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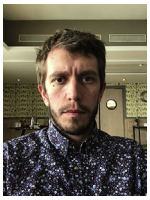

PROSTHESIS-PATIENT MISMATCH IS NOT SYNONYMOUS WITH ELEVATED TRANSVALVULAR PRESSURE GRADIENT

To the Editor:

Vriesendorp and colleagues[1] recently evaluated the relationship between the effective orifice area indexed (EOAi) to body surface area and the postoperative transprosthetic mean gradient in patients undergoing surgical aortic valve replacement (AVR) using a stented bioprosthesis. The authors conclude that the current EOAi thresholds proposed in the American and European society guidelines and the Valve Academic Research Consortium-2 are not appropriate to define prosthesis–patient mismatch (PPM) because their ability to predict high residual transprosthetic gradients is weak.

The study by Vriesendorp and colleagues[1] is based on the premise that the presence of PPM necessarily implies elevated transprosthetic pressure gradient. Indeed, in patients with normal left ventricular outflow, there is a strong and inverse curvilinear relationship between EOAi and transvalvular gradient. However, this relationship does not hold anymore if transvalvular flow is reduced, such as is the case in a large proportion (≤45%) of patients following AVR.[2] In the presence of low flow, the mean transprosthetic gradient may be pseudonormal despite the presence of a bona fide severe PPM. This phenomenon is analogous to low-flow, low-gradient native aortic stenosis, in which the transaortic gradient may be low despite the presence of true severe aortic stenosis. Hence, the mean transprosthetic gradient or peak transprosthetic velocity lack sensitivity to identify PPM, particularly in patients with low flow state (Figure 1). These parameters should thus not be used as a reference to confirm the presence or absence of PPM.[3]

As opposed to the mean gradient or peak velocity, the EOAi measured by Doppler echocardiography may overestimate the incidence and severity of PPM in patients in a low-flow state. Indeed, as in low-flow, low-gradient native aortic stenosis, the EOA and thus the EOAi may be pseudosevere in presence of low flow and may thus overestimate the severity of aortic stenosis or of PPM. Indeed, in presence of low flow, the bioprosthetic valve leaflets may not open fully and the measured EOA may thus be small and lead to the erroneous conclusion that severe PPM is present, whereas in fact, this is pseudosevere PPM. To overcome this limitation, it is recommended to use the predicted EOAi instead of the measured EOAi to identify and quantify PPM.[4] The predicted EOAi is calculated from the normal reference value of EOA for the model and size of prosthetic valve being implanted in the patient divided by the body surface area. The predicted EOAi has been shown to be superior to the measured EOAi to identify true severe PPM (Figure 1) and predict hemodynamic and clinical outcomes following AVR.[5] To obtain accurate predicted EOAi, it is essential to use reliable sources for the normal reference values of EOAs,[4] which are not necessarily those provided by the prosthetic valve manufacturers. Furthermore, it is recommended to use lower threshold values of EOAi (<0.55 vs 0.65 cm^2/m^2 for severe PPM) in patients with obesity to avoid overindexation of EOA and thus overestimation of PPM in these patients (Figure 1).[3] To enhance the definition, prediction, and prevention of PPM following AVR, a task force led by International Organisation for Standardisation and Heart Valve Collaboratory has been launched to establish accurate and reliable normal reference values of EOAs for each given model and size of surgical or transcatheter bioprosthesis using a robust and standardized methodology.

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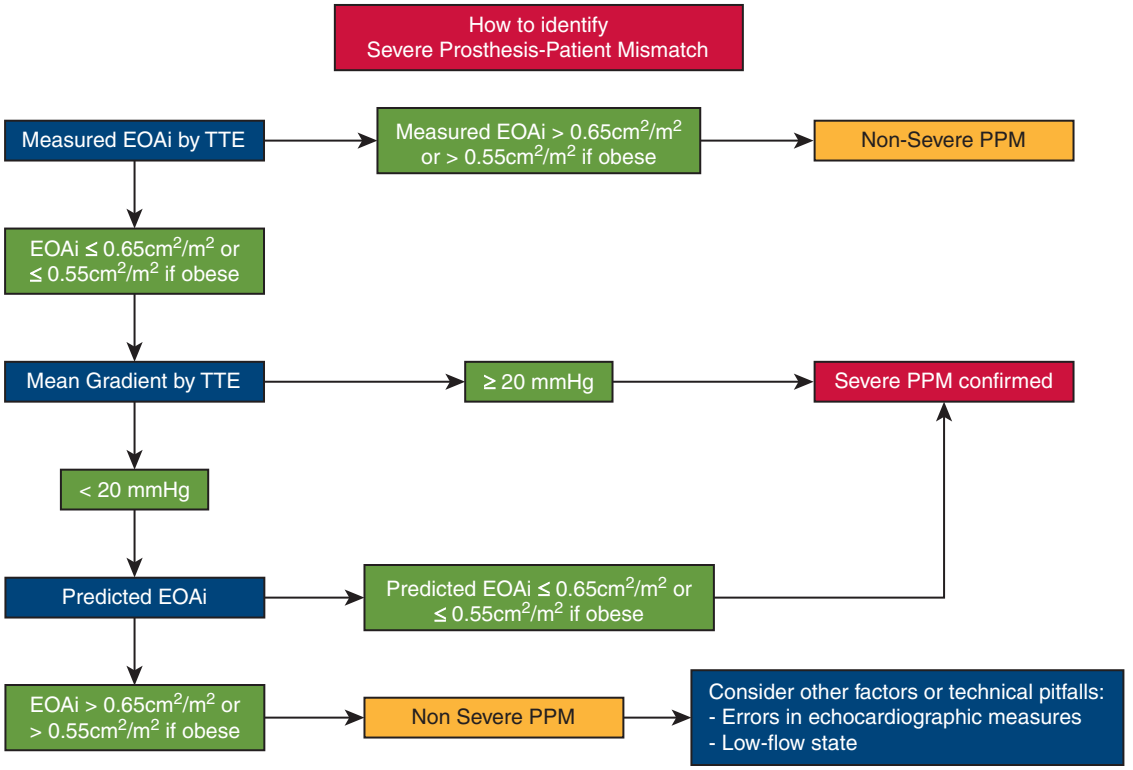

FIGURE 1. Algorithm to identify the presence of severe prosthesis–patient mismatch (*PPM*). *EOAi*, Effective orifice area indexed to body surface area; *TTE*, transthoracic echocardiography.

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