Currently, this technique has been adopted in cases of rheumatic mitral valvulopathy with challenging pathologies for total chordal preservation. However, considering its simplicity and ease, this implantation rather than replacement technique might be an attractive alternative to conventional MVR.

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EDITORIAL COMMENTARY

Getting beyond the “bar of death” in complex rheumatic mitral valve surgery

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See related article on pages 1453-5.

In this issue of the *Journal*, Chang and colleagues¹ present a small but compelling series of patients operated on with a novel surgical approach to the management of complex rheumatic mitral valve disease. In this procedure, they first remove pie-shaped sections from the belly of the mitral valve leaflets, leaving the chordae, the subvalvular apparatus, and the annulus intact. This preserves the continuity of the valve with the ventricle, which they suggest confers a functional advantage. The now grossly regurgitant native valve is addressed by inserting a valved conduit around the annulus. They do this by first sewing one end of a suitably sized graft to the mitral annulus. In cases where sutures cannot be sewn directly into the annulus, such as in the presence of heavy calcification, the graft is secured to atrial tissue adjacent to the annulus. The prosthetic valve, either mechanical or biologic, is then sewn into the other end of

the graft, which has been trimmed appropriately, making sure to leave sufficient clearance between the prosthetic valve and the native annulus so that there is no compromise of prosthetic valve function. The same center first described the successful use of this technique in a neonate because the smallest available mitral valve prosthesis (16 mm) would not fit into the tiny annulus of a baby.²

Is this a viable operation? Although most surgeons would consider this technique inferior to standard mitral valve replacement, there are clearly cases in which the approach described by Chang and colleagues¹ might be very useful. The most obvious example is the case of a patient with severe mitral annular calcification (MAC), which can present daunting challenges to the surgeon. In these patients, not only is extensive annular débridement required, the damaged annulus must be reconstructed with a large patch to avoid the dreaded (and usually fatal) complication of atrioventricular disruption. These are demanding operations that, even in experienced centers, are associated with significant mortality and morbidity.³⁻⁵ There is good reason that severe MAC has through the years been colloquially referred to as the “the bar of death,” a description that has historically been attributed to Walton Lillehei. In fact, one suspects that many patients with rheumatic mitral valve disease, otherwise amenable to surgical correction, are turned down for surgery or perhaps not referred for

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surgery in the first place because of the presence of severe MAC. Does this operation, as described by Chang and colleagues,¹ offer a better chance for those patients with severe MAC who otherwise would face a risky reconstructive procedure? One suspects that it might, although even with this technique there are challenges, such as ensuring that sutures can be sewn around the calcified annulus and the adjacent left atrial tissue or avoiding damage to a dominant circumflex artery if present in the atrioventricular groove. Their operation could be simplified somewhat by removing the entire anterior mitral leaflet while preserving the posterior leaflet attachments to the chordae. Their follow-up is relatively short (less than a year), and it remains to be seen whether thrombosis occurs in the “dead space” inside the graft between the native mitral annulus and the prosthetic valve. No doubt imminent advances in transcatheter based valve implantation technologies may facilitate

correction of mitral valve disease in patients with severe MAC. Until such time, however, the technique described by Chang and colleagues¹ deserves consideration by any surgeon performing mitral valve surgery, especially in the face of severe MAC.

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Fluorescence-guided placement of an endoaortic balloon occlusion device for totally endoscopic robotic mitral valve repair

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See related commentary pages 1458-9.

Totally endoscopic robotic mitral valve repair (TERMR) is performed with 4 robotic port sites and a single 2- to 3-cm access incision used to pass instruments, suction, sutures and annuloplasty devices. An endoaortic balloon occlusion device (endoballoon) replaces both the external aortic cross-clamp and the aortic root line during TERMR. Used in approximately 4000 patients annually, this technique has the advantage of eliminating the clutter of a physical cross-clamp in the surgical field, as well as the additional incision it requires, and of avoiding the need to puncture the

ascending aorta for cardioplegia, venting, and deairing, simplifying the totally endoscopic procedure. Determining the position of the endoballoon without radiographic fluoroscopy requires the use of narrow transesophageal echocardiographic views (Figure 1, A) and differential upper extremity pressure monitoring. Once the left atrium has been opened to expose the mitral valve the echocardiographic window is lost (Figure 1, B), making it difficult to confirm or reposition the endoballoon under echocardiographic guidance. We sought to determine whether the endoballoon filled with the fluorescent dye indocyanine green (ICG) could be directly visualized with the fluoroscopic feature of the robotic endoscope, and whether this would facilitate placement and positioning of the endoballoon.

TECHNIQUE

Pericardiotomy is performed to the superior pericardial reflection with stay suture placement to provide visualization of the aortic root and ascending aorta. The endoballoon (Intra-Clude Intra-Aortic Occlusion Device; Edwards Lifesciences, Irvine, Calif) is inserted through a side port of the femoral arterial cannula and advanced into the ascending aorta over a guidewire under echocardiographic guidance. When aortic occlusion is desired, the balloon is inflated with a 0.03% solution of ICG (IC-Green; Akorn Inc, Lake Forest, Ill) in 5% albumin to a pressure of 250 to 350 mm Hg. The ICG-albumin

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