

Clinical determinants of non-invasive global myocardial work index before and after transcatheter aortic valve implantation: a prospective study

B.K. Lakatos, M. Ruppert, Z. Ladanyi, A. Fabian, A. Ujvari, T. Turschl, B. Molnar, E. Straub, A. Molnar, A. Nagy, L. Molnar, A. Kovacs, B. Merkely

Semmelweis University Heart and Vascular Center, Budapest, Hungary

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The estimation of non-invasive global myocardial work indices is a novel method of the left ventricular (LV) functional assessment, which may overcome the load-sensitivity of the traditional functional measures. The diagnostic and prognostic role of this approach may gain particular importance in pressure overload states, such as in patients with severe aortic stenosis. However, the longitudinal changes of this recently introduced measure are scarcely investigated, and data are also lacking about the main determinants of these measures.

Accordingly, our aim was to investigate the clinical determinants of preoperative and also postoperative GMWI in patients undergoing transcatheter aortic valve replacement (TAVR).

Fifty patients (62% male, age: 78 ± 5 years) were enrolled. Prior to the procedure, subjects underwent echocardiographic investigation and the detailed medical history was also recorded. Speckle-tracking analysis was performed and global longitudinal strain (GLS) was measured. LV pressure curve was estimated by adding the mean aortic valve gradient to the systolic blood pressure. Using these measures, global myocardial work index (GMWI) and global constructive work index (CMWI) was quantified by commercially available software. A 6 months follow-up examination was

also performed and at that time point we determined the aforementioned parameters.

At follow-up, GLS has significantly increased (-13.0 ± 4.1 vs. $-14.8 \pm 3.8\%$; $p < 0.001$), while GMWI was significantly lower compared to baseline (1789 ± 748 vs. 1506 ± 561 mmHg%, $p < 0.01$). CMWI did not differ between the two time points (2309 ± 782 vs. 2086 ± 609 mmHg%, $p = 0.11$). Using multivariable analysis, age ($\beta = 0.30$; $p < 0.05$) preoperative New York Heart Association (NYHA) class ($\beta = -0.48$; $p < 0.001$) and having a pacemaker ($\beta = -0.44$; $p < 0.01$) were found to be independent predictors of the preoperative GMWI ($R^2 = 0.39$; overall $p < 0.001$). On the other hand, postoperative GMWI was determined ($R^2 = 0.48$; overall $p < 0.001$) by gender ($\beta = -0.25$; $p < 0.05$), the presence of diabetes mellitus ($\beta = -0.37$; $p < 0.01$) and also by having a pacemaker ($\beta = -0.38$; $p < 0.01$).

TAVR significantly alters LV functional measures. Different clinical factors influence GMWI before and after the procedure: age, NYHA class-based symptom severity and having a pacemaker were found to be independently associated with preoperative GMWI, while gender, the presence of diabetes mellitus and pacemaker device are the most important clinical determinants of the postoperative GMWI value.