Global left ventricular afterload matters in left ventricular reverse remodeling after aortic valve replacement

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It has long been held that effective orifice area (EOA) of a prosthetic valve solely determines left ventricular (LV) mass regression following aortic valve replacement (AVR) for aortic stenosis (AS), and that patient prosthesis mismatch (PPM) is associated with inadequate LV reverse remodeling and poor prognosis. The degree of LV mass regression, however, varies in individual patients, and even a patient with PPM could achieve significant LV reverse remodeling [1].

Hypertension is commonly seen in patients with AS, and is associated with negative LV remodeling and increased cardiovascular morbidity and mortality [2]. Hypertension is another important component of LV afterload, or vascular load, and is often overlooked. Global LV afterload including both valvular and vascular loads may play a vital role in postoperative LV reverse remodeling. Valvuloarterial impedance (Zva) is an echocardiographic derived measure of global LV afterload, and is calculated using the formula, $Zva \text{ (mmHg/ml/m}^2\text{)} = (\text{systolic blood pressure} + \text{mean transvalvular pressure gradient}) / \text{stroke volume index}$ [3]. We have shown that Zva is a significant predictor of LV reverse remodeling after AVR, as opposed to traditional parameters of prosthetic valve function including transvalvular pressure gradients and prosthetic valve EOA [4].

The present study by Hachiro and colleagues showed that postoperative EOA did not correlate with LV reverse remodeling in patients without PPM [5]. Multivariate predictors of LV reverse remodeling were male gender and preoperative LV mass index. Taking Zva into consideration would have led to more reliable results in this patient population. We recently investigated LV reverse remodeling following aortic valve neocuspidization for AS, which achieves larger EOA than commercially available stented bioprostheses. In

this study, Zva was the multivariate predictor of LV reverse remodeling, but traditional parameters of valvular function were not even in patients with large enough EOA (unpublished data). Global LV afterload seems to add a deeper insight into longstanding debate over who is the key player in postoperative LV reverse remodeling in patients with and also without PPM after AVR for AS.

Compliance with ethical standards

Conflict of interest The authors disclose no sources of support or conflicts of interest.

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