The aim of the study was to assess relationship between left ventricular mass (LVMI) and QT dispersion (QTd) in children with aortic valve stenosis (AS) aged 7-18 years (AS group) and 17 matched healthy children (Controls) participated in this study. Based on echocardiographic results the LVMI was calculated using the Devereux formula and then indexed by the body surface area (LVMI). QTd and QTcd were calculated in standard 12 leads ECG. Holter ECG monitoring was performed for arrhythmia evaluation. Correlation between LVMI and QTd and between LVMI and QTcd were analysed using Pearson correlation coefficient.

Results of LVMI, QTd and QTcd in AS group and Controls are presented in Table 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>QTd (s)</th>
<th>QTcd (s)</th>
<th>LVMI (g/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.045±0.02</td>
<td>0.05±0.02</td>
<td>91.76±29.89</td>
</tr>
<tr>
<td>AS Group</td>
<td>0.03±0.006</td>
<td>0.03±0.006</td>
<td>59.23±16.377</td>
</tr>
</tbody>
</table>

Strong correlation between LVMI and QTd (r=0.67) and between LVMI and QTcd (r=0.548) was found. Arrhythmia was diagnosed in 12 children with AS: within them 11 had single ventricular ectopic beats and 1 had ventricular runs.

Conclusions: In children with congenital aortic valve stenosis left ventricular hypertrophy goes with increased QT and QTc dispersion. Increased dispersion of QT and QTc in children with aortic valve stenosis may reflect higher risk of arrhythmia.

New aspects of congenital heart diseases

Friday, 9 December 2005, 10:00–11:00

Location: Poster Area
769 Rapid decrease and follow-up of right atrial size after secundum atrial septal defect closure with Amplatzer Septal Occluder in children

B. Kucinska, B. Werner, M. Wroblewska-Kaluzewska. The Medical University of Warsaw, Department of Pediatric Cardiology, Warsaw, Poland

Aim: The goal of the study was to assess right atrial (RA) size after Atrial Septal Defect (ASD) II closure with Amplatzer Septal Occluder (ASO). Patients and methods: The echo evaluation was performed in 45 children (study group aged 4.5-18 years with body surface area 0.69m² - 1.87m² before ASD II implantation and 24 hours, 1.5, 12 months, 2, 3, 4 years post procedure. In the apical four chamber view RA longitudinal diameter (RAD1), transverse diameter (RAD2) and RA area (RAA) were measured and presented as an absolute values RAD1, RAD2, RAA and as an indexed for body surface area (BSA) values: RADI/BSA, RAD2BSA, RAA/BSA. Statistical comparison of RA measurements obtained prior to the values after the procedure as well as post- closure values to previous examination measurements were performed. The control group consisted of 40 healthy children.

Results: The comparison of RA pre and 24 hours post closure dimensions in study group revealed significant reduction (p<0.0001) of absolute values: RADI, RAD2, RAA as well as significant reduction (p<0.0001) of indexed values: RADI/BSA, RAD2/BSA, RAA/BSA. No significant changes of RAD1, RAD2, RAA and RADI/BSA, RAD2/BSA occurred at 1 month when compared to the values obtained 24 hours. Further significant reduction of RAA/BSA occurred at 1 and 3 months (p<0.05, p<0.00). There were also significant changes between 1 and 3 months for RAD1 (p<0.0001) and RAD2/BSA (p<0.0001) values. Between 3 and 12 months there were significant reductions of RAD1 (p<0.1), RAD2 (p<0.05) and RAD2BSA (p<0.05) however afterwards there were no significant differences between RA measurements. Statistical analysis revealed no significant differences (p>0.05) between absolute and indexed values of RA measurements in study and control group; at 24 h for RAA and RAA/BSA, at 3 months for RAD1 and RADI/BSA, at 12 months for RAD2 and at 24 months for RAD2/BSA.

Conclusions: 1. Rapid reduction of RA size occurs during the first 24 hours after percutaneous closure of ASD II. Slower changes of RAD2 and RAD2/BSA values reflecting RA transverse diameter could result from big geometric profile of ASD. 2. Values of RA area seems to reflect better RA size changes than values of RA axis.

770 Delayed systolic strain and ventricular dysfunction in young adults with Fontan circulation

M.H. Sander 1, L. Kapusla, F.W.A. Verheugt 2, A.J. van Dijk 3. 1University Medical Center Nijmegen, Children's Heart Centre, Nijmegen, Netherlands; 2Radboud University Nijmegen Medical Centre, Department of Cardiology, Heartcenter, Nijmegen, Netherlands; 3University Medical Center Nijmegen, Heartcenter, Department of Cardiology, Nijmegen, Netherlands

Background: Homogenity of strain distribution plays an important role in overall ventricular function and long-term energetics of the heart. Delayed systolic strain may occur after closure of the atrial valve.

Purpose: Using tissue velocity and strain imaging to detect ventricular dysfunction in adult patients having single ventricle physiology.

Patients: Thirty patients, aged 27±10 years (mean±SD), having single ventricle palliated by Fontan procedure (follow-up 15±7 y, age at operation 12±7 y) were investigated by tissue velocity imaging using Vivid 7 (GE, Horten, Norway). Peak systolic, early- (E) and late (A) myocardial velocities, maximal systolic strain and the presence of abnormal delayed systolic strain were obtained in 12 ventricular segments using SPEQLE-analysis software. Abnormal delayed systolic strain was defined as strain >20% of the peak systolic strain.

Results: Decreased peak myocardial velocities were present in all segments (p<0.001). Tissue velocity E to A ratio was even inverted in some segments. Mean strain was lower in all segments (p<0.01). Abnormal delayed systolic strain occurred in 30/340 segments, mostly in the inferior wall (table).

Conclusions: Young adults with Fontan circulation have an inefficient ventricular strain distribution with parts of the myocardium that are still contracting while the atrial valve is already closed. This dysynchronous contraction might be amenable to cardiac resynchronization therapy.

771 Coronal sinus atrial septal defect: clinical profile, diagnosis and management in 29 patients

C.H. Attenhofer Jost 1, H.M. Connolly 2, G.K. Danielsson 3, C.A. Warnings 4, J.A. Dinarello 5, F.J. Puga 5, A.J. Tajik 6, 1Unisstegsgahrten, Switzerland; 2Mayo Clinic, Division of Cardiovascular Diseases, Rochester MN, United States of America; 3Mayo Clinic, Cardiovascular Surgery, Rochester MN, United States of America

Background: Unroofed coronary sinus (UCS) is defined as partial or complete absence of the partition between the coronary sinus and left atrium resulting in bidirectional interatrial shunting, increased pulmonary blood flow and decreased systemic oxygen saturation with risk of cyanosis and cerebral complication. Despite its rarity, exact diagnosis is essential.

Methods: A retrospective review of symptoms, surgery, and echocardiographic data (echo) of 29 consecutive patients (pt) with UCS, who underwent cardiac surgery at our institution between 1981 and 2003. There were 16 males (55%). Age at surgery was 22±24 years (range: 0.75 years). Preoperatively, echo was performed in 25 and cardiac catheterization in 23 pt.

Results: Diagnosis of UCS was made by preoperative echocardiography in 6 pt (21%) or by preoperative catheterization in 6 patients (21%). The diagnosis was only made by the surgeon at the time of the operation in 15 patients (52%). In 2 pt, it is unclear who diagnosed UCS first. Common associated findings included secundum atrial septal defect in 15 pt (52%), pulmonary atresia or stenosis in 14 pt (48%), persistent left superior vena cava in 9 pt (31%), and tricuspid atresia in 7 pt (24%). In 3 pt, UCS was the only finding in 2 other pt UCS was associated with only persistent left superior vena cava. In 6 pt (21%), there were clinical symptoms attributable due to UCS including prior cerebral abscesses, right heart failure or dyspnea, in the other 23 pt, there were symptoms attributable to other congenital heart disease.

Conclusion: UCS is often missed during the preoperative evaluation of congenital heart disease. In any complex congenital heart disease or in heart disease with atrial septal defects or persistent left superior vena cava, UCS should be considered as a possible additional finding. An increased level of awareness and comprehensive preoperative imaging (including intraprochicardiography) is recommended in patients with suspected intracardiac shunts that are not readily apparent after initial evaluation.
Echocardiographic assessment of mechanical asynchrony in adult patients after repair of tetralogy of Fallot

A. Uebing 1, S.V. Babu-Narayan 1, G.P. Diller 1, O. Goktekin 1, M.Y. Henein 2, D.G. Gibson 2, M.A. Gatzoulis 1, W. Li 1.

1 Royal Brompton Hospital, Adult Congenital Heart Disease Unit, London, United Kingdom; 2 Royal Brompton Hospital, Department of Cardiology, London, United Kingdom

Background: Patients after tetralogy of Fallot repair (ToF) frequently have RV dysfunction and right bundle branch block (RBBB) with greatly prolonged QRS duration (QRSd). On this basis, cardiac resynchronization therapy (CRT) has been considered. Aim: To assess any ventricular asynchrony in repaired ToF patients and its relation to QRSd.

Methods: 39 ToF patients (aged 31-69 years; 26±1-8 years after repair) and 12 controls were studied by Doppler and long-axis echocardiography acquired from the RV free wall, LV and septum. To determine mechanical asynchrony the delay between Q-wave and onset of long-axis shortening (qOS) in each segment and the difference between pulmonary and aortic pre-ejection periods (dPEP) was measured. In 8 patients, delay in RV outflow tract contraction with respect to RV free wall (RVOT-RV delay) was determined with M-mode at pulmonary valve level.

Results: In ToF patients, QRSd correlated with qOS RV (r=0.49; p=0.002) and with dPEP (r=0.49; p=0.002) indicating additional interventricular asynchrony. A close relation between QRSd and RVOT-RV delay was found (r=0.77; p=0.02). Asynchrony of LV and septum was absent in all patients and of RV in 14/39 regardless of QRSd (Figure).

Conclusion: Prolongation of QRS duration in patients after ToF repair is related to both delay in the onset of RV free wall contraction and to a further delay in contraction of the RV outflow tract. Thus, QRSd does reflect abnormal long-axis and infundibular mechanics. However, mechanical asynchrony cannot be assumed on the basis of QRSd alone. RV electromechanical interactions studied with echocardiography may help identify potential CRT candidates.

Surgical validation of real-time 3-D echocardiographic assessment of atrioventricular septal defects

A. Van den Bosch 1, A. Ten harkel 5, J.S. McGhie 3, J.W. Roos-Hesselink 1, M.L. Simoons 1, A.J.C. Rogers 3, F.J. Meijboom 1, 1 Thoraxcenter, erasmus MC Rotterdam, Cardiology Dept., Rotterdam, Netherlands; 2 Thoraxcenter, erasmus MC University, Paediatric Cardiology, Rotterdam, Netherland; 3 Thoraxcenter, erasmus MC University, Thoracic surgery, Rotterdam, Netherlands

Background: The purpose of this study was to evaluate the accuracy of AV valve morphology assessed by real-time 3D echocardiography (RT-3DE) compared to surgical findings and to assess whether RT-3DE is applicable in clinical practice.

Methods: Between June 2004 to Mars 2005, 16 patients with an atrioventricular septal defect (AVSD) undergoing surgical treatment at our institution were enrolled in the study. RT-3DE was performed with Hewlett-Packard Sonos 7500 echosystem and off-line analysis with TomTec Echoview software. The AVSD was assessed for the morphology of AV valve, with particularly interest to the anterior and posterior bridging leaflets. 3D data were compared with measurements and descriptions acquired during the surgical procedure.

Results: Acquisition of RT-3DE datasets was feasible in all patients. Of the 16 patients, there were 9 infants (age < 1 year). The duration of 3D data acquisition was 11±3 min for patients above 1 year and 4±1 for infants. Reconstruction time was 24±6 minutes. In all patients the AV valve orifice and RT-3DE observations of the anterior and posterior bridging leaflets were all correctly identified by RT-3DE compared with the surgical findings.

Conclusion: Real-time 3D echocardiography provides accurate assessment of AVSDs and correctly depicts the AV valve morphology. After a short learning curve, RT-3DE is easily applicable in daily clinical practice.