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Estimating left ventricular myocardial deformation during cardiopulmonary exercise testing in patients with dilated cardiomyopathy and reduced ejection fraction

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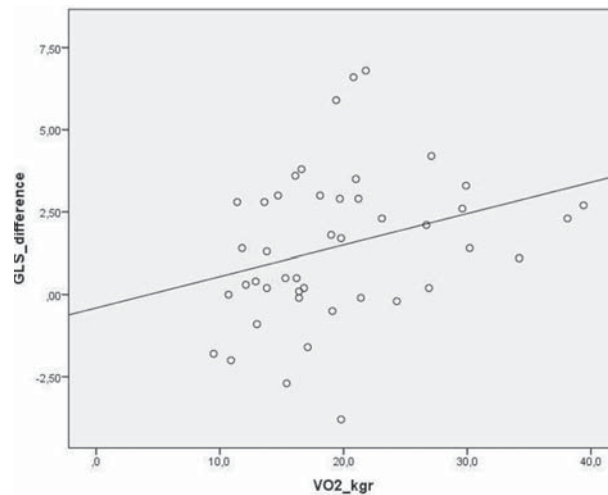
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Background: Cardiopulmonary exercise testing (CPET) has been recognized as a valuable tool regarding the integrated estimation of exercise ability in patients with several cardiopulmonary diseases, dilated cardiomyopathy (DCM) included. Left ventricular (LV) abnormal myocardial deformation might be studied by newer echocardiography techniques. Aim of this study is to explore differences of LV myocardial deformation in DCM patients during a CPET session.

Methods: Forty-four DCM patients (mean age 53±13 years, 34 men) with an ejection fraction <50% (mean EF = 33±10%) and no history of previous pulmonary disease were subjected to maximum CPET. Simultaneously, we estimated LV myocardial deformation using speckle tracking imaging and we measured global longitudinal strain (GLS), longitudinal strain rate both at systole (GLSrS) and diastole (GLSrE) at baseline and at peak exercise. The difference between GLS at baseline-GLS at peak exercise was defined as GLS difference.

Results: All patients finished uneventfully CPET (peakVO₂ = 20±7 ml/min/kg) and improved GLS at peak exercise (GLS difference = 1.5±2). We found that at peak exercise, systolic blood pressure (SBP) was increased (119±14 vs. 159±23 mmHg, p<0.001) while GLS (-12.5±4 vs. -14±5, p<0.001), GLSrS (-0.7±0.2 and -1.0±0.4, p<0.001) and GLSrE (0.7±0.4 and 1.0±0.6, p=0.001) were improved. A positive correlation between peakVO₂ and GLS difference was found, independent of peak SBP (β=0.38, p=0.01).

Conclusions: Patients with dilated cardiomyopathy and ejection fraction <50% present an increased exercise ability when they manage to improve LV GLS during maximum exercise. Consequently, LV GLS improvement during exercise characterizes beside patient's exercise ability the severity of heart failure as well.



Relationship between GLS dif and CPET