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Commentary: Surgical mitral-in-mitral annular calcification: Progress but not the solution

J. James Edelman, MBBS(Hons), PhD,^a
Pradeep K. Yadav, MD,^b and Vinod H. Thourani, MD^c



J. James Edelman, MBBS(Hons), PhD, Pradeep K. Yadav, MD, and Vinod H. Thourani, MD

CENTRAL MESSAGE

Mitral valve disease and severe mitral annular calcification are difficult to treat. Hybrid solutions using novel valves represent progress until a percutaneous solution can be refined.

Mitral annular calcification (MAC) in association with mitral valve pathology requiring surgery is a challenging problem. Resection of MAC is associated with the risk of atrioventricular disruption, whilst placing a prosthesis without MAC debridement is associated with small prosthesis size and paravalvular regurgitation. MAC is most often found in elderly patients with multiple medical comorbidities who are already at considerable risk of death if undergoing traditional cardiac surgery; therefore, many patients are not offered surgery.¹

Several techniques to manage MAC have been described, broadly grouped into complete resection of the MAC with annular reconstruction, or incomplete (or no) resection. Feindel and colleagues² and Carpentier and colleagues³ have described the classic techniques for complete en bloc resection of MAC with annular reconstruction. Other groups have described modifications of the classic techniques, including a recently published impressive series of 54 robotic MAC resections with mitral valve repair.⁴⁻⁶ Various techniques of incomplete resection have also been described.⁷⁻⁹ More

recently, percutaneous transcatheter mitral valve replacement (TMVR) in MAC has been hampered by a relatively high rate of acute obstruction of the left ventricular outflow tract (LVOT), a near-lethal complication.¹⁰ In contrast, an open transatrial approach, where a transcatheter aortic valve (TAVR) prosthesis, generally with a balloon-expandable Sapien 3 valve (Edwards Lifesciences, Irvine, Calif), is placed under vision into the calcified mitral annulus has reported good results.¹¹ The Tendyne valve (Abbott Vascular, Santa Clara, Calif) is a dedicated transcatheter mitral valve prosthesis placed in a beating heart from the apex and the Mitral in MAC feasibility trial is currently underway as a substudy within the Feasibility Study of the Tendyne Mitral Valve System for Use in Subjects With Mitral Annular Calcification (NCT03539458).

Vodstrup and colleagues¹² describe the placement of a rapid-deployment Intuity valve (Edwards Lifesciences) into the calcified mitral annulus of a 72-year-old patient with severe MAC with mitral stenosis. Sutures were placed through leaflet tissue and the anterior leaflet left intact. The patient recovered well, with mild mitral stenosis and mild LVOT gradient, but experienced a minor stroke 4 months postoperatively.

The authors should be congratulated for a novel solution to a difficult problem; the case raises several important points. Rapid-deployment aortic valve prostheses have found a place in aortic valve replacement because surgeons can resect calcified leaflets (unlike in TAVR), whilst minimizing crossclamp time in high-risk patients. The advantage over a TAVR valve in open mitral-in-MAC procedures is less clear, other than potential cost saving on the valve itself. Russell and colleagues¹¹ have described

From the ^aDepartment of Cardiothoracic Surgery, Fiona Stanley Hospital, Perth, Western Australia, Australia; and ^bDivision of Cardiology, and ^cDepartment of Cardiovascular Surgery, Marcus Valve Center, Piedmont Heart Institute, Atlanta, Ga.

Disclosures: Dr Thourani has served as an advisor and assisted with research for Abbott Vascular and Edwards Lifesciences. Dr Yadav has served as a proctor and consultant for Edwards Lifesciences and as a consultant for Shockwave Medical. Dr Edelman reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication March 6, 2020; revisions received March 6, 2020; accepted for publication March 8, 2020; available ahead of print April 1, 2020.

Address for reprints: Vinod H. Thourani, MD, Department of Cardiovascular Surgery, Piedmont Heart Institute, 95 Collier Rd, Suite 5015, Atlanta, GA 30308 (E-mail: vinod.thourani@piedmont.org).

JTCVS Techniques 2020;3:138-9
2666-2507

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<https://doi.org/10.1016/j.jtc.2020.03.003>

in detail their open transatrial technique, which includes resection of the anterior leaflet to reduce LVOT obstruction, placement of sutures through the annulus where possible, and a felt ring around the skirt to reduce paravalvular regurgitation. All but 2 patients had a 29-mm prosthesis (those two had a 26-mm prosthesis), considerably larger than the 23-mm Intuity prosthesis placed in the aforementioned case. Like Russell and colleagues, we consider resection of the anterior leaflet essential to reduce LVOT obstruction. When the anterior leaflet is removed, blood can flow through the open cells of a Sapien 3 transcatheter valve. However, the basal or atrial half of a Sapien 3 valve still has covered cells that may cause obstruction in very small LVOTs. This is difficult to assess intraoperatively in a nonbeating heart but could be predicted by calculating skirt neo-LVOT on a gated contrast enhanced computed tomography (CT). For such patients, additional steps like concomitant basal septal myectomy should be considered during transatrial TMVR. Unlike percutaneous TMVR, CT is not mandatory for the transatrial technique; however, CT offers tremendous preprocedural insight and could be considered part of routine preoperative workup.

The authors do not discuss whether or not the patient was receiving anticoagulation therapy during the postoperative period. The American Heart Association/American College of Cardiology guidelines recommend 3 to 6 months of anticoagulation therapy (classification IIa) after placement of a bioprosthetic valve in the aortic or mitral position, but this is supported by very little data.¹³ Improving our understanding of this issue should be a focus of the structural heart community.

Until a dedicated transcatheter solution to mitral valve disease in MAC can be identified, novel techniques to improve open surgical outcomes should be applauded and encouraged.

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