Quantitative Evaluation of Severity of Left Ventricular Myocardial Abnormalities in Kawasaki Disease: The Tissue Characterization Study

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Myocardial texture is a well-recognized component of Kawasaki disease (KD). The cyclic variation (CV) of ultrasonic integrated backscatter (IBS) from myocardium has been previously used to measure the cardiac cycle as a method of tissue characterization. The aim of this study is to evaluate the severity of the left ventricular (LV) myocardial abnormalities quantitatively using IBS analysis and to assess the rate of resolution of LV myocardial abnormalities after administration of intravenous immunoglobulin (IVIG). Methods The 90 KD patients (pts.) comprised 2 groups: 1) control of 30 pts with well-controlled KD; 2) pts with IVIG resistant KD (Group 1). During hospitalization, CV of IBS was assessed in LV myocardium at 48 hours after IVIG treatment. Results Before IVIG administration in KD pts., the CV of LV myocardium was significantly lower than age-matched control (p<0.05). In Group 1, the CV of LV myocardium increased at 48 hours after IVIG administration (8.8±6.8dB) and significantly different values were noted between group 1 and controls (p<0.05). However, in Group 2, the CV of LV myocardium at 48 hours after IVIG treatment did not increased (7.0±2.5dB), and that value still significantly lower than the value in controls (p<0.05). In Group 2, the CV of LV myocardium at 14 days after IVIG therapy was increased significantly lower than the value in controls (7.1±1.2dB). In group 2, the CV of LV myocardium was increased after IVIG therapy and incidence of CAL. The abnormality of LV myocardium as assessed by IBS is typical at presentation for KD and that recovery is scintigraphed by IVIG treatment in acute phase. In pts. with IVIG resistant KD, however, the abnormalities of LV myocardium persist in convalescent phase. The long-term follow up was used for abnormalities of LV myocardium in KD patients.

Ultrasonic Myocardial Tissue Characterization in Normal and Abnormal Right Ventricle

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Background: Ultrasonic myocardial integrated backscatter (IBS), a new technique for the study of myocardial ultrastructural texture, has been only used for the left ventricle. Aim of our study was to evaluate: 1) the ability of IBS to differentiate normal vs abnormal right ventricular (RV) myocardium, in pts operated for Tetralogy of Fallot(TOF); 2) to identify in pts operated for TOF and 26 BSA-matched normal subjects. The magnitude of cyclic variation(CV) formed an echo examination with IBS analysis in 46 children: 20 (15.5±8.1 yrs) operated ventricular (RV) myocardium, in pts operated for Tetralogy of Fallot (TOF); 26 BSA-matched normal subjects. The magnitude of cyclic variation(CV) formed an echo examination with IBS analysis in 46 children: 20 (15.5±8.1 yrs) operated ventricular (RV) myocardium, in pts operated for Tetralogy of Fallot (TOF); 26 BSA-matched normal subjects. The multiple logistic regression analysis was utilized to correlate both CV and Rf to several parameters.

Results: Results: RV Rf (suggestive of myocardial fibrosis) more evident in later repaired patients and a significant increase in Rf (-16±1.9 vs -21±4.2; p=0.0001) with increasing age. In addition, a significant correlation (r = 0.12, p=0.03) was found between RV Rf and age. Conclusions: The Rf assessed by IBS in RV myocardium provides additional information for the diagnosis of TOF. The severity of IVIG resistant KD, however, the abnormalities of LV myocardium persist in convalescent phase. The long-term follow up was used for abnormalities of LV myocardium in KD patients.

Effect of Altered Preload on Left Ventricular Myocardial Performance Index

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Background: The myocardial performance index (MPI) has been reported as a non-invasive Doppler measurement of ventricular function. It has been shown to be relatively independent of right ventricular loading conditions. However, the effect of loading conditions on left ventricular (LV) MPI is not known. The purpose of this study was to assess the impact of altered preload on LV MPI. Methods: We retrospectively evaluated patients with moderate to large isolated patent ductus arteriosus (PDA) (Gp 1: Gp 2) who were dependent on PDA for oxygenation. Patients with both pre and post PDA coarctation/dilatation with Doppler evaluation of mitral inflow and LV outflow were included. Post-coil Echocardiograms were performed within 3-8 days after PDA coil occlusion. Significant increases were also seen in isovolumic contraction (ICT) and relaxation (IRT) times suggesting that both systolic and diastolic components of the MPI may be impacted by changes in preload. Conclusion: In our study, the LV MPI both before and after PDA coil occlusion did not change. However, similar to other measures of LV function, the MPI appears to be somewhat affected by changes in LV preload. Further prospective studies evaluating the effect of acute and chronic changes in loading conditions on this index seem warranted.

Doppler Results

<table>
<thead>
<tr>
<th>N</th>
<th>Age (yr)</th>
<th>LV MPI</th>
<th>LV ICT</th>
<th>LV IRT</th>
<th>LV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-coil</td>
<td>14</td>
<td>6±12.5</td>
<td>0.21±0.08</td>
<td>22±17</td>
<td>33±10</td>
</tr>
<tr>
<td>Post-coil</td>
<td>14</td>
<td>6±12.4</td>
<td>0.33±0.10</td>
<td>37±15</td>
<td>40±21</td>
</tr>
</tbody>
</table>

p-value: p<0.002, p=0.032, p=0.009, p=0.19