Rate, correlates, and outcomes of hemodynamic valve deterioration after transcatheter aortic valve replacement

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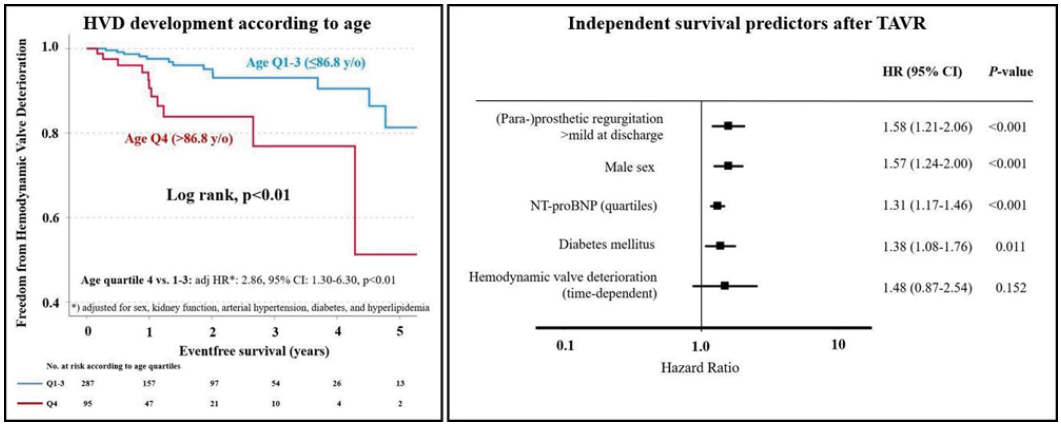
Objectives: Treatment expenditure of transcatheter aortic valve replacement (TAVR) to younger individuals may potentially be limited by valve durability. Long-term hemodynamic performance of transcatheter aortic valves is not well documented. This study sought to determine the incidence, predisposing factors and outcomes of hemodynamic valve deterioration (HVD) after TAVR.

Methods: Consecutive patients undergoing TAVR between May 2007 and December 2018 (67.0% Sapien, 14.6% Evolut, 6.8% Acurate, 6.8% Portico, 4.8% other) were prospectively studied. Baseline assessment included echocardiography, laboratory, and clinical assessment. Echocardiographic and laboratory follow-up after TAVR was performed prior to discharge, at 3 and 12 months, and yearly thereafter. HVD was defined by Doppler assessment according to Valve Academic Research Consortium 3 criteria as a ≥10 mm Hg increase in mean gradient to ≥20 mm Hg OR worsening of (para-)prosthetic regurgitation ≥1/3 class to ≥moderate. The primary endpoint was the incidence of HVD. All-cause mortality served as secondary endpoint. Multivariate cox regression was used for outcome analysis.

Results: 649 patients (82.2±6.7 y/o, 55.5% female, EuroSCORE II 4.4±1.0) were analyzed. Among survivors with available echo data from ≥2 follow-ups (n=382), the incidence of HVD was 6.8% (n=26; 4.1% per valve-year), with no difference between valve types. Modes of HVD were stenosis (n=8), regurgitation (n=14), and both (n=4). Median time to HVD was 14.2 months (interquartile range, 9.4 to 35.0 months), and was significantly shorter in patients in the highest age quartile (Q4 vs. Q1–3: log-rank, p<0.01, Figure). Also, increased age was the only factor that independently predisposed for HVD (Q4 vs. Q1–3: adjusted hazard ratio [adj HR]: 2.86, 95% confidence interval [CI]: 1.30–6.30, p<0.01).

Following TAVR, 355 patients (54.7%) had died after 64.2±31.9 months. Independent predictors of mortality were (para-)prosthetic regurgitation >mild at discharge (HR: 1.58, 95% CI: 1.21–2.06, p<0.001), male sex (HR: 1.57, 95% CI: 1.24–2.00, p<0.001), baseline NT-proBNP serum levels (graded into quartiles, HR: 1.31, 95% CI: 1.17–1.46, p<0.001), and diabetes (HR: 1.38, 95% CI: 1.08–1.76, p=0.011), but not time-dependent HVD (p>0.05, Figure).

Conclusion: This study reports good hemodynamic performance of transcatheter aortic valves up to 8 years following intervention. The incidence of HVD, which may develop over time – especially in the elderly –, is low and does not impact survival. Conversely, (para-)prosthetic regurgitation early after TAVR conveys detrimental prognostic implications and needs to be avoided – particularly in younger patients.



Hemodynamic valve deterioration in TAVR