Reduction in systolic pulmonary artery pressure after TAVI is associated with lower cardiovascular mortality in patients with severe aortic stenosis

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Background: Elevated systolic pulmonary artery pressure (sPAP), assessed by echocardiography, is associated with increased mortality, irrespective of the aetiology.

Purpose: The purpose of this study was to explore the association between dynamic change in sPAP after transcatheter aortic valve implantation (TAVI) and cardiovascular mortality in patients with severe aortic stenosis (AS).

Methods: We screened 688 AS patients who underwent TAVI in our hospital between July 2009 and December 2018. Patients, who performed echocardiography examinations before TAVI (T0) and within 7 days after TAVI (T1), and completed ≥12 months clinical follow-up, were included in this study. Patients who died within 30 days after TAVI were excluded (n=27). Patients with no measurable tricuspid regurgitation for assessment of sPAP were not included. 477 TAVI patients were finally included for further analysis (mean age 81.4±5.9 years, 46.3% male).

Primary endpoint was defined as cardiovascular (CV) death up to 5 years after TAVI.

Results: During 34 (20-55) months follow-up, all-cause mortality and CV mortality was 34.0% and 18.9%, respectively in these patients. 18.7% of patients had COPD, and COPD was identified as a risk factor for increased CV mortality risk (Hazard ratio, HR=2.152, 95% CI 1.376-3.365, P<0.001). Baseline septal trans-mitral early filling velocity to mitral annular early-diastolic velocity ratio (E/E') was identified as an echocardiographic parameter associated with CV mortality (HR=1.028, 95% CI 1.009-1.047, P=0.003).

sPAP at 7 days after TAVI was significantly reduced in no CV-death group (median 38.9 vs. 36.0 mmHg, P<0.001), while remained unchanged in CV-death group (40.7 vs. 41.0 mmHg, P=0.966). We further grouped the patients according to sPAP change trend after TAVI: Group 1, sPAP at T0 <40 mmHg and sPAP at T1 <40 mmHg; Group 2, sPAP at T0 ≥40 mmHg and sPAP at T1 <40 mmHg; Group 3 sPAP at T0 <40 mmHg and sPAP at T1 ≥40 mmHg; Group 4, sPAP at T0 ≥40 mmHg and sPAP at T1 ≥40 mmHg. CV mortality was the highest in the group 4 (28.3%), and significantly lower in the group 2 than in the group 4 (13.6% vs. 28.3%, P<0.001, Figure 1). Multivariable Cox regression analysis showed that TAVI patients with a reduction trend in sPAP at 7 days after TAVI (group 2) were independently associated with reduced CV mortality compared to patients with a consistent elevated sPAP (group 4, HR=2.470, 95% CI 1.260-4.832, P=0.008), after adjusted for age, sex, COPD, and septal E/E'.

Conclusion: TAVI patients with consistently elevated sPAP before and after TAVI are associated with the worst CV outcome. Reduction in sPAP at 7 days after TAVI is associated with reduced CV mortality in patients with severe AS.