed during follow-up were: infective endocarditis, trans-catheter redo-procedure, and surgical redo-procedure.

Results: From 2010 to 2025, 52 patients were evaluated in our catheterization laboratory for TPVI with Melody TPV. Mean age and weight were 22,2±11,9 years and 59,9±20,5 kilograms. The patients were affected by the following CHD: tetralogy of Fallot (28 pts, 54%), pulmonary atresia with ventricular septal defect (VSD) (6 pts, 12%), aortic stenosis s/p Ross surgery (4 pts, 8%), pulmonary stenosis (PS) (4 pts, 8%), transposition of the great arteries with VSD and PS (4 pts, 8%), truncus arteriosus (3 pts, 6%), double outlet right ventricle (2 pt, 4%), Ebstein's anomaly (1 pt, 2%). In 4 cases (8%), the procedure failed because of coronary compression during balloon RVOT interrogation. One patient (2%) died due to post-procedural septic shock. In the other 47 patients (90%), the Melody TPV was implanted effectively. No life threating adverse events were recorded. In 3 cases, the Melody TPV was implanted off label: in tricuspid position (2 cases) and in "small conduits" (<16 mm) (4 cases). The mean follow-up was 5,56 ±2,17 years. During follow-up, 5 patients (11,1%; 1,9% for patient-year) developed an infective endocarditis, 7 patients (15,5%) required a trans catheter procedure (6 Melody balloon dilation and 1 Melody valve-in-valve), and 2 patients (4,4%) underwent surgical Melody TPV replacement.



Conclusions: Trans-catheter Melody TPV implantation is effective to deal RVOT dysfunction. At a mid-term follow-up, most of the implanted Melody TPV worked properly and only a few patients required surgical valve replacement.



P-233 / #183

TRANSCATHETER BALLOONING OF CONGENITAL SYMPTOMATIC LEFT SUBCLAVIAN ARTERY STENOSIS IN A PEDIATRIC PATIENT– CASE REPORT

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Background and Aim: Right aotic arch with aberrant left subclavian artery commonly presents with airway or esophageal compression. Congenital left subclavian artery (LSCA) stenosis is rarely described in pediatric patients. When symptomatic, it may lead to limb hypoperfusion or subclavian steal. Early recognition and appropriate intervention are essential to avoid complications.
Methods: We describe the clinical course, diagnostic evaluation, and transcatheter management of a 4-year-old child with RAA and an aberrant LSCA arising from Kommerell's diverticulum, complicated by significant stenosis at its origin. Assessment included CT imaging, Doppler ultrasound of the upper limb and vertebral arteries, and cardiac catheterization. The stenosis was treated with percutaneous balloon angioplasty.
Results: Imaging demonstrated severe proximal LSCA narrowing with reduced perfusion of the left upper limb and evidence of vertebral steal. Catheterization confirmed a 4 mm stenosis with a 10 mmHg gradient between the descending aorta and LSCA. Balloon dilation using a 7 mm Tyshak balloon reduced the gradient and improved vertebral artery flow. Clinically, the child showed marked reduction in painful, mottled episodes of the left arm. Follow-up ultrasound at six months demonstrated resolution of the steal phenomenon and improved arterial flow
Conclusions: Transcatheter balloon angioplasty provided effective and minimally invasive treatment of congenital LSCA stenosis in this pediatric patient. The intervention resulted in significant symptomatic improvement and correction of the subclavian steal physiology, supporting balloon angioplasty as a viable therapeutic option for similar cases.



P-234 / #784

AORTO-PULMONARY SHUNT CREATION IN CONGENITAL HEART DISEASE: DIFFERENT INDICATIONS, VARIOUS MODIFICATIONS, BUT COMMON TECHNICAL CHALLENGES

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Background and Aim: Percutaneous aorto-pulmonary (AP) shunt creation has demonstrated feasibility in animal models but has only rarely been translated into clinical practice. In contrast, catheter-based reverse Potts shunts are increasingly adopted for advanced pulmonary arterial hypertension (PAH). Transcatheter AP shunting for cyanotic congenital heart disease, however, remains poorly characterized. We present two pediatric cases in which percutaneous AP connections were successfully established—one for profound cyanosis and one for severe PAH.

Methods: Two children, after multidisciplinary heart-team evaluation, were referred for percutaneous AP connection due to strong surgical contraindications. One child underwent CT-based planning; in the other, previously implanted vascular stents served as anatomical landmarks. Interventions were performed under deep sedation with systemic heparinization using biplane fluoroscopy. High-frequency catheter-based perforation was used to traverse from the aorta into the pulmonary artery, followed by stent implantation. Hemodynamics, angiography, and clinical outcomes were reviewed retrospectively.

Results: Patient 1: An almost 3-year-old boy with borderline HLHS and severe PAH underwent successful creation of an ascending aorta–main pulmonary artery shunt. Simultaneous aortic and pulmonary angiography confirmed anatomical suitability, and high-frequency perforation from the aorta into the pulmonary artery was achieved,



followed by arteriovenous loop formation and stent implantation using a Bentley BeGraft device. Due to suprasystemic pulmonary pressures and progressive in-stent stenosis, repeat dilatations and an additional Formula stent were required. Although shunt patency improved, pulmonary pressures remained suprasystemic, and the patient died six months later from progressive biventricular failure. **Patient 2:** An 8-year-old girl after Glenn palliation with cyanosis due to severely impaired left pulmonary artery perfusion underwent attempted descending aorta–LPA perforation. Initial wire alignment failed, but a residual AoD–LPA fistula was identified and successfully stented two months later after occlusion of a competing RPA–LPA connection. The result yielded adequate LPA perfusion and improved systemic oxygen saturation (85–90%).

Conclusions: Percutaneous AP shunt creation is technically feasible even in small pediatric patients, but procedural complexity is high and reintervention is common. Careful anatomical evaluation—preferably CT-based—and individualized planning are essential. Larger studies are required to optimize technique, define indications, and assess long-term outcomes.



P-235 / #1223

PEDIATRIC CARDIAC TAMPONADE REQUIRING PERICARDIOCENTESIS: ETIOLOGY AND AGE DISTRIBUTION OF 252 PATIENTS IN A TERTIARY SINGLE-CENTER COHORT

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Background and Aim: Objective:
Cardiac tamponade (CT) is a rare but life-threatening condition in children, typically requiring urgent percutaneous pericardiocentesis. Despite its clinical importance, comprehensive data on pediatric CT are limited.
Methods:
We retrospectively reviewed 252 pediatric patients (0–18 years) with CT underwent emergency percutaneous pericardiocentesis to evaluate the etiological spectrum, age distribution, and associated clinical factors between November 2003 and May 2025. Diagnosis was based on echocardiographic criteria indicating hemodynamic compromise. Patients were categorized by age group, underlying etiology, and recent history of cardiac intervention.
Results:
Structural heart diseases were the leading cause of CT (51.6%), particularly in neonates and infants. Pericardiocentesis was most frequently performed in children aged 6–12 years (28.2%). Cardiomyopathies were more prevalent in older age groups. Infectious causes were the second most common etiology (11.5%). Cardiac Tamponade occurred more frequently following cardiac surgery (12.3%) than after catheter-based interventions. Iatrogenic tamponade was identified in six patients, most commonly during high-risk transcatheter procedures. Genetic syndromes were present in 30 patients, with Down syndrome being the most common.
Conclusions: To the best of our knowledge this study represents the largest single-center cohort of pediatric CT requiring pericardiocentesis. Cardiac causes, particularly structural heart diseases, represent the most common etiology across all age groups; therefore, these patients should be promptly evaluated for cardiac tamponade when presenting with relevant symptoms.



P-236 / #1216

SUCCESSFUL PERCUTANEOUS BALLOON ATRIAL SEPTOSTOMY IN AN EXTREMELY LOW BIRTHWEIGHT INFANT

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Background and Aim: Balloon atrial septostomy (BAS) is a life-saving procedure performed in infants with transposition of the great arteries (TGA) requiring an increased blood mixing at atrial level. Its role and safety in premature infants and extremely low birthweight (ELBW) is underreported with only few reports describing the procedure in infants weighting no less than 1,4 kg.
Methods: The patient was born at 29 weeks of gestational age via cesarean section performed due to premature rupture of membranes, (birth weight of 1.18 kg; APGAR 5-6). Pregnancy was complicated by a prenatal diagnosis of TGA, confirmed after birth by cardiologic consultation. Even though she had a restrictive foramen ovale (PFO) the weight of the patient was initially judged prohibitive for BAS. First days of life were dominated by respiratory distress syndrome effectively managed with nasotracheal intubation and mechanical ventilation with pre and post-ductal saturations around 75% on 40% FiO2. The arterial duct patency and hemodynamic stability were assured by prostaglandin, dobutamine and low dose diuretic infusion. On the tenth day of life saturations progressively decreased (50-60%) despite pharmacologic and ventilatory optimization.
Results: After multidisciplinary consultation a BAS was performed in the catheterization laboratory (weight of the patient 1 kg). The right femoral vein was surgically isolated and a 5 Fr 10-cm Glidesheath (Terumo) was placed. A 4 Fr Vertebral Glidecath (Terumo) was used to lead a 0.014 inch CHOICE Extra Support guidewire (Boston Scientific) across the PFO and then into the left upper pulmonary vein. First four retractions with a 5 Fr Berman Pressure Catheter (Arrow) were unsuccessful (thick septum). Then a 6 Fr 10-cm Radial Sheath (Terumo) was exchanged in the right femoral venous access and a satisfactory interatrial shunt was obtained with a Rashkind/Z-5 Catheter (NuMED). Final pre and post-ductal saturations were around 90% on 100% FiO2. Notably hemostasis was achieved after surgical suture of the vein



without signs of distal venous congestion.
Conclusions: BAS can be performed safely even in ELBW infants after careful patient selection. To our knowledge this is the smallest patient ever treated with this procedure.



P-237 / #803

HARMONY TRANSCATHETER PULMONARY VALVE IMPLANTATION IN PEDIATRIC PATIENTS WITH REPAIRED TETRALOGY OF FALLOT: A SINGLE-CENTRE EXPERIENCE

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Background and Aim: Children with tetralogy of Fallot (TOF) repaired with transannular patch commonly develop severe pulmonary regurgitation and progressive right ventricular (RV) dilatation. In patients with large native RVOT and pulmonary artery (PA) dimensions, transcatheter pulmonary valve replacement has historically been limited, often leaving surgery as the only option. Self-expanding valves designed for native RVOT anatomies, including the CE-marked Venus P-Valve and the Harmony transcatheter pulmonary valve (TPV; Medtronic), have expanded transcatheter treatment options. While European experience with Harmony TPV has recently emerged, published data predominantly reflect adult and young adult populations. We report our initial single-centre experience with Harmony TPV implantation in a young pediatric cohort with clear guideline-based indications for pulmonary valve replacement.
Methods: Between February and December 2025, nine pediatric patients with repaired TOF underwent cardiac catheterization with the intention to implant a Harmony TPV at the Children's Heart Centre in Lund. Median age was 14.5 years (range 9.1–16.4), and 33% were female. Preprocedural evaluation included standardized thoracic CT with dedicated Harmony screening reports. Procedural characteristics and clinical and echocardiographic outcomes were analyzed.
Results: Patient characteristics are presented in Table 1. Valve implantation was ultimately successful in all patients, with no procedural complications. In case 3, the initial implantation attempt was unsuccessful due to restrictive PA bifurcation with a small left PA, resulting in suboptimal distal crown expansion and malposition of the device. The valve was retrieved and discarded. A second implantation was then performed successfully after placement of an additional Lunderquist wire in the left PA to stretch open the PA bifurcation and optimize the distal landing zone. This double-wire technique was subsequently used in 6 of 9 patients (67%) with challenging PA bifurcation anatomy. One patient developed transient abdominal pain and fever post-procedure; symptoms resolved spontaneously. All remaining patients had an uneventful hospital course. Early



echocardiography demonstrated excellent valve function without residual regurgitation or obstruction, findings that were maintained at the latest follow-up, with all patients remaining clinically
well.

Patient no.	1	2	3	4	5	6	7	8	9
Diagnosis	ToF	ToF	ToF	ToF	ToF	ToF	ToF	ToF	ToF
Age (y)	14.5	16.4	16.3	15.2	11.5	10.5	15.7	14.5	9.1
Weight (kg)	62	48	49	57	36	35	65.2	56	32
Gender	m	f	f	m	m	m	f	m	m
Previous Treatment	TaP	TaP	Valv res.	TaP	TaP	TaP	TaP	TaP	TaP
MRI data									
PR (%)	50	38	45	45	51	44	43	62	50
RVEF (%)	52	50	46	51	49	45	56	53	50
RVEDVi (ml/m^2)	165	162	145	162	184	168	160	160	170
Cath Data									
RVp (mmHg)	30	26	48	36	28	38	24	40	40
PAp (mmHg)	26	24	46	22	24	22	24	30	28
Valve Implantation									
Wire position	RPA	RPA	RPA+LPA	RPA+LPA	RPA+LPA	RPA+LPA	RPA+LPA	RPA	RPA+LPA
Valve used	TPV 25	TPV 25	TPV 25	TPV 25	TPV 25	TPV25	TPV25	TPV25	TPV25
Residual PR	None	None	None	None	None	None	None	None	None
RVp (mmHg)	34	26	44	26	22	36	22	36	40
PAp (mmHg)	30	22	38	22	22	28	16	28	30
Gradient (mmHg)	4	4	6	4	0	8	6	8	10
Procedure time (mins)	94	66	114	105	76	96	115	137	130
Fluoroscopy time (mins)	19	22	28	25	16	20	22	40	22
Arrythmia first 48 hours	nsVT, VES	VES	VES	VES	VES	VES	VES	VES	VES
Arrhythmia after 48 hours	No	No	No	No	No	No	No	No	No
Other complications	No	Yes	No	No	No	No	No	No	No
Hospital Stay (days)	2	4	2	2	2	2	2	2	2
Echo at discharge									
PR (severity)	None	None	None	None	None	None	None	None	None
RVOT Vmax (m/s)	1.9	1.8	1.5	2.2	1.5	2	2.0	2.2	1.9
TR Vmax (m/s)	2.0	2.0	2.9	2.2	2.3	2.7	2.6	-	-

Conclusions: Harmony TPV implantation is feasible and safe in carefully selected pediatric patients, with excellent early outcomes despite young age. Careful anatomical assessment and procedural adaptation are essential for successful implantation.



P-238 / #1182

PERCUTANEOUS EMBOLIZATION OF MAPCAS IN INFANTS WITH TRANSPOSITION OF THE GREAT ARTERIES AFTER ARTERIAL SWITCH OPERATION: A CASE SERIES

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Background and Aim: Major Aortopulmonary Collateral Arteries (MAPCAs) are a rare finding in patients with Transposition of the Great Arteries (TGA); however, they can represent a cause of hemodynamic instability, especially following Arterial Switch Operation (ASO). In this monocentric case series, we describe three infants with TGA who underwent percutaneous embolization of MAPCAs following ASO
Methods: We retrospectively collected cases of patients from our Center undergoing percutaneous MAPCA embolization after ASO. Three cases were identified: all infants had a diagnosis of TGA with intact ventricular septum, underwent Rashkind procedure at birth, and subsequent ASO during the neonatal period.
Results: Case 1: A 3.1 kg neonate underwent ASO at 25 days of life. MAPCAs were suspected preoperatively. After ASO, due to failure to wean from invasive ventilation, cardiac catheterization was performed with plug embolization of a collateral between the descending aorta and the right lung. Rapid improvement ensued. **Case 2:** A 3.2 kg neonate underwent ASO at 17 days. After initial extubation, pulmonary congestion persisted, requiring prolonged non-invasive oxygen support. Following MAPCAs detection via echocardiography, the patient underwent percutaneous plug embolization, resulting in rapid clinical improvement. **Case 3:** A 4 kg neonate underwent ASO with creation of a pre-calibrated atrial septal defect at 28 days. After initial extubation, hemodynamic deterioration, left ventricular (LV) dysfunction, and functional mitral regurgitation occurred. A MAPCA, previously noted preoperatively, was closed percutaneously with a plug, leading to cardiac function recovery.
Conclusions: In this case series, percutaneous closure of MAPCAs resulted in rapid and significant clinical improvement, allowing weaning from ventilatory support and diuretic therapy. The procedure was performed without complications in all cases. Diagnosis was made via echocardiography and confirmed by cardiac catheterization. Significantly, all patients had undergone late correction. MAPCAs represent a potential cause of



hemodynamic instability in TGA neonates post-ASO. Their presence, especially after the physiological drop in pulmonary resistance, can cause a left-to-right shunt and consequent pulmonary overcirculation. Diagnosis relies on echocardiography—with a possible role for computed tomography—and is confirmed by invasive angiography, which allows for embolization. We propose systematically including MAPCA screening in the evaluation of post-ASO patients with haemodinamical instability or failure in weaning from ventilatory support.



P-239 / #884

EFFECTIVENESS AND LONGEVITY OF PERCUTANEOUS PULMONARY VALVE-IN-VALVE IMPLANTATION: THE MUNICH MATCHED STUDY

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Background and Aim: Transcatheter pulmonary valve replacement (TPVR) is an established alternative to surgical reintervention for right ventricular outflow tract (RVOT) dysfunction. Data on long-term outcomes and predictors of failure of valve-in-valve (ViV) procedures remain limited. This study evaluated the safety, effectiveness, and mid-term durability of pulmonary ViV and systematically assessed mechanisms of first-valve degeneration.
Methods: We conducted a single-center retrospective matched cohort study of all patients undergoing ViV implantation from 2006 to 2022. Patients with active endocarditis, patient–prosthesis mismatch, or need for concomitant surgery were excluded. Sixteen ViV patients were matched 1:1 with primary TPVR controls by procedure date, RVOT pathology, post-implantation gradient, and history of endocarditis. Angiographic review of both initial and ViV procedures characterized mechanisms of valve deterioration. Primary endpoint was all-cause mortality; secondary endpoint was freedom from reintervention.
Results: Sixteen ViV patients (median age 19 years) and sixteen matched controls were analyzed. No major periprocedural complications occurred. Two-year survival was 93%, with no difference between groups. Over a median follow-up of 24 months, three patients (9.7%) experienced valve failure; two required surgery. One late infective endocarditis case was medically treated. Final RVOT gradients were similar, while echocardiographic velocity index was higher in the ViV group. Angiographic review identified three mechanisms of early first-valve degeneration: (1) mechanical stress from sternal proximity or deep implantation, (2) somatic outgrowth causing functional undersizing, and (3) inadequate landing-zone preparation or inflammatory injury.
Conclusions: Pulmonary ViV is safe and provides comparable hemodynamic performance to primary TPVR in patients with a well-prepared landing zone. Early valve dysfunction is often predictable and potentially preventable. Routine prestenting, careful gradient management, and individualized lifetime strategies are key to optimize outcomes. Prospective randomized studies are warranted.



P-240 / #1255

PERCUTANEOUS RETRIEVAL OF AN EMBOLIZED EPICUTANEO-CAVAL CATHETER FRAGMENT IN A PRETERM NEONATE

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Background and Aim: Catheter fracture with intravascular embolization is a rare but potentially serious complication in neonates, particularly in preterm infants requiring central venous access. We report a successful percutaneous retrieval of a long embolized epicutaneo-caval catheter fragment in a low-weight preterm neonate.
Methods: A preterm male neonate born at 33+5 weeks of gestational age, weighing 1.7 kg, experienced fracture and embolization of an epicutaneo-caval catheter at a referring hospital. The detached fragment measured approximately 13 cm. Initially located in the right atrium, the fragment subsequently migrated to the pulmonary circulation. The patient was transferred to our tertiary pediatric cardiology center for management. On admission, the neonate was hemodynamically stable, without arrhythmias or respiratory compromise. Imaging confirmed a looped catheter fragment extending through the right ventricular outflow tract, with the distal end lodged in a left sublobar pulmonary artery branch. Given the potential risks of thrombosis, infection, vascular injury, and further migration, percutaneous retrieval was planned and performed the following day in the cardiac catheterization laboratory. Vascular access was obtained via the right femoral vein using a 5 French sheath and via the left femoral vein with a 20-gauge cannula. Intravenous heparin was administered at the beginning of the procedure. Under fluoroscopic guidance, a 5 French long Cook Flexor introducer was advanced into the right atrium. A 5 French MPA1 catheter, followed by a 4 French JR catheter, was navigated into the main pulmonary artery. Initial attempts to capture the proximal end of the embolized fragment using a 5-mm snare were unsuccessful.
Results: Through careful catheter manipulation, the fragment was mobilized from the pulmonary artery and repositioned into the inferior vena cava. Using a Cobra Glidecath and a 10-mm snare, one end of the fragment was successfully captured and withdrawn into the long introducer, allowing complete removal. The procedure was completed without complications. No hemodynamic instability or arrhythmias occurred, and post-procedural imaging confirmed successful retrieval.
Conclusions: This case highlights that transcatheter removal of embolized catheter fragments is feasible and safe even in very small preterm neonates, provided that appropriate technique, materials selection, and experienced operators are available.



P-241 / #798

SHORT- TERM SUCCESS, LONG- TERM CHALLENGE: PROGRESSIVE PULMONARY REGURGITATION FOLLOWING BALLOON PULMONARY VALVULOPLASTY

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Background and Aim: Balloon pulmonary valvuloplasty (BPV) is the standard treatment for pulmonary stenosis (PS), providing excellent short- and mid-term outcomes. However, the development of progressive pulmonary valve regurgitation (PVR) over time presents a challenge for long-term management. This study aims to evaluate the short- and mid-term outcomes of BPV in patients with native PS.
Methods: This retrospective, single-centre study included 67 consecutive patients (26 females) with native PS who underwent BPV at our institution between 2011 and 2025. The median age at the time of BPV was 14 months (IQR 2–95 months), with a mean body weight of 23.1 kg. The median balloon size used was 12 mm (IQR 8–19 mm), achieving a balloon-to-pulmonary annulus ratio of 1.1 (IQR 1.1–1.2). Follow-up data were available for a median of 5.5 (IQR 1– 8.9) years.
Results: BPV resulted in significant immediate haemodynamic improvement, with the systolic peak-to-peak gradient reduced from 52.9 mmHg to 22.5 mmHg ($p < 0.001$). Post-procedural echocardiography showed a decrease in the gradient from 78.5 mmHg to 40 mmHg ($p < 0.001$). In 22 patients (40.7%), the direct gradient reduction was <50% acutely; however, many of these demonstrated further decline in gradient on subsequent echocardiographic follow-up. The incidence of at least moderate PVR increased progressively from 6.5% pre-procedure to 14.6% immediately post-procedure, and up to 42% at the longest follow-up. Despite this, no patient required pulmonary valve replacement during the study period. Early reintervention was required in 7 patients (13.7%), including 4 balloon valvuloplasty and 3 surgical interventions, at a median of 14 (IQR 7–24) months. One additional percutaneous procedure was performed during extended follow-up. Two early postoperative deaths were reported.
Conclusions: BPV for native pulmonary stenosis results in favorable short-term outcomes, including significant and durable reduction of the pressure gradient. However, progressive pulmonary valve regurgitation is common, which may ultimately necessitate pulmonary valve replacement and underscores the need for long-term surveillance.



P-242 / #420

MANAGEMENT OF HLHS WITH PROTEIN-LOSING ENTEROPATHY AND CENTRAL VENOUS OBSTRUCTION: FROM THROMBECTOMY TO VALVE REPLACEMENT CASE REPORT – CONGENITAL HEART DISEASE / INTERVENTIONAL & SURGICAL MANAGEMENT

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Background and Aim: Hypoplastic Left Heart Syndrome (HLHS) is associated with long-term complications related to single-ventricle physiology, including atrioventricular (AV) valve dysfunction, arrhythmias, venous thrombosis, and protein-losing enteropathy (PLE). We present a complex case of a 9-year-old girl with HLHS and severe multisystem complications, focusing on the management of newly diagnosed PLE and central venous obstruction, culminating in tricuspid valve replacement.
Methods: Comprehensive evaluation included echocardiography and CT to assess AV valve pathology, venous patency, and thoracic structures. Cardiac catheterization with mechanical thrombectomy and serial venoplasty was performed to restore venous drainage. Surgical tricuspid valve replacement was subsequently conducted under cardiopulmonary bypass.
Results: The patient, after Norwood and hemi-Fontan surgeries and multiple prior tricuspid valve repairs, was admitted with worsening cyanosis, arrhythmias, fatigue, and newly diagnosed PLE. Imaging revealed thrombosis of the left venous angle and mediastinal fluid collection. Cardiac catheterization via bilateral antecubital access confirmed severe central venous obstruction with collateral circulation. Mechanical thrombectomy (Penumbra system) successfully recanalized the left subclavian and brachiocephalic veins. Balloon angioplasty restored vessel diameters (subclavian 3.5–4 mm; brachiocephalic ~8 mm) and improved Fontan pathway flow. Clinical markers including oxygen saturation and serum protein levels improved. Due to persistent severe AV valve dysfunction, tricuspid valve replacement was performed. A 25-mm Resilia bioprosthesis was implanted after septal leaflet plication. Postoperative recovery was uneventful; echocardiography showed a well-functioning valve (mean gradient 7 mmHg) and reduced right atrial volume. The patient was discharged with improved exercise tolerance and stable saturations (85%).
Conclusions: This case demonstrates the complexity of long-term HLHS management and emphasizes the importance of combined interventional and surgical strategies.



Mechanical thrombectomy with venoplasty effectively addressed central venous obstruction contributing to PLE. Subsequent tricuspid valve replacement restored hemodynamic stability. Hybrid approaches represent an essential component of care for patients with failing single-ventricle physiology.



P-243 / #421

MANAGING HEMITRUNCUS WITH TETRALOGY OF FALLOT IN A LOW-WEIGHT NEONATE: SUCCESSFUL USE OF A MODIFIED VASCULAR PLUG CASE REPORT

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Background and Aim: Hemitruncus arteriosus with Tetralogy of Fallot (ToF) and hypoplastic pulmonary arteries is a rare defect associated with early morbidity. The anomalous origin of the left pulmonary artery (LPA) from the aortic arch can cause severe unilateral pulmonary overcirculation in neonates, particularly in those too small or unstable for early complete repair. This case illustrates the use of a modified vascular plug to modulate pulmonary blood flow as a bridge to surgery.
Methods: Diagnostic evaluation included echocardiography and CT angiography to define pulmonary artery anatomy, VSD morphology, and the anomalous LPA origin. Due to rapid clinical deterioration, urgent cardiac catheterization was undertaken to selectively reduce pulmonary overcirculation. A modified MVPTM Q7 plug was deployed percutaneously into the LPA via femoral venous access.
Results: The 2-day-old neonate (birth weight 2.69 kg) presented with a large malalignment VSD, hypoplastic pulmonary valve and trunk (4.5 mm), and LPA arising from the outer curvature of the aortic arch. Progressive volume overload and left-sided pulmonary hyperperfusion prompted intervention at a body weight of 3.0 kg. Device implantation was successful, with stable post-deployment positioning, maintained distal perfusion, and marked reduction of LPA flow. Clinically, oxygen saturation stabilized around 85%, feeding tolerance improved, respiratory support was reduced, and the infant recovered sufficiently for hospital discharge.
Conclusions: This case demonstrates that percutaneous flow modulation using a modified vascular plug can be a safe and effective strategy in neonates with hemitruncus arteriosus and ToF who are not candidates for immediate surgical correction. The intervention serves as a valuable bridge to definitive repair, particularly in fragile, low-weight infants with complex pulmonary artery anatomy.



P-244 / #1234

CUMULATIVE EFFECTIVE DOSE AND RISK ASSESMENT FROM MULTIMODALITY IMAGING IN CONGENITAL HEART DISEASE PATIENTS: A SINGLE CENTRE STUDY IN ITALY

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Background and Aim: Children treated for congenital heart diseases (CHD) represent a highly radiosensitive population subject to recurrent medical exposure. The cumulative impact of multimodality imaging, including Interventional Cardiology (IC) procedures, radiography, CT and Nuclear Medicine (NM), raises significant concerns regarding stochastic effects. This study evaluates Cumulative Effective Dose (CED), and estimates the Lifetime Attributable Risk (LAR) of cancer and mortality in a pediatric CHD patients cohort in a referral centre in Italy.
Methods: A retrospective study was performed for a cohort of pediatric CHD patients who received at least 2 IC procedures between September 2018 and April 2024. Effective Dose (ED) was calculated using Monte Carlo simulation tools developed by the National Cancer Institute (NCI) and realistic computational pediatric phantoms: NCIRF for IC procedures and chest radiography, NCICT for CT scans, and NCINM for NM exams. For each patient, CED was obtained by summing the ED from all modalities. Furthermore, the LAR of cancer incidence and mortality was estimated based on the BEIR VII Phase 2 models, accounting for sex and age at exposure.
Results: A total of 164 patients were included, who collectively underwent 394 IC procedures, 310 CT examinations, 5400 chest radiographs, and 46 NM exams. Median and IQR CED values by modality were: IC, 1.6 [0.8–2.9] mSv; CT, 7.9 [3.2–20.4] mSv; chest radiography, 0.4 [0.02–1.2] mSv; NM, 2.9 [2.3–5.8] mSv. The overall median CED was 5.2 [1.9–12.4] mSv. CT was the largest contributor to CED, regardless of age and gender. Eight patients exceeded 50 mSv (including two aged < 4 years), and two exceeded 100 mSv, driven by emergency scenarios (stroke, heart transplant, etc.). Regarding risk assessment, the median LAR for cancer incidence was 0.14% (mean: 0.28%, range: 0.008–2.81%) and 9 patients exceeded a LAR of 1%.
Conclusions: The observed cumulative radiation burden, primarily driven by CT scans, highlights the urgency of clinical protocol optimization and longitudinal monitoring of exposure in this vulnerable population. Moving beyond simple dose metrics to LAR



estimations provides a comprehensive safety profile essential for guiding long-term surveillance strategies. This research was supported by the Ministry of Health GR-2018-12365477.



P-245 / #1437

PERCLOSE PROGLIDE SUTURE-MEDIATED CLOSURE SYSTEM DEPLOYMENT IN CHILDREN: EARLY OUTCOMES AND MOBILIZATION TIME

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Background and Aim: The femoral vein and artery are the most adopted vascular access to perform cardiac catheterization in children. This study explores the early outcomes and the mobilization time of Perclose ProGlide suture-mediated closure system (Abbott Vascular, Santa Clara, CA, USA) in children.
Methods: This is a monocentric observational study. From Janaury 2023 to December 2025, the children undergone cardiac catheterization via femoral vein/artery and Perclose ProGlide deployment were analyzed. A vascular ultrasound control of all patients was done before the discharge. The outcomes were: failure of Perclose Proglide, clinical vascular access complications and vascular lesions/damages detected by the vascular ultrasound. Among the patients with an effective Perclose Proglide deployment, a comparison between the standard mobilization (24h) group (group I) and the early mobilization (6h) group (group II) was executed.
Results: Eighty-one children underwent Perclose ProGlide deployment after a cardiac catheterization via femoral vein and/or artery. The suture-mediated closure system was used in 71 cases for a femoral vein and in 10 cases for a femoral artery. In 71 pts (87.7%) an effective hemostasis was achieved, whereas in the others 10 pts the traditional hemostatic systems were used after a ProGlide failure. The mean age and weight were 10.5±3.1 years (range 4-18 years) and 40.9±16.7 kg (range 18-87 kg), respectively. The median sheath size adopted was 12 Fr (range 6-26 Fr). No clinical anomalies and just two arterial stenosis (followed by a spontaneous resolution) were detected after ProGlide deployment. The femoral artery was associated to a higher risk of failure and/or vascular injuries than the femoral vein both at an univariate analysis (40% vs 11.3%, p- 0.02) and at a multivariate analysis (OR 14.9, CI95% 1.7-159.4, p- 0.02). Among the children with an effective ProGlide deployment, 49 pts had a standard (24h) immobilization (group I) and 32 pts had an early (6h) immobilization (group II). No significant differences were detected between the two group at both the clinical examination as well as the ultrasound detection.
Conclusions: The deployment of the Perclose ProGlide suture-mediated closure system is



effective and safe in children. An early mobilization is not associated to higher risk of adverse events.



P-246 / #1446

TRANS-CATHETER MANAGEMENT OF INTER-ATRIAL SHUNT RELATED ARTERIAL DESATURATION SYNDROMES: EARLY OUTCOMES AND MIDTERM FOLLOW-UP

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Background and Aim: Transcatheter closure of the atrial septal defects (ASDs) with a left-to-right shunt is considered the first-line treatment. However, the management of the bidirectional ASD is often challenging and requiring an accurate pre-closure hemodynamic evaluation. The aim of this study is to evaluate the early outcomes and the mid-term follow-up of the trans-catheter closure of the bidirectional ASDs.
Methods: This is a monocentric observational retrospective study that analyzed the patients with a bidirectional ASD shunt undergone to hemodynamic assessment in the catheterization laboratory from 2015 to 2025. Demographic, clinical and hemodynamic data were analyzed and related to the early outcomes (effective ASD closure vs procedural failure, procedure related adverse events, early arrhythmias, exitus, arterial oxygen saturation) and to the mid-term follow-up (right heart failure hospital admission, arrhythmias, exitus, arterial oxygen saturation).
Results: Twenty-two patients with bidirectional ASD were evaluated in our catheterization laboratory. The mean age and weight were 43.1±25.3 years and 68.3±23.6 kilograms. All patients had an arterial oxygen desaturation either in basal state or on effort. Thirteen patients (59.1%) had an associated congenital heart disease (CHD). After a negative balloon occlusion test, all patients underwent ASD closure and in three cases a residual interatrial shunt was left (a residual ASD shunt in two cases and an ex-vivo device fenestration in one case). All patients developed a significant improvement of arterial oxygen saturation (from 92±0.5% to 97±0.5%, p- 0.02). During follow-up, one patient with Ebstein anomaly undergone to a redo-procedure due to a significant accessory ASD responsible of a persistent significant arterial oxygen desaturation. The arterial oxygen saturation improved after the accessory ASD closure. At a mid-term follow-up 5.2±3.2



years, an optimal arterial oxygen saturation (97±0.5%), no exitus, no right heart failure hospitalization were recorded; however, four patients developed supraventricular arrhythmias (1 atrial fibrillation, 2 atrial flutter and 1 frequent atrial ectopic beats).
Conclusions: Trans-catheter closure of bidirectional ASD is safe and feasible after an accurate hemodynamic assessment. The ASD closure increase early the arterial oxygen saturation without significant adverse events during a mid-term follow-up.



P-247 / #1280

OUTCOME IN PATIENTS WITH SECUNDUM TYPE ATRIAL SEPTAL DEFECT REFERRED FOR PERCUTANEOUS OR SURGICAL CLOSURE - A SINGLE CENTRE EXPERIENCE

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Background and Aim: We aimed to analyze our results for ASD cosure (interventional/surgical) with respect to survival and complications. We further aimed to analyze whether patients after surgical or interventional ASD-closure develop symptomatic pulmonary vascular disease during short-term follow-up. We also asked whether there was a difference in the occurrence of atrial arrhythmias between patients after intracardiac repair versus device closure of ASD II.
Methods: The study was conducted as retrospective data analysis. Inclusion criteria: Age ≥ 2 years at the time of ASD II closure, availability of haemodynamic data prior to ASD II closure, time period of defect closure in the years 2005 to 2021. Demographic, clinical and haemodynamic data were obtained from all patients. The time point of the last follow-up visit was recorded. The following parameters were recorded: 1) at cardiac catheterization prior to defect closure: - size and location of defect by transesophageal ECHO, - haemodynamic parameters: systolic, diastolic and mean pulmonary artery pressure, capillary wedge pressure, pulmonary vascular resistance index (PVRi) 2) at last follow-up: survival, functional class, prevalence of arrhythmia, presence or absence of right ventricular dilation at last follow-up. In addition to screening of our own database we contacted all referring physicians in-written to provide us with the latest cardiac findings.
Results: Out of 611 patients, 215 underwent intracardiac repair based on transthoracic ECHO-findings. Transcatheter device closure was attempted and successfully performed in 300 out of 396 patients (Amplatzer™ Septal-Occluder (ASO) n = 290 patients). Follow –up was 3.3 years [1 day - 21.8 years] in patients with interventional closure of ASD and 0.7 years [3 days – 14.7 years] ($p < 0.001$; Mann-Whitney) in patients after surgical closure. There was no in-hospital mortality. One patient after Amplatzer device closure with absent aortic rim developed erosion. Two patients showed dislocation of the device. In 231 out of 396 patients right ventricular dimension normalized completely as determined on last follow-up visit. 26 patients (6.6%) showed pulmonary hypertension (PH) one of them presenting with coincidental ASD and severe PH.



Conclusions: ASD closure can be performed safely by intervention or cardiac surgery. Out of proportion pulmonary hypertension is rare at initial presentation



P-248 / #588

SUCCESSFUL ENDOVASCULAR TREATMENT OF ACUTE MECHANICAL MITRAL VALVE THROMBOSIS WITH LOCAL RECOMBINANT TISSUE PLASMINOGEN ACTIVATOR IN A 2-YEAR-OLD.

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Background and Aim: Severe mitral dysfunction in children is associated with significant therapeutic challenges, particularly when mechanical valve insertion is needed after valvuloplasty fails. It necessitates meticulous management of anticoagulation, as replacement of mitral valves in pediatric populations has a known risk of thrombosis and hemorrhagic events. This case report aims to describe the use of local continuous tissue plasminogen activator (tPA) infusion for successfully treating thrombosis in a mechanical mitral valve in a 2-year-old.
Methods: A 2-year-old girl with congenital mitral stenosis and prior multiple valve repairs underwent mechanical mitral valve replacement. Postoperative anticoagulation was initiated with low molecular weight heparin transitioning to vitamin K-antagonists (VKA); however, stable INR levels were difficult to maintain. After twenty days of post-surgery, she developed mechanical valve thrombosis, with echocardiography showing an impaired leaflet mobility and a mean transvalvular gradient of 22 mmHg, with important post-capillary pulmonary hypertension. Due to complex surgical history and stable anticoagulation hard to maintain, our patient was treated with a local continuous infusion of recombinant tPA (Alteplase) directly into the left atrium with a catheter type Merit Pigtail 4F from which the curl had been cut off, via femoral venous access and through interatrial fenestration. Doses were initially 0.045 mg/kg/h, then escalated to 0.1 mg/kg/h over 48 hours, with continuous intravenous heparin administered to prevent new thrombus formation.
Results: Within 48 hours of local treatment, there was an improvement in leaflet mobility and a significant reduction in the transvalvular gradient (mean 4mmHg). Complete thrombus resolution was achieved without hemorrhagic complication. She was again relayed to VKA, with stable INR rates. At 18 months of follow-up, the patient demonstrated good mechanical valve function and clinical recovery.



Conclusions: This case illustrates that continuous, low-dose local thrombolysis with recombinant tPA is a safe and effective alternative to surgery for mechanical mitral valve thrombosis in pediatric patients, especially those with elevated surgical risks. The approach allows targeted clot dissolution with lower bleeding risk compared to systemic thrombolysis. Individualized anticoagulation management and multidisciplinary care remain essential to improving outcomes in this vulnerable population.



P-249 / #352

INTRAOPERATIVE DIAGNOSTIC ANGIOGRAPHY - FEASIBILITY, SAFETY AND BENEFIT

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Background and Aim: Intraoperative angiography (IA) offers a contemporary technique for an immediate evaluation of the surgical result and may serve as an alternative to early postoperative angiography in the cath lab on the day after. The feasibility, safety and benefit of IA was evaluated in a single center setting.
Methods: Due to the new institutional availability of an intraoperative single plan x ray cath in the operation room, IA is performed in dedicated cases indicated for postoperative angiography on request of the surgeon. We analyzed indications, technical feasibility, procedural safety and medical benefit for early postoperative care.
Results: Between November 1st, 2024, and October 31st, 2025, we performed 14 IA's in 13 patients in 130 surgical procedures (10.8%). Surgical indications were coronary procedure (n=7), or pulmonary procedure (n=7). Age at IA was median 0.66 years (IQR 0.11-3.74) with a body weight of 6.7 kg (3.9-10.9). Feasibility (defined as documented angiography) was 100%, diagnostic value (defined as significant impact for postoperative care) was 85.7%, there were no severe side effects beside bleeding in one patient with need of blood re-transfusion on bypass. Angiography was performed using new inserted sheaths (n=5), cannula in place (n=6) or other (n=3), off cardiopulmonary bypass (n=13) or on ECMO (n=1). Therapeutic consequences included immediate redo after coronary transfer (n=1).
Conclusions: Intraoperative IA was frequently used, technical feasible, safe with a diagnostic and therapeutic impact for the patients during postoperative care. Future aspects include the option of catheter-based hybrid immediate intraoperative procedure in the operation room.



P-250 / #764

TRANSCATHETER INTERVENTIONS IN THE FONTAN PATIENTS: SINGLE CENTRE EXPERIENCE

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Background and Aim: Single-ventricle heart defects are congenital heart defects which require staging palliation procedures. Fontan procedure is the final palliative surgery to certain congenital heart diseases. Frequentlly patients require some form of interventional treatment before or after Fontan paliation. The aim of this study is to present types and frequency of certan transcatheter interventions in patients with Fontain circulation in Croatia.
Methods: Participants were patients who has completed Fontan palliation and were examined on an outpatient basis or hospitalized in 15 years period, between 1st January 2011 to 31th December 2025. Result are exprested in incidence percentage (%) of all transcatheter intervention in study group.
Results: During this period there were 163 participants and 40 % of them requierd some form of transcatheter interventions. In observed period there ware total 117 interventions and the most frequent underlying diagnosis was HLHS (42 %), followed by DILV and TA. Most patients had more than one procedure. The most frequent procedure was fenestration closure (57 %), followed by balloon atrial septostomy (34.5%) and LPA stent implantation (30 %). Balloon dilatation secondary to implanted LPA stent was performed in 14.5 %. When we analyzed closure of fistulas or collaterals, more often was A-V (12.8 %) then V-V collaterals (4.2 %). Implantation of stent CoA was performed in 5.9 %, followed by secondary dilatation of CoA stent (5.1 %). The rarest interventions in our study group were dilatation of SVC (1.7 %), SVC stent implantation (1.7 %), implantation of stent in mBTTs (0.08 %), transcatheter closure of mBTTs 1 (0.08 %), implantation of stents in TCPC (0.08 %), IVC stent implantation (0.08 %) and RPA stent implantation (0.08 %). In our group there was not patient who underwent atrial septal or ductal stenting.
Conclusions: Transcatheter interventions are frequentlly neccesary in patents before or after compliting TCPC. The most of procedures was performed as initial palliation or as conditioning to Fontan procedure. Our study provided incidency of transcatheter



interventions of Fontan population in Croatia in 15-years period. During observar period we noteced changes in incidency of porcedures. As a center in the development we expact further changes and evolving availability of interventions.



P-251 / #1460

A COMPLEX CASE OF POST-TAPVR PULMONARY HYPERTENSION AND NOVEL MANAGEMENT – SIROLIMUS TREATMENT AND AFR IMPLANTATION

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Background and Aim: Objective: In children who have undergone surgical correction for Total Anomalous Pulmonary Venous Return (TAPVR), the development of precapillary pulmonary hypertension (PH) following the dilatation of venous stenosis is a consequence of arterial remodelling.
Methods: In a male term newborn, obstructive supracardiac TAPVR was diagnosed, and he underwent surgical repair on the third day of life. At three months of age, he was hospitalised for respiratory distress, feeding intolerance, and early fatigability. He underwent re-operation using a sutureless repair technique with creation of an atrial septal defect (ASD). The postoperative course was complicated by left upper pulmonary venous (LUPV) obstruction, and multiple balloon venoplasty were performed. Hemodynamic and oximetric measurements were consistent with mixed PH. Sirolimus, losartan and bosentan therapy were initiated. Invasive haemodynamic assessment in the 2nd year of life revealed severe precapillary PH (mean PA pressure 98 mmHg, PVR 12. 8 Wu/m^2, wedge 14 mmHg). At the same time, CT angiography showed no pulmonary vein obstructions and anastomosis between the LUPV and LLPV. A month after catheterisation, he was admitted to the ICU due to deterioration of his general condition and progression of PH (body weight 10kg). Echocardiography revealed severe RV dysfunction, severe tricuspid regurgitation, and a restrictive right-to-left shunt on a small ASD (3 mm). Inhaled NO, along with high-dose milrinone, was initiated; despite a favourable clinical course, we decided to proceed with AFR implantation.
Results: The intervention was performed on iNO and milrinone. ASD dilatation was performed using a Z-Med 2 balloon (10x20mm). During balloon insufflation, severe bradycardia with electromechanical dissociation was observed. Adrenaline infusion was initiated. AFR 8x5 was implanted via 9F delivery sheath. Restitution was continued after the implantation, using noradrenalin, milrinone, dobutamine and levosimendan, with subsequent dose tapering. Control echocardiography demonstrated right ventricular unloading and regression of tricuspid regurgitation, with appropriate device position and



presence of right-to-left shunt.

Conclusions: Development of the precapillary PH is a severe complication of PV stenosis after TAPVR operation. Use of a pulmonary vasodilator and AFR implantation can lead to RV unloading. Based on the literature, we consider the probability of reversibility of this induced PH to be very low.



P-252 / #724

REVERSE CARDIAC REMODELING FOLLOWING TRANSCATHETER ATRIAL SEPTAL DEFECT CLOSURE: A SINGLE-CENTER EXPERIENCE

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Background and Aim: Ostium secundum atrial septal defect (ASD) is the most common subtype of atrial septal defects. It generates a left-to-right shunt that leads to right-sided volume overload and progressive cardiac remodeling. Percutaneous closure has become the treatment of choice for anatomically suitable defects; however, it requires meticulous echocardiographic evaluation before, during, and after the procedure to guide device deployment and assess subsequent cardiac remodeling.
The primary aim of this study was to characterize cardiac remodeling after percutaneous ASD closure and to determine the rate of its normalization following percutaneous closure.
Methods: We conducted a retrospective, descriptive, single-center study in the Pediatric Cardiology Department at La Rabta Hospital. The study included patients with ostium secundum ASD who underwent percutaneous closure between 2021 and 2024. Non-inclusion criteria were the presence of multiple ASDs, associated congenital heart defects, significant left-sided valvular disease, peri procedural complications, and documented arrhythmias.
All patients underwent transthoracic echocardiographic evaluation before the procedure, immediately after device implantation, and during follow-up at 7 days, 1 month, 3 months, 6 months, and 1 year.
Results: We included 32 patients, with a female predominance (25 females vs. 7 males). The median age was 13 years (IQR 7–32), with extremes ranging from 5 to 46 years. Two-thirds of the patients were asymptomatic. Dyspnea was present in 25% of cases. All patients were in sinus rhythm. Before the procedure, all patient had right-sided chamber dilation. Left ventricular dimensions were normal in all patient. Assessment of the interventricular septum showed that only 9.4% of patients had a normal septal morphology. A notable proportion (25.0%) had a flattened septum, while the majority (65.6%) exhibited a paradoxical septal motion.Our results demonstrate that cardiac remodeling after percutaneous closure is significant and occurs early, characterized by a rapid decrease in right ventricular (RV) diameter and a reduction in right atrial (RA) dilation. Concurrently, the left ventricular end-diastolic diameter (LVEDD) increased. RV systolic function and left ventricular ejection fraction (LVEF) remained stable throughout the follow-up



period.

Table 1: Paired Comparison of Right Ventricular (RV) Dilation Before and After Percutaneous Atrial Septal Defect (ASD) Closure

Comparison	p-value	Corrected p-value (Bonferroni)
RV at 1 year vs 6 months	0.553	1.000
RV at 1 year vs 1 month	0.123	1.000
RV at 1 year vs Day 7	<0.001	0.000
RV at 1 year vs before procedure	<0.001	0.000
RV dilation at 6 months vs 1 month	0.343	1.000
RV dilation at 6 months vs Day 7	<0.001	0.000
RV dilation at 6 months vs before procedure	<0.001	0.000
RV dilation at 1 month vs Day 7	0.002	0.016
RV dilation at 1 month vs before procedure	<0.001	0.000
RV dilation at Day 7 vs before procedure	0.013	0.128

Conclusions: Percutaneous closure of ostium secundum ASD leads to rapid and favorable ventricular remodeling, with progressive normalization of heart chamber dimensions. These results highlight the value of echocardiographic follow-up.



P-254 / #708

COLLATERALS EMBOLIZATION IN CHILDREN WITH VASCULAR MALFORMATION AND CONGENITAL HEART DISEASE: A SINGLE CENTER INITIAL EXPERIENCE

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Background and Aim: In pediatric population vessel embolization is commonly required and performed to treat arteriovenous malformations and to address collateral circulation after palliative cardiac surgery. A range of therapeutic and interventional strategies are available, such as vascular plugs, microparticles and coils, but consensus or guidelines to lead the clinician during the choice of the device are missing; there is also lack of evidence of superiority of a specific device.
Methods: Our study analyzed the outcomes of vessel embolization using a known platform, already used for peripheral and cerebral intervention in adults, in a cohort of pediatric patients affected by various conditions referred to our center between September 2023 and May 2025.
Results: We used 35 coils in 7 consecutive patients. The overall immediate procedural success, assessed with a conclusive angiography, was excellent in all patients. No periprocedural complication was observed. Two patients underwent a re-do procedure respectively 6 and 4 months after the first one; persistent results of the initial embolization were confirmed by evidence of complete occlusion of the previously targeted vessels. Patient 5 complained of pleuritic reaction some days after both procedures: this was well-managed using NSAIDs.
Conclusions: This platform of devices is currently used for peripheral and cerebral vessels embolization in adult population and consists of platinum-based bare metal coils of various dimensions, alongside dedicated delivery microcatheters. The required sheat is 5 Fr, allowing for less vascular trauma; in our opinion the system is very maneuverable, especially compared to plug-based systems, that appear to be stiffer. Given that, it's also suitable for access of very peripheral vessel relatively easily while avoiding vascular



damage. Lastly, in case something goes wrong, the coils are easily retrievable with a common guide catheter. In this paper we present our preliminary experience in pediatric patients for embolization of intrathoracic vessels. Our findings label this method as a safe and effective approach. Furthermore, the compact delivery system of this device positions it as a potentially crucial tool in pediatric interventions. Future studies on bigger populations are essential to comprehensively evaluate safeness and long term efficacy of the device in this setting.



P-255 / #203

BALLOON-EXPANDABLE MYVAL OCTACOR VALVE IMPLANTATION FOR PAEDIATRIC MITRAL REPLACEMENT

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Background and Aim: Mitral valve replacement (MVR) in paediatric patients remains challenging due to the small mitral annular size and the lack of prosthetic valves accommodating somatic growth. Balloon-expandable prosthetic valves may offer a new strategy for paediatric MVR. The implantation of the Melody valve in mitral position has been associated with concerns regarding limited durability, valve dysfunction, and a significant incidence of infective endocarditis. We describe the first implantation of a MyVal Octacor Transcatheter Heart Valve (THV) in mitral position in a paediatric patient.
Methods: An 11-year-old boy with neonatal mitral endocarditis had undergone three MVR in early infancy, all complicated by thrombosis and early failure. He subsequently received a Melody valve in mitral position at 6 months of age and a transapical Melody valve-in-valve implantation at 6 years. He re-presented with prosthetic degeneration and recurrent infective endocarditis. After complete explantation of the Melody valve, a 21.5-mm MyVal Octacor THV was partially balloon-expanded ex vivo to facilitate suture placement, then deployed under direct vision and implanted in mitral position.
Results: Intraoperative echocardiography showed a well-seated MyVal Octacor valve with a mean transmitral gradient of 4–5 mmHg and no paravalvular leak. Saline testing confirmed valve competence. At 6-month follow-up, the gradient remained stable and valve function preserved, with no episodes of infective endocarditis or valve dysfunction.
Conclusions: The MyVal Octacor THV demonstrated good early performance in mitral position, with stable function and no early complications. Its shorter frame may reduce the risk of subaortic obstruction, and the limited need for ex vivo manipulation could minimise leaflet injury and the potential for infective endocarditis. The controlled balloon expansion with minimal foreshortening allows for planned percutaneous dilations to accommodate somatic growth, and bench testing has shown structural stability and preserved leaflet function across a wide expansion range. Compared with the Edwards SAPIEN 3, which has a more limited expansion capability and early leaflet restriction, the Octacor may provide greater adaptability for growing children. Although promising for selected older patients



with adequate annular size, its applicability in small infants remains limited, and long-term data on staged dilations are still needed.



P-256 / #459

PDA STENTING IN HIGHLY TORTUOUS DUCTS

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Background and Aim: Stenting of a highly tortuous patent ductus arteriosus (PDA) in newborns with duct-dependent pulmonary circulation is an increasingly used alternative to the modified Blalock–Taussig shunt. However, complex ductal morphology, particularly ducts with a pronounced vertical course, multiple curvatures, or atypical insertions into the pulmonary arteries, remains technically challenging.
Methods: The authors report two cases of successful PDA stenting in newborns with tortuous ducts.
Results: The first patient was a term newborn from a poorly monitored pregnancy, with prenatal diagnosis of duodenal obstruction, pulmonary atresia with ventricular septal defect, and an aberrant right subclavian artery. Prostaglandin infusion was initiated at birth. Duodenal atresia associated with annular pancreas required duodeno-jejunostomy at 14 days of life, postponing cardiac intervention. Cardiac CT identified a class II duct (Qureshi classification) with a ductal curvature index (DCI) of 0.26. Catheterization at 1 month revealed a 9-mm, vertically oriented duct originating from the posteroinferior aspect of the aortic arch, with a minimum diameter of 3.5 mm at the pulmonary end. A left carotid approach (5 Fr) was selected. Two sequential stents (Nagomi™ 4.5×12 mm and Onyx Frontier™ 4.5×12 mm) were successfully implanted with excellent immediate haemodynamic results. The patient remained free of stent-related complications and underwent definitive repair at 15 months, including VSD closure, bilateral pulmonary artery augmentation, RV–PA conduit placement, and ductal occlusion. The second patient, also a term newborn from an unsupervised pregnancy, presented with early cyanosis and was diagnosed with complete unbalanced atrioventricular septal defect, pulmonary atresia, and great arteries malposition. Cardiac CT demonstrated a class III duct with a DCI of 0.56, indicating very high risk for stent failure. At 21 days, catheterization identified a long (20 mm), vertical, extremely tortuous duct originating from the aortic arch, with a minimum diameter 3 mm. Anticipating guidewire instability, left carotid access (5 Fr) was also used. A single Onyx Frontier™ 5.0×22 mm stent was implanted with sustained improvement in oxygenation while awaiting staged surgical
palliation.

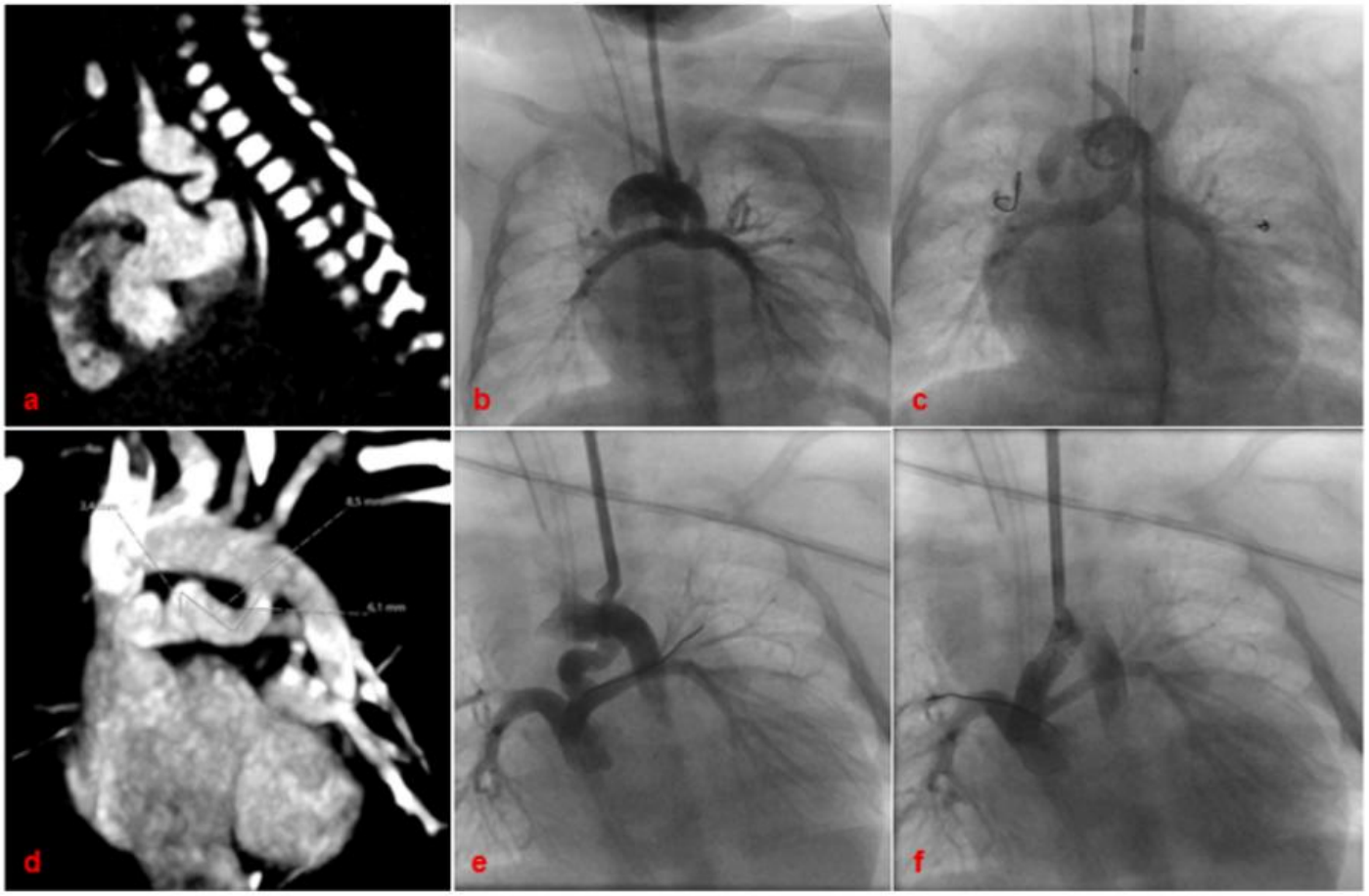


Figure 1. Multimodality imaging of two tortuous ductus arteriosus prior to and during stent implantation. (a) Cardiac CT of Patient 1 showing a vertically oriented, tortuous ductus arteriosus arising from the posteroinferior aspect of the aortic arch. (b) Angiography via left carotid access confirming the complex ductal anatomy and sharp angulation prior to intervention. (c) Final angiographic result in Patient 1 following sequential deployment of two stents, demonstrating full ductal coverage. (d) Cardiac CT of Patient 2 revealing a long, extremely tortuous PDA originating from the aortic arch. (e) Angiographic assessment before intervention in Patient 2 showing the elongated vertical duct. (f) Final angiography after deployment of a single stent in Patient 2, confirming adequate positioning.

Conclusions: These cases demonstrate that PDA stenting is feasible even in high-risk, highly tortuous duct morphologies. Comprehensive pre-procedural anatomical assessment and careful planning are crucial to optimise outcomes.



P-257 / #1457

TRANSCATHETER CARDIAC INTERVENTIONS IN THE NEWBORN: A SINGLE-CENTER EXPERIENCE

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Background and Aim: Transcatheter cardiac interventions represent a effective strategy as palliation or treatment of Congenital Heart Diseases (CHDs) in newborns.
Methods: This is retrospective study reviewed demographic, diagnostic and clinical data of newborns with CHDs underwent percutaneous transcatheter procedure from 2000 to 2025 in our institute.
Results: 559 newborns were included in the study.The demographic data of the overall population are summarized in the Table 1. The most frequently performed procedures were Rashkind atrio- septostomy (167 cases, 30.7%), balloon pulmonary valvuloplasty (163 cases, 29,1%), AD stenting (117 cases, 20.9%), balloon aortic valvuloplasty (56 cases, 10%) and atretic pulmonary valve perforation (126 cases, 7.8%) (Table 2). Multiple different procedures were carried out in the same catheterization in 18 pts (3.2%), Overall morbidity rate was 4,3% (24 pts). Major adverse events and Minor Adverse Events were 3% (17) and 1,3% (7 pts), respectively. In-hospital mortality was 5 % (28 pts). Three patients died during the index procedure whereas the remaining 25 pts died during hospitalization. At multi-variable analysis, primary composite outcomes including procedure-related major adverse event, in-hospital mortality and failure of the intended procedure was significantly related to low-weight (< 2.5 kg) ($p < 0.01$) and younger age (≤7 days) (< b 0.01) at the procedure, prematurity ($p <0.01$), uni-ventricular physiology ($p < 0.01$), associated genetic syndromes ($p < 0.01$) and procedure risk category ($p < 0.01$).
Conclusions:



Table 1:Demographic data of the overall population.

Total (n)	559
Male(%)	346(52)
Weight	2,9 ± 0,5
Age (days)	6,5(0-31)
Low-weight(%)	110(20)
Preterm newborns (%)	58(10,4)
Genetic syndromes(%)	26(4,7)
CHARGE(%)	3(11,5)
Down	2(7,7)
Edwards	1(3,8)
Myhre	1(3,8)
Patau	2(7,7)
Wolf-Hirschhorn	1(3,8)
XYY	2(7,7)
T18	1(3.8)
No-specific clear-cut syndrome	10(50)
UVH physiopathology(%)	47(8,4)

Table 2: Procedural data

Procedure	
Rashkind	167 (29)
Arterial Duct Stent	117 (21)
Atretic pulmonary valve perforation	23 (4)
Balloon aortic valvuloplasty	56 (10)
Balloon pulmonary valvuloplasty	163(29)
Percutaneous transluminal angioplasty	6 (1)
Interatrial septum perforation	7 (0,4)
Surgical shunt stent	3 (0,5)
RVOT stent	2 (0,4)
Arterial Ductal embolization	1 (0,2)
Aorta PTA	1(0,2)

Interventio

nal cardiological procedures applied during the neonatal period provide alternative life-saving methods to surgery. Peri-natal age, low weight, uni-ventricular physiology and genetic syndromes still significantly contribute to procedural morbidity and in-hospital mortality of this approach.



P-258 / #1408

FEASIBILITY AND SAFETY OF STENT PLACEMENT IN MULTIPLE SHUNT TYPES: A SINGLE-CENTER EXPERIENCE.

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Background and Aim: Systemic-to-pulmonary shunts (SPS) are used in neonates with pulmonary or systemic duct-dependent circulation. Acute or chronic complications, including stenosis, thrombosis, or kinking, can cause rapid desaturation and clinical deterioration. We aimed to evaluate the feasibility, safety and outcomes of percutaneous treatment of failing Systemic-to-pulmonary shunts.
Methods: We conducted a retrospective single-center study of all patients who underwent transcatheter stenting of a systemic-to–pulmonary shunt between 2020 and 2025. Primary outcomes were procedural success—defined as successful stent deployment with restoration of adequate shunt flow—and the occurrence of immediate procedural complications. Secondary outcomes included changes in oxygen saturation, need for additional interventions, and short-term survival. Data were analyzed descriptively.
Results: We analyzed 26 children with median age 3.8 years (range 8 days to 16 years) , median weight 11.3 kg (range 3-43) with heterogeneous congenital cardiopathies, all with duct-dependent circulation and shunt complications. Shunt types included 12 modified Blalock–Taussig shunts, 9 Sano shunts, and 5 central Laks shunts. The median interval from shunt placement to intervention was 25 days (range 1 day – 5 years). Direct stenting was performed in 17 elective and 9 emergency procedures. Procedural success was achieved in all cases, with restoration of adequate shunt flow. Complications occurred in 3 patients (12%), two pulmonary bleeding and one transient arrhythmia; all were managed without long-term sequelae. Post-procedural oxygen saturation improved in all patients from a median of 63% (45-70%) to a median of 90% (87-99%). There were no procedure-related deaths.
Conclusions: Transcatheter stenting of systemic-to-pulmonary artery shunts is a safe and effective palliative option for children with duct-dependent circulation and shunt complications. The procedure demonstrates high technical success, significant



improvement in oxygenation, and a low rate of manageable complications, offering a less invasive alternative to surgical revision. .



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STAGED TRANSCATHETER MITRAL REPAIR AND SELF-EXPANDING PULMONARY VALVE IMPLANTATION IN AN ADULT WITH REPAIRED TETRALOGY OF FALLOT AND MULTIVALVULAR REGURGITATION: RATIONALE AND CASE REPORT

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Background and Aim: Adults with repaired Tetralogy of Fallot frequently develop free pulmonary regurgitation secondary to the trans-annular patch used during surgical correction. Chronic regurgitation leads to progressive right ventricular dilatation, tricuspid annular enlargement and functional tricuspid regurgitation. Pulmonary valve replacement restores RV geometry and often reduces TR. However, in patients with multivalvular regurgitation involving the mitral valve, the timing of intervention is challenging. Restoring pulmonary valve competence increases pulmonary venous return and may exacerbate left-sided filling pressures in the presence of diastolic dysfunction and significant mitral regurgitation.
Methods: A 62-year-old man with rTOF, chronic kidney disease (stage IIIA), atrial fibrillation, and an implantable cardioverter-defibrillator presented with severe pulmonary regurgitation, moderate-to-severe MR, and moderate TR. Echocardiography revealed preserved left ventricular (LV) systolic function with diastolic dysfunction, RV dilatation, and a regurgitant pulmonary annulus (~27 mm). The Heart Team discussed the case and considered that isolated pulmonary valve replacement could increase pulmonary venous return and worsen symptoms due to MR and impaired LV compliance. A sequential percutaneous strategy was adopted: **Mitral repair** was performed in February 2025 using a clip-based system (A2–P2), reducing MR from moderate-severe to mild and improving NYHA class (II → I). **Transcatheter pulmonary valve implantation (TPVI)** followed in October 2025. Through a transfemoral venous approach, a **self-expanding 36 mm pulmonary valve** (Venus Medtech, Hangzhou, China) was deployed within the native right



ventricular outflow tract (RVOT). Immediate post-deployment angiography confirmed valve competence with trivial regurgitation and a peak gradient < 10 mmHg.

Results: The procedure was uneventful, with no coronary compression or conduit obstruction. Post-TPVI echocardiography demonstrated complete resolution of pulmonary regurgitation, reduced RV volumes, and stable TR. The patient was discharged on day 2 and remained asymptomatic at follow-up.

Conclusions: In adults with repaired TOF and multivalvular regurgitation, timing of intervention is crucial. This case demonstrates that a staged, fully transcatheter approach—addressing MR first and performing TPVI later—can safely optimize biventricular loading conditions and prevent postoperative pulmonary congestion. The self-expanding pulmonary valve are particularly suitable for large, compliant native RVOTs typical of post-patch TOF, offering excellent conformability and hemodynamic performance. Careful Heart Team planning remains essential in these complex patients.



P-264 / #1417

USE OF THE SAFESEPT GUIDEWIRE FOR TRANSSEPTAL PUNCTURE IN LOW-WEIGHT AND HIGH-RISK PEDIATRIC PATIENTS

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Background and Aim: Transseptal puncture in infants represents a high-risk procedure, especially in critically ill patients. Small atrial dimensions and limited maneuvering space increase the risk of complications. The SafeSept 0.014" guidewire may enhance safety by allowing controlled transseptal access.
Methods: A 19-month-old child (weight 12 kg) with dilated cardiomyopathy was admitted with cardiogenic shock due to acute heart failure. Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) was initiated via cervical cannulation. Evidence of persistent pulmonary congestion and left atrium distension prompted the decision to perform left atrial venting. The procedure was performed under general anesthesia with transesophageal echocardiography (TEE) guidance. Vascular access was obtained: right femoral artery (4 Fr) and right femoral vein (12 Fr). Baseline hemodynamics showed an elevated left atrial pressure of 16 mmHg. An 8Fr long sheath was positioned, and a BRK transseptal needle was advanced to the tip of the dilator, with echocardiographic evidence of interatrial septal tenting. An initial attempt using the needle alone was performed; however, given the small left atrial size, the risk of injury was considered significant. Therefore, a SafeSept 0.014" guidewire was introduced through the BRK needle. The guidewire crossed the interatrial septum smoothly, entered the left atrium and advanced into a pulmonary vein. The transseptal needle was then advanced safely over the guidewire into the left atrium, followed by advancement of the dilator and introducer across the septum. The needle, guidewire, and dilator were subsequently removed, and correct positioning of the introducer was confirmed by angiography. After advancement of a BMW guidewire into the left pulmonary vein, balloon predilatation of the interatrial septum was performed using an 8 × 20 mm balloon.
Results: An 8mm atrial flow regulator device was then implanted via a 12 Fr delivery sheath. Final imaging demonstrated an exclusive left-to-right interatrial shunt and hemodynamics showed a reduction in left atrial pressure to 9 mmHg. The procedure was well tolerated, with no complications.
Conclusions: In low-weight, high-risk pediatric patients, the use of the SafeSept guidewire can significantly enhance the safety of transseptal puncture by reducing complications. This approach may be particularly valuable in small left atria and complex clinical scenarios such as VA-ECMO support.



P-265 / #530

HOW FAR CAN WE GO? MULTIDYSCYPLINARY MANAGING EXTREMELY AGRESIVE PULMONARY VEIN STENOSIS AFTER TAPVR REPAIR: A 22-MONTH COURSE OF REPEATED INTERVENTIONS, SURGICAL REVISIONS, IMATYNIB THERAPY AND VIRTUAL REALITY-GUIDED PLANNING

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Background and Aim: Pulmonary vein stenosis (PVS) remains one of the most challenging entities in congenital cardiology, characterized by rapid progression, frequent restenosis rates despite multidisciplinary therapy. Evidence guiding longitudinal management remains limited.
Methods: We present a 22-month course of a child with biventricular anatomy, infracardiac TAPVR, and bilateral multilevel PVS who underwent one of the most intensive documented multimodal pathways. Management included catheter and surgical therapy, imatinib, and multimodal imaging virtual reality (VR) reconstructions to address a rapidly evolving venous anatomy.
Results: Management included 13 catheterizations, 5 surgeries, imatinib, and multimodal imaging including virtual reality(VR). At each catheterisation and surgery three right-sided veins (upper, middle, lower) and two left-sided veins (upper, lower), severely stenotic from the outset, were targeted. Catheter interventions: Repeated technical successful venoplasty was achieved using high-pressure balloons, cutting balloons, drug-eluting balloons (sirolimus, paclitaxel), double-balloon inflations, and a second-wire technique in severely angulated, recoil-prone veins. Despite this, disease followed a stepwise distal progression, with new downstream stenoses after each successfully relieved venous segment. Surgery: Fife surgical procedures included multiple sutureless surgical revisions. During the fifth operation, a coronary stent was implanted into the nearly occluded left upper pulmonary vein; it later required repeated catheter-based reinterventions due to in-stent proliferation and new stenoses distally to the stent. Surgical procedures provided temporary improvement but did not modify long-term trajectory. Imaging and VR: 5 CT scans, 3D rotational angiography, and serial VR reconstructions revealed dynamic postoperative changes, shifting venous courses, and progressive distal narrowing. VR significantly improved spatial understanding of collectors, vein–mediastinal relationships, catheter trajectories, and conflict zones, directly informing interventional and surgical planning. Imatinib therapy: Imatinib was initiated at 6 months with good tolerance aside



from transient liver enzyme elevation, but without measurable therapeutic effect on disease progression. Clinical course: Despite comprehensive multimodal therapy, pulmonary venous obstruction progressed, pulmonary hypertension became refractory, and the child died at 22 months.

Conclusions: This case highlights the biological severity of aggressive PVS and the limitations of even maximal multimodal therapy. Long-term single-patient datasets such as this underscore the need for multicenter protocols to guide escalation, prognostication, and decisions regarding futility in PVS management.



P-267 / #1550

REVIEW OF DIFFERENT DEVICES USED TO OCCLUDE NATIVE PULMONARY ARTERY TRUNK IN SINGLE VENTRICLE PATIENTS AFTER TCPC- SINGLE CENTER EXPERIENCE

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Background and Aim: Native pulmonary blood flow after partial cavopulmonary connection has been theorised to promote pulmonary artery growth due to additional pulsatile flow, however advantages and disadvantages of this course of treatment remain debatable. Commonly during the Fontan procedure, the native pulmonary trunk is closed surgically if not performed upon bidirectional Glenn, yet in some cases the cardiac surgeon decides to maintain flow after TCPC which may require closure in the future.
Methods: Single tertiary center retrospective analysis of patients undergoing interventional device occlusion of the native pulmonary artery trunk after total cavopulmonary connection and review of the devices used. The indications for closure differed from patient and included: elevated TCPC pressure, progressive ventricular dilation with or without dysfunction and in asymptomatic patients as a preventive measure.
Results: 8 patients after TCPC with native pulmonary artery trunks were included in the analysis, patient population is summarized in table 1. The devices used were AVP II, Amplatzer muscular VSD occluder, Konar MF, Bentley BeGraft – chosen due to accompanying LPA stenosis. In one patient we experienced procedural complications, first device implanted was the ADO II which embolized into LPA and was retrieved using lasso after which a CP CVD 8Z45 stent on BiB 18x45 was implanted. On routine control we discovered that the stent had migrated to the distal LPA, fortunately no small branch arteries were occluded and Amplatzer Septal occluder was implanted into the pulmonary trunk. Due to hemolysis and hematuria the device was retrieved the next day. The ASO was the only device that caused significant hemolysis resulting in device retrieval. Other procedures were uneventful and well tolerated.
Conclusions: Controversial is the decision to maintain this connection after TCPC. Theories suggest it may prevent acute ventricular preload reduction in the early postoperative period, on the other hand leaving the patient at risk for developing elevated pulmonary pressure, pleural effusion or progressive ventricular failure. Transcatheter



device closure of native pulmonary artery trunk after TCPC is possible. Although relatively safe and effective, It is important to monitor the patient post procedure to exclude hemolysis and enable device retrieval if necessary and exclude delayed device embolization.



P-269 / #1424

PSYCHOSOCIAL IMPACT AND RESILIENCE IN PARENTS OF CHILDREN AND ADOLESCENTS WITH CONGENITAL HEART DISEASE

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Background and Aim: The diagnosis of a child with congenital heart disease creates significant emotional, financial, and social challenges for the family, affecting their overall well-being, adjustment, and support systems.
Methods: The aim of this study is to investigate the psychosocial needs and resilience of parents with children who have congenital heart defects (CHD). Additionally, the coping skills, attitude and difficulties of adolescents with CHD were assessed.The study involved parents (N=61) and adolescents (11–17 years old) with Congenital Heart Disease (CHD) (N=31), all of whom were either hospitalized or under follow-up care at the outpatient cardiology clinic of a tertiary children's hospital. Data were collected using various questionnaires assessing demographics, medical history, mental health (General Health Questionnaire - GHQ), psychological trauma (GPS), resilience (RES-9), strengths and difficulties (SDQ), and parental stress (PSI). Adolescents completed the SDQ.
Results: There were no significant changes in the quality of the relationship between partners (parents) after the onset of the illness in the child/adolescent (p=0.852). The parents showed more physical symptoms (p=0.043), increased levels of anxiety (p=0.017), and depression (p=0.05) before the surgery. Additionally, there were no significant differences in the attitude of the family and social environment before and after the onset of the illness. On the other hand, the relationship between partners affects self-efficacy (p=0.044) and the overall resilience of the parents (p=0.022). Moreover, it was found that parents exhibited symptoms of post-traumatic stress (39.3%) related to their children's heart disease, even if they had previously experienced a traumatic event. There was also no relationship between the parent's gender and higher levels of anxiety. Regarding the children/adolescents, the findings did not show an increase in emotional disorders based on the child's/adolescent's gender (p>0.05).
Conclusions: Parents of children with CHD face significant emotional and health



challenges, particularly with the prospect of future surgeries, experiencing heightened anxiety. The quality of the parental relationship influences mental resilience more than family or social support. Further research is needed to identify those at higher risk for poor adaptation to the diagnosis, to optimize psychological support.



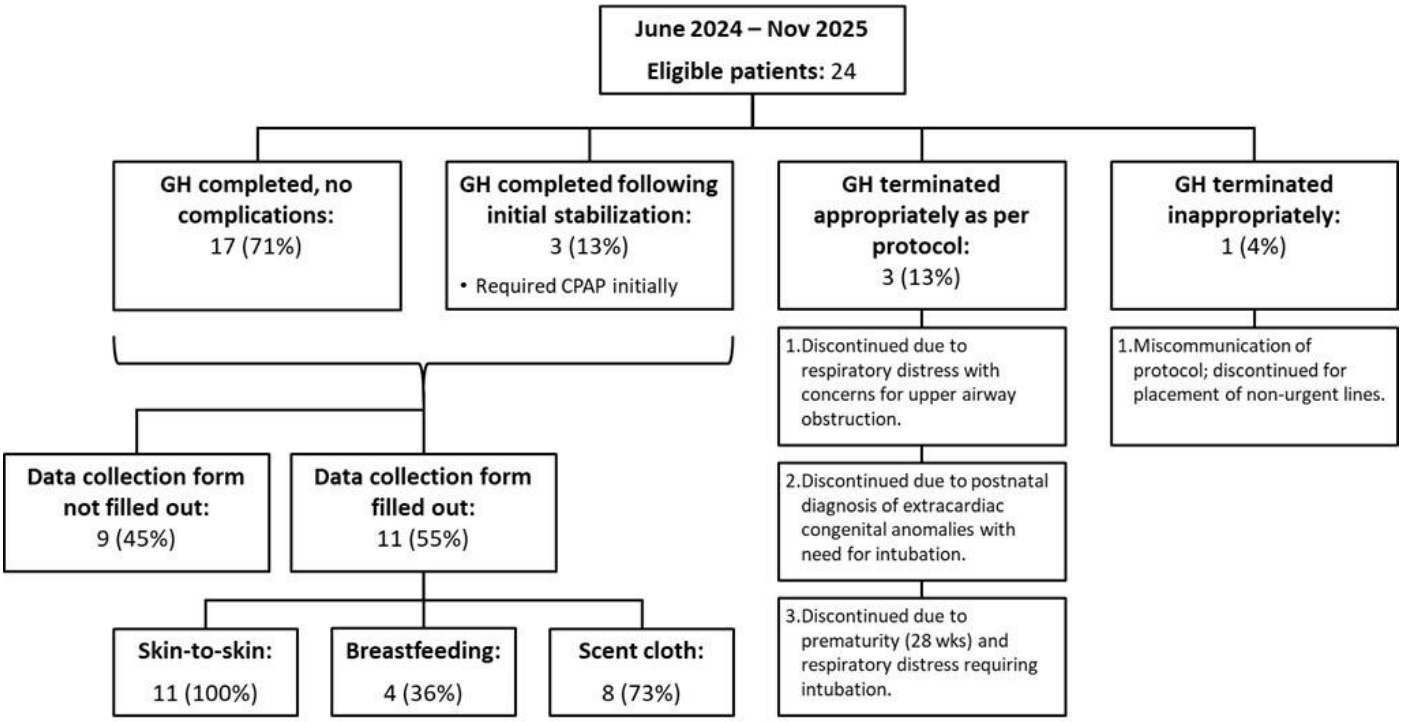
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GOLDEN HOUR FOR NEONATES WITH CONGENITAL HEART DISEASE: A QUALITY IMPROVEMENT PROJECT

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Background and Aim: Golden Hour (GH) protocol in the newborn involves a combination of well-established practices that occur in the first hour after birth. These practices include skin-to-skin contact, breast feeding, and parent-baby togetherness, known to support fetal-to-neonatal transition and associated with mental health and neurodevelopmental benefits for mother and baby, respectively. GH is standard practice for healthy newborns delivered at BC Women's Hospital. Newborns with prenatally diagnosed critical congenital heart disease (CHD) were historically ineligible for GH, despite potential benefits for a population at risk for neurodevelopmental challenges. These babies are typically separated from mothers and transferred to the ICU for care, minutes after delivery, with GH implementation hindered by perceived patient acuity, staff apprehension, and lack of protocol guidance and standardization. We propose GH is feasible and safe for neonates diagnosed prenatally with critical CHD. This quality-improvement project, using Plan-Do-Study-Act (PDSA) cycles, targeted >80% GH implementation for eligible neonates with CHD within 6 months.
Methods: GH eligibility criteria were established by the fetal cardiologists; Babies with CHD lesions (including duct-dependent) expected to require neonatal intervention were eligible. Babies with plans for immediate postnatal intervention (e.g. balloon atrial septostomy or pacing) or palliative care, genetic syndromes or extracardiac congenital anomalies associated with cardiopulmonary instability at birth, cardiomyopathy or hydrops, were excluded. Patient-specific antenatal care plan documents to guide GH were created. Education and training for providing teams was completed. Data collection forms were used to record GH components completed, and collect general feedback. Electronic medical records were used to collect clinical data and verify if GH was followed when forms were missing.
Results: Most common reason given for not breastfeeding was ongoing maternal medical procedures; for scent cloth (promotes parent-baby togetherness), it was forgotten. C-section delivery (9/20, 45%) did not prevent GH from being completed. There was no associated patient morbidity or mortality related to the change in practice. Most common feedback was desire from the medical team for more clear antenatal

documentation.



Conclusions: This pilot project demonstrates feasibility and safety of implementing GH in babies with CHD requiring neonatal intervention. Feedback regarding documentation and miscommunication regarding line insertion will inform the next PDSA cycle.



P-272 / #719

PARENT AND CARER REPORTED QUALITY OF LIFE IN INDIVIDUALS WITH DOWN SYNDROME AGED 2-35 YEARS

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Background and Aim: Health-related quality of life (QL) in those with Down Syndrome (DS) can be influenced by comorbidities such as congenital heart disease (CHD). This study assesses QL in a group of individuals aged 2-35 years with DS, with and without CHD.
Methods: Parents/ carers of individuals aged 2-35 with DS in Northern Ireland (NI), listed on a comprehensive medical database (N=1296), were invited to complete an online questionnaire which included Pediatric Quality of Life Inventory (PedsQL) 4.0. Parent-proxy PedsQL total and subscale (physical, social, emotional) scores were analysed by age group for children (aged 2-13), adolescents (aged 14-19) and adults (aged 20-35). Differences in QL by age-band and CHD status were assessed using ANCOVA, adjusting for gender, with post hoc Tukey tests for age comparisons.
Results: A total of 379 responses (mean age 15.3 years, 52% male) were linked to the medical database. Of these, 51% had CHD, most commonly VSD (43%) and AVSD (34%) and 71% of those with CHD required a cardiac intervention. Overall mean total QL scores were similar for those with and without CHD (51.4 vs 53.1). For overall PedsQL, ANCOVA showed significant effects of age band (p=0.004) and gender (p=0.001), but not CHD status (p=0.30). Post hoc tests indicated adults had higher overall QL than children (mean difference 6.47, p=0.004), and males scored higher than females. In the physical domain, age-band (p=0.037) and gender (p=0.004) were significant, with adults scoring higher than children (p=0.032) and males scoring higher than females (p=0.007); CHD was not significant (p=0.45). For the social domain, age-band was significant (p=0.023), with adults scoring higher than children (p=0.034), while gender was not significant. Emotional scores differed by gender only (p=0.0007), with males rated higher; age and CHD had no effect.
Conclusions: QL in individuals with DS increases with age for overall, physical and social domains, and parents/ carers rate higher overall, physical, and emotional QL for males. Interestingly, CHD status was not independently associated with QL. These findings indicate lower QL overall than previously reported and highlight the need for targeted interventions and improved medical care for the DS population.



P-274 / #292

UNDERSTANDING OF HEALTHCARE PROFESSIONALS' KNOWLEDGE OF PREVENTING MECHANICAL VENTILATOR DAMAGE FROM NEBULISED MEDICINES USED TO TREAT CHILDREN WITH CARDIAC DISORDERS - THE PHARMACIST ROLE

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Background and Aim: 1 in 4 children receive nebulised medicines, including off-label use, during mechanical ventilation e.g. milrinone; pulmonary hypertension, tranexamic acid; pulmonary haemorrhage. Cardiac anaesthetists and the paediatric intensive care (PICU) team should be aware of factors that influence aerosol delivery to the lungs during ventilation and relationship to drug, device, patient, ventilator circuit and settings. The vibrating-mesh nebulisers used in the ventilator are approved for licensed nebulised medication only. Two ventilator failures occurred within two weeks from nebulised medicine build-up on the expiratory valve diaphragm, resulting in out of action ventilators. Requiring clean or replacement of the diaphragm. Deposits on the diaphragm cause large leaks in the ventilatory circuit. The extent of the problem couldn't be determined as often faulty ventilators are sent without the expiratory valve diaphragm.
Methods: Electronic survey was developed and distributed to gain understanding of healthcare professionals' (HCP) knowledge of preventing mechanical ventilator damage. 47 of 168 responded: 3 anaesthetists, 22 nurses, 12 physiotherapists, 10 medical/advanced nurse practitioners and 1 pharmacist.
Results: 91% of respondents were aware that nebulised medicines are deposited in the ventilator, with 59% aware how to reduce this happening. Lack of awareness (41%) of how to reduce this is reflected in practice e.g. bacterial/expiratory filters not used or not removed after nebulisation. 75% were aware that the medication deposits could damage the ventilator, with 64% knowing that medication deposits on the expiratory valve. 28% of the respondents were prescribers, of these only 38% would consider the impact on the ventilator before prescribing nebulised medication.
Conclusions: The ventilator failures due to drug deposits and the survey highlighted that the nebulisation technique through the ventilator needs to be improved to ensure efficient, safe, feasible and reproducible drug delivery for children with cardiac disorders. Prescribing nebulised medicines through the ventilator, consideration of benefits versus the risks of lack of evidence-based practice, off-label administration, HCP exposure to aerosol particles and the potential inadvertent patient harm due to damage to ventilator



needs to be considered. There is a role for pharmacists to promote safe and effective practice via prescribing and administration guidance.



P-275 / #1544

CEREBRAL VASCULAR ACCIDENTS ON MCS - RESCUING HEART TRANSPLANT ELIGIBILITY

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Background and Aim: Cerebrovascular accidents (CVA) are among the most feared complications in patients receiving mechanical circulatory support (MCS), owing to their high associated morbidity and mortality. As a substantial proportion of pediatric patients on MCS are candidates for heart transplantation, the occurrence of cerebrovascular events may significantly affect prognosis and transplant eligibility. Acute ischemic stroke caused by large-vessel occlusion can be treated with mechanical thrombectomy, which has shown increasing safety and efficacy in selected pediatric patients.
Methods: We report a single-center case series of pediatric patients supported with MCS who developed acute ischemic stroke and were treated with mechanical thrombectomy. Clinical presentation, neuroimaging findings, procedural outcomes, neurological evolution, and impact on transplant candidacy were retrospectively reviewed.
Results: Case 1: An 8-year-old girl with transposition of the great arteries underwent cardiac surgery and required post-cardiotomy left ventricular assist device support due to severe ventricular dysfunction. She developed acute left hemiparesis secondary to middle cerebral artery (MCA) occlusion. Mechanical thrombectomy achieved complete recanalization. Ten days later, she developed a massive hemorrhagic transformation of the ischemic lesion and died. **Case 2:** A 13-year-old boy with dilated cardiomyopathy supported with a left ventricular assist device (Levitronix) while awaiting heart transplantation presented with acute aphasia and right hemiparesis. Imaging confirmed left MCA occlusion. Mechanical thrombectomy with clot aspiration resulted in complete recanalization. He recovered fully without neurological sequelae and successfully underwent heart transplantation a few days later. **Case 3:** A 12-year-old boy with dilated cardiomyopathy supported with a paracorporeal biventricular pulsatile VAD developed right hemiparesis one day after implantation due to left MCA occlusion. Mechanical thrombectomy was successfully performed. Although moderate neurological sequelae persisted initially and rehabilitation was limited by other complications, neurological function gradually improved. He underwent heart transplantation six months later and currently has only mild residual motor deficits.
Conclusions: Cerebrovascular accidents are a frequent and serious complication in pediatric patients on MCS awaiting heart transplantation. Mechanical thrombectomy



appears to be a feasible and potentially effective treatment for acute ischemic stroke in this setting and may preserve or restore transplant candidacy. Careful patient selection and multidisciplinary management are essential.



P-279 / #1477

IVABRADINE FOR TREATMENT OF INCESSANT ATRIAL TACHYARRHYTHMIAS IN CONGENITAL HEART SURGERY PATIENTS UNDERGOING VALVE SURGERIES: A SINGLE CENTER OBSERVATIONAL STUDY

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Background and Aim: Atrial tachyarrhythmias of diverse pathophysiology are common after congenital heart surgeries, prolonging ventilation time and icu stay. Ivabradine is new rise for remission to normal sinus rhythm (NSR) in sick substrates with high vasoactive inotropic score (VIS) who cannot tolerate myocardial depression with conventional antiarrhythmics.

Methods: 12 patients between the age group of 3 months to 14 years, underwent valve surgery, from January 2021 to December 2022 were included in this study. All patients had VIS 20 and more. All patients started with IV dexmedetomidine infusion from operating room before sternotomy and IV digoxin (5mcg /kg/ twice a day) after post op 18 hours. Atrial tachyarrhythmias with heart rate persistently more than 170/min, not settling despite of adequate temperature control, correction of dyselectralmia and analgesia were started with per oral ivabradine 0.2 mg/kg BID. In all patient optimal hemoglobin was maintained with multimodal analgesia. Continuous monitoring of heart rate, ECG, invasive blood pressure, urine output and 4th hourly lactate levels checked. Occurrence of brady arrythmias and/ or hypotension were observed, sustained decreases in heart rate, invasive blood pressure were considered for withdrawing of ivabradine. Therapy was continued till reversion to NSR and no recurrence of atrial tachyarrhythmias, followed by discontinuation of medication.

Results: Per oral ivabradine reverts atrial tachyarrhythmias to NSR within two doses with minimal effects on haemodynamics.

Conclusions: Atrial tachyarrhythmias poses hemodynamic instability mandating immediate attention. Though IV amiodarone and beta blockers are preferred medications for rate control and reverting to NSR, causes hypotension, detrimental in patients with high VIS. Ivabradine is anodyne medication with minimal effects on cardiac inotropy, repolarization and blood pressure, making it as likely alternative for Vaughans class II/ III drugs for control of atrial tachyarrhythmias and safely used for its management, where conventional antiarrhythmics have minimal scope owing to their negative inotropic effects in patients who are already had high VIS.



P-280 / #1507

UNWANTED RANDOM VARIABILITY: FIRST ATTEMPTS TO IDENTIFY NOISE IN MEDICAL DECISION MAKING

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Background and Aim: Random variability in day-to-day decision making referred to as 'noise' is associated with variation that negatively affects reproducibility and quality of decision making. The prevalence and significance of noise in medical decision making is poorly understood. Building on our previous work, this study sought to 1) broaden the scope in which we observe noise, 2) better characterize the forms that noise takes and 3) better understand the impact of noise and the perceived effects of noise on patient care.
Methods: A survey was developed using RedCap and was distributed to staff at The Hospital for Sick Children and Seattle Children's Hospital (n=102). Ordinal regression was used to assess the association between role and specialty with noise prevalence for each survey question that is on a likert scale. The associations were quantified as ORs (odds ratios) with their corresponding 95% CIs as p values. For survey questions on presence and magnitude of perceived effects where the outcome was dichotomized logistic regression was used to assess the association between role and specialty with presence and magnitude of perceived effects.
Results: Occasion and stable pattern noise were comparable among role and specialty. Attending physicians and fellows/trainees observed more differences in the quality of judgements made by their colleagues than Nurses/Advanced practitioners (OR [95%CI]:4.427 [1.941, 10.097] and 2.095 [0.734, 5.981] respectively, p = 0.001). Attending physicians and fellows/trainees also perceived less variability in physician judgment than Nurses/Advanced practitioners. (OR [95%CI]: 0.292 [0.119, 0.716] and 0.681 [0.221, 2.095], respectively, p = 0.001) Furthermore, Nurses/Advanced practitioners were more likely than Attending physicians and Fellows/trainees to perceive that noise lowered patient/family satisfaction (OR [95%CI]: 0.316 [0.124, 0.806] and 0.686 [0.195, 2.412], respectively, p = 0.044)
Conclusions: Differences across roles were found to be most pronounced. Nurses/Advanced practitioners generally perceived noise as more influential across multiple domains, whereas Attending physicians and Fellows/trainees were less affected or perceived less variability in judgments and outcomes.



P-281 / #1414

PHARMACODYNAMIC ALTERATIONS IN PAEDIATRIC CARDIAC SURGICAL PATIENTS RECEIVING EXTRA-CORPOREAL MEMBRANE OXYGENATION (ECMO)

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Background and Aim: Extracorporeal membrane oxygenation (ECMO) is used in paediatric cardiac surgery patients who are unable to be weaned from cardiopulmonary bypass or who develop postoperative low cardiac output syndrome. ECMO constitutes a supportive modality, while definitive patient management depends on appropriate pharmacological therapy. Initiation of the ECMO circuit induces immediate alterations in drug bioavailability. To date, there are no standardized guidelines for drug dose adjustment in patients supported with ECMO. The aim of this study was to review the factors affecting drug bioavailability in paediatric patients supported with ECMO.
Methods: A systematic literature review was conducted covering the period from 1990 to 2025.
Results: Installation of ECMO results in immediate pharmacokinetic alterations of administered drugs. The additional circulating volume of the extracorporeal circuit increases the volume of distribution, leading to drug haemodilution. The synthetic materials of the circuit, which lack native endothelium, attract lipophilic drug molecules (especially with lipophilic coefficient LogP > 2), resulting in their adsorption onto circuit surfaces. Plasma albumin demonstrates increased deposition on synthetic surfaces, concomitantly sequestering highly protein-bound drugs (>70%), thereby leading to subtherapeutic plasma circulating concentrations. Continuous, non-pulsatile flow in veno-arterial ECMO disrupts hepatic metabolism, prolonging the half-life of circulating drugs. Mean arterial pressure is interpreted by the kidneys as hypotension, activating the renin–angiotensin system and resulting in fluid retention with further drug haemodilution. Acute kidney injury due to reduced cardiac output, along with increased capillary permeability, secondary to systemic inflammatory response, increases the volume of distribution, leading to dilution of hydrophilic drugs. Early postoperative lactic acidosis alters drug ionization, reducing cellular drug uptake.
Conclusions: Knowledge of the biochemical properties of drugs and understanding the pharmacokinetic alterations induced by ECMO, assist clinicians in modifying



pharmacological regimens to achieve adequate therapeutic plasma concentrations. Further clinical pharmacokinetic studies are required to establish clear dosing guidelines in patients supported with ECMO.



P-283 / #1463

CLINICAL EFFECTS OF PERSISTENT PULMONARY HYPERTENSION IN NEWBORNS DIAGNOSED WITH TRANSPOSITION OF THE GREAT ARTERIES

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Background and Aim: Transposition of the great arteries (TGA) is one of the critical congenital heart diseases of the newborn. The transition from fetal to postnatal circulation in these infants is complex, and the presence of persistent pulmonary hypertension of the newborn (PPHN) during this period may affect surgical outcomes. Evaluating autonomic functions may be useful in assessing this adaptation process. This study aims to evaluate the impact of PPHN on perioperative morbidity and mortality in infants with TGA.
Methods: The study was conducted between December 1, 2024, and December 1, 2025, in two high-volume cardiac centers, involving newborns diagnosed with TGA. Patients were divided into two groups—PPHN and non-PPHN—based on clinical and echocardiographic findings. PPHN was defined in infants with a preductal–postductal difference of more than 5% in transcutaneous oxygen saturation (SpO_2, measured between the right arm and leg) while breathing 100% oxygen, either spontaneously or via mechanical ventilation. The groups were evaluated for early-term (first 30 days) mortality and morbidity. Findings were analyzed statistically.
Results: A total of 48 newborns with TGA (60% male) were included. The median age at operation was 5 days (IQR 3–7), median weight was 3100 g (IQR 2900–3400), and the median preoperative oxygen saturation was 76% (IQR 70–82). Balloon atrial septostomy was performed in eight infants prior to ASO. PPHN was identified in thirteen infants (27%). Postoperative complication rates—including duration of vasopressor use, duration of sedative medication, length of hospital stay, and duration of mechanical ventilation—were higher in the PPHN group ($p < 0.05$). Overall mortality was 10.4%, with no significant difference between the PPHN and non-PPHN groups (15.3% vs. 8.5%; $p = 0.60$).
Conclusions: In newborns with TGA, the presence of PPHN was associated with higher



postoperative complication rates, although it did not significantly affect mortality. Improvements in intensive care and treatment strategies may have contributed to these findings.



P-286 / #13

TARGET OXYGEN PARTIAL PRESSURE IN CARDIOPULMONARY BYPASS ASSOCIATED WITH ACUTE KIDNEY INJURY DURING FONTAN SURGERY

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Background and Aim: It has been reported that high partial pressure of oxygen (PaO_2) during cardiopulmonary bypass (CPB) in cardiac surgery can cause perioperative acute kidney injury (AKI). Congenital heart disease with cyanosis requires strict PaO_2 management, yet reports are scarce. Therefore, we hypothesized that prolonged high PaO_2 during CPB is associated with perioperative AKI in Fontan surgery. Our aim was to prove this hypothesis.
Methods: Patients under 10 years of age who underwent Fontan surgery at Hokkaido University between 2013 and 2025 were classified into non-AKI and AKI groups using the KDIGO classification. The following variables were analyzed using t-tests and binary logistic regression: age, weight, preoperative cardiac output (Qs), pulmonary artery pressure (PAp), end-diastolic pressure (EDP), pulmonary vascular resistance (PVR), CPB time, maximum PaO_2, mean PaO_2, duration of PaO_2 >250 mmHg, and duration of PaO_2 >300 mmHg. For factors showing significant differences in the t-test, ROC curves and DeLong tests were performed retrospectively. $p < 0.05$ was considered significant.
Results: Out of 90, 28 (31%) were in the AKI group (Grade 1: 17, Grade 2: 7, Grade 3: 4). Age (mean 2.0 years), weight (10.5 kg), Qs (3.9 L/min/m^2), PAp (9 mmHg), EDP (6 mmHg), PVR (1.4 wood), maximum PaO_2 (266 mmHg), and mean PaO_2 (222 mmHg) showed no significant difference between the two groups. However, significant differences were observed in CPB time (91 vs. 127 min), duration of PaO_2 >250 mmHg (9 vs 35 min), and duration of PaO_2 >300 mmHg (6 vs 19 min). In binary logistic regression analysis, only CPB time was an independent predictor of AKI (odds ratio 1.015: 95% confidence interval 1.004-1.03). However, in the ROC curve analysis for the three factors, the cutoff values, AUC, sensitivity, and specificity were as follows: (117 min: 0.71: 0.79: 0.57 vs 40 min: 0.67: 0.55: 0.82 vs 30 min: 0.65: 0.75: 0.57). The DeLong test showed no significant difference among the three indices.
Conclusions: Perioperative AKI in Fontan surgery occurs in association with CPB time exceeding 117 minutes; however, relatively strict management avoiding sustained PaO_2



>250 mmHg for over 40 minutes and >300 mmHg for over 30 minutes during CPB may be crucial.



P-287 / #264

THE SILENT COMPLICATION: CLINICAL BURDEN OF DIAPHRAGM PARALYSIS FOLLOWING PEDIATRIC CARDIAC SURGERY

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Background and Aim: Phrenic nerve injury after cardiac surgery is a rare but an important problem in children who underwent cardiac surgery for congenital heart defects. Rapid assessment and multidisciplinary care iare crucial in the management of patients with diaphragm paralysis. The main objective of the study was to determine the risk factors for the development of diaphragm paralysis. Secondary objectives were to review the clinical course and treatment options of this challenging complication.
Methods: Between January 1st 2020 and January 1st 2025, patients (n=21) diagnosed with diaphragm paralysis at post-operative period after congenital cardiac surgery were included. Data of the included patients were collected and recorded from archived medical files. Statistical analyses were performed by Statistical Package for the Social Science program (SPSS-21).
Results: 21 patients (males n=7, females n=14) were included in the study. Median age was 5,37 months (0,1 - 36,03) Total corrective operation for Tetralogy of Fallot was the most common surgery type (n=5) followed by arcus reconstruction and bidirectional Glenn anastomosis operations (n=3 and n=3). %55 percent of patients were managed conservatively and did not require plication. 10 patients underwent tracheostomy and needed prolonged mechanical ventilation. Mortality occurred in 5 patients, of whom, 2 patients died at immediate post-operative period in pediatric intensive care unit, whereas 3 patients died after being discharged to home. Plication surgery and tracheostomy was not correlated with mortality.
Conclusions: Diaphragm paralysis is an important factor for morbidity after cardiac surgery. Prompt evaluation and multidisciplinary treatment plan should be undertaken as early as the clinical suspicion arises. Although it can be managed conservatively and spontaneous recovery is possible, plication surgery and or tracheostomy may be needed. This condition continues to be a burden for patients with congenital heart defects even after being discharged to home.



P-288 / #211

SWIMMING WITH L-VAD: THE CRITICAL EVENT IN THE PEDIATRIC CASE WITH L-VAD AFTER SEA WATER EXPOSURE.

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Background and Aim: Left ventricular assist devices (LVADs) are increasingly used in pediatric patients with end-stage heart failure. Although they improve survival and functional capacity, serious complications can occur.
Methods: An 11-year-old girl diagnosed with dilated cardiomyopathy (DCM) at age eight presented with progressive heart failure despite optimized medical therapy. Extensive genetic and metabolic testing was unremarkable, and cardiac MRI showed an interventricular septal enhancement defect consistent with previous myocarditis. As her condition progressed to inotrope-dependent end-stage heart failure, she was referred to our tertiary center, listed for transplantation, and underwent HeartMate 3 LVAD implantation at age 9.5 years (PEDIMACS profile 2, EF 15%). Due to emerging depressive symptoms, psychiatric follow-up and structured LVAD education were provided to both the patient and caregivers. During outpatient follow-up, the patient entered the sea, resulting in seawater exposure of the driveline and external battery system. Thirty minutes later, alarms indicated imminent battery shutdown, prompting emergency admission. She was alert and hemodynamically stable, with MAP 72 mmHg and heart rate 98 bpm. Echocardiography revealed EF 30%, severe mitral regurgitation, mild aortic regurgitation, and no right heart failure. Device interrogation confirmed moisture damage. Because of the risk of oxidation and pump malfunction, urgent replacement of the controller, battery, and modular driveline was planned. In the PICU, dobutamine infusion was initiated. During the brief 15-second LVAD interruption, her MAP fell below 45 mmHg, causing presyncope, but stability returned immediately after reconnection. She recovered uneventfully and was discharged with reinforced education and psychosocial support.
Results: Continuous-flow LVADs, particularly the HeartMate 3, have markedly improved outcomes in advanced heart failure, yet require strict adherence to device care. Water immersion is strongly prohibited, as moisture—especially seawater—can damage external components, promote bacterial contamination such as *Vibrio* species, and accelerate corrosion. These risks may result in infection, sepsis, pump malfunction, or irreversible hardware failure requiring urgent replacement and antimicrobial management.
Conclusions: This is the first pediatric case describing LVAD sea water exposure. The case



highlights the importance of repeated education, psychological support, and preparedness for high-risk interventions. This case also underlines potential infectious and corrosive risks following seawater exposure.



P-289 / #184

RAPID GENETIC TESTING FOR ALVEOLAR CAPILLARY DYSPLASIA: ECMO AS A BRIDGE TO DIAGNOSIS

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Background and Aim: Alveolar capillary dysplasia (ACD) is a rare frequently fatal developmental lung disorder presenting with severe, treatment-refractory persistent pulmonary hypertension of the newborn (PPHN). Most affected infants deteriorate rapidly despite maximal cardiopulmonary support. Early recognition is essential, yet diagnosis is often delayed due to nonspecific initial findings. We describe the clinical course and diagnostic pathway of a term neonate ultimately confirmed to have ACD.
Methods: We have reviewed the case of a term infant with profound hypoxemic respiratory failure and suprasystemic pulmonary pressures requiring two runs of ECMO, first veno-arterial (VA) and then veno-venous (VV) in a tertiary paediatric cardiac intensive care unit. We hereby describe her diagnostic trajectory, including clinical findings, imaging, and genetic testing.
Results: A term female neonate developed severe hypoxemia shortly after birth, unresponsive to inhaled nitric oxide, high-frequency oscillatory ventilation, and prostaglandin infusion. Serial transthoracic echocardiograms demonstrated a structurally normal heart with suprasystemic right-sided pressures and preserved right ventricular systolic function. Her chest CT showed no features of interstitial lung disease or pulmonary parenchymal abnormalities. Recurrent hypoxemic crises, despite maximal therapy, prompted VA-ECMO initiation, with temporary stabilisation and successful decannulation after three days. However, the patient remained dependent on pulmonary vasodilator therapy with persistent desaturations. She required re-cannulated onto VV-ECMO as a bridge to definitive diagnosis. She was stable during the second ECMO run (15 days) with no ECMO complication and on triple therapy of nitric oxide, sildenafil and epoprostenol. Rapid genetic testing identified a *de novo* FOXF1 variant, consistent with ACD, when combined with the characteristic clinical phenotype. A multidisciplinary team discussion



concluded that recovery or transplantation were not viable options for this patient. Following compassionate discussions with the family, life-sustaining therapies were withdrawn, and the infant died peacefully.

Conclusions: ACD must be considered early in term neonates with severe PPHN to ensure timely genetic assessment, which has superseded lung biopsy as the diagnostic modality of choice. ECMO support allows sufficient time to secure a definitive genetic diagnosis and enable shared decision-making and appropriate transition to family-centred palliative care.



P-291 / #369

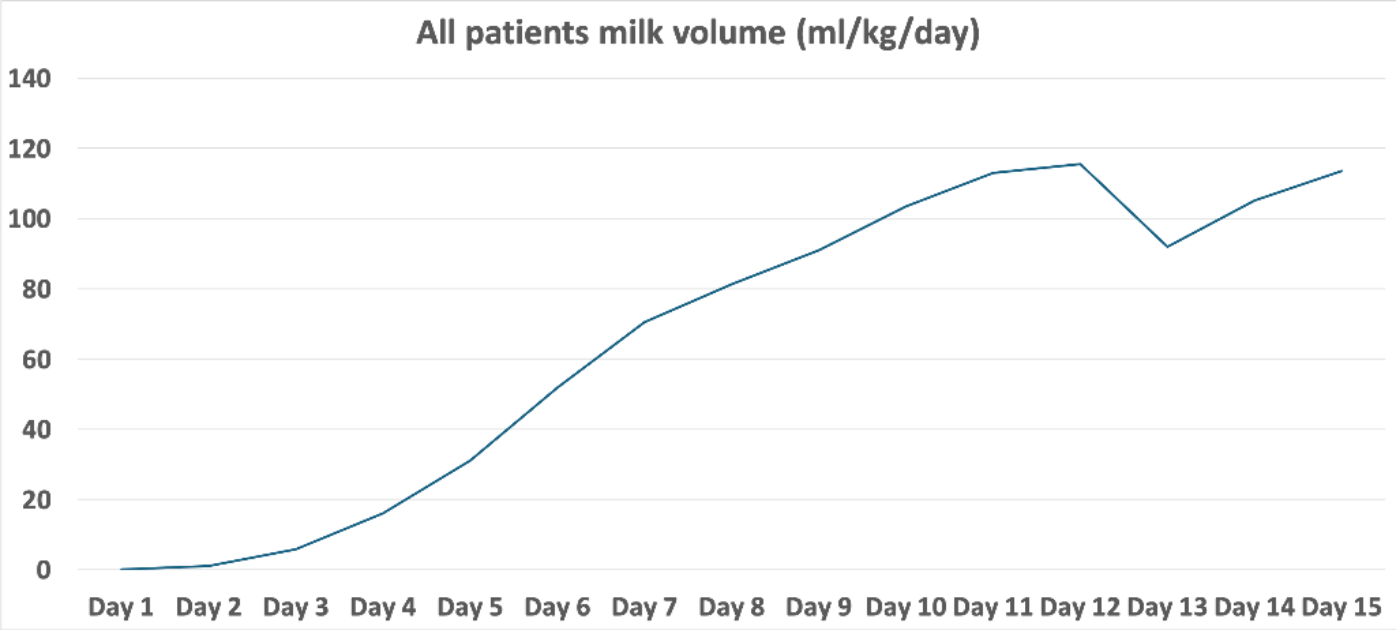
FEEDING TERM NEONATES WITH DUCT DEPENDENT CONGENITAL HEART DISEASE: VARIATION WITHIN AN INSTITUTION

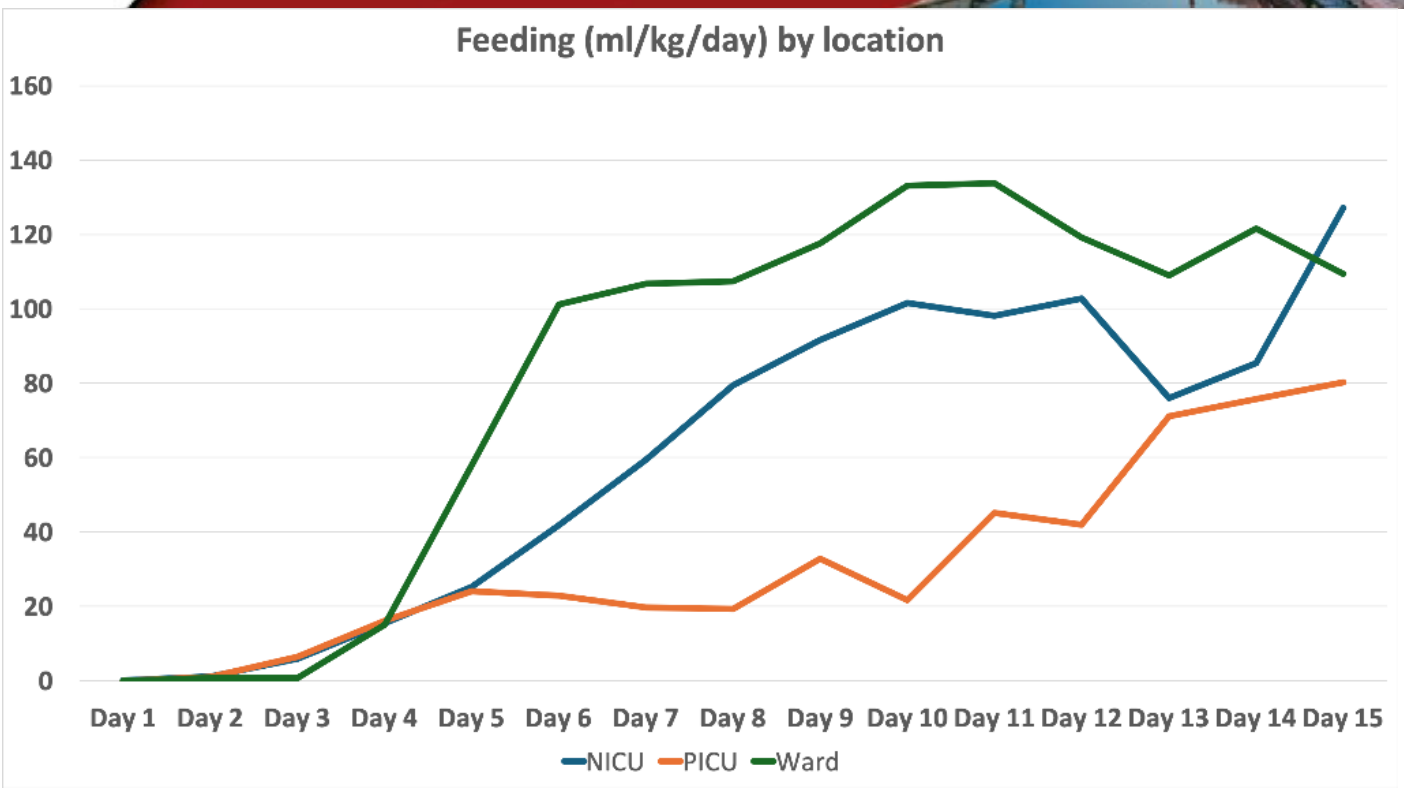
Oliver Stubbs[1], Anton Dennis[1], Manimaran Jayamurthy[1], Abhishek Oswal[1], Hannah Bellsham-Revell[2], Hammad Khan[1]
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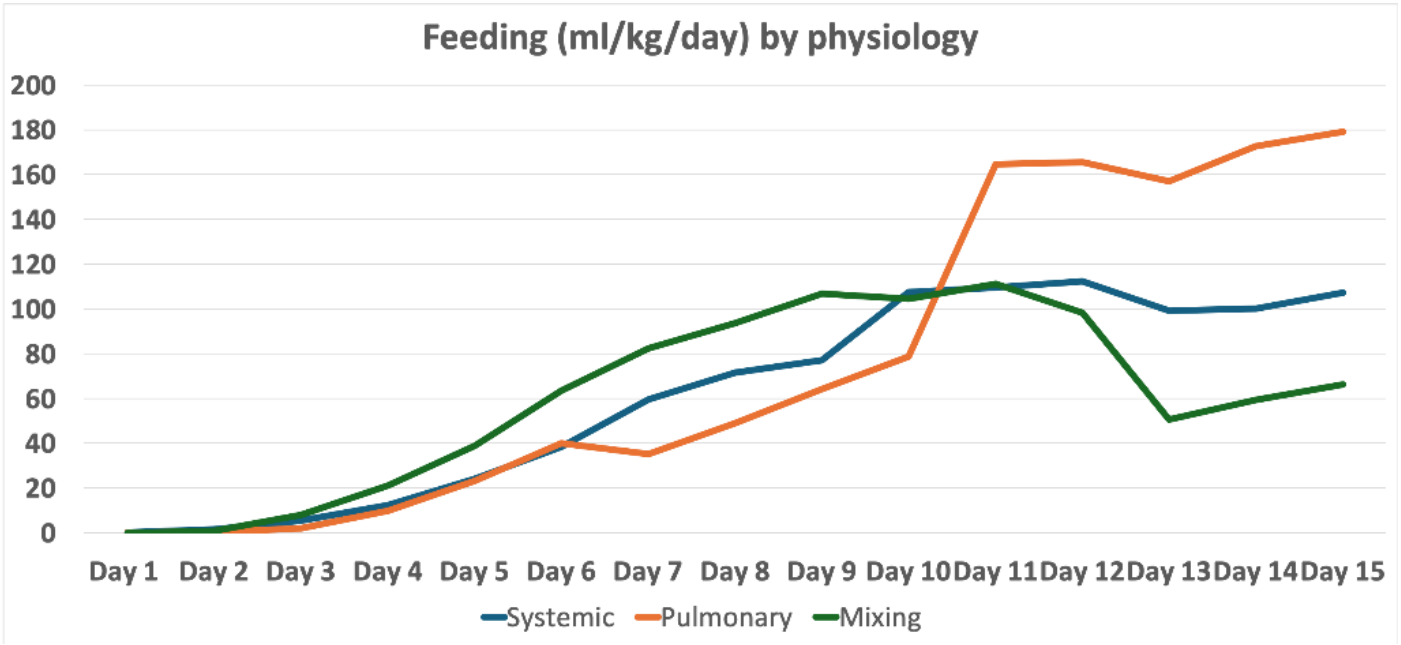
Background and Aim: Feeding neonates with critical congenital heart defects (CHDs) poses a challenge to cardiologists and intensivists. Malnutrition is associated with higher mortality, morbidity and longer duration of stay. However, infants with duct dependent CHD are often fed more restrictedly due to concerns of feed intolerance and necrotising enterocolitis (NEC). Protocolised feeding, particularly with breast milk of such infants has not shown association with increased rates of adverse events. In our institution, pre-operative feeding infants with duct dependent CHD varies significantly between the paediatric intensive care unit (PICU), neonatal intensive care unit (NICU) and the cardiology ward. We aimed to document the feeding practices across these 3 areas, and associations with adverse outcomes.
Methods: We selected all patients who received prostaglandin (n=110) in a 12-month period. We excluded those were shown to not be duct dependent, born outside of our unit, inoperable cardiac lesions, had concomitant GI pathology (TOF-OA, anorectal malformation), or born preterm. We collected demographic data (gender, birth gestation, birth weight, comorbidities, cardiac diagnosis, interventions) and adverse events (death, NEC). For each day of life until their first intervention (excluding balloon atrial septostomy) or day 15 of life, we recorded which ward they were on (PICU, NICU, cardiac ward), the type and volume of milk they were fed (formula vs breast milk).
Results:

Table 1

Total number	51
Male (%)	29 (57%)
Average Gestation	38+2 (37+0 - 40+1)
Average Weight	3119g (2170-4360g)
Duct dependent systemic circulation	22 (43%)
Duct dependent pulmonary circulation	9 (18%)
Duct dependent mixing	20 (39%)







The demographics are shown in table 1. There was 1 death pre-intervention. 1 patient developed NEC and is reported on separately. The average feeding per day of life (figure 1), and split by location (figure 2), show that infants received significantly less milk in PICU (by ANOVA of slopes). Analysis by physiology (figure 3) shows that infants with duct dependent pulmonary circulation were fed more over time.

Conclusions: We show a variation in the feeding practices across wards within a single



institution for infants with duct dependent CHD which may relate to practices on each ward. The limitations of this work include the variability in transfer of infants between the wards. We plan to use these data to generate a feeding guideline to reduce variability between wards and improve feeding rates, without impacting adverse events.



P-294 / #1362

PROLONGED MECHANICAL VENTILATION AFTER LEFT PULMONARY ARTERY SLING REPAIR: PREVALENCE AND RISK FACTORS IN CHILDREN

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Background and Aim: Left pulmonary artery sling (LPAS) is a rare congenital anomaly frequently associated with airway abnormalities and congenital heart disease (CHD). Airway compression and concomitant CHD increase the risk of postoperative respiratory complications, especially prolonged mechanical ventilation (PMV). This study aimed to determine the prevalence of PMV and identify its associated risk factors among paediatric patients undergoing LPAS repair.
Methods: A retrospective cross-sectional study was conducted involving patients aged <18 years who underwent LPAS repair at the National Heart Institute, Malaysia, between 2007 and 2023. Patients with incomplete medical records were excluded. Demographic characteristics, clinical presentation, surgical details, and postoperative outcomes were collected using a structured proforma. PMV was defined as mechanical ventilation lasting more than 7 days postoperatively. Statistical analysis was performed using IBM SPSS Statistics Version 29.0.
Results: A total of 23 patients were included, with a male predominance (60.9%). The mean age at surgery was 9.4 months (SD 24.9). Common associated cardiac defects included patent ductus arteriosus (47.8%), ventricular septal defect (43.5%), atrial septal defect (39.1%), and tetralogy of Fallot (13.0%). Airway anomalies were frequently observed, particularly tracheal stenosis (78.3%), complete tracheal rings (34.8%), tracheomalacia (8.7%), and bronchomalacia (13.0%). Presenting symptoms included respiratory distress (56.5%), stridor (52.2%), and recurrent chest infections (43.5%). PMV occurred in 10 patients (43.5%). Significant predictors of PMV were younger age at surgery ($p = 0.02$), respiratory distress at presentation ($p = 0.01$), tracheal stenosis ($p = 0.04$), Type 1A LPAS ($p = 0.02$), and postoperative sepsis ($p = 0.003$). These factors were also associated with prolonged intensive care unit stay. Overall mortality was 8.7% ($n = 2$).
Conclusions: The prevalence of prolonged mechanical ventilation following LPAS repair was high (43.5%). Younger age at surgery, respiratory distress at presentation, tracheal stenosis, Type 1A LPAS, and postoperative sepsis were significant risk factors. Early identification of high-risk patients is crucial to optimise postoperative management, reduce PMV, and improve morbidity and mortality outcomes following LPAS surgery.



P-295 / #441

PULMONARY VENO-OCCLUSIVE DISEASE (PVOD) IN CHILDREN – SINGLE CENTER EXPERIENCE WITH A HIGHLY DIFFICULT DIAGNOSIS AND TREATMENT OUT OF THE BOX

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Background and Aim: Pulmonary veno- occlusive disease (PVOD) is a very rare, often fatal entity of pulmonary hypertension (WSPH group 1.5 PH). At first clinical presentation, PVOD is often misdiagnosed as idiopathic pulmonary arterial hypertension (PAH). Treatment of PVOD remains challenging since vasodilatory, PAH-targeted drugs – at least in mid to higher dosage - frequently cause life-threatening pulmonary edema, making early correct diagnosis highly relevant. Herein we report a case series of children with PVOD illustrating the challenges of diagnosis and management of this disease.
Methods: We present the clinical features at presentation, clinical course, path to diagnosis and treatment of 3 infants with severe PVOD.
Results: All infants were diagnosed within the first year of postnatal life and presented with suprasystemic PA pressure and RV dysfunction. Suspicion of diagnosis was made mainly based on the clinical course after vasodilatory pharmacotherapy was initiated and / or somewhat typical features were found on Chest CT[. All patients received inotropic support at initially and were then treated with a combination of vasoactive substances and high doses of diuretics Two patients improved upon this treatment and are still alive and stable (8y /9y). One patient diagnosed as neonate initially improved but died due to pulmonary hypertensive crisis during sepsis at 6 months of age.
Conclusions: Adherence to diagnostic workup of patients presenting with PH and careful and repeated evaluation after initiating therapy are key to early suspicion and diagnosis of PVOD. Combination of careful, moderate vasodilation and high dose-diuretics can improve hemodynamics and survival, and thus postpone lung transplantation.



P-296 / #1382

GENETIC VARIANTS AND CANCER CARDIOTOXICITY IN CHILDREN

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Background and Aim: Toxicity from chemotherapy and radiotherapy has an adverse effect on vascular structure and function. Complications may be acute or early-onset, within the first year of treatment, but may be long-lasting and occur in childhood cancer survivors up to several years after the completion of antineoplastic therapy. The purpose of the present study is to evaluate cardiotoxicity during the treatment of children with malignancy, but also after the completion of their antineoplastic treatment.
Methods: The following genetic variants associated with cardiotoxicity were selected: rs2229774, rs7853758, rs17863783, rs1056892, rs2232228, rs4982753, rs4149178. . Regarding the choice of techniques for the echocardiographic indicators, both the classic indicators of systolic and diastolic function of the left ventricle and the newer techniques of mechanical deformation (strain) were chosen from the guidelines of t 2022 ESC Guidelines on cardio-oncology
Results: During this period, from 23/03/2022 until today, 72 children, 42 boys and 30 girls aged between three months and 16 years, who were diagnosed with neoplasia from 2022 to 2024, were included in the study. Specifically, data was collected from 16 children in 2022, 40 children in 2023 and 16 children in 2024.Ten cases of cardiotoxicity were identified, seven girls and three boys.Echocardiographic screening was completed in fourteen children. The variant rs17863783 (UGT1A6) was found once in children with cancer and never in children without cancer, and rs4149178 (SLC22A7) five times in children with cancer and once in children without cancer. The rs7853758 (SLC28A3) variant in eleven children with cancer and in eleven children without cancer. The variant rs2229774 (RARG) was found in six children with cancer and eight children without cancer, and rs4982753 (SLC 22A17) was found in five children with cancer and three children without cancer. The polymorphism rs2232228 (HAS3) was found in twenty children with cancer and twenty-five children without cancer and finally the polymorphism rs1056892 (CBR 3) was found in twenty-five children with cancer and twenty children without cancer
Conclusions: The results show similar trends to the general population. However more data is required in order to identify a statistically significant association.



P-297 / #35

PULMONARY HYPERTENSION IN CHILDREN WITH HEMATOLOGIC MALIGNANCIES: A SINGLE-CENTER COHORT FROM 2014–2025

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Background and Aim: Pulmonary hypertension (PH) may complicate the course of pediatric hematologic malignancies, but its mechanisms are not fully defined. We aimed to describe the occurrence, etiologies, and clinical course of PH in this population.
Methods: We retrospectively reviewed patients <15 years of age who underwent hematopoietic stem cell transplantation (HSCT) or received chemotherapy at Hokkaido University Hospital between January 2014 and September 2025. We assessed the presence of PH and subsequent clinical course.
Results: Among 290 pediatric cases (HSCT, n=70; chemotherapy only, n=220), PH was identified in 5 patients (1.7%). Etiologies were heterogeneous and included pulmonary arterial hypertension (PAH), suspected pulmonary veno-occlusive disease (PVOD), and suspected chronic thromboembolic pulmonary hypertension (CTEPH). Four patients had exposure to cyclophosphamide and three to busulfan. In 4 of 5 cases, PH developed during or shortly after treatment for the primary disease, necessitating pulmonary vasodilator therapy and supplemental oxygen. In two of these, PH medications were successfully discontinued within one year. In one case, no PH was evident immediately after HSCT; however, PAH was diagnosed 10 years post-transplant following chest pain and hemoptysis, requiring long-term pulmonary vasodilator therapy. Two patients died from progression of the underlying malignancy, and one experienced cardiopulmonary arrest due to a PH crisis with resultant hypoxic-ischemic encephalopathy.
Conclusions: In children with hematologic malignancies, vigilance for PH is warranted not only during active treatment and early post-treatment periods but also in the long term. Because potential PH etiologies are diverse, careful review of the oncologic course and medication exposure is essential, and individualized evaluation and management should be undertaken.



P-298 / #714

PERSISTENT PULMONARY HYPERTENSION OF THE NEWBORN: THE RECENT REALITY OF A TERTIARY CARE HOSPITAL

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Background and Aim: Persistent pulmonary hypertension of the newborn (PPHN) morbimortality is influenced by perinatal risk factors (RF) and initial echocardiographic severity. Emerging therapeutic strategies show promising effects on patient outcomes. This study aimed to characterise newborns with PPHN admitted to a tertiary hospital (presentation, management, and clinical evolution).
Methods: Observational, retrospective, longitudinal study including newborns admitted with PPHN between January/2018-June/2024. Patients with CHD were excluded. PPHN severity was classified as mild when the pulmonary artery systolic pressure (PASP) was <2/3 SBP; moderate if between 2/3 SBP and systemic levels; and severe if PASP systemic/supra-systemic. VIS was used as an indirect measure of clinical severity. Clinical improvement: reduction in PASP and decreased requirements for oxygen therapy/ventilatory support/cardiovascular support.
Results:



Table 1. Treatment during patients' stay in the intensive care unit.

Treatment		n (%) / median [IQR]
Surfactant		53 (66)
IMV HFV		65 (81) 2 (3)
iNO		18 (23)
Oral sildenafil		9 (11)
iNO or oral sildenafil		24 (30)
iNO and oral sildenafil		3 (4)
Cardiovascular support (n = 35)	1 drug	15 (19)
	2 drugs	15 (19)
	3 drugs	5 (6)
	Dopamine	26 (33)
	Dobutamine	21 (26)
	Epinephrine	10 (13)
	Milrinone	3 (4)
	VIS, μg/kg/min	15 [9-25]
Oral sildenafil and cardiovascular support Sildenafil and milrinone		2 (3) 1 (1)
ECMO		0 (0)

Abbreviations: ECMO – extracorporeal membrane oxygenation; HFV – high-frequency ventilation; IQR – interquartile range; IMV – invasive mechanical ventilation; iNO – inhaled nitric oxide; VIS – vasoactive inotropic score.
$\alpha = 0.05$.
The results are rounded to the nearest whole number.



Table 2. Univariate analyses of PPHN severity and mortality in relation to demographic and clinical variables.

Demographic and clinical variables	PPHN severity			Mortality	
	Mild (n = 10)	**Moderate** (n = 33)	**Severe** (n = 37)	**Survivors** (n = 68)	**Non-survivors** (n = 12)
GA - median [IQR], weeks	0.140[a]			**0.038**[a]	
	38 [35-39]	37 [32-40]	36 [28-38]	37 [31-39]	27 [26-39]
BW - median [IQR], grams	0.142[a]			**0.005**[a]	
	3017 [2264-3568]	2860 [1795-3300]	2570 [893-3185]	2862 [1765-3422]	843 [610-2969]
Severe oligohydramnios (n = 10) - n (%)	0.299[b]			**0.034**[b]	
	0	3 (9)	7 (19)	6 (9)	4 (33)
Pulmonary haemorrhage (n = 6) - n (%)	0.402[b]			**0.041**[b]	
				3 (4)	3 (25)
Surfactant - n (%)	0.500[c]			**0.006**[b]	
				41 (60)	12 (100)
IMV	0.075[c]			0.109[b]	
iNO	0.132[c]			0.129[b]	
Sildenafil	0.172[b]			0.999[b]	
iNO or sildenafil - n (%)	**0.042**[c]			0.168[b]	
	0	9 (27)	15 (41)	18 (26)	6 (50)
Cardiovascular support (n = 35) - n (%)	**0.006**[c]			**<0.001**[c]	
	0	14 (42)	21 (57)	24 (35)	11 (92)
VIS (n = 35) - median [IQR], µg/kg/min	0.562[a]			**0.041**[a]	
				10 [8-23]	25 [14-50]
Length of stay	0.064[a]			-	
Death (n = 12)	0.249[b]			-	

Abbreviations: BW – birth weight; GA – gestational age; IQR – interquartile range; IMV – invasive mechanical ventilation; iNO – inhaled nitric oxide; PPHN – persistent pulmonary hypertension of the newborn; TP – hypertensive pneumothorax; VIS – vasoactive inotropic score.
α = 0.05. a – Kruskal-Wallis test; b – Fisher's exact test; c – Chi-squared test.
Median, percentage and IQR values are rounded to the nearest whole number.

Table 3. Multivariate analysis of mortality.

	BW	CV support	iNO or sildenafil
Mortality	**0.008** (OR 0.999, CI 95% 0.998-1.000)	**0.008** (OR 29, CI 95% 2-343)	0.081

Abbreviations: BW – birth weight; CI – confidence interval; CV – cardiovascular; iNO – inhaled nitric oxide; OR – odds ratio.
$\alpha = 0.05$.
Logistic regression: likelihood ratio $\chi^2 = 25.1$; Hosmer–Lemeshow test: $p = 0.525$; Nagelkerke $R^2 = 0.472$.

Eighty newborns (51% male) were included. The median gestational age was 37 weeks [29-39], and the median BW was 2777g [1333-3337]. Approximately 13% had mild PPHN, 41% moderate, and 46% severe. The most frequent perinatal RF were early sepsis (41%) and meconium aspiration syndrome (29%). Table 1 presents the treatments administered. Surfactant was given to 66%; 81% required IMV; 23% iNO, 11% sildenafil, and 4% iNO+sildenafil. Cardiovascular support was initiated in 44%, with a median VIS of 15µg/kg/min. Clinical improvement occurred a median of D3 post-diagnosis. The median length of stay was 13 days [9-30]. The overall mortality rate was 15% (67% with severe and 33% with moderate PPHN). There was a trend towards lower median BW with increasing severity, and severe PPHN cases more frequently had a history of oligohydramnios and tension pneumothorax. Significant associations between PPHN severity and the need for pulmonary vasodilators and cardiovascular support were observed (Table 2). Multivariate analysis of PPHN severity, adjusting for demographic and perinatal RF, did not reveal significant associations. Mortality was significantly associated with low gestational age, low BW, oligohydramnios and pulmonary haemorrhage. Higher VIS was associated with mortality, highlighting its role as a marker of clinical instability (Table 2). Predictors of



mortality were lower BW and cardiovascular support (Table 3).

Conclusions: More than the initial classification, clinical evolution determined prognosis. This underscores the importance of early individualised intervention, including the use of promising therapies (iNO+sildenafil or sildenafil+milrinone).



P-299 / #537

ORAL ENOXIMONE AS ADJUNCT THERAPY FOR PAEDIATRIC DIASTOLIC DYSFUNCTION: TWO CASE REPORTS

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Background and Aim: Managing paediatric diastolic dysfunction from cardiomyopathy or restrictive physiology in congenital heart disease is challenging, as few medication directly improve myocardial relaxation; current therapy is mainly supportive. Phosphodiesterase type-3 inhibitors like enoximone enhance lusitropy and inotropy by increasing cAMP, improving compliance, and reducing filling pressures, but oral long-term options are scarce. Limited paediatric data e.g., Fürck et al. suggest oral enoximone benefits end-stage heart failure, though evidence in diastolic dysfunction is lacking. We present two cases of oral enoximone in children with restrictive physiology, highlighting symptomatic and echocardiographic changes.

Methods: Two patients under tertiary paediatric cardiology care were considered for oral enoximone after multidisciplinary review due to persistent symptoms despite optimal conventional therapy. Patient 1: An 8-year-old with hypertrophic cardiomyopathy with restrictive physiology and severe left atrial dilatation (TNNT2 mutation). Patient 2: A 2-year-old with restrictive cardiomyopathy and preserved systolic function (TNNI3 mutation). Treatment, including dosing and monitoring, was guided by published paediatric experience. Retrospective data included echocardiographic indices, clinical symptoms, and adverse events.

Results: Patient 1 demonstrated improved diastolic relaxation after three months, with E/A ratio decreasing from 1.59 to 1.12, deceleration time shortening by 44 ms, and E/E' septal reducing by 1.3. LVEDD decreased by 5 mm, while tricuspid regurgitation (TR) gradient remained stable. Left atrial volume increased slightly. Clinically, exercise tolerance improved with no arrhythmias or adverse effects. Patient 2 showed more pronounced changes over six months; E/A ratio decreased from 2.02 to 1.29, E/E' septal reduced by 5.2, and E/E' lateral by 9.6. TR gradient reduced by 14 mmHg, while LV size increased modestly (19 mm (Z+0.4) to 29 mm (Z+0.1)). Left atrial enlargement persisted despite a small reduction in volume. Parents reported improved feeding and fewer breathless episodes; no arrhythmias or intolerance occurred. Overall, both patients tolerated oral enoximone well, with consistent symptomatic improvement and moderate echocardiographic changes despite persistent atrial enlargement.

Conclusions: Oral enoximone was well tolerated, associated with symptomatic improvement and changes in diastolic indices. However, these changes may reflect



underlying disease evolution or concurrent management rather than a direct effect of enoximone. Further prospective studies are required to determine efficacy, optimal dosing, and long-term safety.



P-300 / #754

REVERSIBLE SEVERE PEDIATRIC PULMONARY HYPERTENSION SECONDARY TO PERNICIOUS ANEMIA: RECOVERY WITH ECMO AND OFF-LABEL ENDOTHELIN RECEPTOR ANTAGONIST USE

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Background and Aim: Pulmonary hypertension (PH) in children is typically secondary to congenital heart disease or chronic lung pathology. Nutritional etiologies such as vitamin B12 deficiency are exceedingly rare but potentially reversible. We report a case of severe PH in a child with pernicious anemia, successfully managed with extracorporeal membrane oxygenation (ECMO) and off-label endothelin receptor antagonist therapy. The aim is to highlight the importance of recognizing reversible metabolic causes of PH and the role of advanced supportive strategies in recovery.
Methods: A 6-year-old boy with autism and restrictive diet presented with progressive fatigue, pallor, and dyspnea. Laboratory evaluation revealed severe anemia (hemoglobin 6 g/dL), markedly reduced vitamin B12 and folate levels, and elevated N-terminal pro-brain natriuretic peptide (NT-proBNP). Echocardiography demonstrated severe PH with tricuspid regurgitant jet velocity of 4.4 m/s (right ventricular systolic pressure ~79 mmHg), right ventricular dilation, and mild pericardial effusion. Despite maximal therapy with dual phosphodiesterase-5 inhibitor and endothelin receptor blockade, the patient developed cardiogenic shock requiring veno-arterial ECMO.
Results: ECMO provided circulatory stabilization, allowing correction of nutritional deficiencies and optimization of pulmonary vasodilator therapy. NT-proBNP decreased from 30,974 pg/mL to 803 pg/mL, correlating with progressive improvement in right ventricular function and pulmonary pressures. Serial echocardiography confirmed normalization of right ventricular size and function, with resolution of PH. The patient was successfully weaned from ECMO and discharged in stable condition. Follow-up demonstrated sustained recovery with complete reversal of cardiopulmonary abnormalities.
Conclusions: This case underscores that vitamin B12 deficiency can cause endothelial dysfunction and pulmonary vascular remodeling, leading to severe but reversible PH. Early recognition of metabolic etiologies, timely initiation of supportive measures such as ECMO, and judicious use of pulmonary vasodilators can prevent irreversible cardiopulmonary damage. The complete recovery achieved in this child emphasizes the



need for heightened awareness of nutritional causes in pediatric PH and supports consideration of advanced therapies as a bridge to metabolic correction.



P-301 / #1402

TREPROSTINIL RESCUE THERAPY IN NEONATAL PULMONARY HYPERTENSION: DUBAI EXPERIENCE WITH CONGENITAL DIAPHRAGMATIC HERNIA AND EXTREME PREMATURITY

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Background and Aim: Persistent pulmonary hypertension of the newborn (PPHN) remains a major challenge in neonates, particularly in congenital diaphragmatic hernia (CDH) and extreme prematurity. Conventional vasodilators such as sildenafil and bosentan often fail, and extracorporeal membrane oxygenation (ECMO) is not always feasible. Treprostinil, a prostacyclin analogue, has rarely been reported in this population. We present our Dubai experience with treprostinil in critically ill neonates and preterm infants, highlighting feasibility, safety, and outcomes, and proposing a structured program for earlier escalation of therapy.
Methods: Retrospective case series of three infants treated with treprostinil for severe PH refractory to standard therapy: **Extremely low birth weight triplet (23+4 weeks GA, 380 g)** with severe PPHN and refractory hypoxemia despite HFOV and iNO. **Term neonate (1.9 kg) with left CDH, dysmorphic features, large PDA with right-to-left shunt, TR gradient up to 130 mmHg, sepsis, and refractory PH despite sildenafil, bosentan, iNO, and inotropes. Term male (3.1 kg) post-operative left CDH repair, complicated by pneumonia, sepsis, and refractory PH despite sildenafil, bosentan, iNO, and inotropes.**
Treprostinil was initiated intravenously via central line, titrated gradually, and monitored with serial echocardiography and NT-proBNP.
Results: Both CDH patients, already on sildenafil and bosentan, demonstrated significant improvement after treprostinil initiation: oxygen saturation increased, oxygen requirement decreased, and echocardiography showed improved shunt direction, reduced pulmonary artery pressures, enhanced right ventricular function and size, and improved left ventricular filling. The ELBW infant tolerated therapy with stabilization of oxygenation. Blood pressure stabilization required ongoing inotropes, but no additional adverse effects were observed
Conclusions: Treprostinil may represent a viable therapeutic option for refractory neonatal PH, even in extreme prematurity and complex congenital anomalies such as CDH. Our Dubai experience demonstrates feasibility, safety, and encouraging outcomes, marking the first reported pediatric treprostinil series from the MENA region. These results prompted us



to propose a comprehensive program for advancing PH therapies earlier when conventional treatments fail, with the goal of improving survival and long-term outcomes in this vulnerable population.



P-302 / #341

SINGLE-CENTER EXPERIENCE WITH ENALAPRILAT ORODISPERSIBLE MINITABLETS (ODMT) IN INFANTS WITH CONGENITAL HEART DISEASE-ASSOCIATED HEART FAILURE

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Background and Aim: Background: Congenital heart disease (CHD) is the most common cause of congestive heart failure (HF-CHD) in children. Despite a significant need for evidence-based pharmacological treatment strategies, observational and clinical trial data on HF-CHD is sparse in children and especially in infants. Current concepts are usually extrapolated from adult guidelines, with angiotensin-converting enzyme inhibitors (ACEi) being one of the most commonly prescribed medications for CHD-HF. The recent availability of enalaprilat orodispersible minitablets (ODMT) provide a new alternative for infants with HF-CHD. Aim: To describe our experience with enalaprilat ODMT for HF-CHD in infants < 1 year of age.
Methods: We performed a single-center retrospective analysis in infants with pre- and post-operative HF-CHD, who received enalaprilat ODMT. Changes in heart rate, respiratory rate and blood pressure and weight were analyzed. In addition, adverse events (i.e. severe arterial hypotension, hyperkaliemia) were recorded and nursing staff was asked to complete a standardized questionnaires to describe their experience with enalaprilat ODMT in comparison to previously available liquid formulations.
Results: We identified 12 infants who received enalaprilat ODMT pre- and/or postoperatively for CHD-HF. The groups was heterogenous in regard to underlying CHDs and included simple shunt defects and more complex CHD. In all cases, enalaprilat ODMT were part of a combined pharmacological regimen for HF-CHD, which usually also encompassed beta-blockers and spironolactone. Enalaprilat ODMT were well-tolerated and no adverse events were recorded. We observed reductions in heart and respiratory rates, and systolic blood pressures in most cases. Nursing staff questionnaires (n=20) revealed “safety“, "exact dosing“ and “easier application“ as the most commonly provided reasons for favoring ODMT over liquid formulations.
Conclusions: Conclusion: We herein provide single-center real-world data on HF-CHD therapy in infants. Enalaprilat ODMT were well-tolerated as part of a standardized HF-CHD regimen. In addition, nursing staff generally favored ODMT over liquid formulation. However, more systematic research and controlled trial data is mandatory to further explore the role of ODMT in pediatric heart failure treatment.



P-303 / # 1185

UTILISING PLASMA BIOMARKERS AND MODIFIED ROSS SCORE FOR THE EARLY DETECTION OF CARDIAC DYSFUNCTION IN CHILDREN WITH SINGLE VENTRICLE PHYSIOLOGY

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Background and Aim: Children with single ventricle physiology are at significant risk of developing ventricular dysfunction over time. In stable individuals, cardiac dysfunction is largely identified on echocardiography. This study aimed to assess if plasma biomarkers and Modified Ross score corelated to echocardiography and could identify early evidence of heart failure.

Methods: All children with single ventricle physiology were invited to participate in this prospective cohort study between March 2022 and July 2023. Participants underwent 6-monthly clinical assessment, echocardiograms and blood sampling. Plasma was analysed for NT-proBNP, Troponin T, sST2 and Tetranectin. Modified Ross scores were calculated for each participant and used to define heart failure status.

Results: 63 participants were recruited with a median age of 7 years. 97% (61/63) were outpatients. Two participants died during follow up. Modified Ross scores ranged from 0-16 with a median score of 1, mean score of 1.55. There was a statistically significant positive correlation between NT-proBNP ($r(52)=0.566$, $p=<0.001$), Troponin values ($r(52)=0.446$ $p=<0.001$) and Modified Ross score at all study appointments. There was no significant correlation between sST2 or Tetranectin and Modified Ross score. There was no consistent correlation between the biomarkers and systolic functional parameters on echocardiogram. However, Troponin and sST2 had significant positive correlation with 3D-EF in the HLHS sub-analysis (n=27). Overall, the NT-proBNP values were similar to healthy, age matched controls, Troponin T levels were generally low, sST2 values correlated to diastolic dysfunction on echocardiogram and Tetranectin was higher in the children with adverse outcomes. The Modified Ross score was highest in children with adverse outcomes, the subgroup of HLHS and pre 3rd surgical stage. It correlated to Simpsons EF, 3D EF, FAC, GLS, AVVR and qualitative EF assessment on echocardiogram.

Conclusions: This cohort of children with single ventricle physiology had minimal evidence of heart failure using the Modified Ross score. Whilst this limited the usefulness of biomarker analysis, it suggested there may be a role for the Modified Ross score in quantifying heart failure in this cohort as it includes, NT-proBNP and ejection fraction and



clinical evidence of heart failure. This could be a useful longitudinal tool for identifying early deterioration before evident on echocardiogram alone.



P-304 / #282

YIELD OF A NON-INVASIVE SCREENING PROGRAMME FOR HERITABLE PULMONARY ARTERIAL HYPERTENSION IN CHILDREN

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Background and Aim: Current guidelines recommend disease screening in asymptomatic individuals with first degree relatives with heritable pulmonary arterial hypertension (HPAH) or who test positive for a PAH-causing gene mutation (PAH-gene). Data for yield and outcomes of such an approach are lacking in children. We sought to assess the yield of a paediatric PAH screening programme.
Methods: Retrospective review of children 18 years referred to a national centre since 2001 and who underwent PAH screening. We identified asymptomatic children referred for screening due to either incidental identification of a mutation in PAH-gene or a relative with HPAH. The screening programme consisted of annual clinical assessment, ECG and echocardiography. The *screened-PAH cohort* of screen-detected PAH patients were compared to a *familial-PAH cohort* of children with HPAH with a family history of HPAH following symptomatic presentation.
Results: Sixty-seven children underwent screening: 64 (95%) due to a family history of HPAH (48 (72%) had a PAH-gene variant in the family, 16 (24%) had no known familial PAH-variant) and 3 (4%) due to a microdeletion encompassing the BMPR2 gene without a family history of PAH. High echocardiographic probability of pulmonary hypertension was identified in 6 (9%) children on initial screening and in a further child after 1 year. All 7 children from the screened-PAH cohort were identified to be PAH-gene variant carriers (ACVRL1=1, BMPR2=4, TBX4=2). Twenty children formed the familial-PAH cohort, with 9 (45%) having a PAH-gene identified in the family. Children in the familial-PAH cohort were more likely to be in FC III/IV (65% versus 14%, p=0.03) and to be treated with upfront combination therapy including a prostanoid analogue (60% versus 0%, p=0.01). At 1 year from diagnosis all children in the screened-PAH cohort were alive (6 reassessed, 1 not reached 1-year follow-up), whereas 2 (10%) children died in the familial-PAH cohort.
Conclusions: A significant proportion of children undergoing screening for HPAH are found



to have PAH. Non-invasive screening can identify children with PAH before severe symptoms develop.



P-307 / #636

CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION IN A CHILD WITH CONGENITAL HEART DISEASE: DIAGNOSTIC CHALLENGES AND SUCCESSFUL SURGICAL CURE

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Background and Aim: Chronic thromboembolic pulmonary hypertension (CTEPH) is exceptionally rare in children, even in those with congenital heart disease. Pediatric risk factors may include previous cardiac surgery and prothrombotic triggers such as prior viral infections, including COVID-19. We describe the course of a 12 year old boy with tricuspid valve dysplasia who had undergone surgical tricuspid valve repair two years before symptom onset and later developed CTEPH following acute pulmonary embolism. The aim of this report is to highlight diagnostic challenges, therapeutic decision-making, and the importance of early recognition of CTEPH in children.
Methods: This case summarizes multiple hospitalizations and follow-up assessments. Data were collected from medical records, including symptoms, laboratory findings, echocardiography, CT pulmonary angiography, surgical and interventional procedures, and outpatient evaluations. Management included anticoagulation, targeted pharmacotherapy, cardiac surgery, and long-term clinical monitoring.
Results: The patient initially presented with progressive exercise intolerance, fever, and hemoptysis. Imaging showed a right ventricular thrombus and pulmonary embolism. Laboratory tests revealed elevated anti–SARS-CoV-2 antibodies. Treatment began with therapeutic heparin, later transitioned to rivaroxaban after stabilization. Despite appropriate anticoagulation, pulmonary hypertension persisted, and the thrombotic burden in the pulmonary arteries did not diminish. Echocardiography continued to show elevated right ventricular pressures, and perfusion defects remained unchanged. Persistent symptoms and stable thrombotic material raised suspicion of CTEPH. Riociguat was initiated as targeted therapy for pulmonary hypertension. The patient underwent surgical removal of the right ventricular thrombus, followed by referral for definitive treatment. Bilateral pulmonary endarterectomy was performed successfully. The postoperative period was uncomplicated. A progressive improvement in hemodynamic parameters was observed, including resolution of pulmonary hypertension and



normalization of right ventricular systolic function. Clinically, the patient experienced a gradual return to full physical performance, ultimately regaining the level of exercise tolerance present before the onset of symptoms.

Conclusions: This case highlights the extreme rarity of CTEPH in pediatric patients and demonstrates the need to consider this diagnosis in children with persistent pulmonary hypertension. Prior cardiac surgery and serological evidence of previous COVID-19 infection may have contributed to a prothrombotic state. A multimodal treatment approach - including anticoagulation, targeted medical therapy, and ultimately pulmonary endarterectomy - resulted in full clinical and hemodynamic recovery.



P-308 / #541

CIRCULATING NON-CODING RNA SIGNATURES IN HIGH-PERFORMING FONTAN PATIENTS: MULTI-OMIC INTEGRATION REVEALS PATHWAYS UNDERLYING SUBCLINICAL ORGAN DYSFUNCTION

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Background and Aim: Background: Although the Fontan procedure is essential for sustaining life in individuals with functionally univentricular hearts, it is fundamentally suboptimal and subjects patients to chronic systemic venous hypertension and reduced cardiac output. Fontan-associated comorbidities are common yet poorly understood. Of particular interest are the so-called high-performance Fontan (HPF) patients - defined by preserved exercise capacity, good ventricular function, valve competency, and no overt Fontan-associated comorbidities. To date, the molecular features that distinguish HPF patients remain unknown. However, distinct molecular signatures suggestive of adaptive or protective mechanisms are highly plausible. **Aim:** This study seeks to characterise the transcriptomic profiles of HPF patients in comparison to healthy controls and subsequently integrate these findings with previously published serum metabolomic and proteomic analyses from the same cohort. Using a multilayer omics approach, this study aims to elucidate the biological significance of the identified analytes and reveal functional interactions associated with HPF physiology.
Methods: Untargeted transcriptomic profiling of circulating non-coding RNA species was performed on serum samples from 20 HPF patients and 20 healthy controls matched for sex and age. These data will be integrated with previously generated proteomic and metabolomic datasets from the same cohort using the multivariate multi-omics integration framework, such as mixOmics.
Results: Preliminary transcriptomic profiling has identified candidate non-coding RNAs dysregulated in Fontan circulation. The final integrated multi-omics analysis - incorporating transcriptomic, proteomic, and metabolomic data from the same cohort - will be completed prior to the conference, and the full results will be presented.
Conclusions: This study presents the first analysis of circulating non-coding RNA profiles in HPF patients. Although integration of these transcriptomic data with existing proteomic and metabolomic datasets from the same cohort - using the mixOmics framework - is still underway, this integrative approach is expected to enable a systems-level understanding of multi-omic crosstalk and, consequently, may reveal convergent molecular pathways underlying both end-organ remodelling and other Fontan comorbidities.



P-309 / #546

MARIBAVIR TREATMENT FOR REFRACTORY CYTOMEGALOVIRUS INFECTION IN A HIGH-RISK PAEDIATRIC ORTHOTOPIC HEART TRANSPLANT RECIPIENT – INITIAL POLISH EXPERIENCE: A CASE REPORT

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Background and Aim: Cytomegalovirus (CMV) infection poses a significant clinical challenge post-solid organ transplantation, especially in high-risk recipients (D+/R-), impacting graft survival and patient morbidity. While ganciclovir/valganciclovir is standard first-line therapy, drug-refractory cases necessitate second-line agents. Current therapies (foscarnet, cidofovir) are limited by severe nephrotoxicity or myelosuppression. Maribavir, a novel anti-CMV agent, has proven effective in adults with refractory CMV, but its use in paediatric transplant recipients remains limited.
Methods: A 16.5-year-old male, 6 months post heart transplantation (HTX) due to Fontan circulation failure, developed high-level CMV viremia. Given the CMV seropositive donor/seronegative recipient status (D+/R-), the patient was classified as high risk, and prophylactic valganciclovir was initiated immediately post-transplant. During prophylaxis, a gradual increase in CMV PCR viremia was observed. After therapeutic valganciclovir, he achieved viral clearance, which was sustained for 8 weeks post-cessation. However, viremia rapidly recurred. Upon re-initiation of therapeutic valganciclovir, the patient responded well initially, but after 4 weeks of continued dosing, the viral load began to rise, eventually peaking at 3.9x10^3 IU/ml. Concurrently, substantial leukopenia was observed. Despite optimized immunosuppression, maximized valganciclovir (with therapeutic pharmacokinetics), and anti-CMV immunoglobulin infusions, the patient failed to achieve sustained virological clearance and was diagnosed with refractory CMV infection. To address persistent viral replication and avoid the substantial toxicities associated with foscarnet/cidofovir, an off-label 8-week course of Maribavir was initiated following Institutional Bioethics Committee approval.
Results: Maribavir treatment was well tolerated, with transient dysgeusia as the only adverse event. No bone marrow suppression or abnormal liver/kidney functions were



observed. The therapy resulted in a rapid virological response, achieving three consecutive undetectable plasma CMV PCR results. CMV viremia remained undetectable for at least 3 months following the completion of the 8-week Maribavir course.

Conclusions: This case, representing the first reported use of Maribavir in a paediatric HTX recipient in Poland, highlights the significant challenges of managing refractory CMV infection in high-risk paediatric patients. Maribavir proved to be an effective and well-tolerated therapeutic option, leading to virological response where standard first-line and supportive therapies had failed. Maribavir should be considered as a safe and effective alternative for refractory CMV infection in the paediatric HTX population.



P-310 / #1212

LATE GADOLINIUM ENHANCEMENT AFTER HEART TRANSPLANTATION: BURDEN AND TEMPORAL EVOLUTION IN PEDIATRIC AND ADULT RECIPIENTS

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Background and Aim: Cardiac magnetic resonance (CMR) is a promising non-invasive tool for evaluating acute rejection in heart transplant (HTx) recipients. Late gadolinium enhancement (LGE) reflects myocardial injury and fibrosis and has been associated with adverse long-term outcomes in adult HTx populations, while evidence in pediatric recipients remains limited. We aimed to characterize the burden and temporal evolution of LGE after HTx in pediatric and adult recipients.
Methods: We conducted a 5-year (2020-2025) retrospective cohort study including all adult and pediatric HTx recipients who underwent clinically indicated CMR during the study period (total n = 137; adults 28/87 [32%], pediatrics 47/50 [94%]). LGE was assessed qualitatively and quantitatively using visual interpretation and full-width half-maximum-based quantification (Medis Suite 4.0). Demographic and clinical variables were extracted from the electronic medical record (Table).
Results: At baseline, LGE prevalence was similar in pediatric and adult recipients (26/47 [55%] vs 20/28 [71%], p = 0.166). However, quantitative LGE extent was lower in pediatric patients (median 3.0%, IQR 2.0-7.0) than in adults (median 6.5%, IQR 4.3-8.8; p = 0.040). The first CMR was performed later after HTx in pediatric recipients (median 24 months, IQR 6-85) compared with adults (median 3.0 months, IQR 2-10). Donor-specific antibodies at transplantation were more frequent among pediatric patients with LGE (23% vs 0%, p = 0.031). Follow-up CMR was available in 20 pediatric and 18 adult recipients. Over a mean follow-up of 12 months in children and 9 months in adults, quantitative LGE remained stable. In pediatric recipients, median LGE extent was 1.0% (IQR 0.0-2.5) at baseline and 2.0% (IQR 0.0-5.0) at follow-up (p = 0.241). In adults, median LGE extent was 3.5% (IQR 0.0-8.0) at baseline and 2.5% (IQR 2.0-4.0) at follow-up (p = 0.223). New LGE was detected in 9 pediatric and 8 adult recipients during follow-
up.



Table. Baseline characteristics

Pediatric N = 47			
Baseline CMR	**LGE+**	**LGE-**	**P-value**
Age at Htx (years)	5.93 (1.1-12.7)	7.96 (1.7-11.6)	0.765
Sex, female	13 (50%)	13 (62%)	0.414
HTx indication			0.355
CHD	9 (35%)	5(24%)	
DCM	8 (31%)	8 (38%)	
ICM	0 (0%)	0 (0%)	
Other CM	9 (35%)	6 (29%)	
Other	0 (0%)	2 (10%)	
ECMO before HTx	8 (31%)	3 (14%)	0.185
VAD before HTx	7 (27%)	4 (19%)	0.390
DSA at HTx	6 (23%)	0 (0%)	**0.031**
Ischemic time (min)	206 (153-249)	207 (140-251)	0.835
Post-HTx ECMO	10 (38%)	4 (19%)	0.148
LGE %	3.0 (2.0-7.0)		
Adult N = 28			
Baseline CMR	**LGE+**	**LGE-**	**P-value**
Age at Htx (years)	53.98 (45.7-61.3)	59.71 (52.7-64.0)	0.286
Sex, female	4 (20%)	4 (50%)	0.64
HTx indication			0.538
CHD	2 (10%)	0 (0%)	
DCM	8 (40%)	3 (38%)	
ICM	5 (25%)	2 (25%)	
Other CM	4 (20%)	1 (13%)	
Other	1 (5%)	2 (25%)	
ECMO before HTx	7 (35%)	3 (38%)	0.615
VAD before HTx	5 (25%)	3 (38%)	0.411
DSA at HTx	5 (25%)	0 (0%)	0.158
Ischemic time (min)	192 (168-213)	194 (101-215)	0.899
Post-HTx ECMO	4 (20%)	0 (0%)	0.237
LGE %	6.5 (4.3-8.8)		

The values are expressed as median (IQR) or n (%). The bold values denote statistically significant differences.

Conclusions: Pediatric and adult HTx recipients had similar LGE prevalence, but pediatric recipients demonstrated a lower quantitative LGE burden. LGE extent did not change significantly over short-term follow-up, although new LGE emerged in a subset, suggesting a phenotype that warrants further investigation.



P-311 / #1227

THE INTERACTION BETWEEN CENTRAL VENOUS PRESSURE AND PLASMA VOLUME AS A NOVEL MARKER FOR THE CIRCULATORY FAILURE IN THE PATIENTS WITH FONTAN CIRCULATION

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Background and Aim: Elevated central venous pressure (CVP) is a source of peripheral organ dysfunction in heart failure. Meanwhile, violent fluctuations of CVP are often induced by the physical activity or volume loading, which are originating from the individual differences in circulatory characteristics or even due to time difference. Accordingly, absolute value of CVP can be obscure although it is considered to be marker particularly in the Fontan patients. We tested the hypothesis that the relationship between central venous pressure (CVP) and circulating plasma volume (PV) reflects the circulatory characteristics of congenital heart disease.
Methods: The relationship between CVP-PV and circulatory parameters was analyzed in consecutive 94 non-Fontan and 85 Fontan patients in whom circulating PV was directly measured using the dye-dilution method during cardiac catheterization.
Results: Fontan patients had higher CVP than non-Fontan patients (9.5±1.7 vs. 6.1±1.6 mmHg, $p<0.001$), whereas lower circulating plasma volume (68.5±20.2 vs. 79.0±24.6 ml/kg, $p=0.0036$), suggesting stiffer vascular characteristics (PV/CVP ratio: 5.7±1.9 vs 12.6±7.0 ml/kg/mmHg) in the Fontan patients. In the non-Fontan cohort, the comparison between low and high PV/CVP ratio, which is defined as less or more of that of the 95th percentile of Fontan patients, revealed that those with a higher PV/CVP ratio had higher cardiac output (3.4±0.9 vs 2.9±0.8 mmHg, $p=0.038$), lower pulmonary artery pressure (16.8±7.6 vs 22.4±8.5 mmHg, $p=0.026$), and lower ventricular end-diastolic pressure (RV: 7.4±2.1 vs 11.2±3.6 mmHg; LV: 9.2±2.0 vs 11.9±2.3 mmHg; both $p<0.001$). Additionally, there was a trend toward lower serum aldosterone levels (111±95 vs. 167±232 mmHg, $p=0.08$), but no difference in plasma BNP levels. Subsequently, we divided Fontan patients into four categories based on the median values of PV and CVP. Interestingly, the incidence of liver cirrhosis, protein-losing enteropathy, and clinical heart failure was highest in the low PV/high CVP category and no Fontan related complications was observed in the high PV/low CVP category.
Conclusions: PV/CVP can be the marker for vascular system remodeling in the patients



with congenital heart diseases. Further studies will be warranted to guide therapeutic interventions for the circulatory failure in this cohort.



P-312 / #1326

PULMONARY HYPERTENSION IN PAEDIATRIC PATIENTS: HIGH ALTITUDE VERSUS SEA LEVEL

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Background and Aim: Pediatric pulmonary arterial hypertension (PAH) is a rare and life-threatening condition characterized by increased pulmonary vascular resistance and progressive right ventricular failure. High-altitude exposure, resulting in hypobaric hypoxia, may further increase pulmonary arterial pressures and promote vascular remodeling, thereby exacerbating disease severity and outcomes. This study aimed to evaluate the impact of altitude-related hypoxia on the clinical presentation and outcomes of children with PAH.
Methods: A retrospective cohort analysis was performed comparing children with PAH living at high altitude (Bogotá, Colombia; 2,640 m) and low altitude (Dutch National Pediatric Pulmonary Hypertension Registry). Clinical, hemodynamic, and functional parameters, including WHO functional class, NT-proBNP, echocardiographic measurements, and 6-minute walk distance at presentation, were analyzed. Baseline patient characteristics in the two cohorts were compared, and transplant-free survival was evaluated using Kaplan-Meier analyses and log-rank testing.
Results: The two cohorts comprised a total of 254 children. We excluded children with PH due to underlying respiratory disease from analyses due to substantial differences in age and etiology between cohorts. In the remaining PAH cohorts compared to sea-level patients (n= 132), high-altitude patients (n=86) presented at younger age, with better functional class (WHO-FC, $p < 0.001$) despite more severe pulmonary hemodynamics, including higher pulmonary arterial pressures (mPAP 60 mmHg vs. 47 mmHg, $p < 0.001$) and elevated pulmonary vascular resistance index (PVRI 15 vs. 12 WU·m^2, $p = 0.01$). NT-proBNP and 6-minute walk distance were similar between groups. In contrast, during follow-up, mortality was lower in the high-altitude cohort (31.5% vs. 46.9%, $p = 0.012$), and Kaplan–Meier analysis demonstrated improved survival compared with the low-altitude cohort (log-rank $p = 0.01$).
Conclusions: These findings show that children with PAH at high-altitude residence present at a younger age, with more severe pulmonary hemodynamics, but with better functional class and improved survival. These counterintuitive observations may be



explained by different physiological adaptations or a distinct hyperreactive disease phenotype. These considerations may affect risk stratification and treatment approaches in these distinct populations.



P-313 / #443

SAME DISEASE, DIFFERENT COURSE. THERAPEUTIC STRATEGIES IN INFANTILE HEART FAILURE.

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Background and Aim: The therapeutic options for cardiomyopathy manifesting in infancy differ from
those used in later life. Mechanical circulatory support is associated with a high complication
rate in these patients, which limits its applicability. However, reversible pulmonary banding (rPAB) by utilizing the ventricle-ventricle interaction, the most effective in this age group. We present our therapeutic decisions and the different clinical courses in a triplet.
Methods: Medical history of a monozygotic male triplet was presented. There were no abnormalities in the family history or intrauterine screening. Perinatal adaptation and the neonatal period were uneventful in all three children. The diagnosis of DCM was based on echocardiography, and genetic testing was also performed.
Results: 1. child: At 6 weeks of age presented with clinical symptoms of severe circulatory failure (proBNP > 35 000 pg/ml), which led to inotropic dependence and rPAB at 2 months of age. Stable clinical condition, but chronic circulatory failure (proBNP between 1016 and 5715 pg/ml) and unimproved left ventricular function led to heart transplantation at 11 months of age without complications. 2. child: Early oral anticongestive treatment due to clinically compensated left ventricular dysfunction (EF: 50%) detected during screening at 2 months of age. Progression was observed during follow-up (EF: 35%), resulting in rPAB at 3 months of age, with complete restoration of left ventricular function (EF: 69%). 3. child: Early oral anticongestive treatment due to clinically compensated left ventricular dysfunction (EF: 52%) detected during screening, with complete remission (EF: 64-67%). Genetic testing revealed only variants of uncertain significance
Conclusions: Even with identical genetic background, environmental factors and identical treatment regimens, the clinical course can vary greatly, for which there is no explanation. The steps taken in the treatment of the twins represent the most widely used therapeutic options in this age group.



P-314 / #154

IMPLEMENTING SHARED DECISION-MAKING FOR PREVENTIVE SPORTS CARDIOLOGY IN YOUTH WITH HEART DISEASE: A PILOT STUDY

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Background and Aim: Despite growing recognition of the benefits of physical activity in pediatric cardiology, many youths with chronic cardiac conditions remain insufficiently active. Shared decision-making (SDM) between patients, families, and care teams has been proposed to support personalized exercise guidance, but practical implementation models are scarce. This pilot study evaluated the feasibility, acceptability, and safety of the *Young Heart and Sport Clinic*, a SDM-based preventive sports cardiology consultation for children and young adults with heart disease.
Methods: A prospective, single-center study (2024–2025) enrolled participants aged 6-25 years with chronic heart disease. The consultation comprised: (1) a well-being assessment using patient-reported outcomes; (2) a sports cardiology evaluation, including cardiopulmonary exercise test, electrocardiogram, echocardiography, spirometry, muscle strength testing, and accelerometry; and (3) a multidisciplinary SDM consultation involving a pediatric sports cardiologist, a specialist nurse, and an adapted physical activity (APA) educator. This team jointly reviewed all findings and conducted a semi-structured interview to identify barriers, motivators, and goals, informing individualized exercise prescriptions. Post-consultation orientation included cardiac rehabilitation, community-based activity, or referral to other specialists.
Results: Of 35 referred patients, 34 completed the program. Families and referring cardiologists endorsed its relevance and feasibility. No exercise-related adverse events were reported. At 6-month follow-up, 85% adhered to recommendations, 53% engaged in community-based activity, and 44% in cardiac rehabilitation.
Conclusions: This pilot study supports the feasibility, safety, and acceptability of a multidisciplinary, SDM-based model integrating preventive exercise guidance into pediatric cardiology care. This approach may help bridge gaps between adult guidelines and pediatric practice.



P-315 / #242

PROFESSIONAL FOOTBALL PLAYER WITH LEFT VENTRICULAR DILATION AND ATRIAL TACHYARRHYTHMIA – WHICH CAME FIRST: THE EGG OR THE CHICKEN?

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Background and Aim: Defining electro- and echocardiographic changes as "athletics heart" is not always straightforward, especially when more than one borderline finding is present.
Methods: 17-year-old previously healthy football player with uneventful family history was referred to our center because of palpitation, reduced physical capacity, and frequent premature atrial contractions (PACs) on 12-lead ECG with elevated QRS voltage suggestive of left ventricle (LV) hypertrophy. He reported febrile illness few months before.
Results: All laboratory tests including electrolytes, hormones and cardiac biomarkers were within reference range. LV hypertrophy was not present on echocardiography, but LV dilation with indexed end diastolic volume (EDVi) of 120 ml and ejection fraction (EF) 50%. The arrhythmia burden was 12% in 24 hours with daytime couplets, triplets and runs of non-sustained tachycardia. Cardio-pulmonary stress test on cycle ergometer (15 W/Ramp) showed normal physical capacity, no arrhythmia or repolarization changes. The patient reached 62% of the predicted oxygen consumption and respiratory equivalent ratio of 1.12. No edema or late gadolinium enhancement were present on cardiac magnetic resonance. RV wall dimensions and function were preserved. There was no LV hypertrophy, but slight dilation with normalized EDV of 94 ml/m^2 and EF of 52%. Flecainide 100 mg/day was initiated because of patient's symptoms, and 3-months sport's restriction was recommended. The boy was asymptomatic on the follow-up visit, with no PACs on ECG and a burden of 2% isolated beats on 24-hour Holter. LV dimensions and function normalized – EDVi 74 ml/m^2, EF 62%. The patient was advised to return gradually to his activity.
Conclusions: We consider this case informative and educational for several reasons. First of all, the diagnosis of "athlete's heart" is one of exclusion and not always easy to make especially in symptomatic individuals. Second, the case proves that in children the arrhythmia burden sometimes doesn't correlate with symptoms, and their presence should be the main reason to start treatment. Finaly, it is debatable whether Flecainide or sports restriction led to arrhythmia suppression. No arrhythmia was observed on cardio-pulmonary stress test, but it can still be associated with training. Our patient improved, but the question of his sports eligibility remains.



P-316 / #566

HEALTHY HEART AND VESSELS IN YOUNG ATHLETES: THE ROLE OF CARDIORESPIRATORY FITNESS IN CARDIOVASCULAR DEVELOPMENT

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Background and Aim: Promoting cardiovascular health in children and adolescents requires a detailed understanding of how the heart and vessels adapt during growth. Young athletes undergo substantial physiological changes that present both opportunities for enhancing cardiovascular fitness and potential risks for early maladaptive remodeling. This study aims to investigate the longitudinal relationship between annual changes in maximal cardiorespiratory fitness (CRF) and the development of vascular and cardiac structure and function in pediatric athletes.
Methods: A cohort of 142 young athletes (mean age 14.0 years; 17 females) was assessed at baseline and after one year as part of the Munich Cardiovascular Adaptation in Young Athletes Study (MuCAYA-study). Maximal cardiorespiratory fitness was measured using peak oxygen uptake (VO_2peak) and absolute and relative power output. Vascular parameters included central systolic blood pressure, aortic pulse wave velocity, and carotid intima-media thickness. Cardiac structure and function were assessed via echocardiography, including left ventricular (LV) end-diastolic and internal dimensions, interventricular septal and posterior wall thickness, and LV mass indexed to body size and height. Longitudinal associations between changes in fitness and cardiovascular parameters were analyzed using linear mixed-effects models.
Results: demonstrated that a one-year increase in VO_2peak was associated with higher central systolic blood pressure and increased aortic stiffness. Improvements in maximal power output were also linked to increased carotid intima-media thickness. Both VO_2peak and power output gains corresponded with measurable changes in cardiac structure, including enlarged LV dimensions, increased wall thickness, and higher indexed LV mass. A slight decrease in ejection fraction was observed, reflecting the complex remodeling processes occurring during growth and athletic training.
Conclusions: These findings indicate that improvements in cardiorespiratory fitness in pediatric athletes coincide with significant changes in vascular stiffness, arterial wall



thickness, and cardiac morphology and function. These patterns underscore the importance of interpreting cardiovascular changes during growth within a clinical and developmental context. The insights gained in this study into the cardiovascular remodeling of adolescent athletes highlight the need for ongoing observation of these physiological adaptations to better understand how they progress over time and their implications for long-term cardiac health and safe athletic participation.



P-317 / #1485

EXERCISE CAPACITY IN CHILDREN AND ADOLESCENTS WITH CONGENITAL HEART DISEASE: COMPARISON BETWEEN PHENOTYPES AND IMPACT ON ELIGIBILITY FOR COMPETITIVE SPORT PARTICIPATION

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Background and Aim: Regular physical activity is increasingly recognized as advantageous for children and adolescents with congenital heart disease (CHD), improving physical fitness, psychosocial well-being and quality of life. Contemporary literature supports a less restrictive, individualized approach to competitive sport, integrating anatomical and functional assessment. In this context, cardiopulmonary exercise testing (CPET) plays a key role in eligibility evaluation; however, the relative contribution of different CPET-derived parameters in different CHD phenotypes remains incompletely defined. This study aimed to identify functional determinants of competitive sport eligibility across CHD phenotypes.
Methods: We conducted a retrospective single-centre observational study at Papa Giovanni XXIII Hospital (Bergamo, Italy), including CHD patients undergoing CPET between 2014 and 2025 for competitive sport eligibility assessment. Patients were classified by CHD phenotype and categorized as eligible or non-eligible after multidisciplinary evaluation. Demographic, clinical and CPET variables were collected, including VO_2peak, VE/VCO_2 slope, chronotropic response and oxygen pulse, expressed as absolute values and percentage of predicted.
Results: In this preliminary analysis, 241 patients were included (median age 16 years), of whom 68 (28.2%) were deemed eligible for competitive sport participation. Diagnoses encompassed a wide spectrum of congenital heart disease phenotypes. Differences between eligible and non-eligible patients were mainly driven by functional CPET parameters. Eligible patients showed higher aerobic capacity (median VO_2peak % predicted 89.5, IQR [82.8–97.5]), greater cardiovascular efficiency (median oxygen pulse 12.0 ml·beat^{-1}, IQR [9.4–13.8]) and better ventilatory efficiency (median VE/VCO_2 slope 28, IQR [27.0–28.0]). Among CPET-derived variables, oxygen pulse (% predicted) demonstrated the strongest association with non-eligibility ($p < 0.001$). An association between VO_2peak and non-eligibility was observed only when applying the clinically relevant cut-off of VO_2peak ≤84% predicted.



Conclusions: Competitive sport eligibility in paediatric CHD patients should rely on a global, individualized functional evaluation, rather than on anatomical diagnosis alone. CPET-derived parameters, particularly oxygen pulse, provide clinically relevant information beyond VO_2peak for risk stratification. These preliminary findings support a shift from an exclusion-based approach towards a patient-tailored strategy, aimed at identifying appropriate and safe sport participation, in line with current evidence promoting physical activity, inclusion and quality of life.



P-318 / #707

HIGH PROPORTION OF DYSMORPHIC FEATURES AND CARDIOVASCULAR ABNORMALITIES IN YOUTH BASKETBALL PLAYERS

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Background and Aim: Background: Tall stature is considered an advantage in basketball, but it may be associated with various clinical risks. Some conditions, such as aortic aneurysms or cardiomyopathies, may lead to life-threatening events during physical exertion, including sudden cardiac death. Despite these risks, systematic echocardiographic and genetic screening is not routinely performed in youth athletes. **Aims**: This study aimed to investigate the phenotypic, endocrine, cardiac and genetic characteristics of tall adolescent basketball players to identify possible causes of tall stature and associated health risks.
Methods: Methods: We examined 55 youth basketball players (29 females, median age 17 years). Each underwent detailed endocrine and anthropometric examination, echocardiography, and genetic testing (number of X and Y chromosomes, gene dosage analysis of the *SHOX* gene, and a custom NGS panel of 786 genes related to growth).
Results: Results: Marfanoid habitus was present in 20 (36 %) individuals and (mild) dysmorphic features were described in 87% (48/55). No endocrine dysfunctions were detected. Echocardiographic abnormalities were found in 18 % (10/55), including left atrial enlargement, left ventricular hypertrophy, valvular regurgitations, and aortic dilatation, 80 % participants with positive ECHO finding presented with (mild) dysmorphic features. One proband (1.8 %) was diagnosed with monogenic cause of tall stature carrying a pathogenic variant in the *FBN1* gene causing Marfan syndrome.
Conclusions: Conclusions: Comprehensive phenotyping, including anthropometry and echocardiography may improve early detection of associated cardiovascular risks in youth athletes, especially with tall stature. While genetic screening among athletes does not seem reasonable.



P-319 / #1494

PERICARDIAL FAT IN PEDIATRIC OBESITY: AN EARLY MARKER OF CARDIOMETABOLIC RISK?

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Background and Aim: Introduction
Pediatric obesity is a growing public health concern and is associated with early cardiovascular and metabolic alterations. The identification of simple, reproducible markers of cardiometabolic risk is therefore of increasing clinical relevance. In adults, epicardial/pericardial adipose tissue assessed by imaging techniques has been associated with adverse cardiometabolic profiles and increased cardiovascular risk. However, in children and adolescents, the clinical significance of echocardiographic assessment of pericardial fat remains unclear. This study aimed to investigate whether echocardiographic pericardial fat thickness represents a potential marker of cardiometabolic risk in pediatric obesity and to evaluate its associations with anthropometric, laboratory, and echocardiographic parameters.
Methods: Methods
We conducted a prospective study including children and adolescents with overweight or obesity. Echocardiographic evaluation comprised a standard examination, with assessment of left ventricular mass indexed to body surface area (LVMi), relative wall thickness (RWT), and pericardial fat thickness measured at the right ventricular free wall in the parasternal long-axis view. Anthropometric measurements included weight, height, body mass index (BMI), BMI z-score, and waist circumference. Laboratory parameters included fasting glucose, insulin, lipid profile, and alanine aminotransferase (ALT). Associations were analyzed using Spearman correlation and multivariable linear regression models adjusted for age, sex, and BMI z-score.
Results: Results
Pericardial fat thickness was significantly associated with waist circumference ($\rho = 0.50$; $p = 0.036$), but not with body weight, height, or body surface area. Associations with BMI and



BMI z-score were borderline and did not reach statistical significance. A significant positive correlation was observed between pericardial fat thickness and fasting glucose (ρ = 0.51; p = 0.043), with a trend toward higher insulin levels. No significant associations were found with lipid profile or ALT. In multivariable analyses, pericardial fat thickness was not independently associated with LVMi or RWT.

Conclusions: In children with obesity, pericardial fat accumulation is associated with central adiposity and early metabolic alterations, but not with echocardiographic markers of ventricular remodeling. These findings suggest that, in pediatric obesity, ventricular remodeling may be primarily driven by global adiposity and hemodynamic load. Pericardial fat may therefore serve as an early marker of cardiometabolic risk rather than a direct determinant of structural cardiac changes.



P-320 / #575

AEROBIC CAPACITY, COMPETITIVE SPORT PARTICIPATION, PHYSICAL ACTIVITY HABITS AND RIGHT VENTRICULAR FUNCTION IN ADOLESCENTS WITH POSTOPERATIVE TETRALOGY OF FALLOT

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Background and Aim: Sport is a primary way for many children to stay active, but participation often requires sufficient aerobic capacity. We recently showed that frequency of sport participation is related to peak aerobic capacity (VO_{2peak}) in children with congenital heart disease. We sought to determine if VO_{2peak} and sport participation are related in patients with post operative tetralogy of Fallot (TOF) and/or if right ventricular (RV) function is related to frequency of physical activity (PA) and competitive sport participation.
Methods: A single-centre retrospective review of all cardiopulmonary exercise tests (CPET) performed in TOF adolescents from June 2016 to October 2025. PA habits assessed using F.I.T.T principle, and echocardiography measures were also collected. VO_{2peak} Z-scores based on age and sex were calculated. Sport participation was classified as: non-competitive vs competitive. Competitive sport was defined as participation in regular training and games or involvement in a sport academy. Frequency of PA was classified into 3 groups: 1: 0-1 days/week; 2: 2-3 days/week; 3: 4+ days/week. RV systolic pressure (RVSP) derived from tricuspid valve regurgitant peak Doppler velocity and tricuspid annular plane systolic excursion (TAPSE Z-score) were compared between groups. Medians (IQR) are presented.
Results: Fifty TOF patients (37 male) were included with a VO_{2peak} Z-score of -1.28 (-2.33, -0.94). Twenty percent participated in competitive sport and had a higher VO_{2peak} Z-score than the non-competitive group [-0.81 (-1.28, -0.12) vs -1.53 (-2.52, -1.11); p=0.004]. Group 1 had a lower VO_{2peak} Z-score than Groups 2 and 3 [-2.00 (-2.69, -1.22) vs -1.19 (-1.57, -0.72) vs -0.81 (-2.12, -0.21); p=0.006], with no significant differences between Group 2 and 3 (p=0.672). RVSP (p=0.038) was higher, while TAPSE Z-score was lower in Group 1 (p=0.028) compared to the other groups with no differences between non-competitive and competitive groups (p=0.36 and p=0.73, respectively).
Conclusions: VO_{2peak} is reduced in adolescents with TOF. Those who engage in regular PA and competitive sport have a higher VO_{2peak} than those who do not. Increased RVSP and



decreased RV function is seen in those who participate in less PA but no difference was seen in the non-competitive and competitive sport groups.



P-321 / #671

SAFETY AND FEASIBILITY OF SUPERVISED PHYSICAL ACTIVITY IN CHILDREN WITH CARDIAC DISEASE: A 14-YEAR REAL-WORLD COHORT

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Background and Aim: Physical activity is recommended for most children with cardiac conditions, yet safety concerns and overprotection often limit participation. KidsTUMove is a long-standing supervised physical activity program for children with and without chronic disease. We aimed to assess real-world safety by analysing severe unexpected events (SUE: unplanned hospitalization, life-threatening event, or death) and feasibility indicators in children with cardiac diagnoses.
Methods: We conducted a retrospective cohort study covering all KidsTUMove events from 2011 to 2025. A total of 35 events were included. Baseline characteristics, medical diagnoses, and event participation were extracted from medical documentation. Cardiac diagnoses comprised congenital heart disease (simple n=2, moderate n=13, complex n=29, unclassified n=1), arrhythmias without structural disease (n=7), and other chronic cardiovascular conditions (n=7). Exposure time was quantified as participant-days, defined as one day of attendance in a supervised program. Outcomes included the incidence of SUE per 1,000 participant-days with exact Poisson 95% confidence intervals (CI) and return rates defined as attendance at more than one event. A predefined subcohort consisted of winter sports events at moderate altitude.
Results: Among 546 total participants, 59 had a cardiac diagnosis and contributed 267 event participations, corresponding to 1,257 participant-days. One SUE occurred, resulting in an incidence rate of 0.8 per 1,000 participant-days (95% CI 0.02 to 4.43). The single SUE was a hospitalization unrelated to exercise intensity. During 310 participant-days of winter sports, no SUE occurred (0 per 1,000 participant-days; 95% CI 0 to 11.90). Return rates differed markedly: 67.8% of children with cardiac diagnoses (40/59), 48.7% of children with non-cardiac chronic conditions (37/76), and 16.3% of healthy peers (67/411) attended more than one event. Odds of returning were highest in children with cardiac diagnoses (OR 10.9 vs peers).



Conclusions: This 14-year real-world analysis demonstrates a low incidence of SUE in children with cardiac diagnoses participating in supervised multisport programs, including winter sports at moderate altitude. These findings indicate that, with interprofessional supervision and individualized activity adaptation, participation appears safe and feasible. Markedly higher return rates among children with cardiac conditions suggest perceived safety, acceptance, and benefit, highlighting the need for accessible, diagnosis-aware activity programs.



P-322 / #1375

CARDIOVASCULAR RISK IN OBESE ADOLESCENTS UNDERGOING MULTIMODAL INPATIENT THERAPY: BLOOD PRESSURE REDUCTION BUT PERSISTENT RETINAL MICROVASCULAR IMPAIRMENT

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Background and Aim: Adolescent obesity is a major public health issue in Germany, affecting over 15% of youth and predisposing them to early cardiovascular disease. Obesity accelerates vascular ageing, promotes hypertension, and induces endothelial dysfunction, changes that are already detectable in children. Sustained hypertension is associated with early target organ damage involving the heart and microvasculature. Retinal vessel analysis offers a non-invasive marker of early microvascular impairment. Obesity often persists into adulthood and cardiovascular risk increases with earlier and longer exposure, early intervention is crucial. While multimodal lifestyle interventions improve weight and blood pressure, data on direct vascular effects remain limited.
Methods: This pre–post study was conducted in an inpatient setting at the Fachklinik Gaißach, Germany. Sixty children and adolescents aged 10–18 years with overweight, obesity, or severe obesity were included. Baseline vascular and anthropometric assessments were performed prior to the start of a four-week multimodal inpatient intervention comprising caloric restriction, structured physical activity, and nutritional counseling. Vascular health was assessed using retinal vessel analysis and pulse wave velocity measurements. Anthropometric parameters were measured using standardized procedures. Intervention effects were analyzed using linear mixed models to evaluate time- and group-specific changes.
Results: The study cohort had a mean age of 13.1 ± 2.4 years and comprised 34 females and 26 males. At baseline, mean body weight was 96.8 ± 22.3 kg, mean height 167.0 ± 10.8 cm, and mean BMI 34.1 ± 5.1 kg/m^2, systolic blood pressure 136,19 ± 12,17 mmHg and the arteriovenous ratio (AVR) 0.79 ± 0.05. After 4 weeks of inpatient standard multimodal therapy, body weight was reduced by 6.0 ± 3.0 kg ($p < 0.05$). Systolic blood pressure decreased during the intervention period by 9.59 ± 10.02 mmHg ($p < 0.01$). Retinal vessel analysis revealed a reduced AVR at baseline compared with a healthy reference population. However, no significant improvement in AVR was observed over the standardt therapy.
Conclusions: A short-term inpatient multimodal lifestyle intervention significantly reduced body weight and systolic blood pressure in obese adolescents but did not improve retinal



microvascular function. These findings suggest that while cardiometabolic risk factors are modifiable, microvascular alterations may require longer or more intensive interventions.



P-323 / #435

MOVING TOGETHER: FEASIBILITY OF AN 8-WEEK, TELEHEALTH DELIVERED EXERCISE INTERVENTION FOR YOUNG CHILDREN LIVING WITH CONGENITAL HEART DISEASE AND THEIR FAMILIES

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Background and Aim: In adults and older children with congenital heart disease (CHD) ,engagement in structured exercise training has been shown to improve exercise capacity, muscular strength, psychosocial functioning and quality of life. Facilitating exercise participation in young children with CHD and their families remains understudied. This study aimed to evaluate the feasibility and acceptability of a telehealth delivered, family-based intervention for children aged 5-10 years living with moderate to complex CHD. Secondary aims were to explore changes in sedentary time (ST) and moderate to vigorous physical activity (MVPA).
Methods: Families participated in 8 weekly 45-60 minute supervised small group online exercise sessions, comprising warm-up games, circuit based activities, physically active storytelling, dancing and fundamental movement skill practice. Weekly independent home-based activity challenges and educational material covering safety and benefits of physical activity, healthy eating, goal setting and reducing screen time were provided. At baseline and post-intervention child and parent seven-day accelerometry were assessed. Utilising parent and child questionnaires, feasibility was assessed across four domains - acceptability, practicality, implementation, and preliminary efficacy.
Results: Seventeen children (15 family units) were recruited, with 15 children (14 family unites) completing the program (88% retention).12 children and 9 parents attended at least 75% of the eight prescribed sessions. Ten children (66.7%) were classified as engaged, having participated in all session components for >75% of the time. In the parent cohort, seven (50%) demonstrated engagement in all components >75% of the time. All parents



(n=14) agreed or strongly agreed that they would recommend the program, and 93% reported that the educational components enhanced their confidence in supporting their child's physical activity. Most children reported understanding what to do during the sessions (93%), feeling good afterwards (87%), and enjoying participating (87%). Children's weekday ST significantly decreased following the intervention ($p = 0.021$), although no significant change was observed in MVPA among children or parents.

Conclusions: This low-cost, telehealth-delivered, family-based exercise intervention is feasible, acceptable and engaging for young children with CHD and their families. Larger trials of this intervention in young children with CHD and their families to examine longer term benefits are warranted.



P-325 / #475

CARDIOVASCULAR HEALTH IN ADOLESCENTS DURING THEIR UNDERGRADUATE STUDIES - RESULTS OF THE LONGITUDINAL HEALTH PROMOTION PROGRAM TUM4HEALTH

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Background and Aim: Early cardiovascular prevention can help students to adopt sustainable, health-oriented behaviors. Undetected cardiovascular risk factors, such as elevated blood pressure or congenital heart defects, may contribute to cardiovascular diseases later in life. Cross-sectional studies have repeatedly shown that academic demands often lead to suboptimal health behaviors. This study examined the cardiovascular health status of students in sports and health science bachelor programs, whether lifestyle behaviors change during university studies, and how health and fitness parameters develop over time.
Methods: A total of 116 students (38% male) completed two examinations between May 2017 and July 2023, one at the beginning of their studies and a follow-up 3 years later. The sports-medical and motor-performance examinations encompassed body-fat analysis, spiroergometry, echocardiography, blood pressure, and electrocardiography. Longitudinal changes and predictors of individual trajectories were analyzed using linear mixed-effects models.
Results: According to the ACCF/AHA Classification Model, 26% of the students had an elevated risk for cardiovascular events at the beginning of their studies, and 14% in the follow-up examination. According to ACCF/AHA 13% of the participants were categorised in Stage BI and 10% in the follow-up. Moreover, 32 participants changed their lifestyle towards cardiovascular health by stopping smoking ($p < .001$) or reducing alcohol consumption ($p < .001$). VO_2peak increased significantly over time ($b=1.94$, $p<.001$). Weekly training volume was a significant positive predictor of VO_2peak ($b=0.51$, $p<.001$). Body-mass indicators, including body-fat, showed no significant change during the study period (all $p < .001$).
Conclusions: Students in sports and health sciences generally begin their studies with above-average physical fitness and maintain an active, though not consistently health-promoting, lifestyle. A substantial proportion exhibited cardiovascular risk factors that were detected during the initial assessment and subsequently addressed, leading to a reduction in the number of at-risk individuals at follow-up. Contrary to existing literature,



which, however, refers to other academic disciplines, fitness levels increased over the study period. Overall, the study highlights the value of early screening and targeted preventive strategies to support cardiovascular health in young adults.



P-326 / #930

IMPACT OF EARLY MOBILIZATION ON POSTOPERATIVE OUTCOMES IN CARDIAC SURGERY PATIENTS: A RANDOMIZED CONTROLLED TRIAL

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Background and Aim: Cardiac surgery is commonly associated with delayed functional recovery, postoperative complications, and prolonged hospital stay. Prolonged immobility in the early postoperative period contributes to pulmonary complications, delirium, and delayed discharge. Early mobilization has been proposed as a simple, low-cost intervention to improve outcomes; however, evidence from randomized controlled trials in cardiac surgery patients remains limited. This study aimed to evaluate the effect of early postoperative mobilization on recovery time, postoperative complications, and length of hospital stay in patients undergoing cardiac surgery
Methods: A single-center randomized controlled trial was conducted over 12 months at a tertiary care hospital. A total of 132 adult patients undergoing elective cardiac surgery were randomized into an early mobilization group (n=66) and a standard care group (n=66). The intervention group initiated supervised mobilization within 24 hours postoperatively, while the control group received routine physiotherapy starting on postoperative day three or later. Primary outcomes included time to functional recovery (Modified Barthel Index ≥90), incidence of postoperative complications, and length of hospital stay. Statistical analysis was performed using independent-samples t-tests and chi-square tests
Results: Patients in the early mobilization group achieved functional recovery significantly earlier than those receiving standard care (5.2 ± 1.1 vs. 7.9 ± 1.5 days; p=0.001). The incidence of pulmonary infection (6.1% vs. 15.2%; p=0.048) and postoperative delirium (4.5% vs. 13.6%; p=0.041) was significantly lower in the early mobilization group. Length of hospital stay was also reduced (8.4 ± 2.0 vs. 11.2 ± 2.6 days; p=0.001). No significant differences were observed in rates of deep vein thrombosis or wound dehiscence.
Conclusions: Early postoperative mobilization significantly improves functional recovery, reduces selected postoperative complications, and shortens hospital stay in patients undergoing cardiac surgery. These findings support the incorporation of structured early mobilization protocols into routine postoperative cardiac surgical care.



P-327 / #326

HIGHER BODY SIZE IS ASSOCIATED WITH LOWER CARDIORESPIRATORY FITNESS IN YOUTH ATHLETES: LONGITUDINAL IMPLICATIONS FOR PEDIATRIC CARDIOVASCULAR HEALTH

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Background and Aim: Regular physical activity during growth supports cardiovascular and metabolic health. Insights into the longitudinal development of cardiorespiratory fitness (CRF) in young athletes are essential for understanding healthy adaptation, training effects, and prevention of cardiovascular risk later in life. This study investigated long-term trends in CRF and maximal exercise performance in child and adolescent athletes of various sport disciplines over a 12-year period. The primary aim was to determine how growth, body size, and sport-specific demands influence relative VO_2peak and exercise performance (Wmax) across developmental stages, with a special focus on sex- and sport-type differences during adolescence—a period of heightened vulnerability for declines in relative CRF and long-term cardiovascular health implications.
Methods: A total of 397 athletes (48 girls; 8–20 years) underwent cardiopulmonary exercise tests (CPETs) between 2012 and 2024, using standardized ramp protocols to volitional exhaustion. Participants were categorized by sport type (endurance, mixed, skill, or power disciplines). Linear mixed models accounted for repeated measures and examined associations of age, anthropometric measures, training intensity, and sport category with VO_2peak and Wmax, stratified by sex and developmental stage.
Results: Across 1,009 CPETs, VO_2peak and Wmax increased significantly with age, reflecting natural growth and training effects. However, higher BSA was consistently associated with lower relative VO_2peak and Wmax across several age groups, particularly in adolescent girls ($\beta = -5.47$, $p = 0.002$), suggesting that body size attenuates relative aerobic capacity. Endurance athletes demonstrated significantly higher CRF than those in mixed, power, or skill sports. Significant VO_2peak gains occurred primarily in early to mid-adolescence, with subsequent stabilization after puberty.
Conclusions: CRF improves with age and training but is tempered by growth-related increases in body size. These effects, especially prominent in adolescent girls, highlight the importance of sustained endurance exercise and individualized monitoring during puberty to support cardiovascular health and lifelong disease prevention.



P-329 / #333

BARRIERS AND FACILITATORS OF PHYSICAL ACTIVITY IN CHILDREN WITH CONGENITAL HEART DISEASE: A QUALITATIVE STUDY AMONG HEALTHCARE PROFESSIONALS

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Background and Aim: Sufficient physical activity (PA) is crucial for healthy physical, psychosocial, and cognitive development. In children with congenital heart disease (CHD), PA lowers the risk of later complications and is related to quality of life as well. Yet, recent estimates indicate that over half of children with CHD are insufficiently active. Consensus statements emphasize the important role of healthcare professionals (HPs) in PA promotion. This study explores HPs' perspectives on barriers and facilitators influencing PA in children with CHD, to identify opportunities for more effective support and intervention.
Methods: HPs (N = 21) from six Dutch university medical centres participated in individual or small-group semi-structured interviews. HPs of different disciplines involved with paediatric CHD were included, including cardiologists, nurse specialists, and physical or occupational therapists. Predefined topics addressed barriers, facilitators, and communication about PA in children with CHD. Interviews were recorded, transcribed verbatim, and analysed using thematic reflexive analysis. Revealed themes were mapped to the COM-B model of behaviour change to identify key PA determinants and potential intervention targets. Preliminary results are outlined.
Results: According to HPs, lack of PA and sports participation in children with CHD appears more often influenced by psychosocial and contextual factors than by physical restrictions. First, psychosocial (child and family) factors included motivation, fear of harm of PA, and parental modelling of PA. Second, further social factors comprised (lack of) awareness on CHD and encouragement in sports participation from teachers or peers, and



varying cultural norms around PA. Third, contextual factors involved healthcare system barriers including lack of structured exercise guidance and community opportunities for PA. In terms of the COM-B model, the domains of psychological capability, social opportunity, and motivation were identified as most influential for PA in children with CHD.
Conclusions: The present findings suggest that insufficient PA in children with CHD results from an interplay between psychosocial and contextual influences rather than physical restrictions. HPs' PA promotion should therefore address these determinants, focusing on family engagement, social support, and system-level facilitators. These findings will inform the design of a co-created systemic PA intervention for children with CHD, within the national STAMINA consortium on PA in CHD.



P-330 / #861

CARDIOPULMONARY EXERCISE CAPABILITY IN CHILDREN WITH FUNCTIONAL RIGHT VERSUS LEFT VENTRICLE FONTAN CIRCULATION

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Background and Aim: Congenital heart defects resulting in a functional single ventricle (FSV) heart occur at a prevalence of ~35 per 100 000 live births. With continually improving survival rates into adulthood with Fontan circulation, we wanted to compare cardiopulmonary exercise test (CPET) results of children with functional right ventricle (FRV) and functional left ventricle (FLV) morphology.
Methods: We performed CPET to exhaustion prospectively on a treadmill in 25 children of whom12 with right ventricle and 13 with left ventricle morphology to assess their baseline cardiopulmonary status
Results:

Parameter	LV Fontan	RV Fontan	P value
Age range years (mean)	12 – 17 (15)	11 – 18 (14)	
Exercise time (mins)	5.76 ± 1.96	6.5 ± 1.44	0.28 (NS)
Work at Anaerobic Threshold AT (Watts)	84.07 ± 16.02	82.18 ± 50.97	0.89 (NS)
Work at peak exercise (VO2max) (Watts)	112.61 ± 29.39	108.45 ± 53	0.8 (NS)
VO2 at rest (mls/kg/min)	4.63 ± 1.27	4.83 ± 1.55	0.72 (NS)
VO2 at AT (mls/kg/min)	18.94 ± 4.4	20.84 ± 3.92	0.25 (NS)
VO2max)mls/kg/min)	26.13 ± 8.44	27.65 ± 6.61	0.61 (NS)
VO2 AT/VO2max %	74.3 ± 7.84	76.66 ± 8.46	0.46 (NS)
VE/VCO2 at AT	35.3 ± 7.48	36.91 ± 3.08	0.48 (NS)
VE/VCO2 at VO2max	37.07 ± 7.66	38.5 ± 4.46	0.5 (NS)



Conclusions: Fontan patients are known to have decreased exercise capacity and consequently impaired performance. Our prospective study suggests that Fontan palliation in children with a functional single ventricle morphology may not be associated with an appreciable difference in exercise performance from those with a functional left ventricle morphology.



P-331 / #149

IS EXERCISE TESTING AN EFFECTIVE WAY TO IDENTIFY RISK OF SUDDEN CARDIAC DEATH AND VENTRICULAR ARRHYTHMIA IN YOUNG PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY?

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Background and Aim: Hypertrophic cardiomyopathy (HCM) frequently results in complications such as cardiac death and ventricular arrhythmia, especially in young patients. As HCM is common yet often under-recognized condition, and managing risk is complicated by its wide spectrum of presentation, effective assessment is vital. Exercise testing identifies high-risk patients, guides exercise prescription, and consequently enhances quality of life. This review aimed to determine whether exercise testing can effectively identify the risk of sudden cardiac death (SCD) or ventricular arrhythmia in young HCM patients.
Methods: The literature search focused on patients under 21 with a formal diagnosis of HCM, who underwent a formal testing protocol. Studies only tracking 1 outcome or with a population made up of primarily patients over the age 21 were excluded. 16 abstracts were identified for review, which were narrowed down to 4 full studies.
Results: The findings of these studies confirm that exercise testing is an effective method for identifying these risks. Key findings included: • Reduced Exercise Tolerance: All four studies noted reduced exercise tolerance, with peak VO2 being significantly reduced in these patients. One study identified a significant association between peak VO2 and LVOTO gradient and another identified VO2<60% as the “best cut off value in predicting the composite endpoint”. • Ectopy and Risk: Two studies found the presence of ectopy contributed to increased risk. One trial documented ectopy in 43% of patients and concluded it was a strong predictor of cardiac death. • Abnormal BP Response: Patients who experienced adverse outcomes showed a higher prevalence of syncope and abnormal blood pressure (BP) response on testing. These indicators showed significant association with adverse outcomes but despite reduced exercise capacity on exercise testing, athletes in one study largely still competed, supported by infrequent reporting of exertional symptoms during competition.
Conclusions: Ultimately, exercise testing is highly effective, but it appears to work best when integrated with other imaging modalities, such as the picturing of LVOTO, to provide further clinical context to more effectively tailor management. Further research involving larger populations and one standardized exercise testing protocol assessed over a longer duration is needed to definitively confirm its value in the diagnostic pathway.



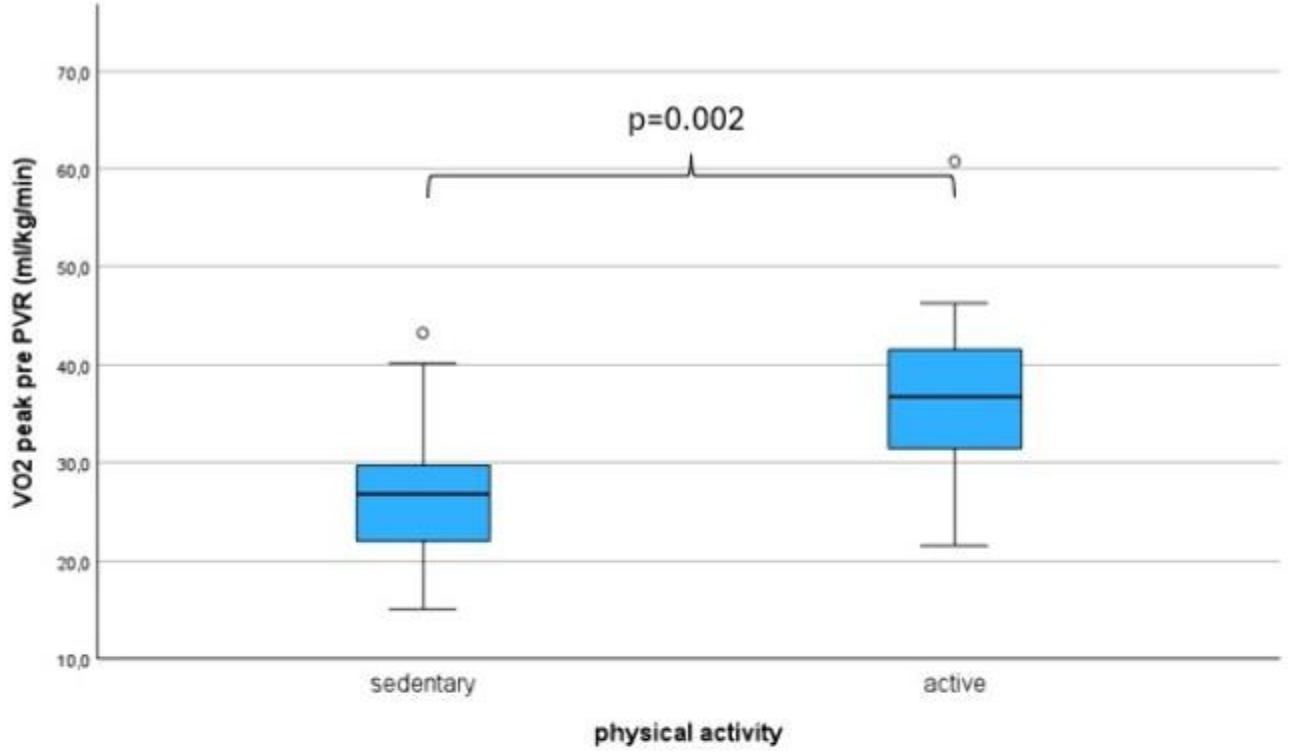
P-332 / #1281

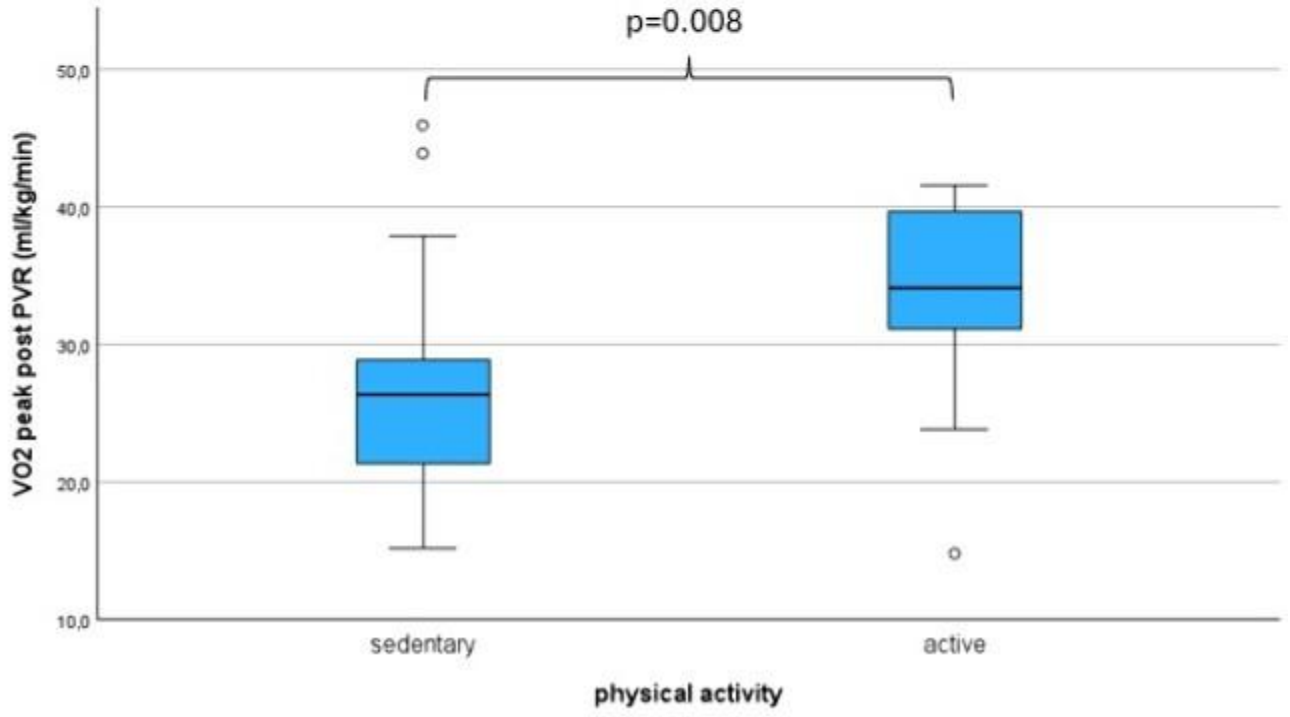
FUNCTIONAL EVALUATION BEFORE AND AFTER PULMONARY VALVE REPLACEMENT IN CONGENITAL HEART DISEASE

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Background and Aim: After right ventricular outflow tract reconstruction, patients with congenital heart disease (CHD) can have residual stenosis or develop pulmonary valve regurgitation, requiring pulmonary valve replacement (PVR). We aimed at characterising the impact of physical activity (PA) on aerobic capacity before and after PVR.
Methods: This interventional longitudinal study included patients with CHD referred for maximal cardiopulmonary exercise test (CPET) before and after PVR. Non parametric tests were used for statistical analysis.
Results: 38 patients were included: 68% tetralogy of Fallot, 3% double outlet right ventricle, 11% pulmonary stenosis, 5% pulmonary atresia, 13% other CHD; 76% males, median age at PVR 20 years (IQR 17.5-28.5), BMI 21 kg/m^2 (IQR 19-26). 40% practiced structured PA. CPET was performed at a median of 15 months (IQR 5-20) before, and 17 months (IQR10.5-26.5) after PVR. Median VO_2peak before PVR was 29 ml/kg/min (70% of predicted), VE/VCO_2slope 29, O_2pulse 11 ml. No statistically significative difference emerged in terms of VO_2peak (both in ml/kg/min and % of predicted), VE/VCO_2slope and O_2pulse before and after PVR, neither between sedentary and active subjects in terms of ΔVO_2peak (VO_2peak change in % from baseline after PVR). However, patients practicing structured PA had higher VO_2peak (ml/kg/min and % of predicted) both before ($p=0.002$, $p=0.037$) and after PVR ($p=0.008$, $p=0.018$) than the sedentary counterpart. A significant correlation emerged between sex, BMI, age and PA with VO_2peak before PVR (respectively $p=0.016$, $p=0.004$, $p<0.001$, $p=0.002$) and with VO_2peak after PVR (respectively $p=0.015$, $p=0.002$, $p=0.009$, $p=0.007$). At linear regression, VO_2peak pre PVR remained associated with age and BMI, while VO_2peak post PVR with BMI and sex.
Conclusions: Our study suggests that PA is a significant factor in determining aerobic capacity both before and after PVR. Nonetheless, even in physically active patients, VO_2peak did not change significantly after PVR. Further studies are needed to understand

the interplay between PA and cardiac morpho-functional characteristics in determining the trend of aerobic capacity after
PVR.







P-333 / #252

ASSESSING SLEEP IN CONGENITAL HEART DISEASE THROUGH WEARABLE DEVICES AND A HEALTH APPLICATION PROGRAMMING INTERFACE

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Background and Aim: Advances in cardiology have enabled patients with congenital heart disease (CHD) to reach older ages, yet many develop additional health challenges. Although sleep is a central component of overall health, objective sleep data in this population are still scarce. This study examined sleep patterns in adults with CHD compared to controls using wearable tracking and a Health Application Programming Interface (API).
Methods: During routine appointments at the TUM Klinikum Deutsches Herzzentrum, a sample of 174 adults with CHD (33.1±10.3 years; 49.2% women) and 51 controls (34.4±12.4 years; 40.4% women) were recruited between September 2023 and June 2025. Participants wore a Garmin Vivosmart®5 for seven consecutive days and synchronized it daily with the respective health API. Analyses covered sleep parameters and weekday-weekend differences. Multivariate models were used to identify demographic and clinical predictors.
Results: Individuals with CHD accumulated more deep sleep (83±19 vs. 75±16 min; p=.004) but lower Sleep Scores (74±9 vs. 77±9; p=.041). Within the CHD group, deep sleep increased on weekends compared with weekdays (p=.033, Figure 1). Age (p=.016), sex (p=.013), and body mass index (BMI; p<.001) significantly influenced sleep outcomes. Among CHD patients, women showed longer REM durations (p<.001), and higher BMI was consistently associated with poorer sleep. More severe heart defects were linked to reduced Sleep Scores.

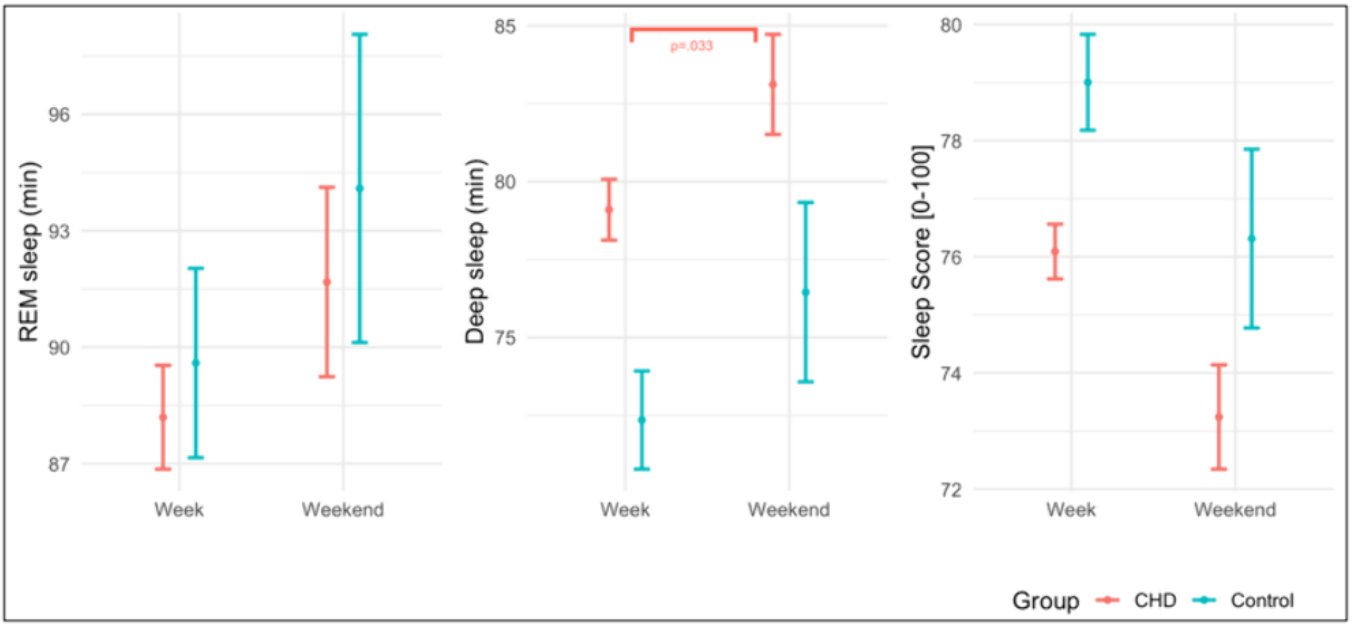


Figure 1. *Differences in sleep parameters across groups between weekdays and weekends. CHD, congenital heart disease; REM, Rapid Eye Movement; p-value significant with p<.05.*

Conclusions: Individual factors, particularly BMI, sex, and disease severity, substantially influence sleep. Additional variability across weekdays and weekends, together with the elevated risk of sleep-disordered breathing known from previous research, highlights sleep as an underrecognized focus for prevention and clinical management in CHD.



P-334 / #346

FEASIBILITY OF A HIGH-ALTITUDE SKI CAMP FOR ADOLESCENTS WITH CONGENITAL HEART DISEASE

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Background and Aim: Adolescents with congenital heart disease (CHD) often have limited opportunities for vigorous physical activity, especially in environments that increase cardiopulmonary stress. High-altitude winter sports may expose participants to increased physical load, hypobaric hypoxia, and restricted recovery, potentially affecting heart rate (HR), oxygen saturation (SpO_2), and electrophysiological markers such as QRS duration. Previous studies indicate that high altitude can impair oxygenation and increase cardiopulmonary strain, with children with CHD experiencing greater limitations than healthy peers. This study aimed to evaluate the feasibility and safety of a structured five-day ski camp for a heterogeneous cohort of adolescents with CHD.
Methods: A prospective, descriptive field study was conducted during a five-day winter camp (base ~1,150 m; activities up to ~2,600 m). Fourteen participants (mean age 16.5 ± 2.7 years) with diverse CHD diagnoses—including hypoplastic left heart syndrome, tetralogy of Fallot, double outlet right ventricle, double inlet left ventricle, transposition of the great arteries, hypertrophic cardiomyopathy, heart transplantation, and artificial mitral valve—took part. Vital parameters were measured twice daily. SpO_2 and HR were assessed using a validated pulse oximeter (Pulox PO-650B), and QRS duration using a standardized ECG device (Checkme Lite, Pulox by Viatom). Daily structure included a morning warm-up, two ski sessions, a midday rest, and evening workshops.
Results: Participants tolerated the camp well. Mean HR across the week was 88.0 ± 15.7 bpm, with no significant day-to-day variation ($p = 0.59$). Mean SpO_2 was 94.1% ± 4.3, also stable across days ($p = 0.20$). Overnight recovery showed no significant changes in any parameter (all $p > 0.05$), indicating adequate physiological adaptation despite altitude exposure and high daily activity.
Conclusions: Despite substantial physiological demands associated with daily skiing and altitude exposure up to 2,600 m, participants with CHD diagnoses tolerated the camp well. Stable HR and SpO_2 throughout the week, along with unremarkable overnight recovery patterns, support the feasibility of such high-altitude winter camps when conducted with



structured routines, medical monitoring, and supervision. These findings encourage the further development of inclusive alpine sports programs that promote physical activity among youth with CHD.



P-335 / #590

FUNCTIONAL VASCULAR ALTERATIONS IN PEDIATRIC INFLAMMATORY BOWEL DISEASE

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Background and Aim: This study investigated early vascular changes in children with inflammatory bowel disease (IBD) and their associations with inflammatory markers, disease duration, and activity.
Methods: A cross-sectional case-control design included 55 children with newly diagnosed IBD, 53 in clinical remission, and 53 healthy controls. Carotid intima-media thickness (cIMT) was assessed by ultrasound, and additional arterial parameters were measured using the oscillometric technique.
Results: No significant differences in cIMT were observed between IBD patients and controls, indicating the absence of structural arterial changes at this stage. Similarly, aortic pulse wave velocity (PWVao), a marker of arterial stiffness, did not differ significantly (P = 0.515). However, IBD patients demonstrated a significantly lower augmentation index (Aix) (P < 0.001), reflecting altered pulse wave characteristics. Heart rate correlated positively with disease duration (ρ(159) = 0.22, P = 0.006).
Conclusions: Although structural arterial changes were not detected, altered pulse wave features and progressive increase in heart rate suggest the presence of early functional vascular impairment in pediatric IBD.



P-336 / #160

POOR EXERCISE PERFORMANCE IN ADOLESCENTS WITH CONGENITAL HEART DISEASE (CHD), IS IT FROM PRIMARY HEART DISEASE OR PHYSICAL DECONDITIONING?

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Background and Aim: Adolescents with repaired CHD tend to reveal poor exercise performance. Whether it is due to baseline cardiac problems or physical deconditioning (PD) is poorly understood.
Methods: CPET of adolescents with Fontan operation, repaired tetralogy of Fallot (rTOF), and Controls were retrospectively studied. Those with peak VO2 (pVO2)/kg < 80% of predicted max VO2/kg (PmaxVO2/kg) were enrolled, where < 80% Controls represented pure PD group. † and ‡ indicate $p < 0.05$ compared with Controls and rTOF, respectively.
Results: Fontan 34 (male 15), rTOF 26 (male 9), and Controls 62 (male 29) were selected from 51 Fontan, 37 rTOF, and 233 Controls. Ages (years) were 16.4 ± 4.2‡ (Fontan), 19.0 ± 4.0† (rTOF), and 14.6 ± 1.6 (Controls). pVO2/predicted maxVO2 was 61.9 ± 11.2%† (Fontan), 63.9 ± 12.2% (rTOF) and 69.9 ± 8.6% (Controls). Peak HR was significantly lower in Fontan (158 ± 17†‡) than rTOF (173 ± 20) or Controls (185 ± 11). Peak respiratory exchange ratio was significantly lower in Fontan (1.16 ± 0.10†‡) than in rTOF (1.25 ± 0.12) or Controls (1.24 ± 0.17). ΔVE (mintue ventilation)/ΔVCO2 was significantly higher in Fontan (33.7 ± 4.2†‡) than rTOF (28.4 ± 6.6) or Controls (27.5 ± 5.0). %VAT (ventilatory anaerobic threshold)/PmaxVO2 and ΔVO2/ΔWR (aerobic work efficiency) were comparable in all groups. Peak work rate (pWR)/kg (Watts/kg) were significantly different: 1.83 ± 0.31† (Fontan), 1.96 ± 0.44 (rTOF), and 2.33 ± 0.43 (Controls) in males and 1.47 ± 0.40† (Fontan), 1.67 ± 0.33 (rTOF), and 1.90 ± 0.28 (Controls) in females. ΔVE/ΔVCO2 /[pVO2/kg] was also significantly higher in Fontan than Controls: 1.18 ± 0.20† (Fontan), 1.00 ± 0.30 (rTOF), and 0.90 ± 0.16 (Controls) in males and 1.72 ± 0.57†‡ (Fontan), 1.33 ± 0.35 (rTOF), and 1.15 ± 0.35 (Controls) in females.
Conclusions: Within poor exercise performers, Fontan and rTOF showed different CPET profile from Controls. Fontan revealed lower peak HR and higher ΔVE/ΔVCO2 than rTOF or Controls. pWR/kg (power production) was lower in CHD groups, especially in Fontan, suggesting the effects of PD may be disproportionally higher in CHD groups. Higher ΔVE/ΔVCO2/[pVO2/kg] and lower pWR/kg may characterize the poor exercise performance in CHD.

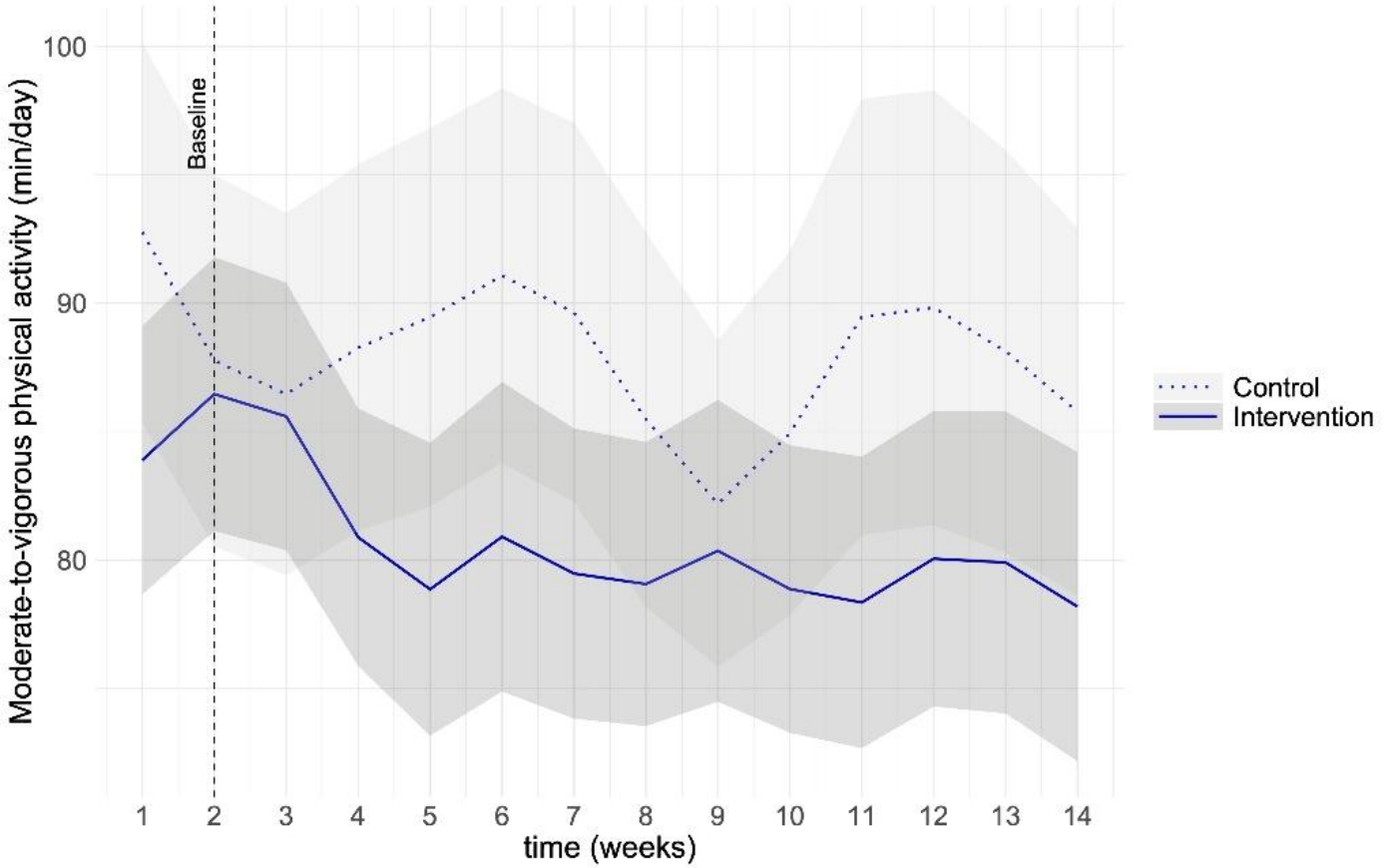


P-337 / #621

DIGITAL LIFESTYLE INTERVENTION TO PROMOTE PHYSICAL ACTIVITY, NUTRITION AND HEALTH LITERACY IN CHILDREN WITH CONGENITAL HEART DISEASE

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Background and Aim: Despite the well-documented benefits of an active lifestyle, most children with congenital heart disease (CHD) fail to meet recommended physical activity levels. Digital interventions represent a scalable, low-effort approach to promoting healthy behaviors. The aim of this study was to develop and evaluate a digital lifestyle intervention for children with CHD.
Methods: From October 2024 to October 2025, 64 children aged 8-14 years with CHD were recruited during routine medical check-ups at the German Heart Center and randomized to either intervention or control group. Following a two-week baseline phase, the intervention group received 12 weeks of access to a digital platform providing weekly training videos, healthy recipes, and health education content. The primary outcome was moderate-to-vigorous physical activity (MVPA; ≥3 METs). MVPA was continuously monitored in both groups using a wearable device (Garmin Vivofit Jr. 2 ®). Secondary outcomes were nutrition health literacy and physical activity health literacy assessed using the NHL-C and PAHL-C questionnaires at baseline, 6 weeks, and 12 weeks. The study is registered at ClinicalTrials.gov (NCT06626672).
Results: According to the linear mixed model, the change of MVPA over the study period did not significantly differ between groups when controlling for baseline MVPA (b = 0.20, 95% CI [-0.71; 1.11], p = 0.668). Overall activity levels were high, with approximately 80% of participants meeting the WHO recommendations for MVPA. Across the 12-week study period, both groups exhibited comparable activity levels, with MVPA values of 81.1 [59.8; 100.2] min/day in the intervention group and 84.8 [70.4; 100.6] in the control group. Neither nutrition health literacy nor physical activity health literacy changed significantly over the study period (NHL-C: Intervention Δ = 0.0 [-21.9; 12.5], Control Δ = 3.1 [-6.2; 10.9], p = 0.636; PAHL-C: Intervention Δ = 3.1 [-3.1; 21.9], Control Δ = 0.0 [-3.9; 16.4], p = 0.731).



Conclusions: The 12-week digital lifestyle intervention did not improve physical activity or health literacy in children with CHD. High baseline activity levels may have limited the potential for detectable intervention effects.



P-338 / #1474

KINESIOPHOBIA IN CHILDREN WITH HEART DISEASE AND THEIR CAREGIVERS: A DELPHI-BASED QUESTIONNAIRE DEVELOPMENT STUDY.

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Background and Aim: Despite the benefits of physical activity (PA), a substantial proportion of children with heart disease (HD) do not meet recommended PA levels. One potentially important but understudied psychological factor influencing PA is kinesiophobia, defined as fear of movement. To date, no validated instrument exist to measure kinesiophobia in children with HD or their caregivers. This study aimed to develop child-reported and caregiver-reported kinesiophobia questionnaires, tailored to the paediatric cardiology context.
Methods: A three-round Delphi-method was used to develop the questionnaires (Figure 1).The Delphi-process comprised survey rounds addressing the domain structure of both questionnaires and the development of the full caregiver-reported questionnaire. A multidisciplinary working group (WG) coordinated the process and integrated panel feedback throughout. Panel members, selected by the WG, represented a broad range of expertise including paediatric cardiology, allied health science, behavioural science and

caregivers. After completion of the Delphi-rounds, the caregiver-reported questionnaire was adapted into a parallel child-reported version to ensure age-appropriate wording and comprehension.

Results: Prior to item development, the WG formulated a definition of kinesiophobia within the context of HD, guiding domain identification. In the first Delphi-round, panel consensus resulted in the identification of six domains: four shared domains (fear of harmful effects; knowledge and understanding; social and environmental concerns; avoidance of perceived threat), one child-reported domain (bodily vulnerability), and one caregiver-reported domain (caregiver concerns). In the second Delphi-round, WG members independently generated questionnaire-items per domain at B1 language level to ensure accessibility across literacy skills. Items were categorized, discussed, and refined, resulting in a 30-item questionnaire. Based on panel feedback, two items were revised. In the third and final Delphi-round, consensus was reached on the items, with only minor refinements for clarity. A parallel child-reported version was subsequently developed and approved by the WG.

Conclusions: Using a method that integrates scientific literature, multidisciplinary expertise and experience, this study developed the first kinesiophobia questionnaires specifically targeting children with HD and their caregivers. Once validated, these instruments will enable assessment of kinesiophobia as a barrier to PA and threat to cardiovascular health, and support the development of targeted interventions to promote PA for children with
HD.

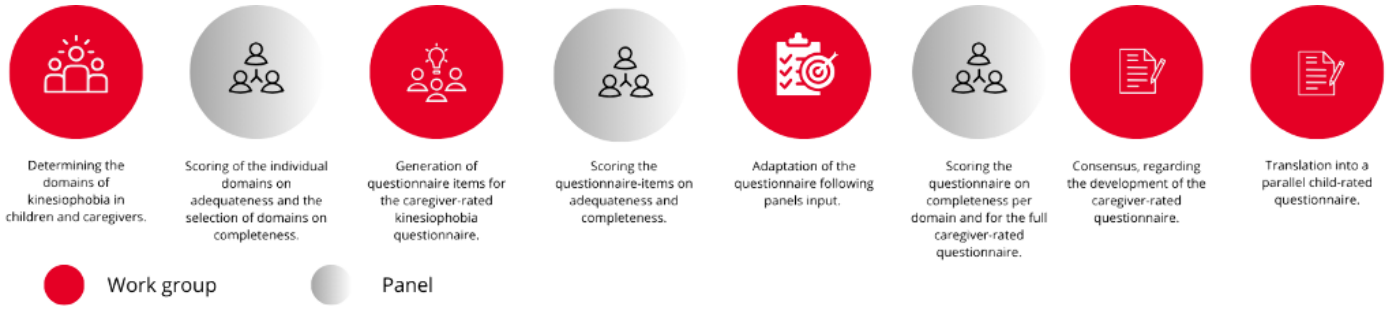


Figure 1: Schematic display of the Delphi-process used to develop the kinesiophobia questionnaires.



P-340 / #657

SUBCUTANEOUS IMPLANTABLE DEFIBRILLATOR: A REASONABLE OPTION FOR OLDER CHILDREN AND YOUNG ADULTS WITH CONGENITAL HEART DISEASE AND INHERITED ARRHYTHMIAS

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Background and Aim: Subcutaneous Implantable Cardiac Defibrillators (SICDs) have been increasingly used for multiple indications in adults. Experience in pediatric and adult congenital heart disease (CHD) patients is still limited. We present our single-center series of young patients with SICDs.

Methods: Review of clinical information, procedure reports and follow-up records of all patients with CHD and inherited arrhythmias as well as pediatric patients with unexplained cardiac arrest, who underwent SICD implantation or replacement in our center. Pre-implantation testing for suitability was performed in all and patients were chosen for implantation if they passed the test in at least 2/3 configurations. All procedures were performed by pediatric electrophysiologists under general anesthesia.

Results: From 8/2021 to 12/2025, 18 patients were treated by our department (ages 13-46, median 16,08 years, 83,3% males). The primary diagnoses included: Cardiomyopathies in 9 (50%), CHD in 6 (33,3%), channelopathies in 2 (11%) and unexplained cardiac arrest in 1 (5%). Indication was primary prevention in 72,3% and secondary prevention in 27,7%. Replacement of a previously existing SICD was performed in one patient. In all patients an intermuscular position of the device with a 2-incision technique was used. Two patients with CHD had a preexisting pacemaker, with no interference noted with the SICD. Two patients had SICD implanted because of inducible ventricular tachycardia during an electrophysiologic study before percutaneous pulmonary valve replacement. Defibrillation testing (DFT) was performed in 17 patients and was successful in all except for one who required repositioning of the coil. DFT was not performed in one patient with dilated cardiomyopathy and very low ejection fraction. Defibrillation impedance was mean 72,4 and median 68 Ohms. During a mean follow up of 18,7mo, one 1 patient had an inappropriate shock due to T wave oversensing. No infections or other complications occurred.



Conclusions: SICD implantation is a reasonable option in young patients with inherited arrhythmias, cardiomyopathies, unexplained cardiac arrest and CHD, without a need for pacing and can be performed with minimal procedural risk and long-term complications.



P-341 / #382

GENOTYPE TODAY, PHENOTYPE TOMORROW: TRACKING THE PEDIATRIC EVOLUTION OF ARRHYTHMOGENIC CARDIOMYOPATHY

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Background and Aim: Arrhythmogenic cardiomyopathy (ACM) is a cardiomyopathy characterized by "non-ischemic" myocardial scarring predisposing to heart failure, ventricular arrhythmias; and is classified as right-dominant (ARVC), biventricular (ABVC), and left-dominant (ALVC) phenotypes. Pediatric presentations are particularly challenging because many children present in a subclinical electrical phase with preserved ventricular morphology. We aimed to describe genotype–phenotype evolution and phenotypic conversion in children within the ACM spectrum, including subclinical disease.
Methods: We conducted a single-center cohort retrospective study (2010–2025) of children evaluated for suspected ACM and classified according to 2024 Task Force terminology. Diagnoses were categorized as ARVC, ABVC, ALVC, or subclinical ACM (defined as electrical/genetic criteria fulfillment without structural or morphofunctional (MF) abnormalities. Longitudinal reassessment determined phenotypic conversion to definite ACM.
Results: Thirty-eight patients met diagnostic or pre-diagnostic ACM suspicion thresholds: ABVC (n=21, 55%), ARVC (n=10, 26%), ALVC (n=1, 3%), and subclinical ACM (n=6, 16%). Median age at diagnosis was 14,7 (IQR:10,5-15,9) years and the median follow–up was 27 (IQR:9,7-59,6) months. Among ARVC cases, 60% (n=6) demonstrated left ventricular(LV) involvement, whereas 10% (n=1) fulfilled one major LV criterion in non-morpho-functional (N-MF)/structural domains. The single ALVC patient also fullfilled RV major and minor non-structural criteria, indicating early biventricular electrical involvement despite preserved morphology. During follow-up, phenotypic conversion to ABVC occurred in 3 patients (25% (2/8) with definite ARVC and 100% (1/1) with borderline ALVC), all of whom already met major/minor diagnostic criteria in N-MF/structural domains for the contralateral ventricle at baseline. Among 6 subclinical patients, 2 (33%) evolved to structural ACM: ABVC (n=1, 16,6%) and ALVC (n=1, 16,6%).
Conclusions: In children, the early subclinical phase of ACM is characterized by pathogenic variants, ventricular tachyarrhythmias, repolarization/depolarization



abnormalities despite preserved ventricular morphology and function. As the disease advances, phenotypic conversion becomes evident. Diagnostic interpretation remains limited when mandatory MF or structural criteria are lacking. Systematic follow-up is therefore essential to accurately classify evolving phenotypes. Our findings suggest that cross-ventricular diagnostic criteria and subclinical ACM in children should be considered an indication for structured, long-term imaging follow-up, as phenotypic conversion to structural disease was clearly documented in this cohort.



P-347 / #1329

OLFACTORY DYSFUNCTION IN CHILDREN WITH FONTAN CIRCULATION: ASSOCIATION WITH NT-PROBNP AND OXYGEN SATURATION

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Background and Aim: This study aimed to investigate the relationship between olfactory function and clinical parameters, including hypoxia and heart failure related biomarkers, in pediatric patients who had Fontan circulation.
Methods: A total of 24 children with Fontan circulation were included. Olfactory function was assessed using the 12-item Sniffin' Sticks screening test and patients were categorized into two groups based on the presence (n=15) or absence (n=9) of olfactory dysfunction. Clinical variables including age, sex, body weight, arterial oxygen saturation (SaO_2), brain natriuretic peptide (NT-proBNP) levels, AAT-1 (Fecal Alpha-1 Antitrypsin) status, age at Fontan surgery , systemic ventricular morphology, presence of heterotaxy, and fenestration were compared between groups. Statistical analyses included independent t-tests, chi-square tests, ROC analysis, and linear regression.
Results: Olfactory dysfunction was observed in 66.7% of patients. NT-proBNP levels were significantly higher in the dysfunction group (453.3 ± 309.6 pg/mL) than in the normal group (93.7 ± 63.2 pg/mL; $p = 0.002$). SaO_2 was significantly lower in the dysfunction group (94.8 ± 0.9%) compared to those without dysfunction (95.7 ± 0.7%; $p = 0.005$). No significant differences were found between groups in terms of age, body weight, sex, AAT-1 status, age at Fontan surgery, systemic ventricular type, heterotaxy ($p > 0.05$) (Table1). ROC analysis showed BNP was a strong predictor of olfactory dysfunction (Area Under the Curve= 0.812). In linear regression analysis, NT-proBNP was the only independent predictor of olfactory function ($p = 0.0053$), while SaO_2 did not retain significance.



Table 1. Comparison of Clinical Characteristics Between Fontan Patients With and Without Olfactory Dysfunction

Variable	No Dysfunction (n = 9)	Dysfunction (n = 15)	p-value
Age (years)	14.0 ± 4.4	14.2 ± 4.6	0.89
Body Weight (kg)	45.1 ± 11.9	45.9 ± 16.6	0.89
Oxygen Saturation (SaO_2 %)	95.7 ± 0.7	94.8 ± 0.9	**0.005**
NT pro BNP (pg/mL)	93.7 ± 63.2	453.3 ± 309.6	**0.002**
AAT-1 Status ("High" %)	55.6% (5/9)	80.0% (12/15)	0.25
Age at Fontan (months)	85.0 ± 52.4	104.7 ± 58.5	0.43
Systemic Ventricular Type (LV%)	55.6% (5/9)	53.3% (8/15)	0.91

Conclusions: Elevated BNP levels and reduced oxygen saturation are associated with olfactory dysfunction in children with Fontan circulation. However, NT-proBNP appears to be the sole independent predictor, possibly reflecting systemic congestion more accurately. These findings support the inclusion of olfactory assessment as part of long-term follow-up in this population.



P-356 / #1527

POSTOPERATIVE THROMBOSIS AFTER PEDIATRIC CARDIAC SURGERY

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Background and Aim: Congenital heart disease (CHD) is among the most common congenital malformations at birth, affecting approximately 1% of all live births in recent decades. Patients undergoing congenital heart surgery are at high risk for developing thrombosis due to disrupted blood flow, platelet activation secondary to extracorporeal circulatory support, inflammation, and/or hypercoagulable states. Previous studies have reported postoperative thrombosis incidence rates ranging from 2.9% to 49% in children with CHD. This study aimed to evaluate factors associated with postoperative thrombosis or thromboembolism in pediatric patients undergoing surgery for CHD.
Methods: This study was conducted between December 1, 2024, and December 1, 2025, in pediatric patients who underwent surgery for CHD at two high-volume cardiac centers. Patients diagnosed with venous or arterial thrombosis postoperatively via ultrasound, echocardiography, transesophageal echocardiography, CT, or fluoroscopy were included in the thrombosis group. Patients with thrombosis were matched at a 1:2 ratio with control patients without thrombosis based on age, STAT mortality category, and gender. Thrombosis incidence and associated risk factors were investigated, and findings were analyzed statistically.
Results: A total of 1,100 patients underwent surgery during the study period. The incidence of thrombosis was 6.7% (n = 74), of which 72% involved the venous system. The median time to thrombosis onset was 15 days (IQR 8–20 days). No statistically significant differences were observed between the two cohorts in age, gender, STAT mortality category, cardiopulmonary bypass (CPB) use or duration, presence of genetic or chromosomal anomalies, or other preoperative comorbidities. Single-ventricle physiology (OR 2 [95% CI 1.2–4]), neonatal age group (OR 1.8 [95% CI 0.8–6.2]), excessive fresh frozen plasma use (>30 mL/kg) (OR 0.8 [95% CI 0.6–2.4]), and prolonged central venous catheter duration (>14



days) (OR 4.4 [95% CI 2.4–14]) were identified as independent risk factors associated with increased thrombosis.

Conclusions: Postoperative thrombosis is a significant risk in pediatric CHD patients. Single-ventricle physiology, neonatal age, excessive use of fresh frozen plasma (>30 mL/kg), and prolonged central venous catheter duration (>14 days) were identified as independent risk factors contributing to thrombosis development.



P-357 / # 778

WHEN THE NEO-PULMONARY ARTERY GROWS TOO FAR: LEFT CORONARY COMPRESSION AND FATAL INFARCTION AFTER ARTERIAL SWITCH IN A NEWBORN

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Background and Aim: Coronary obstruction or stenosis is the most serious complication following an arterial switch operation (ASO) for transposition of the great arteries (TGA), necessitating meticulous pre- and postoperative coronary evaluation. We present a neonate who developed a fatal, extensive myocardial infarction after ASO due to an exceptionally rare mechanism.

Methods: The patient had an antenatal diagnosis of TGA with intact ventricular septum (TGA/IVS), confirmed postnatally, with the aorta positioned anterior to the pulmonary artery and a usual coronary pattern. Initial echocardiography also identified major aortopulmonary collaterals (MAPCAs) and moderate pulmonary hypertension.

Four weeks after ASO and MAPCA ligation, the infant experienced sudden sustained ventricular tachycardia during routine monitoring in neonatal post-ICU, followed by right bundle branch block, marked anterolateral ST-segment elevation and installation of cardiogenic shock. Echocardiography revealed a severely dilated neo-pulmonary root, absent flow in the left coronary artery (LCA), and profound left ventricular systolic dysfunction with very poor contractility in antero-lateral terittory. Emergency angio-CT demonstrated compression of the LCA by an aneurysmal neo-pulmonary artery. Dynamic ECG changes and significantly rising cardiac enzymes confirmed an extensive antero-lateral myocardial infarction.

Results: Due to hemodynamic compromise, emergent resternotomy and arterioplasty of the pulmonary trunk were performed, and veno-arterial ECMO was initiated. Postoperative



echocardiogram and CT-scan confirmed restoration of LCA perfusion. Despite this, left ventricular function failed to recover, and the patient's condition progressively deteriorated, resulting in death two weeks later.

Conclusions: Marked neo-pulmonary artery dilatation is an uncommon postoperative finding after ASO, and to our knowledge, coronary compression by an enlarged neo-pulmonary root has not been previously reported as a cause of severe complications. This case emphasizes the need for vigilant postoperative surveillance, recognizing that even rare anatomical changes may lead to life-threatening outcomes.



P-360 / #1289

EPIDEMIOLOGOCAL, CLINICAL AND PATHOPHYSIOLOGICAL PROFILE OF PEDIATRIC PULMONARY HYPERTENSION: A SINGLE CENTER COHORT STUDY

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Background and Aim: Pulmonary Hypertension (PH) in the pediatric population is a heterogeneous and complex condition, with elevated etiological and prognostic variability. The early identification of associated clinical variables can improve recognition and diagnostic assessment.The aim of this study is to describe the demographic and clinical characteristics,comorbidities,and pathogenetic mechanisms of PH in a pediatric cohort of patients evaluated at the Pulmonary Hypertension Clinic of Monaldi Hospital.
Methods: We conducted a single-center,retrospective,observational study including patients diagnosed with pulmonary hypertension (PH),evaluated between 2015 and 2025.The following variables were collected:age at diagnosis,sex,birth weight and gestational age,intrauterine growth restriction (IUGR),comorbidities,pathophysiological mechanism and clinical classification according to the WHO system and specific pharmacological therapies chosen.
Results: Sixty-six pediatric patients with PH were included:24 females(36.4%) and 42 males(63.6%).Mean gestational age at birth was 31.1 weeks (SD ± 5.5), with a prematurity(birth before 37 weeks)rate of 71.4% of cases.The mean birth weight was 1290.9 grams(SD ± 936.5).Intrauterine growth restriction(IUGR)was reported in 4 patients (6.1%). PH related to lung disease (Group 3)was the most common type(40 patients, 60.6%), mostly related to bronchopulmonary dysplasia in preterm babies.Group 1(pulmonary arterial hypertension) was found in 19 patients (28.8%),mainly related to congenital heart disease.Group 4 (chronic thromboembolic PH) was reported in only one case(1.5%). No patients were classified in Group 2(PH due to left heart disease) or Group 5 (PH with unclear or multifactorial causes).Overall,41 patients(62.1%)had other important conditions,including neurological,syndromic,respiratory, or metabolic disorders.Specific medical treatment for PH was given to 30 patients(45.5%). Thirty patients had medical therapy:19 (63.3%) pts were treated with ildenafil, 7(23.3%) had a combination sildenafil-bosentan,1 (3.3%) epoprostenol, 1(3.3%) bosentan and epoprostenol, 1(3.3%)with ambrisentan, and 1 (3.3%) received bosentan monotherapy.
Conclusions: Our cohort highlights the high clinical heterogeneity of pediatric patients



with pulmonary hypertension with a broad representation of pulmonary vascular and hypoxic form. The early identification of prenatal risk factors and underlying pathophysiological mechanisms could support a more targeted diagnostic and therapeutic approach. The high number of neurological and respiratory comorbidities underlines the importance of early multidisciplinary follow-up. Our registry is a real contribution to better understanding the clinical and care profile of pediatric patients with PH in a third-level center.



P-361 / #630

ROLE OF THREE-DIMENSIONAL ECHOCARDIOGRAPHY IN THE SELECTION OF PATIENTS FOR PERCUTANEOUS PULMONARY VALVE IMPLANTATION AFTER COMPLETE REPAIR OF TETRALOGY OF FALLOT

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Background and Aim: Introduction: The advancement of transcatheter pulmonary valve implantation (TPVI) for the native right ventricular outflow tract (RVOT) offers a strategy to minimize open surgery rates in patients after complete repair of Tetralogy of Fallot (TOF). The limited size range of transcatheter valves makes identifying the optimal timing for TPVI - a key clinical challenge. The optimal therapeutic window depends on the quantitative assessment of RVOT/PA diameters, as well as the right ventricle (RV) volumetric and functional status. Aim: To evaluate the reliability of three-dimensional echocardiography (3D-ECHO) as a method for selection of patients for TPVI.
Methods: Materials and Methods: This prospective study included 20 patients with median age 12.9 years [range 8-20]; median weight 41.1 kg [23-65]. All patients had hemodynamically significant pulmonary valve insufficiency (≥ grade 2) after TOF correction, with median time after surgery on RVOT - 12 years. All patients underwent outpatient evaluation, including exercise stress test and 24-hour ECG monitoring. Comprehensive 3D-ECHO (with a focus on 3D RV mode) was performed to assess: indexed right ventricular end-diastolic (RVEDVi) and end-systolic (RVESVi) volumes, the RVEDVi/LVEDVi ratio, right ventricular global longitudinal strain (RV GLS), as well as RVOT and PA diameters based on 3D reconstructions. 3D-ECHO data were compared with computed tomography (CT) findings using Mann-Whitney test. The presence of ≥2 guideline-recommended criteria for pulmonary valve replacement, combined with an RVOT/PA diameter ≥25 mm, served as indications for advanced imaging (CT, MR angiography).
Results: According to 3D-ECHO, the mean values were: RVEDVi 116.7 ml/m^2 [62-188], RVESVi 61.6 ml/m^2 [34-115], RVEDVi/LVEDVi ratio 2.2/1, and RV GLS -23.3% [-19 to -28.7]. The mean RVOT diameter was 23 mm [15-38], and PA diameter was 25 mm [20-31]. There were no statistically significant differences between RV volume values obtained by 3D-



ECHO and CT (p=0.143). Based on the developed algorithm, a TPVI waiting list was established to enable dynamic monitoring.

Conclusions: 3D-ECHO is a reliable and informative method for the selection of patients for TPVI after TOF correction. The proposed 3D-ECHO-based algorithm allows for patient stratification, determination of optimal timing for advanced radiological diagnostics (CT, MRI), and subsequent minimally invasive endovascular correction.



P-362 / #1519

LEFT ATRIAL RESERVOIR STRAIN AS A NON-INVASIVE MARKER OF FILLING PRESSURES IN CHILDREN WITH SUSPECTED PULMONARY HYPERTENSION

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Background and Aim: Non-invasive assessment of left-sided filling pressures in pediatric patients remains challenging. Left atrial reservoir strain (LARS) has emerged as a promising non-invasive marker of elevated left ventricular filling pressures in adults, correlating with pulmonary capillary wedge pressure (PCWP). Evidence in children is limited. Accurate estimation of left-sided filling pressures is essential for guiding therapy and prognosis in pediatric pulmonary hypertension, where invasive assessment carries procedural risks and is not always feasible.This study aimed to evaluate the relationship between LARS and PCWP in pediatric patients referred for cardiac catheterization due to echocardiographic suspicion of pulmonary hypertension

Methods: We conducted a retrospective observational study including 31 pediatric patients who underwent clinically indicated echocardiography and cardiac catheterization within a two-month interval. All patients were in sinus rhythm at the time of both procedures. LARS was measured using two-dimensional speckle-tracking echocardiography from the apical four-chamber view with end-diastolic R-wave gating. PCWP was obtained during catheterization at end-expiration. Associations between LARS, lateral E/E', and PCWP were analyzed using Spearman correlation and ROC analysis. All LARS measurements were performed using the same vendor (Philips, Andover, USA).

Results: Mean age was 9.33 ± 4.88 years (range 0.1–16). Mean invasive PCWP was 11.90 ± 4.45 mmHg (range 4.0–24.0). Mean LARS was 28.32 ± 11.80% (range 4.3–48.0). PCWP ≥15 mmHg was present in 7 patients (22.6%). LARS showed a significant inverse correlation with PCWP (Spearman's $\rho = -0.568$, $p = 0.00086$). Lateral E/E' was also correlated with PCWP, although with lower strength ($\rho = 0.45$, $p = 0.012$). Lower LARS values were associated with higher invasive filling pressures. In ROC analysis for detecting PCWP ≥15 mmHg, LARS showed excellent discrimination (AUC = 0.917; 95% CI 0.783–1.000). The



optimal cut-off was 14.5%, yielding sensitivity 85.7% and specificity 95.8% (LR+ 20.6; LR− 0.15).

Conclusions: LARS demonstrates a significant inverse association with PCWP in children with suspected pulmonary hypertension and appears to correlate more strongly with invasive filling pressures than conventional diastolic parameters. As a non-invasive tool, LARS may complement risk stratification and clinical decision-making. Prospective studies with synchronized echocardiography and catheterization are warranted to confirm these results and establish standardized pediatric reference values



P-363 / # 1510

ASSOCIATION OF NON-INVASIVE RIGHT VENTRICULAR TO PULMONARY ARTERY COUPLING WITH INVASIVE HEMODYNAMICS AND FUNCTIONAL CLASS IN CHILDREN WITH PULMONARY HYPERTENSION

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Background and Aim: The ratio between tricuspid annular plane systolic excursion (TAPSE) and pulmonary artery systolic pressure (PASP) is considered a non-invasive surrogate of right ventricular–pulmonary artery (RV–PA) coupling in adults, with prognostic thresholds proposed. Evidence in pediatric populations remains scarce. We aimed to assess the association of TAPSE/PASP with invasive pulmonary pressures and functional class in a cohort of children with pulmonary hypertension

Methods: We retrospectively analyzed 41 paired echocardiographic and catheterization studies in patients aged 3 weeks to 16 years evaluated for suspected or confirmed pulmonary hypertension. TAPSE/PASP (mm/mmHg) was measured by TTE. Invasive systolic (sPAP), mean pulmonary artery pressure (mPAP), and pulmonary vascular resistance (PVR) were recorded within 4 weeks. Associations were assessed using Pearson's correlation and non-parametric tests across NYHA functional classes. The adult-derived cut-off (<0.19) was explored descriptively

Results: Patients ranged from 3 weeks -16 years (mean 5.93 years) and weighed 2.7 to 60 kg (mean 19.6 kg). 91.2% of invasive measurements confirmed PH with mean pulmonary artery pressure (mPAP) >20 mmHg. Median mPAP was 32 mmHg (mean 39.3 ± 19.5). Mean TAPSE/PASP was 0.243 ± 0.123 (range 0.05–0.56). Right atrial and ventricular dilation were frequent (66.7%), and most patients belonged to WHO Group 1 or 2 pulmonary hypertension categories, reflecting a heterogeneous but predominantly pre-capillary profile.TAPSE/PASP showed a moderate-to-strong inverse association with mPAP ($r = -0.534$; $p < 0.001$) and moderate associations with sPAP ($r = -0.454$; $p = 0.004$) and PVR ($r = -0.490$; $p = 0.002$). Correlations were stronger in older/heavier children (mPAP $r = -0.692$; PVR $r = -0.723$; both $p \leq 0.002$). TAPSE/PASP values decreased across worsening NYHA classes (Kruskal–Wallis $p = 0.026$). Among patients with TAPSE/PASP <0.19, 66.7% were



NYHA III–IV versus 38.1% with ≥0.19 (linear trend p = 0.030), although dichotomous comparison was not significant (Fisher p = 0.112).

Conclusions: In this pediatric cohort, TAPSE/PASP demonstrated moderate-to-strong inverse associations with invasive pulmonary pressures and functional class. These associations highlight the physiological relevance of RV–PA coupling in pediatric pulmonary hypertension and suggest that TAPSE/PASP may complement invasive assessment for risk stratification/ follow-up. Its non-invasive nature is particularly valuable in children.

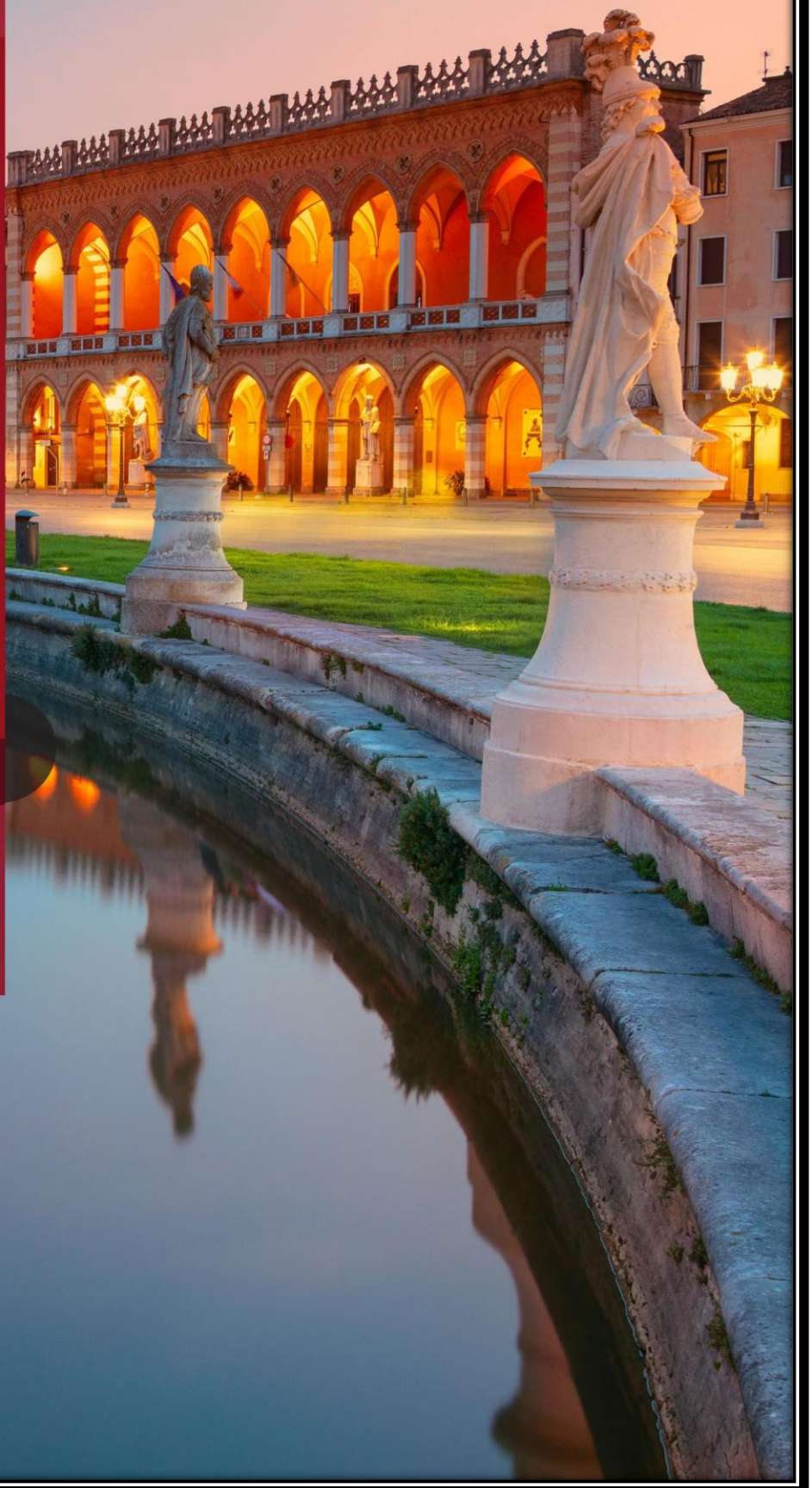
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