Robotic Endoscopic Removal of Failed Mitral Valve Clips with Complex Valve Repair Using Only 8-millimeter Port-Site Incisions

Kyle W. Prochno BA[1], Jake L. Rosen BA[1], Colin C. Yost BA[1], Jenna L. Mandel BA[1], Regina E. Linganna MD[2], T. Sloane Guy MD MBA[3]

[1]Sidney Kimmel Medical College, Thomas Jefferson University, Philadelphia, PA | [2]Dept. of Anesthesiology, Thomas Jefferson University, Philadelphia, PA | [3]Div. of Cardiac Surgery, Dept. of Surgery, Thomas Jefferson University, Philadelphia, PA

Background

Mitral valve clip failure occurs at a rate of approximately 3.5%, and results in mortality in nearly one-third of patients, and moderate-to-severe mitral valve regurgitation (MR) in almost one-half of patients.

Clip failure is often treated medically; a minority is treated with open surgical repair or replacement of the valve, or with repeat transcatheter clip placement.

We present the first known case of mitral valve clip failure treated via robotic endoscopic removal of the failed clips—and subsequent complex mitral valve repair—using exclusively eight-millimeter skin incisions.

Case Presentation

79-year-old female with a history of MR treated via placement of two mitral valve clips the year prior presented with six months of increasing dyspnea.

Transesophageal echocardiography revealed two mitral valve clips attached to A2/P2 and A3/P3, and mitral valve prolapse with severe MR and pulmonary vein flow reversal.

Cardiac catheterization revealed severe pulmonary hypertension with systolic pulmonary arterial pressure of 91 mmHg.

The patient was scheduled for endoscopic robotic mitral valve clip removal and valve repair.

Initial Operative Technique

An eight-millimeter camera port was placed in the right fourth intercostal space, and three additional eight-millimeter incisions were made for robotic arm ports, as well as an eight-millimeter incision for air-seal working port placement.

Bypass cannulas were placed percutaneously in the femoral vessels, and an aortic endoballoon was inserted via the femoral arterial cannula side port.

After initiation of cardiopulmonary bypass, the mitral valve was visualized through the left atriotomy, and upon inspection was found to have clips between A2/P2 and A3/P3.

Pre- and Post-Operative Imaging

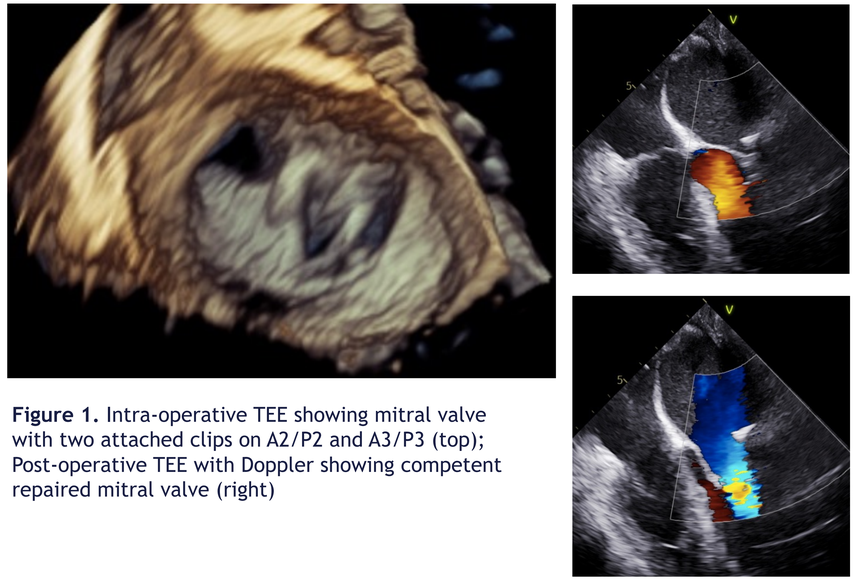


Figure 1. Intra-operative TEE showing mitral valve with two attached clips on A2/P2 and A3/P3 (top); Post-operative TEE with Doppler showing competent repaired mitral valve (right)

Mitral Clip Removal

A 2-0 suture with needle was passed through the two small wire loops in the crotch of the first clip at P2, and traction assistance was provided manually via the working port while the clip was held and opened robotically.

This enabled opening of the clip and detachment of the grippers, and removal of the entire clip itself, from the posterior mitral valve leaflet without significant damage. This process was repeated for the clip on A3/P3 with similar results.

Static test of the valve then revealed prominent prolapse of P2 and P3, and two sets of neochords were sewn in. A 34mm flexible band was then intracorporeally sized and sewn in using 3-0 V-lock sutures.

The patient was discharged home on post-operative day three.

Conclusions

This is the first known case of failed transcatheter mitral valve clips treated with robotic endoscopic clip removal and subsequent mitral valve repair using only eight-millimeter incisions.

With an experienced robotic surgeon and an appropriately selected patient, this appears to be an excellent treatment option compared to medical therapy for potentially increased survival, and compared to open surgery for potential reduction of post-operative pain and length of stay.

Disclosures

Dr. Guy is a consultant for Edwards Lifesciences, Medtronic, and proctor for Intuitive Surgical.

References

1. Mangieri A, et al. Management and Outcome of Failed Percutaneous Edge-to-Edge Mitral Valve Plasty: Insight From an International Registry. JACC Cardiovasc Interv. 2022 Feb 28;15(4):411-422. doi: 10.1016/j.jcin.2021.11.040. PMID: 35210047.
2. Marmagkiolis K, Hakeem A, Ebersole DG, Iliescu C, Ates I, Cilingiroglu M. Clinical outcomes of percutaneous mitral valve repair with MitraClip for the management of functional mitral regurgitation. Catheter Cardiovasc Interv. 2019 Nov 15;94(6):820-826. doi: 10.1002/ccd.28203. Epub 2019 Apr 1. PMID: 30938045.