Echocardiographic assessment of the right heart in patients with aortic stenosis undergoing transcatheter aortic valve implantation: analysis from a large single-center cohort

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Introduction: The impact of right ventricular (RV) function and RV to pulmonary artery (RV-PA) coupling on outcomes of patients with aortic stenosis undergoing transcatheter aortic valve implantation (TAVI), and the early effect of the intervention in right heart echocardiographic parameters, remain partly unclear.

Aim: To evaluate the postprocedural trend of right heart echocardiographic (echo) parameters and its impact on the outcome of patients with aortic stenosis undergoing TAVI.

Methods: Retrospective analysis including consecutive patients submitted to TAVI at our center between 2007-2021. Pre and postprocedural (≤96h) echo parameters were analyzed: tricuspid annular plane systolic excursion (TAPSE), S-wave tissue Doppler velocity of the tricuspid annulus (S'), pulmonary arterial systolic pressure (PASP). TAPSE/PASP ratio was used as a surrogate of RV-PA coupling; TAPSE/PASP ratio <0.31 defined RV-PA uncoupling.

Primary endpoint (PE) was defined as all-cause death within 1-year after TAVI. Echo parameters were compared between patients according to the PE. Pairwise comparison of pre- and post-TAVI indexes was also performed, for the overall cohort and according to the PE. Statistical significance was considered if p<0.05.

Results: Of 1051 TAVI patients, 615 with complete echo and follow-up data were included: median age 81(77-85) years, 53% female, median EuroSCORE II 3.6(2.1-5.7)%, median aortic valve mean gradient 47(39-56) mmHg, left ventricular ejection fraction 55(45-60)%

Before TAVI, 27 patients (11%) presented RV dysfunction (TAPSE <17mm), and 30 (15%) with RV-PA uncoupling. At least moderate tricuspid regurgitation was present in 61 (10.6%) patients.

Overall, a significant reduction in PASP was observed after TAVI (40 vs 36 mmHg, p<0.01). TAPSE decreased post-TAVI (20.0 vs 19.5 mm, p=0.04), while the TAPSE/PASP ratio increased (0.50 vs 0.57, p<0.01) in the postprocedural period. S' values did not differ between evaluations (11.20 vs 11.50, p=0.08).

The primary endpoint occurred in 54 (8.8%) of the 615 patients included. Patients who met the PE had higher preprocedural PASP (43 vs 39 mmHg, p=0.03), and more frequently presented RV-PA uncoupling at baseline (35% vs 24%, p=0.023).

PASP decreased after TAVI (39 vs 35 mmHg, p<0.001) in patients who survived the first-year post-implantation, but not in patients meeting the PE (p=0.83). Post-implantation PASP was significantly higher in patients who met the PE (40 vs 34, p=0.006). Postprocedural TAPSE/PASP ratio was lower in the deceased group (0.46 vs 0.58, p=0.014).

Conclusions: In this cohort, RV longitudinal function parameters did not improve after TAVI. Contrarily, RV-PA coupling improved after the procedure post-TAVI, irrespectively of the PE. Patients who did not survive the 1st year after TAVI more frequently presented RV-PA uncoupling at baseline.