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Physical exercise reduces aortic regurgitation - a study using a new magnetic resonance exercise test

*Stern H.(1), Calavrezos L (1), Steinlechner E. (1), Meierhofer C. (1), Müller J. (1), Hager A. (1), Martinoff S. (2), Ewert P. (1), Fratz S.(1)
Deutsches Herzzentrum München, Germany; Clinic for Pediatric Cardiology and Congenital Heart Disease (1) and Department of Radiology (2)*

BACKGROUND: Direct and quantitative assessment of aortic regurgitation (AR) during physical exercise has not been studied so far.

METHODS AND RESULTS: Twelve asymptomatic patients with isolated moderate aortic regurgitation (AR) and twelve healthy controls were studied by cardiovascular magnetic resonance (CMR) at rest and during submaximal physical exercise (25% of maximal exercise capacity in healthy controls) using a specially designed apparatus. AR was quantified as regurgitant fraction (in percent) of left ventricular stroke volume.

During submaximal exercise, heart rate, systolic and diastolic blood pressure, as well as cardiac index (CI) increased significantly and similarly in both groups.

In controls under submaximal exercise, median VO₂ increased from 4.1ml/kg/min (range:3.7-4.9ml/kg/min) to 8.6 ml/kg/min (range:7.2-13.7ml/kg/min, p=0.008). Left ventricle (LV) volumes and ejection fraction (EF) did not change..

In patients, AR decreased from median 35% (range:9-64%) of left ventricular stroke volume at rest to 16% (range:7-42%) during submaximal exercise (p=0.003). There was a linear correlation between AR at rest and increase in CI during submaximal exercise (r²=0.64; p=0.001); LV-EF increased (p=0.021), LV end diastolic volume (LV-EDVI, p=0.004) and LV end systolic volume (LV-ESVI, p=0.009) decreased.

CONCLUSION: In asymptomatic patients with moderate isolated AR, regurgitant fraction decreases and LV function improves during submaximal exercise. This can be monitored precisely by submaximal exercise testing during CMR