P43. Is The Doppler-derived Effective Orifice Area Really A Measure Of Prosthetic Valve Hemodynamic Properties?

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OBJECTIVES: Prosthetic valve function is estimated using the Doppler-derived effective orifice area (EOA). But since pressure recovery is not taken into account, influencing factors like the outflow geometry are not appreciated. To evaluate the use of the Doppler-EOA, we compared it to the Gorlin-EOA, which usually can not be obtained in patients with prosthetic aortic valves.

METHODS: Small mechanical and biological aortic valve prostheses (size 19-23) were analyzed by Doppler echocardiography and simultaneous invasive hemodynamic measurements using a pulsatile circulatory simulator at different hemodynamic conditions (CO 2, 4, 5, 7l/min, 70 and 110 bpm respectively) for 2 outflow geometries: one aorta with statistically normal diameter (32.6mm), one aneurysmatic aorta (50mm). Orifice areas were calculated according to the Bernoulli-equation (Doppler-data) and the Gorlin-formula (invasive measurements).

RESULTS: For all valves Doppler-EOAs were significantly lower than Gorlin-EOAs. Cardiac output ($p < 0,05$), heart rate and valve size ($p<0.0001$) significantly influenced overall EOAs, whereas the outflow geometry significantly ($p<0,0001$) influenced only the Gorlin-EOAs, not the Doppler-EOAs ($p<0,25$).

CONCLUSIONS: Doppler-EOAs differ substantially from invasive (Gorlin) EOAs. Doppler-EOAs principally are a measurement of the static orifice pressure drop, whereas the invasive Gorlin-EOA more realistically reflects the true hemodynamic valve characteristics. This has also have major impact on the (Doppler-derived) calculation of patient-prosthesis-mismatch, and may explain its minor relevance on long term outcome.

Fig. 1