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Exercise echo: a diastolic and systolic function evaluation test for patients with dyspnea

Exercise echocardiography may be of interest for the assessment of patients with dyspnea. Dyspnea on effort may be an angina-like symptom, and in this case ischemia should be ruled out, or reflect diastolic dysfunction, and in this case it would be important to demonstrate exercise-induced high left ventricular filling pressures. Echocardiography during exercise has the capability of assessing both exercise-induced wall motion abnormalities and diastolic function. Therefore, we aimed to assess both, wall motion abnormalities and diastolic function (by the E/e´ ratio) during exercise on a treadmill in patients whose main complaint was dyspnea, to investigate the impact of both on outcome. We hypothesized that patients with either abnormal wall motion at peak exercise or increased E/e values at post-exercise might have worse outcome.

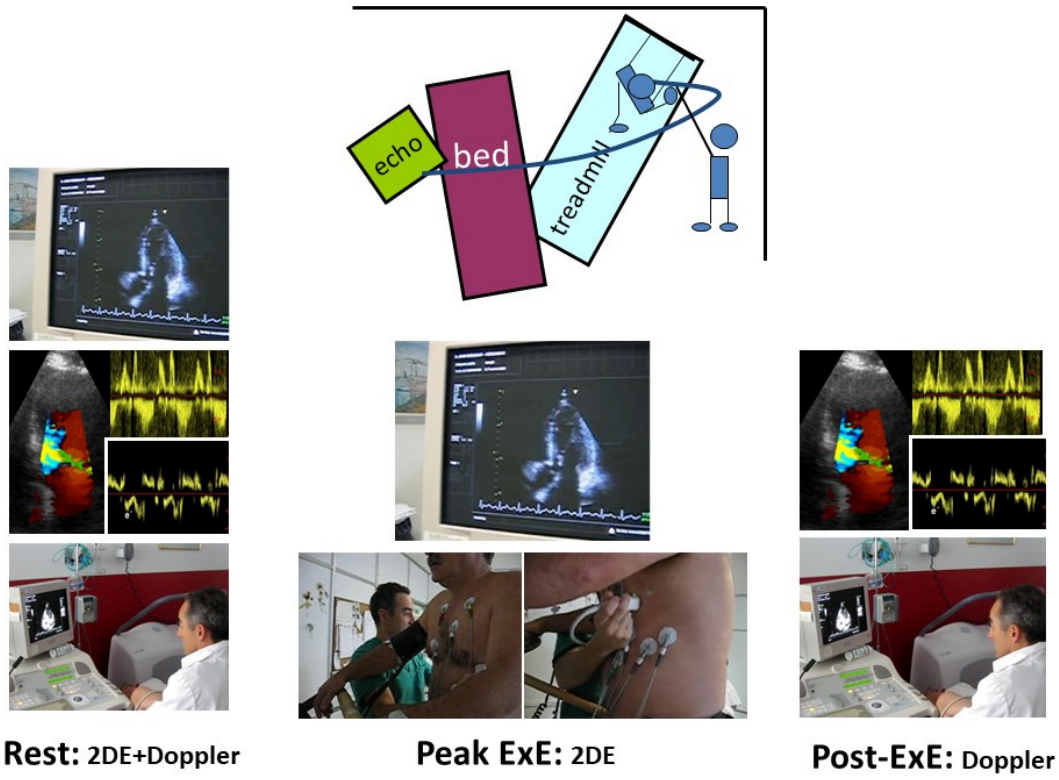

Fig. 1. Peak exercise imaging on the treadmill was used for LV systolic assessment; Immediate post-exercise imaging for E/e´ and mitral regurgitation assessments.

A total of 505 patients with a mean age of 66±11 years (57% women) referred for evaluation of dyspnea were studied. Mitral regurgitation, ratio of early left ventricular inflow wave to early diastolic annulus wave (E/e´), and wall motion abnormalities (WMAs) were measured at rest and at exercise. Of note, imaging for regional wall motion function was obtained at peak exercise on the treadmill, whereas E/e´ and mitral regurgitation

assessments were performed during the immediate post-exercise period. Considered events were overall mortality, non-fatal myocardial infarction, late revascularization, and admission for heart failure.

We detected ischemia in 102 patients (20%), whereas wall motion abnormalities at rest were already present in 55 patients (11%). Most of the patients (70%) exercised maximally (>100% of age-gender predicted METs).

During a median follow-up of 3.5 years, 66 patients had events (annualized event rate 3.5%). An E/e´ value of 13 at post-exercise was the best cut-off value to predict events. After adjustment by clinical and exercise echo variables, the combination of an abnormal exercise echo (ischemia and/or fixed wall motion abnormalities) and E/e´ values at post-exercise >/=13 was an independent predictor or events (Hazard Ratio= 3.67, 95% Confidence Interval= 2.11-6.38, p<0.001). The worse outcome corresponded to patients with abnormal exercise echo and raised E/e´values at post-exercise (annualized event rate 17.2%). Patients with normal E/e´values at post-exercise had better outcome irrespectively of the exercise echo results (annualized event rate 2.2% with normal exercise echo and 2.9% with abnormal exercise echo), whereas patients with high E/e´values at post-exercise but normal exercise echo results were in an intermediate risk (annualized event rate 5.0%).

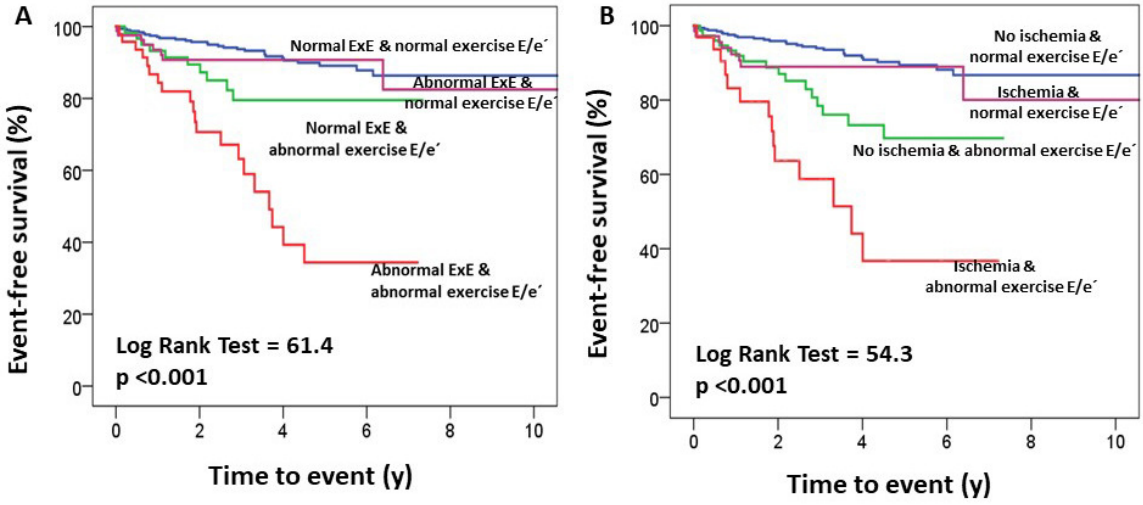

Fig. 2. Combined event-free survival curves for patients grouped according to the presence or absence of wall motion abnormalities during exercise echocardiography and of the presence or absence of a raised E/e´value (>/=13) at exercise (A), and for patients grouped according to the presence or absence of ischemia and of the presence or absence or a raised E/e´value (>/=13) at exercise (B).

Thus, in conclusion, despite favorable exercise echo results, event rate remains high among patients with dyspnea referred for this test, which may have a role to predict outcome in this setting. Abnormal wall motion and filling pressures predicted events in these subjects. Those with both raised E/e´values at post-exercise and abnormal exercise echocardiography results were at the highest event risk.

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Publication

Abnormal exercise echocardiography plus abnormal E/e' ratio at exercise portends worse outcome in patients with dyspnea.
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