

Complex robotic mitral valve redo repair after failed transcatheter edge-to-edge repair



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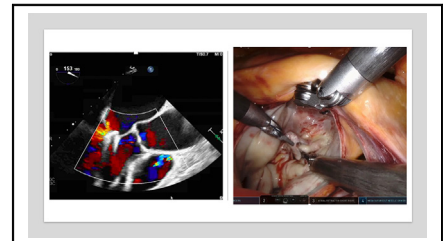
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Echocardiography of flail leaflet with clip; intraoperative view of leaflet and clip.

CENTRAL MESSAGE

Robotic mitral valve surgery is a feasible option in the setting of failure of recent TEER, both in retrieval of the clip and repair of the valve.

Video clip is available online.

Robotic technology has become increasingly widespread in cardiac surgery for procedures such as coronary artery bypass grafting, valve procedures, and septal defect closure among others. Mitral valve repair is a mainstay of minimally invasive robotic cardiac surgery. Robotic-assisted repair has become a preferred method of mitral valve repair due to exceptional outcomes.¹

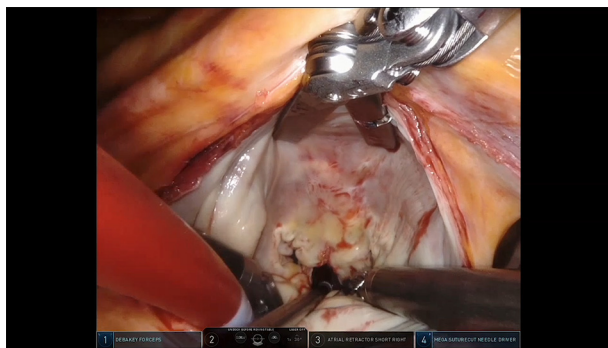
Transcatheter edge-to-edge repair (TEER) is another increasingly popular minimally invasive intervention for mitral regurgitation in those not eligible for surgical intervention. The American College of Cardiology/American Heart Association 2022 guidelines assigned a class 2A recommendation for mitral TEER (M-TEER) for patients with “persistent symptoms despite guideline-directed medical therapy, appropriate anatomy on transesophageal echocardiography and with left ventricular ejection fraction between 20% and 50%, left ventricular end-systolic diameter ≤ 70 mm, and pulmonary artery systolic pressure ≤ 70 mm Hg” not undergoing concomitant coronary artery bypass grafting.²

Single-leaflet device attachment (SLDA) is an infrequent but serious complication of M-TEER. Multiple clinical trials have shown a progressive decrease in the incidence of SLDA since TEER’s inception, from the Endovascular Valve Edge-to-Edge REpair STudy (EVEREST) (11.0%) to the MitraClip Experience of Performance and Safety for the Next Generation of MitraClip® Devices (EXPAND) study (1.9%) and EXPAND Fourth Generation (G4) study (1.7%).³ The

majority of SLDAs occur within 30 days, and many are noted during the procedure and are corrected with repeat M-TEER.^{3,4} Most of those not corrected acutely require surgical intervention. Chikwe and colleagues⁵ noted in a review of the Society of Thoracic Surgeons database, that 15,000 patients received M-TEER between 2014 and 2020, and 524 patients underwent first-time mitral surgery after TEER in that timeframe.⁵ Ninety-five percent of these patients received mitral valve replacement over repair. Only a small fraction of mitral valve surgeries are performed robotically. This case provides valuable insight into the technical nuance of a complex and infrequent procedure.

PRESENTATION OF CASE

An 83-year-old woman presented with heart failure symptoms 6 weeks post-TEER. Transesophageal echocardiography showed mitral regurgitation with flail posterior leaflet and a mitral clip attached only to the anterior leaflet. The decision was made to pursue mitral clip removal and mitral valve repair and mitral valvuloplasty via minimally invasive robotic surgery. This report was waived from institutional review board approval; consent was obtained at the time of this case on the condition that it contain no personal health identifiers and be used for educational purposes.



VIDEO 1. Operative technique. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00364-4/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00364-4/fulltext).

OPERATIVE TECHNIQUE

Three 8-mm retractor ports were placed in the second, sixth and fifth intercostal spaces. The patient was heparinized and cannulated with a 25 Edwards through the left femoral vein and side-arm Edwards cannula through the right femoral artery. Through the side-arm, a balloon occlusion device was prepositioned in the ascending thoracic aorta. After pericardiotomy, diaphragmatic pericardial stays were placed. Working through the transverse sinus, a 35-mm AtriClip (AtriCure) was deployed at the base of the left atrial appendage. The crossclamp balloon then occluded the aorta with echocardiography confirmation. The heart was arrested with cold blood cardioplegia. Vertical left atriotomy was made, and the remnant atrial septal defect was oversewn with 2-layer running Ethibond. The clip was removed from the anterior mitral leaflet, leaving the leaflet intact. We resected a triangular section of P2 and repaired at the base with 4-0 GoreTex (W. L. Gore & Associates). A 34-mm ATS annuloplasty band was then secured to the posterior annulus, trigone to trigone, with interrupted horizontal non-pledgeted sutures of Ethibond seated and secured with a Cor-Knot (LSI Solutions). Saline check was performed and found to be satisfactory. After completion of the mitral valve repair, the left atriotomy was closed over a left ventricle vent with

running GoreTex suture and with strong suction on both vents the crossclamp was removed. See [Video 1](#).

DISCUSSION

The patient was successfully extubated on the day of surgery without complication. The patient was discharged uneventfully on postoperative day 4. At a single institution, we identified 5 similar cases of SLAD in a 3-year period that were treated with robotic surgical replacement (3 out of 5) and repair (2 out of 5). Many factors may influence which patients are eligible for repair versus replacement, including amenability of native valve pathology to repair, extent of post-TEER fibrosis and sclerosis of the valve, and technical familiarity of the surgeon with advanced mitral reconstructive techniques. This case illustrates that mitral valve repair after failed percutaneous mitral valve clip can be performed safely and effectively by those with relevant expertise in eligible patients.

Conflict of Interest Statement

The authors reported no conflicts of interest.

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

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