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Commentary: Valve sparing surgery after the Ross procedure: Keeping the promise alive

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The main benefit of the Ross procedure is implantation of an autologous living valve substitute in the aortic position. The unique biological and hemodynamic characteristics of the pulmonary autograft translate into excellent long-term survival, hemodynamics, freedom from valve-related complications, and quality of life. This has now been consistently demonstrated in long-term studies published over the last decade.¹ Nevertheless, as with all valve surgeries, there is an inherent risk of reintervention after the Ross procedure owing to autograft valve regurgitation, pulmonary homograft dysfunction (typically stenosis), or a combination of the two.

Pulmonary autograft failure usually follows a bimodal presentation. Early presentation (<5 years) is mostly related to primary valve failure, such as cusp prolapse or commissural tear, whereas late failure, which is more often secondary to pulmonary autograft root dilatation, tends to develop more gradually. Early failure can be induced by surgical technique, such as distortion following inclusion in a Dacron graft or as a result of uncontrolled hypertension in the first weeks and months after surgery. When surgery is required, prosthetic aortic valve replacement is usually the only reasonable option. In contrast, late failure is mostly observed in patients with preoperative aortic regurgitation and a dilated aortic annulus. Although this risk can be mitigated using a tailored approach at the time of the Ross procedure,² it cannot be fully eliminated. In those instances, however, the pulmonary autograft valve can be spared or repaired in selected patients.

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CENTRAL MESSAGE

A living autologous valve substitute represents the main benefit of the Ross procedure. Valve-sparing root surgery maintains this promise and should always be considered in patients requiring reintervention.

In this issue of the *Journal*, Goldstone and Woo³ provide an excellent review of valve-sparing root replacement (VSRR) after a previous Ross procedure. The combination of increased safety of these operations and improved understanding of optimal cusp morphology and cusp repair techniques have allowed for expansion of the use of VSRR to failed autografts. Based on their vast experience with aortic root reconstruction, the authors provide a clear description, with tips and tricks of the surgical technique.

Pulmonary autograft valves calcify only very rarely and thus represent optimal targets for repair. One of the important points to keep in mind when doing these operations is that if the autograft was appropriately implanted within the left ventricular outflow tract, the VSRR is not different than in a native aortic root. However, if a long sleeve of infundibular muscle is left in place and the autograft is implanted in a supra-annular position, it is important to extend the aortic root dissection all the way down to the level of the native basal ring to improve cusp coaptation and root geometry. In other words, it is not enough to simply dissect to a level just below the insertion of autograft cusps, because this would leave the native basal ring unaddressed. This deep dissection between the pulmonary homograft and aortic root can be challenging on occasion, especially if felt, pericardial strips, or hemostatic agents were previously used. In these instances, a remodeling technique with suture annuloplasty using CV-0 Gore-Tex (as proposed by

Schafers) allows for a cinching effect while obviating the need for deep dissection. The presence of scar and fibrous tissue makes it very robust and dependable.

Two additional points are worth emphasizing. First, in light of the safety, feasibility, and encouraging durability data with VSRR after the Ross procedure, early referral and evaluation for reintervention should be considered when the autograft valve appears likely to be preserved. Indeed, although the risk of autograft dissection is rare and most surgeons would consider watchful waiting until the autograft root reaches 55 to 60 mm, this may hamper the feasibility of a VSRR because of chronic stretching of the cusps causing large stress fenestrations or retraction secondary to fibrosis. Therefore, if valve morphology is favorable, earlier intervention should be considered to avoid replacing the pulmonary autograft with a prosthetic valve. Second, these considerations underscore the importance of establishing aortic reconstructive centers of excellence⁴ and ensuring that these interventions are concentrated in regional reference centers. This would result in safer outcomes and higher

probability of valve preservation. As much as the Ross procedure is a specialized operation, a VSRR after a Ross is undoubtedly ultra-specialized. Importantly, a successful VSRR helps keep alive the promise of a living valve substitute in the aortic position. Ultimately, from a lifetime management standpoint, this serves the patients best.

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