484

Color Tissue Doppler derived dysynchrony index is associated with left ventricular diastolic restrictive pattern in idiopathic dilated cardiomyopathy

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Purpose: Little is known about the influence of left ventricular (LV) mechanical discordance on LV filling pressure in end-stage congestive heart failure. This study aimed to evaluate possible association of off-line color tissue Doppler (TD) derived LV dysynchrony and standard Doppler indexes of LV diastolic function in idiopathic dilated cardiomyopathy (DCM).

Methods: Thirty-nine patients (EF<27±12 months, mean age = 54±9 years, 71±8% with left bundle branch block) affected by DCM and 35 sex- and age-matched healthy controls underwent standard TD echocardiography: pulsed TD and off-line color TD (apical views). All DCM patients had normal coronary angiography. Myocardial early (Em) velocity was measured at LV lateral mitral annulus by pulsed TD and the ratio between transmural E velocity and Em (E/Em ratio) derived as an index of LV end-diastolic pressure. The time to peak (from the onset of ECG QRS complex to peak systolic velocity) was measured by off-line color TD in 12 LV myocardial segments and related with systolic septal, lateral wall, inferior and anterior walls, anterior septum and posterolateral walls and LV filling pressure. The LV filling pressure was calculated as the standard deviation of the averaged value.

Results: The 2 groups were comparable for body mass index and heart rate but systolic and diastolic blood pressure were lower (both p<0.01) in DCM. Patients had ejection fraction (30±5±6% vs. 69±1±0% cm3, p<0.01) and LV end-diastolic dimension (6.9±1.0 cm vs. 5.6±1.2 cm, p<0.01) increased. LV myocardial E/Em was significantly reduced in DCM (1.4±0.1 vs. 3.4±0.3, p<0.01). LV systolic dyssynchrony was measured by variability of systolic time intervals (SD-TI) and systolic time index (STI) and LV early diastolic dyssynchrony was measured by variability of E/Em ratio (SD-E/Em). LV E/Ea ratio was significantly increased in DCM (5.0±0.6 vs. 4.0±0.4, p<0.01) and systolic time intervals (SD-TI) and early diastolic dyssynchrony were measured by variability of E/Em ratio (SD-E/Em).

Conclusion: LV mechanical discordance is associated with LV diastolic function (pseudonormal and restrictive patterns), it being parallel to the extent of increase in LV end-diastolic pressure. Intraventricular dysynchrony has to be carefully quantified when a low ejection fraction is combined with high LV filling pressure, to address patients towards cardiac resynchronization therapy.

485

Tissue Doppler myocardial imaging in assessing impact of permanent short time pacing on global left ventricular myocardial function

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Background and Aim: Tissue Doppler echocardiography (TDE) has been introduced as a quantitative and more objective method for assessing global myocardial function. Chronic right ventricular (RV) pacing in pacemaker patients is associated with increased ventricular discordance and decreased risk of heart failure. The aim of the study is a quantitative assessment of the effects of short time permanent pacing on global myocardial systolic and diastolic functions using pulsed wave TDE.

Methods: Eight patients with dual chamber pacemakers or defibrillators were evaluated. Twenty-five patients (mean age 64±11 years, 9 female) with <20% pacing within previous 6 months (16% of VDD mode, 84% of DDDR mode) were included in the study in order to evaluate the effects of two-dimensional echocardiography. Tissue Doppler echocardiography and TDE were performed at baseline. After 4 hours of interventricular delays (AV) were abbreviated to achieve >90% ventricular pacing at an optimal AV interval for 4 hours. After 4 hours long AV delay that achieved >90% sensing was chosen and echocardiography was repeated. Mitral E-wave velocity (E), A-wave velocity (A), isovolumetric relaxation time (IRT), isovolumetric contraction time (ICT), and speckle tracking at LV free wall were measured. E/A ratios were increased and E/Em and early (Em) and atrial (At) tissue Doppler velocities of the mitral annulus were exhibited. Pulmonary venous flow patterns (systole - Ps, diastole - Pd, atrial reversal - Pa) were also evaluated. The ratios of E/L to E/Em were calculated. Continuous variables are expressed as means ± standard error.

Results: Mitral E (69±1.5±3 cm/s vs. 67±5±4 cm/s, p = 0.59) was reduced, A (73±0.2±3 cm/s vs. 72±0.2±2 cm/s, p = 0.64) and atrial E/Em (5.6±0.4 vs. 5.9±0.5, p = 0.83) was increased after pacing. But there were no statistically significant differences. The EF did not change. Sm, Em, Am were reduced nonsignificantly after pacing. The increase in Pa was (44±5±2 cm/s vs. 45±5±0 cm/s, p = 0.59), Pa (25±4±1 cm/s vs. 31±5±2±2 cm/s, p = 0.39) flows were not statistically significant.

Conclusion: Short time pacing seems to have no significant effects on left ventricular systolic and diastolic functions. Further investigations with increased number of patients with different EF and clinical subgroups are needed to evaluate the effects of pacing on left ventricular functions.