

Hemodynamic Effect of Transcatheter Aortic Valve Replacement in Low Gradient Severe Aortic Stenosis

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Background: Patients with aortic valve area (AVA) <1.0 cm², low transvalvular gradient and normal ejection fraction (EF) may represent a subgroup with an advanced stage of aortic stenosis with poor prognosis. We retrospectively evaluated the hemodynamic outcomes of transcatheter aortic valve replacement (TAVR) in patients with high operative risk and low-gradient aortic stenosis (LGSAS) defined as AVA <1.0 cm² and mean gradient ≤ 40 mm Hg.

Methods: The hemodynamic effect of TAVR in patients with LGSAS was compared to effect of TAVR in patients with typical severe aortic stenosis (AVA <0.1 cm²; mean gradient > 40 mm Hg) using echocardiography.

Results: Among 104 symptomatic patients (mean age, 83 ± 7 years; EuroScore 31 ± 15), baseline echocardiography revealed typical severe aortic stenosis in 72 (69%) patients and LGSAS in 32 (31%). Baseline EF was higher in patients with LGSAS than in those with typical severe aortic stenosis ($54\pm 13\%$ versus $62\pm 6\%$; $P<0.01$). All patients underwent successful TAVR. At 30 months of follow-up, there was a significant reduction of end systolic volume in patients with typical severe aortic stenosis (46 ± 23 ml to 39 ± 22 ml, $p<0.001$), and patients with LGSAS (32 ± 10 ml to 28 ± 11 ml, $P<0.001$). Similarly, both patients with typical severe aortic stenosis and with LGSAS experienced increase in EF ($52\pm 12\%$ to $60\pm 13\%$, $p<0.001$ and $62\pm 6\%$ to $67\pm 7\%$, $p<0.001$ respectively). There was reduction of systolic pulmonary artery pressure in the patients with typical aortic stenosis (43 ± 13 mmHg to 38 ± 13 mmHg, $p=0.003$), and the patients with LGSAS (41 ± 14 mmHg to 35 ± 11 mmHg, $p=0.003$).

Conclusion: TAVR provides similar hemodynamic benefit in patients with high risk LGSAS to that in patients with typical aortic stenosis.