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Force-frequency relationship during dobutamine stress echocardiography predicts exercise tolerance and BNP levels in patients with chronic congestive heart failure

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Purpose: D obutamine stress echocardiography (DSE) is widely used to evaluate myocardial contractile reserve; it provides prognostic information in patients with chronic congestive heart failure (CHF). The force?frequency relationship (FFR) is a method for evaluate LV contractility during DSE . The aim of our study is to assess the relationship among FFR, BNP levels, and aerobic exercise capacity in CHF patients.

Methods and materials: 37 CHF patients (age 67±8 years, 54% with an ischemic etiology), underwent high dose DSE (up to 40 m g/kg/min). FFR was determined as a ratio between systolic cuff pressure and end-systolic volume (biplane using a Simposon rule) assessed at baseline and peak DSE . BNP levels were determined on blood samples withdrawn at baseline. After a few hours, CHF patients underwent cardiopulmonary exercise test with expired gas measurement.

Results: Mean ejection fraction was 32±7% and NHYA class 2.5±0.6. FFR was directly related to peak oxygen consumption (Figure Left), LV ejection fraction (r=0.398, p=0.015) and mitral annulus peak systolic velocity (r=0.428, p=0.013). FFR was inversely related to NYHA class (r=-0.43, p=0.013), LV end-diastolic diameter (r=-0.377, p=0.022), LV intraventricular dyssynchrony (r=-0.394, p=0.016), and BNP levels (Figure Right). At multiple regression analysis, FFR (B=0.502, p=0.004) and E/Ea ratio (B=-0.336, p=0.044) were the best predictors of exercise tolerance.

Conclusions: In patients with stable CHF, impaired myocardial contractility during DSE is related to higher BNP levels and poorer exercise tolerance.