Recent research in the diagnosis of congenital heart disease

Thursday, 8 December 2005, 16:30–18:00

Location: Giotto

586
Echocardiographic follow-up of cardiac resynchronization therapy in congenital heart disease

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Introduction: Mid-term effects of cardiac resynchronization therapy (CRT) in congenital heart disease (CHD) have so far rarely been demonstrated.

Methods: CRT was applied in 15 pts aged 2.6 - 29.2 (median 12.2) yrs with CHD, systemic left (N=7) or right (N=8) ventricular dysfunction and spontaneous (N=4) or pacing induced (N=11, mean pacing duration 5.8±3.3 yrs) ventricular desynchronization using total atrioventricular (N=8), transvenous (N=1) or mixed (N=6) lead systems. Concurrent cardiac surgery was performed in 6/15 pts. Follow-up ranged from 1.1-22.4 (median 16) months.

Results: There were no major procedure related complications or death. CRT was associated with following acute changes: QRS duration decreased from 161±22 to 115±17 ms (p=0.001) and interventricular mechanical delay from median 60 to 53 ms (p=0.002). Systemic ventricular max. +dP/dt (mean dose: 340 mg/m2). All children underwent a complete echocardiographic

Conclusion: CRT is associated with positive acute hemodynamic changes and significant reverse systemic (left or right) ventricular remodeling in the mid-term.

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587
Cardiac function in children exposed to chemotherapy during intra-uterine life

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Background: The incidence of cancer diagnosed during pregnancy is increasing as childbearing is delayed to older maternal age. Currently chemotherapy (chemo), including anthracyclines, is used to treat malignancies during pregnancy. The effects of this on fetal development and pediatric cardiac outcome has been poorly

Aim: To evaluate cardiac outcome and function in children whose mothers received chemo during pregnancy.

Methods: Eight children (age range: 3-88 months) were included in the study. The mothers were treated for different malignancies. The first chemo was given at 15-36 weeks gestational age (mean 21 weeks). Six of them received doxorubicin (mean dose: 340 mg/m2). All children underwent a complete echocardiographic exam including tissue-Doppler imaging (TDI). Conventional as well as TDI-derived parameters for cardiac function were assessed. This included measurement of peak systolic myocardial strain rate and strain in different myocardial segments. Data were compared to normal age and gender-matched healthy controls.

Results: No morphologic cardiac abnormalities could be detected in any of the children. All functional parameters assessed, including TDI data were within normal range (see table). Values are presented as mean ± SD. NS not significant

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Patient (n: 8)</th>
<th>Controls (n: 8)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVEDD (mm)</td>
<td>29.6±5.5</td>
<td>31.2±6.3</td>
<td>NS</td>
</tr>
<tr>
<td>LV mass (g)</td>
<td>68.7±12.9</td>
<td>82.97±15.3</td>
<td>NS</td>
</tr>
<tr>
<td>Fractional shortening (%)</td>
<td>36.3±4.5</td>
<td>33.6±3.6</td>
<td>NS</td>
</tr>
<tr>
<td>E/A ratio</td>
<td>2.3±0.6</td>
<td>2.3±0.4</td>
<td>NS</td>
</tr>
<tr>
<td>LV annular motion (mm)</td>
<td>11.0±2.4</td>
<td>12.1±1.1</td>
<td>NS</td>
</tr>
<tr>
<td>Radial strain rate (cm/s)</td>
<td>5.3±0.9</td>
<td>4.5±1.0</td>
<td>NS</td>
</tr>
<tr>
<td>Longitudinal Strain (cm/s)</td>
<td>-2.3±0.5</td>
<td>-2.5±0.7</td>
<td>NS</td>
</tr>
<tr>
<td>Fractional shortening (%)</td>
<td>-26.7±7.6</td>
<td>-29.0±7.6</td>
<td>NS</td>
</tr>
<tr>
<td>LVEDD (cm/sec)</td>
<td>76.6±16.1</td>
<td>73.0±9.8</td>
<td>NS</td>
</tr>
</tbody>
</table>

Conclusions: Our study indicates that chemo given during pregnancy is safe and does not result in disturbance of cardiac development. In the short-term cardiac function in the offspring seems not to be affected by intra-uterine exposure to chemo. Long-term monitoring and larger studies are needed to further support this finding.

588
Colour M-mode a novel non invasive method for assessment of pulmonary vascular resistance


Background: The estimation of the pulmonary vascular resistance (PVR) dictates the management of congenital heart disease with left to right shunt. Cardiac catheterization has been the gold standard for measurement of pulmonary artery pressure & PVR.

Objectives: The goal of this study is to evaluate the use of color M-mode velocity of flow propagation down the pulmonary artery (VP-PA) as a method for assessment of PVR, in comparison to the invasive cardiac catheterization.

Methods: Thirty patient with left to right shunts with no obstruction to the pulmonary vascular tree & no history of previous surgical intervention were studied. Full Echo-Doppler and Color M-mode Doppler studies were performed, with estimation of right ventricular systolic pressure (RVSP) and Color M-mode VP-PA was calculated in cm/sec. The PVR was calculated invasively by obtaining samples and pressures using Fick's principle. The resistance was measured in Wood's units.

Results: The patients were classified into two groups according to the invasively calculated PVR, group I, 9 patients with PVR ≤ 7 Wood’s unit, group II, 21 patients with PVR > 7 Wood’s units. Both groups were age & body surface area matched. The mean VP-PA in group I was 12.6±3.8 cm/sec, while in group II it was 8.8±3.9 cm/sec, with statistical significant difference between both groups (P<0.05). There was a significant negative correlation between VP-PA & both PVR & RVSP (P=0.05).

The value of VP-PA that showed the highest sensitivity (88%) was 9.5 cm/sec, this is the point below which PVR exceeds 7 Wood's units.

Conclusion: Color M-mode velocity of flow propagation down the pulmonary artery appears to be a highly sensitive method to evaluate pulmonary vascular resistance in patient with left to right shunt.