24

Malposition of the great arteries: A new 3D echocardiographic approach
Kaled Hadeed, Sébastien Hascœ, Marianne Peyre, Yves Dulac, Romain Amadieu, Philippe Acar
Cardiologie pédiatrique, Hôpital des Enfants, CHU de Toulouse, Toulouse, France

Purpose.— Geometric profile of the left and right outlets as well as position and size of the ventricular septal defects (VSD) determine the surgical approach of malposition of the great vessels.

Aim. — To determine the ability of the 3D echocardiography (3DE) to depict the outlet chambers in normal and pathologic situations.

Methods. — Twenty patients were prospectively enrolled [10 had normal heart, five tetralogy of Fallot (TOF), three double outlet right ventricle (DORV), two double discordance (DD) with VSD]. The median age was 3.6 years (range 2 months–13 years). All underwent transthoracic 3DE (Philips, ie 33, X5-1 and X7-2). Full volume and Live 3D acquisition were performed. Off-line analysis was performed using a dedicated system (Qlab version 9). An asymmetry index of the VSD was calculated by the maximal 3D diameter divided by the minimal 3D diameter. A cut-off of 1.25 was set to distinguish ovale and circular shape.

Results. — Mitro-aortic continuity was observed in all controls and patients with TOF. Mitro-aortic distance was measured in patients with DORV (36 mm/m²). Septo-aortic and septo-pulmonary continuity was observed respectively in control and DD with VSD. Distance between tricuspid and pulmonary valve was (25.7 mm/m²) in control, (54.4 mm/m²) in TOF, (58.9 mm/m²) in DORV, and (17.5 mm/m²) in DD. VSD was in sub-aortic position in TOF and in 3 DORV; in sub-pulmonary position in two DD. Mean size of the VSD was 13.8 mm (27.3 mm/m²). Shape of the VSD was circular in all but one DD with small oval VSD; subvalvular insertion on VSD crest was observed in the same patient responsible of sub-pulmonary stenosis.

Conclusions. — 3DE is able to describe the outlet chambers and VSD position and geometry. This tool could help to determine the best surgical strategy in patients with malposition of the great vessels.

http://dx.doi.org/10.1016/j.acvd.2013.06.031

25

Isolated left ventricular non-compaction: Relationships between MRI criteria for non-compaction and clinical events
Delphine Marest a, Patrice Guérina, Claire Defrance b, Marion Caza a, Georges Fau b, Beatrice Delassalle a, Karine Warin Fresse b

a Department of Radiology, Thorax Institute, University Medical Center, Nantes, France
b Department of Radiology, Thorax Institute, University Medical Center, Nantes, France

Background. — Isolated ventricular non-compaction is a congenital cardiomyopathy, based on an arrest of normal embryonic myocardial development and characterized by the presence of a two-layered myocardial structure, with a compacted epicardial band and a non-compacted endocardial layer of prominent trabeculations. It is sometimes complicated by ventricular dysfunction and heart failure, arrhythmias or thrombo-embolic events. The aim of our study was to look for a potential relationship between magnetic resonance imagery’s non-compaction extension criteria and these clinical events.

Methods. — Between 2004 and 2013, we conducted a retrospective study reviewing magnetic resonance imagery with diagnosis of non-compaction. One hundred and twenty-five patients were included in the study. Left ventricular ejection fraction, left ventricular volumes, global left ventricular mass, compacted and non-compacted left ventricular mass, number of non-compacted segments and non-compaction score were measured. Non-compaction score was the sum of the ratios of the thickness of non-compacted to compacted myocardial layers superior to 2.3, measured in the diastolic phase.

Results. — There was no statistical relationship between left ventricular ejection fraction alteration and non-compaction score (P = 0.57) or number of non-compacted segments (P = 0.97), between stroke incidence and non-compaction score (P = 0.22) or number of non-compacted segments (P = 0.96) and between ventricular arrhythmias and non-compaction score (P = 0.59) and number of non-compacted segments (P = 0.59). Conversely, we found a significant inverse relationship between left ventricular ejection fraction and compacted mass (P = 0.0001) and between stroke and compacted mass (P = 0.007).

Conclusion. — Our study did not show any association between magnetic resonance imagery criteria of non-compaction extension and clinical events. Conversely, we found a relationship between compacted mass and left ventricular ejection fraction dysfunction and the incidence of strokes, but not of ventricular arrhythmias. These findings suggest that isolated left ventricular non-compaction does not involve only the non-compacted part of the myocardium, but also its compacted part.

http://dx.doi.org/10.1016/j.acvd.2013.06.032

26

Percutaneous stent placement for aortic coarctation in adolescents and adults
C. Ducruex a, F. Sassolas a, M. Veyrier a, J. Ninet b, H. Joly a, A. Bozio a, S. Di Filippo a

a Department of Pediatric and Congenital Cardiology, University of Lyon Medical Center, Lyon, France
b Department of Cardiothoracic Surgery, University of Lyon Medical Center, Lyon, France

Aim. — The aim of this study was to assess the results of transcatheter stent treatment of native or recurrent coarctation of the aorta in adolescents and adults, as an alternative to surgery.

Material and methods. — Single-center study included patients aged >10 years with significant recurrent or native coarctation of the aorta. Clinical data (blood pressure, antihypertensive medications), echocardiographic (maximal aortic gradient, LV shortening fraction), CT scan (isthmus diameter) measurements and hemodynamical isthmus gradient were assessed before and after the procedure. All procedures were performed under general anesthesia.

Results. — From 2009 to 2012, eighteen patients, aged 10.8 to 49 years (mean 26), with native (6) or recurrent (12) coarctation underwent transcatheter stent placement. All had high blood pressure and 80% were given antihypertensive medications. Doppler peak systolic gradient across the coarcted segment before procedure was 61 ± 16 mmHg. LV hypertrophy was present in 50% of the cases, mean LVSF was 27%. Stent was successfully implanted in all patients. The balloon to coarcted segment diameter ratio was 2.5 ± 0.5, stents diameters ranged 34 to 45 mm. Peak to peak hemodynamic gradient decreased from 25 ± 11 before to 3 ± 3 mmHg after stent placement. Doppler maximal gradient decreased to 20 ± 5 mmHg. Arterial hypertension regressed or improved in 77% of the cases. Echocardiographic LV hypertrophy persisted in only 30% of the cases. These results maintained at mean 19-months follow-up (1 month to 3 years).

Adverse events included one early femoral artery thrombosis and one external iliac artery thrombosis, but no clinical limb ischemia occurred.
Conclusion.— Percutaneous stent placement for management of native or recurrent aortic coarctation is an efficient and safe alternative to surgery, and is associated with a long term reduction in blood pressure and LV hypertrophy.

http://dx.doi.org/10.1016/j.acvd.2013.06.033

27 Closure of huge tubular patent ductus arteriosus using amplatzor vascular plug II or IV in premature infants and small children under 6 kg
Alexandre Bretonneau, Claire Cornolle, Hugues Lucron
Congenital and Pediatric Cardiology, Antilles, Guayana tertiary care center for complex congenital cardiac diseases (M3C), University Hospital of Martinique, BP 632, 97200 Fort-de-France, Martinique, French West Indies
∗ Corresponding author.

Background.— Percutaneous closure of huge and tubular (type C) patent ductus arteriosus remain challenging or unsuccessful in small infants.

Aim.— To evaluate the usefulness and safety of Amplatzor vascular plug II and IV for percutaneous closure of very large ductus arteriosus under 6 kg.

Methods.— Single-center retrospective study including all consecutive unselected patients (≤6 kg, large symptomatic ductus arteriosus) referred to our institution over a 4 years period for percutaneous closure and treated with plug II or IV. No patient was excluded and there was no failure or surgery within the weight limit to consider percutaneous closure (> 2.5 kg).

Results.— Seven patients were successfully treated using vascular plug II and IV without any residual shunt. Six plug II were implanted (mean patients weight 4.3 ± 0.8 kg, mean ductus diameter 6 ± 1.8 mm, mean device size 8.6 mm (6–14), fluoroscopy time 14.8 ± 6.3 min, occlusion rate 100%, mean follow-up 6 ± 2 months) including huge type C (5) and one type E (1) ductus. Mean pulmonary artery pressure dropped from 25 ± 7 (17–38) mm of Hg to normal value in all cases and there was no aortic protrusion or embolization. One patient experienced severe but reversible pulmonary hypertension crisis in the catheter lab requiring blood transfusion. A 6 mm Amplatzor vascular plug IV was also implanted in a 4.2 kg patient (4.8 mm type D ductus, fluoroscopy 10 min, uneventful 8 months follow-up).

Conclusion.— Percutaneous closure of very large ductus arteriosus is safe and effective under 6 kg. In our experience, the vascular plug II profile allows with acceptable risk to extend indication to infants below 4 kg with huge tubular forms. This might contribute to reduce surgical indications and in hospital morbidity and to improve cost effectiveness. We believe that plug II could also be proposed in the near future for closure of conical shape (type A) with similar results.

http://dx.doi.org/10.1016/j.acvd.2013.06.034

28 Relationship between fluoroscopic time, morphological parameters and irradiation during catheterization in children with congenital heart disease
S. Hascoëta, G. Oustaub, K. Hadeedc, S. Balduyckb, F. Heitzd, Y. Dulacc, R. Fesseaue, X. Alacoquee, G. Chausseraye, Damien Bonneta, Daniela Lauxa, Virginie Sallea, Stanislas Lyonnetb, Martinique, French West Indies

Background.— Catheterization procedures are being increasingly performed in children with congenital heart disease for diagnostic and treatment purposes. Given children’s greater sensitivity to radiation and the longer life span during which radiation health effects can develop, the ALARA principle (irradiation As Low As Reasonably Achievable) is of peculiar importance. We report the radiation doses and related factors for children who underwent cardiac catheterization procedure in Toulouse children Hospital from January to April 2013.

Methods.— We prospectively included 60 children (mean age 4 years old, weight 2.350—59 kgs) undergoing a therapeutic (n = 55, 91.7%) or diagnostic (n = 5, 8.3%) cardiac catheterization procedures. We investigated the relationship between dose area product (DAP), fluoroscopy time (FT), pulsed fluoroscopic DAP, image acquisition DAP, age, morphological parameters and double products combining FT and weight or size or body mass index (BMI) or body surface area (BSA). BSA was calculated according to the Mosteller formula.

Results.— The mean DAP was 20,697 ± 29,342 mcgym². The mean total fluoroscopic time was 24.6 ± 19.7 min. DAP was not significantly different between diagnostic and therapeutic catheterization (P = 0.98). Although image acquisition DAP accounted for only 4.4 ± 2.4% of FT, it represented 42.5 ± 19.6% of DAP. DAP was moderately although significantly correlated with FT (r = 0.73, P = 0.0001), BSA (r = 0.44, P = 0.0011), age (r = 0.37, P = 0.0082), weight (r = 0.43, P = 0.002) and size (r = 0.38, P = 0.0052). DAP was strongly associated with FT × Weight (r = 0.92, P = 0.0001), FT × BSA (r = 0.93, P < 0.0001) and FT × Size (r = 0.91, P < 0.0001). Linear regression analysis model involving FT × BSA to predict DAP was significant (P < 0.0001). Approximately 90% of the variance of DSA was accounted for by this model.

Conclusion.— FT and morphological features (BSA, weight, size) are the key parameters associated with DAP. Pelicular attention to reduce FT and avoid unnecessary image acquisition may decrease irradiation during catheterization in children with congenital heart disease.

http://dx.doi.org/10.1016/j.acvd.2013.06.035

29 Systematic description of cardiac phenotype based on the anatomical and clinical classification (ACC-CHD) in a DNA bank for congenital heart disease
Daniela Lauxa, Fanny Bajolleb, Virginie Sallea, Stanislas Lyonnetb, Damien Bonnetb
a Centre de Référence Malformations Cardiaques Congénitales Complexes (M3C)-Necker, Hôpital Necker-Enfants—Malades, Assistance Publique des Hôpitaux de Paris, Université Paris Descartes, Sorbonne Paris Cité, Paris, France
b Service de Genétique médicale, Hôpital Necker-Enfants—Malades, Assistance Publique des Hôpitaux de Paris, Université Paris Descartes, Sorbonne Paris Cité, Paris, France

Background.— DNA banks containing samples of patients with congenital heart disease are being developed at international level. The accurate anatomic description of the cardiac phenotype of such samples is a key feature for their success.

Objective and methods.— To precisely describe the cardiac phenotype of the available samples of the "CARREG" DNA bank, started in April 2009 in our institution, based on the recently published clinical and anatomic classification (ACC-CHD) and the International Pediatric and Congenital Cardiac Code (IPCCC). Samples collected