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01 Feasibility and reproducibility of tissue motion annular displacement of mitral valve in children with and without heart disease

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Objectives. — Little is known about parameters of systolic left ventricular (LV) function using speckle tracking (ST) in children. The aim of this study was to define the feasibility (F) and reproducibility (R) of tissue motion annular displacement of mitral valve (TMAD) in healthy children (HC), in children with heart disease (HD) and to assess the correlations between TMAD and usual LV systolic function parameters (LVSVF).

Methods. — We prospectively included 22 children with HD (13 boys, mean age 104 months) and 22 HC (12 boys, mean age 116 months). In an apical four chambers view, one region of interest (ROI) was placed at the septal and lateral parts of the mitral annulus and one at the apex. The displacement of the midpoint between the two annular ROIs toward the apex was automatically calculated by QLAB 9® software (Philips).

Results. — TMAD indexed F was 100% (CI95% 94.8—100%) in children with and without heart disease and 86% (CI95% 71.5—100%) in healthy children. TMAD was not correlated to age nor to body surface area (BSA) nor to LV ejection fraction in HC whereas indexed TMAD was respectively 19% and 11% in HC and in children with HD. TMAD was not correlated to BSA and well correlated with stroke volume. The advantage of TMAD over tissue Doppler imaging relies on the independence on angle and measurement of strain vectors not parallel to the ultrasound beam. TMAD is an interesting tool in children. Its accuracy to estimate systolic function needs to be further investigated in children.

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02 Impact of micro-transoesophageal echocardiography for congenital cardiac surgery in the operating room and the pediatric intensive care unit

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Purpose. — Transoesophageal echocardiography (TEE) impact on post-operative issue is unknown and its application in operating room (OR) and pediatric intensive care unit (PICU) debated.

Aims: —to describe residual lesions by TEE in the immediate and follow-up post-operative period; —to determine the feasibility of a new micro-TEE probe dedicated in small infants.

Methods.— One hundred and ninety-six patients were prospectively enrolled. From 2010 to 2012, mini-multi-pediatric TEE (4—7 MHz, tip-length 27 mm, tip-width 10.6 mm) was performed in 176 patients (median weight 15.1 kg [4.5—7]). From 2013, micro-TEE (3—8 MHz, tip-length 18.5 mm, tip-width 7.5 mm) was performed in 20 patients (median weight 11.7 kg, [3.5—40]). Operated lesions were (1) left-to-right shunt, (2) pulmonary obstruction with VSD, (3) left AV valve regurgitation (LAVVR). Residual lesions were assessed by TEE in the OR and by TTE at the last visit (mean follow-up 5 months after surgery). Lesions were classified as severe [residual shunt (RS) > 5 mm, maximal pulmonary gradient (PG) > 50 mmHg, LAVVR grade 4], as moderate (RS 2—5 mm, PG 35—50 mmHg, LAVVR grade 2—3), as mild (RS < 2 mm, PG < 35 mmHg, LAVVR grade < 2). Micro-TEE image quality was scored from 0 to 2.

Results.— One hundred and ten patients (56%) had none residual lesions in the OR. Significant lesions were observed in six patients (3%), all have had a redo surgery (one RS, two PG, three LAVVR). Moderate lesions were observed in 17 patients (9%): one RS (stable), nine PG (one regression, four stable, four aggravated lesions: three awaiting for reoperation and one dilated by balloon), seven stable LAVVR. Mild lesions were observed in 63 patients (32%): 30 RS (24—
regression, three stable, three moderate), 16 PG (four regression, four stable, four moderate), 17 LA/VR (six regression, seven stable, four moderate). Image quality of micro-TEE was scored 1 for 2D and 2 for Doppler. In three patients on circulatory assistance, micro-TEE could be performed in PICU with good tolerance and acceptable quality.

Conclusions.—TEE is a tool to evaluate hemodynamic significance of post-operative residual lesions. This new microprobe offers the possibility to perform TEE in small infants in the OR and in unstable patients with poor imaging TTE in PICU.

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03
Coronary artery compression during transcatheter right-ventricular outflow tract treatment: Incidence, diagnosis and outcome
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Background.—Coronary compression (CC) may occur during percutaneous pulmonary valve implantation (PPVI) and is potentially life threatening when undiagnosed before right ventricular outflow tract (RVOT) stenting. We sought to evaluate its incidence, diagnosis and outcome.

Methods.—All consecutive patients who underwent transcatheter RVOT treatment from May 2008 to December 2011 in two institutions were studied. Baseline demographics, diagnosis and outcomes of CC were reviewed with analysis of risk factors.

Results.—CC occurred in six out of 100 patients (6%) at a median age of 24 (13 to 49) years, with RVOT conduit stenosis as the primary lesion in all cases. The initial congenital heart disease was pulmonary atresia-ventricular septal defect (n = 3), complex transposition of the great arteries (n = 2) and critical aortic stenosis status-post Ross operation (n = 1). The RVOT initial median conduit diameter at surgical implantation was 23 (17 to 24) mm and conduit types were homograft (n = 3), bioprosthesis (n = 2) and a pericardial patch (n = 1). CC was diagnosed by coronary angiogram during balloon dilation of the RVOT in all cases whereas it was suspected on pre-procedure computed tomography (CT-scan) in only two cases. Compression occurred on the left anterior descending coronary artery in four cases and on a right coronary artery that arose from the proximal left anterior descending coronary artery in two patients (single coronary artery). No risk factor was found but there was a significantly higher incidence of CC in one of the two institutions (P = 0.04). CC was well-tolerated and resolved after the balloon was deflated in all the cases. No patients underwent RVOT stenting or PPVI. Surgical conduit replacement was electively performed in three patients. Two patients with moderate residual RVOT stenosis were followed. One patient with encephalopathy and respiratory insufficiency died 9 months after catheterization.

Conclusions.—CC is efficiently diagnosed by coronary angiogram during balloon dilation in patients undergoing transcatheter interventions on RVOT. Diagnosis by pre-procedure CT-scan is not accurate. No specific risk factors exist. Surgical conduit replacement is indicated when balloon dilation fails to improve the RVOT obstruction.

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04
The influence of closure of patent ductus arteriosus on left and right ventricular size and function
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Background.—Patent ductus arteriosus is responsible for left ventricular diastolic and right ventricular systolic overload. Little is known about hemodynamic changes after percutaneous and surgical closure.

Methods.—We conducted a bicentric prospective study, of children, with patent ductus arteriosus, evaluating the evolution of systolic and diastolic ventricular function before, 1 day and 1 month after successful closure, by means of transthoracic echocardiography.

Results.—Thirty-three children, age 3 months to 14.5 years, underwent successful closure of their patent ductus arteriosus, 32 percutaneously and one surgically. All patent ductus arteriosus were closed for hemodynamic reasons, with a mean diameter of 3.6 ± 0.9 mm. There was a significant increase in systemic (100.6 ± 15.1 versus 95.4 ± 15.3 mmHg, P < 0.05) and diastolic (53.2 ± 17.1 versus 47.8 ± 17.2 mmHg, P < 0.05) blood pressures, immediately after the suppression of the shunt. Left ventricular fractional shortening and end-diastolic volumes index were significantly lower the day after closure (respectively 34.7 ± 5.5 versus 37.8 ± 4.7% and 47 ± 16.2 versus 54.6 ± 20.1 mL/m²) and remained low compared to the preclosure state at follow-up (respectively 33.8 ± 5.4 versus 37.8 ± 4.7% and 47 ± 12.7 versus 54.6 ± 20.1 mL/m²). A non-significant decrease in left ventricular filling pressures was observed. Right ventricular systolic parameters (TAPSE) were significantly lower 1 month after closure (19.3 ± 2.9 versus 21.4 ± 4.4 mm, P < 0.05).

Conclusion.—Changes in left ventricular volume and function and in right ventricular function occur immediately after patent ductus arteriosus closure, and remain at 1 month of follow-up. Further studies are warranted to increase the number of patients and the duration of follow-up.

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05
A 10-year study of planned delivery of foetuses with prenatally diagnosed congenital heart disease in a single institution
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Objectives.—To describe the aims and rationale for planned delivery in a tertiary referral centre for foetuses with prenatal diagnosis of congenital heart disease.

Methods and results.—Two thousand one hundred and thirty consecutive foetuses with congenital heart disease diagnosed from...