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Commentary: Aortic root enlargement—optimizing for today and preparing for the future

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Bioprosthetic aortic valves now account for >85% of surgical aortic valve replacements (SAVRs).¹ However, valve durability is one of the major limitations one must consider in the lifetime management of patients with valvular heart disease. As the initial valves fail, reintervention including redo-SAVR and valve-in-valve (VIV) transcatheter aortic valve replacement (TAVR) are options. Gaining in popularity, especially in older patients, VIV-TAVR is always limited by the initial surgical valve frame. Thus, optimizing the first implant with the largest valve serves to establish a feasible platform for future VIV-TAVR.

Aortic root enlargement has become an increasingly discussed topic in cardiac surgery, as surgeons look to prevent patient–prosthesis mismatch (PPM). PPM occurs when the effective orifice area (EOA) of the implanted prosthetic valve is too small for the patient’s body size, resulting in high postoperative gradients. Especially in young patients with small annuli, an aortic root enlargement, or replacement, should be performed when the EOA index is $\leq 0.65 \text{ cm}^2/\text{m}^2$ and may be considered when the EOA index is $\leq 0.85 \text{ cm}^2/\text{m}^2$.

First developed in the 1970s, aortic root enlargement has not been widely adopted and is performed in <10% of SAVRs.¹ Aortic root enlargement at time of SAVR can prevent PPM by enabling implantation of a valve size appropriate to a patient’s body size despite native root size and



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CENTRAL MESSAGE

The Y-incision with roof technique provides the opportunity to upsize the valve 3-4 valve sizes, eliminating patient–prosthesis mismatch and providing opportunity for future valve-in-valve TAVR.

can also mitigate future PPM at time of VIV-TAVR by having a larger surgical valve platform in which to place the transcatheter valve. Techniques for root enlargement include Nicks and colleagues,² Manouguian and Seybold-Epting,³ Konno and colleagues,⁴ and the Y-incision.⁵ Both the Nicks and Manouguian procedures enlarge the aortic annuli via posterior extension of the aortotomy through the noncoronary sinus and then closure with patch augmentation; the Manouguian extends onto the anterior mitral leaflet. A Konno, rarely done in adults, is an anterior annular patch augmentation extending onto the right ventricle.

In the current edition of *JTCVS Techniques*, Yang and colleagues report a modification to their previously reported Y-incision/rectangular^{5,6} patch in which they describe a “roof technique” that enlarges the sinotubular junction and proximal ascending aorta via a triangular patch superior to the rectangular patch and facilitates closure of the aortotomy.⁷ Although previous root-enlargement techniques have enabled implantation of valve sizes 1-2 sizes larger than the native annulus, Yang and colleagues report the Y-incision with roof technique enables implantation of valve sizes 3-4 sizes larger than the native annulus. By implanting valves 3-4 sizes larger, the risk of PPM can be eliminated. Moreover, the larger initial valve facilitates future VIV-TAVR. Therefore, the Y-incision with the roof technique should be an available asset in the armamentarium of surgeons

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when faced with a small root in the setting of SAVR. However, a larger cohort and mid- to long-term outcomes are needed to solidify the technique.

In conclusion, various techniques exist to enlarge the aortic root. These techniques, including the Y-incision with roof technique,⁷ should be considered at time of SAVR, particularly in young patients and patients with small roots, to decrease the risk of PPM and enable future VIV-TAVR.

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