

## Impact of Left Ventricular Diastolic Function on Exercise Capacity in Patients with Chronic Mitral Regurgitation: An Exercise Echocardiography Study

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### Summary

**Background:** Mitral regurgitation (MR) is known as one of the most frequent causes of heart failure and sudden death. In spite of increasing prevalence of MR, there have been no available data on cardiac determinants of exercise capacity in patients with chronic MR.

**Hypothesis:** This study aimed to investigate cardiac determinants of exercise capacity in patients with chronic MR.

**Methods:** We consecutively enrolled 32 patients (11 men, mean age:  $44 \pm 14$  years) who had greater than moderate MR with normal left ventricular (LV) systolic function (LV ejection fraction  $> 50\%$ ). Conventional echocardiographic indices and parameters measured by Doppler tissue imaging at septal side of mitral annulus were obtained before exercise. Mitral regurgitation fraction, forward stroke volume, pulmonary venous flow velocities, and systolic pulmonary artery pressure (sPAP) were also obtained with standard methods.

**Results:** Left ventricular ejection fraction was  $61 \pm 6\%$  and MR fraction was  $48 \pm 13\%$ . All patients finished a symptom-limited treadmill exercise test with a peak heart rate of  $> 85\%$  of predicted maximum heart rate. Mean exercise time was  $9.95 \pm 2.17$  min, corresponding to  $11 \pm 2$  metabolic equivalents. Among pre-exercise echocardiographic variables, only early diastolic mitral annulus velocity (E') and pulmonary venous reversal flow velocity (PVa) showed a significant correlation with exercise time ( $r = 0.44$ ,  $p = 0.011$ , and  $r = -0.40$ ,  $p = 0.040$ , respectively), which persisted after multivariate analysis ( $p = 0.011$  and  $0.038$ , respectively). Other parameters such as systolic mitral annulus velocity, resting and postexercise sPAP, forward stroke volume, LV size, LV ejection fraction, left atrial size, and regurgitant fraction showed no significant correlation.

**Conclusions:** Left ventricular diastolic function is an important determinant of exercise capacity in patients with chronic MR. Both E' and PVa, accepted surrogate estimates for LV diastolic function, may be useful for identifying patients with chronic MR and with poor exercise capacity.

**Key words:** mitral regurgitation, diastolic function, exercise capacity, Doppler tissue imaging

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