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Title: Left ventricle myocardial work correlated with functional capacity in severe mitral stenosis patients

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Background & Aims: Functional capacity is reduced in mitral stenosis (MS) patients. Previous studies showed correlation between left atrial strain and functional capacity in this population. However, currently no left ventricle (LV) echocardiographic parameters were associated with functional capacity in patients with MS. Noninvasive LV pressure-strain loop analysis is a new echocardiographic method for evaluating LV function, integrating longitudinal strain from speckle-tracking analysis and noninvasively measured blood pressure to estimate myocardial work (MW) that overcomes the preload-dependent characteristics conventional parameters by integrating afterload. The aim of this study was to evaluate the association between MW and functional capacity measured using exercise tests in

Methods: Adult patients with symptomatic severe rheumatic MS (mitral valve area less than 1, 5 cm²), and preserved LVEF (>50%) and sinus rhythm who underwent echocardiography examination in our hospital from 2019 to 2021 were included. Exclusion criteria were suboptimal image quality for myocardial deformation analysis, significant mitral regurgitation or aortic valve lesions, coronary artery disease, intracardiac shunt, and atrial fibrillation. Standard echocardiographic parameters were measured and the following myocardial work indices were included: myocardial work index, constructive work, wasted work, and work efficiency. Exercise treadmill testing was performed according to standardized protocols, with the modified Bruce protocol used in all tests.

Results: A total of 33 individuals with isolated severe rheumatic MS in sinus rhythm (age 39.8 ± 9.8 years) were included in the study. Patients with severe isolated MS showed significantly impaired LV-GLS values as compared with normal references value. Furthermore, patients with severe MS showed significantly lower values of work index, constructive work and efficiency compared to normal values and higher wasted work (Table 1). Work efficiency was significantly correlated to duration of exercise ($p = 0.025$, Pearson's $r = 0.389$). However, there is no significant correlation between other myocardial work indices with exercise duration.

Conclusions: In stable patients with isolated severe mitral stenosis, work efficiency significantly correlated with functional capacity measured objectively with exercise test.