

Effects of Transcatheter Aortic Valve Implantation on Coronary Blood Flow in Patients with Severe Aortic Stenosis

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Background: In patients with severe aortic stenosis and normal coronary angiography the coronary flow is reduced. Doppler evaluation of proximal coronary flow is feasible using transesophageal echocardiography (TEE) Aim: To assess the change in coronary flow in patients undergoing Trans-catheter Aortic valve implantation (TAVI) for severe aortic stenosis.

Methodes: The left main coronary artery was visualized using TEE in 23 patients (19 patients undergoing percutaneous TAVI and 4 trans-apical TAVI). The peak systolic and diastolic velocities of the coronary flow and the time-velocity integral were obtained before and after TAVI using pulsed wave Doppler.

Results: The mean age was 82.8 ± 4.7 years. Mean aortic gradients decreased from 53.2 ± 14.3 mmHg before TAVI to 4.7 ± 2.6 mmHg after ($p < 0.001$). The aortic valve area increased from 0.62 ± 0.3 cm² to 1.89 ± 0.6 cm² ($p < 0.001$). Cardiac output increased from 3.1 ± 1.5 to 3.5 ± 1.1 l/min ($p < 0.001$). The aortic systolic pressure did not change significantly — 133.1 ± 22.2 mmHg before and 136.5 ± 18.6 mmHg after valve implantation ($p = 0.8$). Left ventricular end-diastolic pressure decreased significantly from 22.2 ± 3.9 mmHg before to 14.9 ± 6.0 mmHg after TAVI ($p = 0.03$). The following coronary flow parameters (median [25th, 75th interquartiles]) increased significantly after TAVI: peak systolic velocity 26.7 cm/sec [18.25-36.5] to 38.25 cm/sec [25.25-49.3] ($p < 0.001$); peak diastolic velocity 51.0 cm/sec [39.9-67.6] to 59.3 cm/sec [44.1-89.8] ($p = 0.002$); total velocity time integral 24.5 cm [17.1-30.1] to 31.1 cm [22.1-37.4] ($p = 0.001$); and systolic velocity time integral 6.1 cm [5.6-9.1] to 10.1 cm [8.8-12.7] ($p = 0.001$). Diastolic time velocity integral increased from 18.1 cm [11.7-25.3] to 22.3 cm [17.2-27.2] ($p = 0.01$).

Conclusion: After TAVI, there is a significant increase in coronary flow as measured by peak systolic velocity, diastolic velocity, and velocity time integral using pulsed wave Doppler by TEE