

P903

Myocardial work in moderate to severe aortic versus primary mitral regurgitation

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BACKGROUND: Myocardial work is an emerging non-invasive technic based on echocardiographic pressure-strain loops that assess left ventricular (LV) function. The method was studied in a large variety of pathologies, but its role in the assessment of valvular regurgitations is still unknown.

PURPOSE: To compare myocardial work indices in moderate and severe aortic and primary mitral regurgitation.

METHODS: Seventy-eight patients with moderate and severe aortic regurgitation (AR) or primary mitral regurgitation (MR) and preserved LV ejection fraction (LVEF > 50%) were retrospectively analyzed. Patients with significant valvular stenosis were excluded. Demographic, clinical and echocardiographic data, including LV global longitudinal strain (GLS) and myocardial work indices, were assessed.

RESULTS: The mean age was 58 ± 14 years, and 46 patients (59%) were men. Thirty seven patients had moderate or severe AR and 41 patients had moderate or severe MR. The two groups were homogeneous in terms of demographic and clinical data, except for age. As expected, diastolic blood pressure was lower in patients with AR compared to MR group (67 ± 8 mmHg vs. 73 ± 10 mmHg, $p = 0,003$), patients with MR had a higher LVEF compared to AR group ($63 \pm 6\%$ vs $59 \pm 6\%$, $p = 0,03$), and a higher left atrial indexed volume (53 ± 16 ml/m² vs 34 ± 12 ml/m², $p < 0.0001$). Overall, GLS, myocardial work index (GWI) and myocardial constructive work (GCW) were significantly lower in patients with moderate or severe AR compared to MR ($-18,1 \pm 3\%$ vs $-21,3 \pm 3,3\%$, $p < 0,0001$; 1849 ± 393 vs 2285 ± 499 , $p < 0,0001$; and 2194 ± 395 vs 2576 ± 594 , $p = 0,003$, respectively). Global wasted work (GWW) and global work efficiency (GWE) were similar. When comparing only asymptomatic patients, results were similar, with higher GLS, GWI and GCW in moderate to severe MR vs. AR ($-22,9 \pm 3,4$ vs $-18,4 \pm 3,4\%$, $p < 0,001$; 2446 ± 570 vs. 1927 ± 338 , $p = 0.001$ and 2767 ± 688 vs. 2236 ± 377 , $p = 0.005$). Interestingly, when comparing asymptomatic patients with a LVEF > 50% for AR, and LVEF > 60% for MR, GWI and GCW were significantly lower in MR group, despite higher GLS values (1852 ± 398 vs. 2322 ± 527 , $p < 0.001$; 2194 ± 400 vs. 2615 ± 638 , $p = 0.005$; $-22,1 \pm 3,3\%$ vs. $-18,2 \pm 2,9$, $p < 0.001$).

CONCLUSION: Patients with moderate to severe MR have higher values of GLS, global work index and global constructive myocardial work. This could translate into the fact that in moderate or severe MR, the myocardium develops a higher amount of work than in AR, maybe to account for the loss of stroke volume into the left atrium. In asymptomatic moderate to severe MR with LVEF > 60%, LV myocardium develops less work than in moderate to severe AR with a LVEF > 50%, suggesting maybe a compensated state.