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Commentary: Bespoke Ross procedure: Best fit for patients with aortic regurgitation?

Ko Bando, MD, PhD

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CENTRAL MESSAGE

After 5 decades of technical refinement and improved postoperative management, the Ross procedure has become an excellent surgical option for younger patients with aortic regurgitation.

Aortic valve replacement (AVR) is an effective procedure, but both mechanical and biological valves have their own risks. AVR with biological valves in nonelderly patients often necessitates reoperation, and mechanical valves require lifelong anticoagulation.[1] The Ross procedure obviates the need for lifelong anticoagulation, provides a hemodynamic profile similar to native valves, and is resistant to infection.[2-4] Thus, it is an ideal surgical option for younger patients. Recent studies have indicated that the Ross procedure confers long-term survival equivalent to that of the age- and sex-matched general population.[1,3-5]

The Ross procedure has been criticized for complexity, the risk of pulmonary autograft and/or pulmonary homograft reoperations, and the prospect of transforming a single-valve disease into a double-valve disease.[6,7] Accordingly, the enthusiasm of the early 1990s declined when a significant number of patients with preoperative aortic regurgitation (AR) required reoperation due to autograft valve regurgitation and annular dilatation. The primary risk factors for late failure of the pulmonary autograft included preoperative AR, larger aortic annulus, dilated ascending aorta, and aortic/pulmonary annular mismatch.[8-11] As a result, the Ross procedure accounted for less than 0.1% of all AVRs performed by 2010 in North America based on the Society of Thoracic Surgeons Adult Cardiac Surgery Database.[7]

Instead of abandoning this technically challenging but the ideal option in young and adult patients with AR, a few centers of excellence have attempted to refine their techniques to prevent annular dilatation and postoperative AR and to lessen the need for pulmonary autograft reintervention.[9,10,12-15]

In this issue of *JTCVS Techniques*, Mazine and El-Hamamsy[15] present an excellent and comprehensive review. The highlights include a detailed description of their own modified technique: full root replacement with extra-aortic annuloplasty and interposition graft, plus technical refinements such as autologous inclusion technique and Dacron inclusion technique, which minimize late AR and annular dilatation in younger patients with AR.[8,9,12-15]

Since it was first described by Donald Ross 5 decades ago,[16] the Ross procedure has been refined and it is now possible to minimize the risk of late AR and annular dilation with superior hemodynamics and long-term survival compared with biological and mechanical aortic valves in younger patients.[2,17]

Full root replacement with either autologous/Dacron inclusion technique provides 97% to 100% survival at 10 years after surgery. Tailored full root replacement with extra-aortic annuloplasty and interposition graft maintains autograft root dynamism and prevents annular and ascending aortic dilatation. It can provide ideal hemodynamics for younger patients with AR. We expect that this technique will continue to improve.[18]

The majority of studies included in this expert opinion are single-surgeon experiences from high-volume centers

From the Department of Cardiac Surgery, The Jikei University School of Medicine, Tokyo, Japan.

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Address for reprints: Ko Bando, MD, PhD, Department of Cardiac Surgery, The Jikei University School of Medicine, 3-25-8, Nishi-Shimbashi, Minato-ku, Tokyo, 105-8461, Japan (E-mail: kobando@jikei.ac.jp).

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of excellence. Although underuse of the Ross procedure[19] is a valid concern, it is difficult to increase the number of dedicated surgeons for the Ross procedure. Mentorship in the technique and the establishment of formal fellowships in the Ross procedure by surgical societies are the possible solutions. It is imperative to train experienced surgeons in the refined Ross procedure, since it is superior to AVR with mechanical and biological valves in younger patients in terms of hemodynamics and longevity.

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