

Left atrial dysfunction in patients with prosthesis-patient mismatch after transcatheter aortic valve replacement

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Background. Transcatheter aortic valve replacement (TAVR) prostheses have better hemodynamics compared to surgical prostheses, with lower incidence of prosthesis-patient mismatch (PPM). Nonetheless, this complication is neither rare nor benign in the expanding population of TAVR patients (pts). Data regarding the effect of TAVR PPM on cardiac function is scarce. Our aim was to determine the short-term impact of PPM on left atrium (LA) function in patients undergoing transfemoral TAVR.

Methods. One hundred forty-three consecutive pts (76.3 ± 7.5 yrs, 74 men) considered to be at high risk for SAVR were enrolled and examined before and 30 days after TAVR. All pts underwent a comprehensive echocardiogram, including speckle tracking echocardiography (STE) for LA and left ventricular (LV) strain analysis. Longitudinal LA strain parameters were assessed from the apical 4-chamber view. Peak values of global longitudinal LA strain (LA ϵ) and LA systolic strain rate (SSr, reservoir function) and early diastolic strain rate (ESr, conduit function) were measured in all. Contractile LA function (late diastolic strain rate, ASr) was assessed in patients in sinus rhythm (106 pts).

Results. Fifty-five pts (38%) had PPM (defined as an indexed effective orifice area, EOA ≤ 0.85 cm²/m²). Most of these pts (71%) had moderate PPM (indexed EOA between 0.65 and 0.85 cm²/m²). No significant differences in age (76.4 ± 8.1 vs 76.3 ± 7.2 yrs, $p = 0.9$), gender ($p = 0.2$), body surface area ($p = 0.8$), body mass index ($p = 0.2$) and the presence of cardiovascular risk factors ($p > 0.2$ for all) were observed between pts with and without PPM. The severity of post-TAVR aortic regurgitation was mild in 92 pts (64%) and moderate in 12 pts (8%) without any significant difference between pts with and without PPM. The post-TAVR prevalence of moderate mitral regurgitation was not different between the two groups ($p = 0.40$). After TAVR, there were no significant differences in terms of indexed LV mass, volumes, ejection fraction ($p > 0.5$ for all). LV global longitudinal strain was also similar between groups (-13.7 ± 4.3 vs $-14 \pm 3.6\%$, $p = 0.7$). Although LA volumes were similar between patients with and without PPM (47.8 ± 12.4 vs 49.3 ± 20.3 ml/m², $p = 0.6$), in the mismatch-group we found a significantly reduced systolic global LA strain (12.7 ± 6.2 vs $15.9 \pm 7.9\%$, $p = 0.009$) and impaired LA contractile function (ASr: -1.0 ± 0.4 vs -1.2 ± 0.5 , $p = 0.03$). Parameters of LV diastolic function were also worse in the mismatch-group, with an E/e' ratio of 22 ± 10 vs 17 ± 7 , $p = 0.01$.

Conclusions. In our study group TAVR was associated with an incidence of PPM of 38%. The short-term follow-up of these patients revealed a significantly impaired LA function and increased LV filling pressure in patients with PPM compared to those without PPM. To our knowledge, this is the first report about the effect of PPM on the LA global and contractile function.