1216-160 Strain Rate Imaging is Superior to Tissue Velocity Imaging for Measuring Atrioventricular Time Interval in the Fetus

Azaria J. Rein, Zoev Perles, Amiram Nir, Ixou Hashimoto, Xiaokui Li, David J. Sahn, Oregon Health & Science University, Portland, OR, Hadassah Hospital, Jerusalem, Israel

Background: We showed in a previous study that tissue velocity imaging (TVI) can accurately assess arrhythmias and atrioventricular conduction time intervals (AVI) in the fetus. Strain rate imaging (SRI) usually produces a lower, ubiquitous signal of atrial wall deformation. This study, therefore, evaluated SRI as a method for AVI measurement in the fetus.

Methods: 15 normal fetuses were studied using a Vivid 5V scanner (GE, 1/4A). A number of views in the heart acquired as tissue velocity images were stored as raw scanline data (3 cardiac cycles/loop). TVI and SRI tracings were obtained by sampling simultaneously the right (R) or left (L) ventricular myocardium and R or L posterior atrial wall for both LAVI and RAVI (4 regions of interest for each method). AVI was calculated and averaged from TVI and SRI tracings obtained. Results: AVI measured by SRI was identical to that measured by TVI (RAVI-TV success, 13/15, 85 ± 11 msec; RAVI-SRI 15/15, 85 ± 10; LAVI-TV 12/15, 72 ± 8; LAVI-SRI 15/15, 74 ± 9). Feasibility of SRI was thus 100% compared with 87% and 80% for right and left atria respectively for TVI. Analysis time was significantly shorter using SRI: 3 ± 1 min versus 7 ± 4 min for TVI (p<0.01). Excellent inter- and intra-observer agreement was found in repeated studies for both TVI and SRI.

Conclusions: SRI and TVI measurements of AVI are identical. SRI is superior to TVI for detecting atrial wall motion in the fetus, whereas TVI failed to clearly define atrial contraction in 10-20% of cases.

1216-161 Two-Dimensional Echocardiographic Valve Measurements in 748 Healthy Children: Are Boys and Girls Different?

Mark V. Zilberman, Philip R. Khoury, Thomas R. Kimball, Cincinnati Children's Hospital Medical Center, Cincinnati, OH

Currently published pediatric 2-D echocardiography data on cardiac valve dimensions are based on a relatively small (less than 200) number of subjects. Our aim was to create nomograms of echo 2-D valve dimensions based on a large group of children without heart disease.

Methods: 748 children (395 boys, 353 girls) aged 0-18, referred for chest pain, heart murmur, or syncoe evaluation, underwent echocardiographic study. All children had normal cardiac structure, systolic and diastolic function. All four valves were measured at their maximal diamensions (aortic - in the parasternal long axis view, pulmonary - in the parasternal short axis view, mitral and tricuspid - in the apical 4-chamber view).

Results: Mean values and standard deviations were calculated and gender-specific Z-score nomograms based on regressions in both body surface area (BSA) (Table) and height were developed. Correlations with BSA were higher than with height for all valves. Boys had higher valve annuli dimensions than girls. This difference was also observed after the adjustments for both - BSA and height in ANCOVA (analysis of covariance) models.

Conclusion: When evaluated in a large group of children, there is gender-specific difference in cardiac valve dimensions adjusted for either BSA or height. Valve dimension correlations are higher with BSA than with height.

Gender-specific z-value formulas

<table>
<thead>
<tr>
<th>Valve/Gender</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitral</td>
<td>lnMV(-.735+4.068*lnBSA)/0.18</td>
<td>lnMV(-.765+4.253*lnBSA)/0.169</td>
</tr>
<tr>
<td>Tricuspid</td>
<td>lnTV(-.755+3.643*lnBSA)/0.186</td>
<td>lnTV(-.817+3.911*lnBSA)/0.171</td>
</tr>
<tr>
<td>Aortic</td>
<td>lnAV(-4.374+4.031*lnBSA)/0.127</td>
<td>lnAV(-4.724+4.928*lnBSA)/0.141</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>lnPV(-.597+4.787*lnBSA)/0.144</td>
<td>lnPV(-.618+4.986*lnBSA)/0.152</td>
</tr>
</tbody>
</table>

863 Congenital Heart Surgery: Intra- and Post-Operative Monitoring

Tuesday, April 01, 2003, 4:00 p.m.-5:00 p.m.
McCormick Place, Room S106

863-1 Cerebral Oximetry as Noninvasive Indicator of Mixed Venous Oxygen Saturation in Newborns After Cardiac Surgery

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Background: Near-infrared spectroscopy (NIRS) is gaining acceptance and now increasingly used for monitoring cerebral oxygenmetry during cardiac surgery. The utility of this technology in the pre and postoperative management or patients with congenital heart disease has yet to be established. The purpose of this retrospective study was to determine whether a correlation exists between NIRS and currently used direct invasive measurements of mixed venous oxygen saturation in newborns after cardio surgery.

Methods: From October 2001 through April 2002, 15 newborns had cerebral oxygenmetry monitored via NIRS (INVOS 4100, Somanetics Co, Troy, MI) for 24 hours after cardiac surgery. Mixed venous saturations via indwelling superior vena cava, right atrial or pulmonaty artery catheters were simultaneously obtained and correlated with cerebral oximetry via NIRS. Number of observations per patient ranged from 1 to 5 (median 4). Eight patients underwent complete biventricular repairs (arterial switch, n=3; repair of tetralogy of Fallot, n=3; repair of total anomalous pulmonary venous return, n=1; repair of truncus arteriosus, n=1). Seven patients with functional single ventricles had palliative procedures (Norwood, n=5; modified Blalock-Taussig shunt, n=2). Results: Mixed venous saturations obtained via indwelling catheter correlated with cerebral oximetry obtained via NIRS with a Spearman rank correlation coefficient of 0.55 (p<0.001) and linear regression of R2 = 0.66, R2=0.44 (p<0.001). Conclusion: Cerebral oximetry via NIRS correlates with mixed venous oxygen saturations obtained via invasive monitoring. NIRS may be a useful non-invasive indicator of mixed venous oxygen saturations in newborns after cardiac surgery with less morbidity than currently used direct or invasive monitoring. Further prospective study is warranted.