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

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Myocarditis is a well-recognized component of Kawasaki disease (KD). The cyclic variation (CV) of ultrasound backscatter (IBS) from myocardium using the cardiac cycle is a method of tissue characterization. The aims of this study are to evaluate the severity of the left ventricular (LV) myocardial abnormalities quantitatively using IBS analysis and to assess the rates of resolution of LV myocardial abnormalities after administration of intravenous immune globulin (IVIG).

Methods: The 90 KD patients (pts.) comprised 2 groups: Group 1 consisted of 30 patients with well documented clinical and echo findings at initial IVIG administration. Group 2 consisted of 20 pts. with IVIG resistant KD. The CV of LV myocardium was measured in the LV posterior wall using a specialized IBS signal processor (Sonos 5500, Agilent Tec. Inc) before and after IVIG treatment. Results Before IVIG administration in the KD pts., the CV of LV was significantly lower than age-matched control 20 pts. (Group 1: 4.6±2.6dB, Group 2: 6.3±2.8dB, vs. control: 2.9±2.1dB, p<0.05.). In Group 1, the CV of LV myocardium increased at 48 hours after IVIG administration (4.6±2.6dB) and a significant difference was observed between group 1 and control (p<0.05). However, in Group 2, the CV of LV myocardium at 48 hours after IVIG treatment did not increased (7.0±2.8dB), and that value still significantly lower than the value in control (p<0.05). In Group 2, the LV myocardium at 14 days of illness when all clinical symptoms of KD improved, is still significantly lower than the value in control (7.1±2.1dB, p<0.05%). Six patients in Group 2 had coronary artery lesion (CAL). The CV of LV myocardium in 3 pts. in Group 2 still persisted lower value compared with that in controls at more than 1 month after KD onset, and they had CAL. Conclusion The changes of the CV of LV myocardium correlating with clinical effects to IVIG therapy and incidence of CAL. The abnormality of LV myocardium as assessed by IBS is typical at presentation and that recovery is ascertained 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 is needed 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. Aims of our study were to evaluate: 1) the ability of IBS to differentiate normal vs. abnormal right ventricular (RV) myocardium and its potential for Tetralogy of Fallot(TOF) detection. 2) To identify TOF pts. predisposing to RV myocardial tissue abnormalities. Methods: We performed an echo examination with IBS analysis in 46 children (30.5±8.1 yrs) operated for TOF and 28 BSA-matched normal subjects. The magnitude of cyclic variation (CV) and calibrated IBS reflectivity (R), which correlates respectively to intrinsic myocardial anisotropy and myocardial fibrosis, were obtained from the RV anterior wall. Multiple and logistic regression analysis was utilized to correlate both CV and R to severe variables: RV pressure, significant pulmonary regurgitation, wall thickness, RVLV end-diastolic diameter ratio, age at surgical repair, previous palliative shunt. Results: Compared to normal subjects, TOF pts. showed a decreased CV (8.7±2.2 vs. 10.3±1.0, p=0.07) and a significantly increased R (16.1±9.9 vs. 21.4±2.2, p<0.001). In addition, statistical analysis showed a significant correlation between RV R and age at surgical repair (p=0.05), a negative trend between CV and RV size (R2=0.06), which was also demonstrated. Conclusion: IBS is a reliable tool for ultrasonic tissue characterization of the RV myocardium in children. 2pts operated for TOF showed an increased RV R (suggestive of myocardial fibrosis) more evident in later repaired patients and a reduced CV indicative of myocardial impairment particularly in presence of dilated RV cavity.

Right Ventricular Doppler Myocardial Performance Index in Adults with repaired Tetralogy of Fallot: Correlations With Ventricular Volume Indices Assessed by Cardiac Magnetic Resonance

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The Doppler-derived myocardial performance index (MPI), reflects systolic and diastolic myocardial function and relates to prognosis in heart disease. We examined the relationship of the MPI of the right ventricle (RV), with right and left ventricular volume, mass and function assessed with Cardiac Magnetic Resonance (CMR) late after tetralogy of Fallot repair (TOF). Methods: We prospectively studied 21 adult patients (mean age 32.3±15.5 yrs, mean age at repair 8.7 yrs). MPI, defined as the sum of RV sovomodul-