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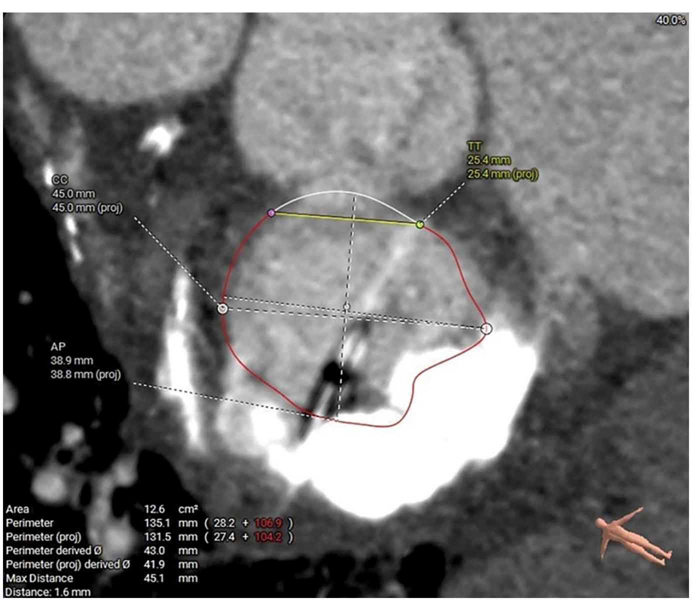
IMAGES IN INTERVENTION

First-in-Human Percutaneous Excision of a Failed MitraClip Followed by Transcatheter Mitral Valve Replacement

David Elison, MD,[a] Gabriel Aldea, MD,[b] Srjdan Jelacic, MD,[c] Christine J. Chung, MD,[a] G. Burkhard Mackensen, MD,[c] James M. McCabe, MD[a]

A comorbid 76-year-old man was treated locally in August 2021 with transcatheter edge-to-edge repair (TEER) using an XTW MitraClip (Abbott Vascular) to the A2/P2 scallops. He continued to experience New York Heart Association functional class IIIb symptoms with severe residual regurgitation and mitral stenosis caused by the clip and significant mitral annular calcification (Figure 1). Transesophageal echocardiography demonstrated a 3-dimensional vena contracta area of 0.88 cm^2 and a mitral valve area of 1.8 cm^2 (Figures 2A and 2B). By cardiac-gated computed tomography angiography, the valve measured 45 mm × 39 mm, and his predicted neo-left ventricular outflow tract was >300 mm^2. For several reasons, he was deemed inoperable, and it was determined that the only viable option would be compassionate use of a dedicated transcatheter mitral valve replacement (TMVR) device facilitated by excision of his MitraClip.

FIGURE 1 **Mitral Valve En Face View With Annular Sizing Demonstrating Mitral Annular Calcification Distribution and Existing MitraClip**



Recreating a single mitral orifice in preparation for TMVR by liberating the TEER device from the anterior mitral leaflet has been previously described as electrosurgical laceration and stabilization of failed MitraClip (ELASTA-Clip).[1] Preserving TEER attachment to the posterior leaflet obviates challenges with explantation, although in certain scenarios the residual clip may interfere with the implantation of a dedicated TMVR device, as was anticipated in this case with the use of an M3 valve (Edwards Lifesciences). Thus, explantation was required.

The procedure was performed with general anesthesia and TEE guidance using a prophylactic 50-mL

From the [a]University of Washington Medical Center, Department of Medicine, Division of Cardiology, Seattle, Washington, USA; [b]University of Washington Medical Center, Department of Surgery, Division of Cardiothoracic Surgery, Seattle, Washington, USA; and the [c]University of Washington Medical Center, Department of Anesthesia and Pain Medicine, Seattle, Washington, USA.

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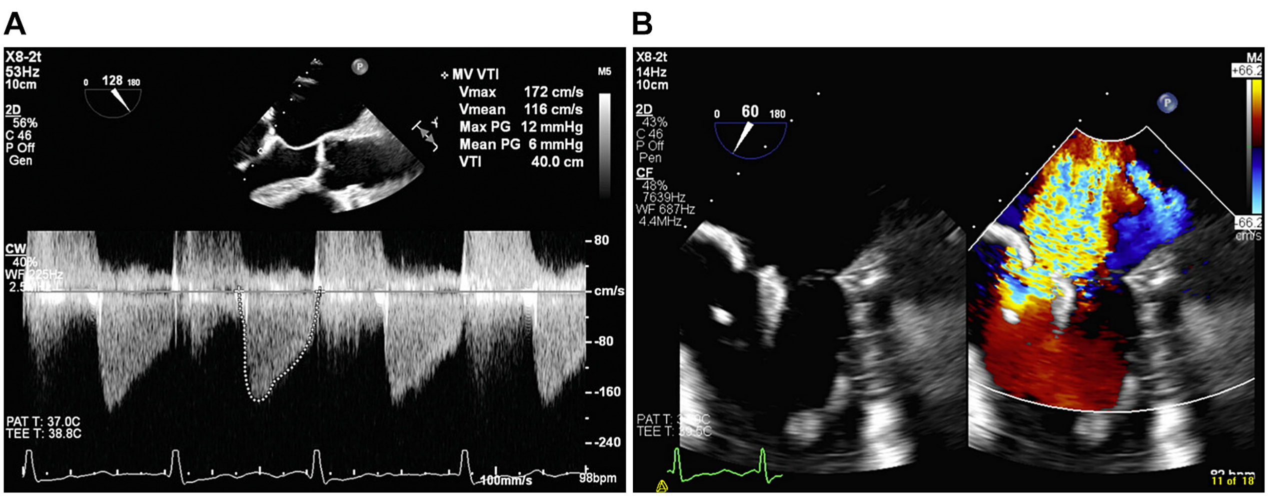
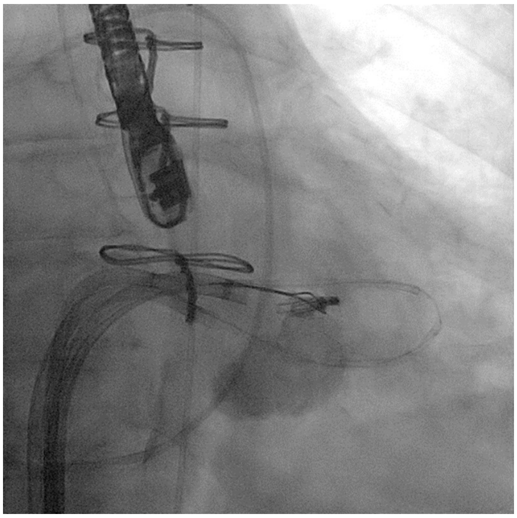
FIGURE 2 Baseline Mitral Valve Performance



(A) Transvalvular mean mitral valve gradient of 6 mm Hg at a heart rate of 98 beats/min. (B) Transesophageal echocardiography image in the bicommissural projection demonstrating severe regurgitation around the indwelling MitraClip.

intra-aortic balloon pump for hemodynamic support. Two 26-F sheaths were placed in the right femoral vein. The upper sheath was used for the retrieval system—a 14-F Destino Twist [OSCOR Inc] steerable guide directing a 20-mm snare within a nitinol retrieval basket [ŌNŌ, ŌNŌCOR Vascular]). The lower sheath was for the lacerating system—2 11-F DiRex (Boston Scientific) steerable guides each with a JR4 guide catheter directed to the medial and lateral orifices, respectively, to create the “flying V” as previously described.[1]

FIGURE 3 Fluoroscopic Projection Demonstrating 3 Steerable Guide Catheters in the Left Atrium



The clip was snared for stability through the largest steerable guide which houses the Ono nitinol basket. The 2 smaller catheters contain the externalized, electrified coronary wire used to lacerate the clip from its leaflet attachments.

FIGURE 4 ŌNŌ Nitinol Basket Used to Reorient the Liberated Clip for Removal Across the Interatrial Septum and Out of the Body Via a Large Right Femoral Venous Sheath

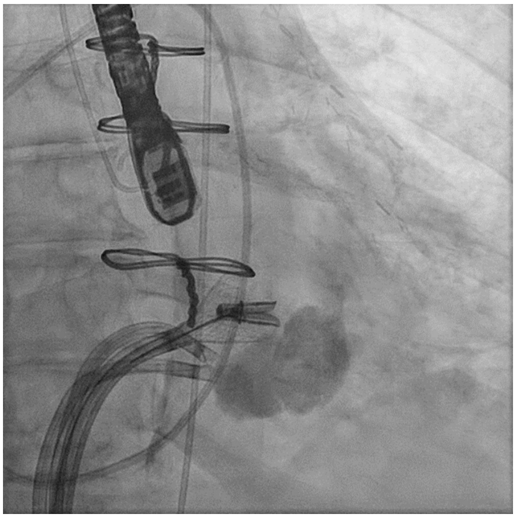


FIGURE 5 **Snared MitraClip With Lacerated Mitral Leaflet Tissue Shown Extruded From the ŌNŌ Retrieval Basket**

Before leaflet laceration, the clip was snared and held by the retrieval system. Liberating the TEER device from both the anterior and posterior mitral leaflets was performed sequentially by electrifying the "flying V" and cutting the posterior leaflet first followed by readvancing the "flying V" into the ventricle and torquing it anteriorly while torquing the snared clip posteriorly to repeat the laceration process on the anterior leaflet (Figure 3).

Once the clip was freed, it was drawn into the ŌNŌ, which was used to orient the snared clip "lengthwise" so it could be successfully drawn back across the interatrial septum and into the sheath (Figures 4 and 5). The incremental increase in mitral regurgitation during TEER removal and implantation of the M3 valve was well tolerated with just the assistance of the prophylactic intra-aortic balloon pump. At the 6-month follow-up, the patient remains well with no residual mitral stenosis or regurgitation.

In conclusion, this case demonstrates a first-in-human procedure to percutaneously remove an imperfect MitraClip via a "double" ELASTA-Clip method in order to accommodate dedicated TMVR implantation.

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ADDRESS FOR CORRESPONDENCE: Dr James M. McCabe, University of Washington Medical Center, Department of Medicine, Division of Cardiology, 1959 NE Pacific St, Seattle, Washington 98195, USA. E-mail: jmmccabe@cardiology.washington.edu.

REFERENCE

1. Lisko JC, Greenbaum AB, Guyton RA, et al. Electrosurgical detachment of MitraClips from the anterior mitral leaflet prior to transcatheter mitral valve implantation. *J Am Coll Cardiol Intv*. 2020;13(20):2361–2370.

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