Prognostic value of cardiac power reserve in patients with normal left ventricular ejection fraction undergoing exercise stress echocardiography

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Topic(s):
Stress Echocardiography

Citation:
Background: Cardiac power output-to-mass (CPOM) ratio is a measure of myocardial performance that incorporates both pressure and flow output, normalized to left ventricular (LV) mass generating that cardiac work. Prior small studies have shown that CPOM predicts outcomes in patients with ischemic cardiomyopathy and reduced LV ejection fraction (EF). We sought to evaluate the prognostic significance of peak exercise CPOM and power reserve (increase from rest to peak exercise) in patients with normal EF.

Methods and results: Retrospective study in 24,783 patients (age 59±13 years, 45% females) with EF=50% and no significant valve disease or right ventricular (RV) dysfunction, undergoing exercise stress echocardiography between 2004-2018. CPOM was calculated as previously described (0.222 x cardiac output x mean blood pressure / LV mass) and expressed in Watts/100g myocardium. Power reserve was calculated as difference in CPOM between peak stress and rest. All-cause mortality was the primary endpoint. Patients were divided into quartiles of power reserve. Patients with higher power reserve were younger, had higher blood pressure and heart rate, lower LV mass, and lower prevalence of prior myocardial infarction. During follow-up (median (IQR) 3.9 (0.6-8.3) years), 931 (3.8%) patients died. Progressively lower power reserve was associated with increasing mortality (Figure A). Compared to patients with abnormal stress test, patients with the lowest power reserve but otherwise normal stress test had the same survival as those with infarction/cardiomyopathy or ischemia on stress test (Figure B). Resting CPOM had lower predictive value. After adjusting for age, sex, METs achieved, ischemia/infarction on stress test results, and diastolic function grade, both peak exercise CPOM and power reserve were independent predictors of mortality (p<0.0001), incremental to conventional measures.

Conclusion: Cardiac power output and reserve measured during exercise stress echo provides independent prognostic information in patients with normal resting EF and no significant valve disease or RV dysfunction. The survival of patients with low power reserve but normal stress test was similar to patients with prior infarction/cardiomyopathy or ischemia on stress test.
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