Valvular Heart Disease

Acute hemodynamic impact of transcatheter aortic valve implantation in patients with severe aortic stenosis

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Funding Acknowledgements: Type of funding sources: None.

Background. There are limited data about the intraprocedural hemodynamic study performed immediately before and after transcatheter aortic valve implantation (TAVI) in patients with severe aortic stenosis (AS). Purpose. We aimed to evaluate the acute hemodynamic impact of TAVI in patients with severe AS and to investigate invasive and non-invasive parameters predicting all-cause mortality. Methods. A total of 245 consecutive AS patients undergoing TAVI were enrolled. Intraprocedural left heart catheterization (LHC) and echocardiogram before and after TAVI were performed. The clinical endpoint was the death for any cause. Results. LHC after TAVI revealed significant changes in aortic and LV pressures, including indexes of intrinsic myocardial contractility and diastolic function such as positive dP/dT (1128.9 ± 398.7 vs 806.3 ± 247.2 mmHg/sec, p<0.001; Figure 1A) and negative dP/dT (1310.7 ± 431.1 vs 1075.1 ± 440.8 mmHg/sec, p<0.001; Figure 1B). Post TAVI echo showed a significant reduction in LV end diastolic volume index (54.6 ± 18.4 ml/m2 vs 51.7 ± 17.5 ml/m2; p = 0.017; Figure 1C), improvement in left ventricle ejection fraction (from 55 ± 12 to 57.2 ± 10.5%, p<0.001; Figure 1D) and pulmonary artery systolic pressure (42.1 ± 14.2 vs 33.1 ± 10.7 mmHg, p<0.001; Figure 1E). After a mean follow-up time interval of 24 months, 47 patients died. Post-TAVI aortic regurgitation (2- 3- 4+) at echocardiography was the only independent predictor of mortality (HR 4.43, C.I. 1,71 – 11,45, p = 0.002; Figure 2). Conclusions. LHC performed immediately before and after prosthesis release offers a unique insight in the assessment of LV adaptation to severe AS and the impact of TAVI on LV, catching changes in indexes of intrinsic contractility and myocardial relaxation. Aortic regurgitation assessed by echocardiography was the only independent predictor of mortality in patients undergoing TAVI.

FIGURE LEGEND

Figure 1. A-B: Impact of TAVI on haemodynamic parameters: Box plot with median and interquartile ranges of positive dP/dT and negative dP/dT values pre vs post TAVI. C-D-E: Impact of TAVI on echocardiographic parameters: Box plot with median and interquartile ranges of left ventricular end diastolic volume index (LVEDVi), left ventricular ejection fraction (EF) and pulmonary artery systolic pressure (PASP) values pre vs post TAVI.

Figure 2. Kaplan-Meier curves for survival showing that AR (2-3-4+) assessed with echocardiography had the strongest association with mortality.

Abstract Figure 1.

Figure 1

Abstract Figure 2.