Feasibility and reproducibility of peak left ventricular twist in children with and without heart disease

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Objectives. — New parameters of systolic left ventricular (LV) function using speckle tracking echocardiography are available. Little is known about the accuracy of these parameters in children. The aim of this study was to define the feasibility and reproducibility of systolic peak left ventricular (LV) twist in healthy children and in children with heart disease. We also aimed to assess the correlations between left ventricular twist and usual left ventricular systolic function parameters.

Patients and methods. — We included in this prospective monocentric study 22 children with cardiopathy (13 boys, mean age 104 months) and 22 healthy children (12 boys, mean age 116 months). Peak LV twist (difference between maximal apical rotation and maximal basal rotation obtained on para-sternal views) was measured off-line in a dedicated workstation (QLab® 9). Feasibilities were compared within the two groups.

Results. — Peak LV twist feasibility was 77% (CI95% 59.4–94.6%) in patients and 64% (CI95% 43.9–84.1%) in healthy children. Feasibility of twist was not significantly different between children with or without cardiopathy. Intraobserver variability of peak LV twist was 43% in patients and 41% in healthy children. Interobserver variability of peak LV twist was 39% in patients and 36% in healthy children. Peak LV twist was correlated to body surface area (r = 0.631, P = 0.0229). Indexed Peak LV twist was significantly correlated to Simpson’s LV ejection fraction (r = 0.678, P = 0.0146) and conversely correlated with indexed end-systolic left ventricular volume (r = −0.604, P = 0.0293) in healthy children unlike non-indexed Peak LV twist. Peak LV twist and indexed peak LV twist were not correlated to mitral annular mean maximal tissular doppler imaging velocity.

Conclusion. — Despite a promising concept to assess systolic function, feasibility of peak LV twist is currently low in child with heart disease and also in healthy children. Intra and inter observer variabilities are high. The high heart rate variability and the difficulty to acquire echo loops without any movement in children may be the limiting factors. Therefore, it seems too early to extend the use of these parameters in clinical practice. The improvement of speckle tracking technology and a thorough formation of operators are probably necessary before using this new promising parameter in clinical practice.

http://dx.doi.org/10.1016/j.acvd.2013.03.048

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

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Objectives. — New parameters of systolic left ventricular (LV) function using speckle tracking echocardiography are available. Little is known about the accuracy of these parameters in children. The aim of this study was to define the feasibility and reproducibility of tissue motion annular displacement of mitral valve (TMAD) in children with and without heart disease. We also aimed to assess the correlations between TMAD and usual left ventricular systolic function parameters.

Patients and methods. — We included in this prospective monocentric study 22 children with cardiopathy (13 boys, mean age 104 months) and 22 healthy children (12 boys, mean age 116 months). TMAD relies on strain vectors measured by speckle tracking technique. Cine loops were registered during a standard 2D echocardiography in the apical four-chamber view allowing a good visualization of the mitral annulus and the left ventricular apex. Cine loops were analyzed using off-line QLAB® 9® software (Philips Medical Systems). Three regions of interest (ROI) were placed: two at the septal and lateral parts of the mitral annulus and the third at the apex. The displacement of the midpoint between the two annular ROIs toward the apex was automatically calculated.

Results. — TMAD indexed feasibility was 100% (CI95% 94.8–100%) in children with cardiopathy and 86% (CI95% 71.5–100%) in healthy children. Feasibility of TMAD was not significantly different between children with or without cardiopathy. Intraobserver variability of TMAD was respectively 19% and 11% in children with and without cardiopathy. Interobserver variability of TMAD was respectively 19% and 16% in children with and without cardiopathy. TMAD was not correlated to age nor to body surface area. TMAD was not correlated to LV ejection fraction using biplane Simpson methods in healthy children whereas indexed TMAD was correlated to stroke volume (r = 0.591, P = 0.0122), cardiac index (r = 0.532, P = 0.0241), indexed TAPSE (r = 0.691, P = 0.0034) and conversely correlated to
end-diastolic LV diameter ($r = -0.677, P = 0.0041$), to end-diastolic LV volume ($r = -0.629, P = 0.0076$) and to end-systolic LV volume ($r = -0.616, P = 0.0090$) in healthy children.

Conclusion. — Speckle tracking is a promising technology to assess myocardial strain. However, feasibility and reproducibility of new systolic parameters such as twist are low. Conversely, TMAD using speckle-tracking technology seems an easy measurable marker with an excellent feasibility and reproducibility to assess the mitral annular displacement. It seems independent of body surface area and well correlated with stroke volume. The advantage of TMAD over tissue Doppler imaging relies on the peculiarities of speckle tracking technology. Speckle tracking is angle independent and thereby permits the measurement of strain vectors that are 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.

http://dx.doi.org/10.1016/j.acvd.2013.03.049

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Identification of major coronary artery anomalies in a pediatric and adult population: A prospective echocardiographic study
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Objectives.— We sought to describe our experiment with major coronary anomalies (MCA) diagnosed in trans thoracic echocardiographic (TTE) in a large adult and pediatric population.

Background. — MCA may have serious clinical consequences. No echocardiographic study has identified prospectively all potentially serious coronary anomalies in a general adult and pediatric population.

Patients. — From June 2008 to January 2012, a systematic search for major coronary anomalies was conducted in children and adults patients, coming for a TTE.

Results. — Three thousand five hundred and two patients (84% adults and 16% children) received a TTE. Fourteen coronary anomalies (0.39%) were diagnosed: nine anomalous origins of coronary artery from the opposite sinus with inter arterial course, one abnormal left coronary artery from pulmonary artery, three single coronary arteries, one coronary fistula. Cardiac symptoms initiated investigation in seven patients. Five patients underwent specific surgery: two coronary reimplantations, three coronary bypass grafting. Ten patients had already received at least one TTE without the anomalous coronary artery being either diagnosed or suspected.

Conclusions. — MCA is a rare condition which can be identified through an accurate exploration of coronary anatomy by TTE. The search for potentially lethal congenital coronary anomalies should be included in a standard echocardiographic examination.

http://dx.doi.org/10.1016/j.acvd.2013.03.050

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Bicuspid aortic valve — the importance of monitoring children
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Bicuspid aortic valve is a common congenital heart defect. Aim. — Point out the importance of bicuspid aortic valve in children, and the importance of monitoring these children.

Patients. — We examined by echocardiography 1830 children: 2 months of age to 18 years old — 978 (53.44%) boys and 852 (46.56%) girls for heart murmur or symptoms of the cardiovascular system. Study was carried out using Sonoline G50. Measurements are performed in 2D and M-mode. Echocardiographic diagnosis of these defects is based on the existence of two aortic cusps, instead of normal three, often asymmetrical, with one line of coaptation consisting of both commissure.

Results. — Among the children examined, 15 (0.82%) children were with bicuspid aortic valve, 11 (1.12%) boys and four (0.47%) girls. Frequency was higher in boys. There were two boys with bicuspid aortic valve, one with aortic stenosis, two with aortic insufficiency, six children (five boys and one girl) with aortic stenosis and regurgitation. Four children (one boy and three girls) had aortic coarctation.

Monitoring the children in 4-year period, three children deteriorated aortic stenosis. In one boy there was no aortic regurgitation, but after a year, it appeared. Enlarged area of the sinus Valsalva was registered in one boy.

Conclusion. — It is important to monitor children with bicuspid aortic valves, because these children are at increased risk of complications including aortic valvular disease, ascending aorta aneurysm and aortic dissection. Patients with bicuspid aortic valve are also at higher risk of aortic coarctation.

http://dx.doi.org/10.1016/j.acvd.2013.03.051

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What about adult congenital heart disease in our country in 2013? Results from an observational study from an Algerian cardiology department
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Objectives. — To analyse adult congenital heart disease (ACHD) regarding gender.

Patients and methods. — One hundred and thirty-four patients (pts), 63 men, mean age 32.62 ± 12.85 yrs, 18—74 yrs underwent TTE and TEE.

Results:
 — atrial septal defects (ASD): 48 pts (31 women (W), 17 men (M)) sexual ratio 1.82; type secundum ASD except one type sinus venosus ASD and one coronary sinus ASD — ventricular septal defect (VSD): eight (7W, 1M) with aortic insufficiency Laubry-Pezzi. 1W with Eisenmenger’s syndrome;
 — atrio-ventricular septal defect (AVSD): eight pts (5W, 3M) with severe cleft regurgitation;
 — patent ductus arteriosus (PDA): three pts (2W, 1M);
 — coarctation of the aorta: two (1W); one pt with membranous sub-aortic stenosis;
 — left ventricular outflow tract obstruction (LVOTO): six aortic stenosis with bicuspid valves (3W and 3M); six sub-aortic stenosis (5M and 1W all with a membranous form); 1M with supravalvular stenosis named Williams and Beuren syndrome;
 — mitral regurgitation: two pts (1W, 1M);
 — right ventricular outflow tract obstruction with 15 valvular stenosis (pulmonary stenosis) 8W and 7M;
 — tetralogy of Fallot: 15 (9W, 6M) of them, one with post-operative cardiac device-related infective endocarditis (CDRIE);
 — double outlet RV: 1M;
 — transposition of the great arteries: 3M with congenitally corrected transposition of the great arteries;
 — Ebstein’s Anomaly: 3M;
 — Marfan syndrome: 10 pts (8M) one died after surgery;
 — man with univentricular heart, one with Tricuspid atresia with Fontan operation, one W with uniauricular heart.

Conclusion. — Majority of patients survive with morbidities. That’s new challenges with regard to cardiac imaging (Fig. 1).