Response to Letter Regarding Article, “Long-Term Outcomes After Valve Replacement for Low-Gradient Aortic Stenosis: Impact of Prosthesis-Patient Mismatch”

We thank Bleiziffer and colleagues for their interest and insightful comments regarding our article describing long-term outcomes after valve replacement for patients with low-gradient aortic stenosis. In our analyses, prosthesis-patient mismatch (PPM) was characterized as an indexed effective orifice area (EOA) of ≤0.85 cm²/m² because this definition constitutes the most generally accepted criterion for PPM. As Bleiziffer et al note in their letter, the use of geometric internal orifice area as a measure of prosthesis size is limited and does not effectively predict hemodynamic or clinical outcomes. We did not use geometric orifice area in our analyses because geometric orifice area does not account for many valve characteristics that contribute to the EOA, such as prosthesis height, profile, opening angle, and leaflet inertia.

We agree with Bleiziffer and colleagues that the EOA derived by Doppler echo continuity equation from individual patients after implantation of the prosthesis may have better quantified the degree of PPM in our study of low-gradient aortic stenosis patients. This methodology has several important limitations, however, related to the difficulties caused by prosthetic valve reverberations in accurately measuring left ventricular outflow diameter after surgery. Moreover, the presence of large localized transprosthetic gradients or nonuniform transprosthetic spatial velocity profiles frequently result in large discrepancies between Doppler echo and actual EOA measurements. Therefore, we used fixed values of in vivo EOAs (also known as projected EOAs) for each prosthesis type and size from literature sources of patients with normally functioning prostheses. Projected EOA values can be attributed to patients who have not yet been echocardiographically examined with their new valve prosthesis, and projected EOA values may also be applied in advance of surgery.

EOAs derived from individual patients are obviously not available at the time of surgical decision making. The EOA can only be determined after the prosthesis has been inserted, the patient has been weaned from cardiopulmonary bypass, and the preload, afterload, and contractility have normalized. Therefore, the EOA of an individual patient (determined after surgery) has little or no role in predicting whether PPM will be avoided with a given prosthesis type and size. From a practical perspective, projected EOAs have greater interpretability and predictability for surgeons performing aortic valve replacement because projected EOAs can be used to decide whether another prosthesis type or size should be selected or whether aortic root enlargement should be performed before implantation of the prosthetic valve. This provided the rationale for our analyses.

Disclosures
None.

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