Robotic Endoscopic Septal Myectomy and Complex Mitral Valve Repair Using Only 8-millimeter Port-Site Incisions

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Background

While symptomatic patients with hypertrophic obstructive cardiomyopathy (HOCM) are often invasive septal reduction therapy candidates, the comparative efficacy of a robotic endoscopic surgical approach for septal myectomy is not well described in the literature.

We present the first case, to our knowledge, of a minimally invasive approach to robotic endoscopic trans-mitral septal myectomy using exclusively eight-millimeter skin incisions.

The patient also underwent concomitant complex mitral valve repair using a patch, and patent foramen ovale (PFO) and left atrial appendage (LAA) closures.

Case Presentation

A 55-year-old male with HOCM diagnosed 15 years prior and primary prophylactic implantable cardioverter-defibrillator placed one year prior presented via referral for surgical evaluation with increasing dyspnea on exertion and NYHA Functional Class III.

Stress echocardiography demonstrated normal left ventricular systolic function at rest, with obvious asymmetric septal hypertrophy and basal septal prominence of approximately 28 mm. Resting left ventricular outflow tract (LVOT) gradient was measured as 9 mmHg, increasing to 74 mmHg with exertion at 85% of maximum target heart rate, and 90 mmHg with Valsalva following exertion.

Cardiac MRI showed interventricular septal wall thickness of 33mm, with marked thickening at the level of the mid-cavity to the base, and left ventricular ejection fraction of 73%.

The patient was subsequently scheduled for robotic endoscopic septal myectomy and mitral valve repair.

Pre- and Post-Operative Imaging

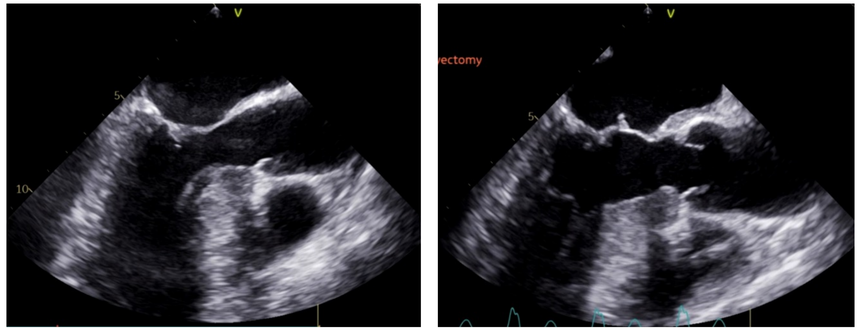


Figure 1. Pre-operative (left) and post-operative (right) long-axis TEE showing LVOT

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 cardiopulmonary bypass initiation, left atriotomy was made and the PFO and LAA were closed. The anterior mitral leaflet was detached from commissure to commissure, enabling LVOT visualization.

Three vertical incisions were made in the septum, at a depth of 10 millimeters, from trigone to trigone; the septum was excised from just below the aortic valve to below the papillary muscles, using traction sutures in the intervening muscle segments.

Finally, a bovine pericardium patch with a width equal to the intra-commissure distance was trimmed and intracorporeally sewn into the anterior leaflet defect, increasing the anterior-to-posterior ratio.

Surgical Outcome

Total cardiopulmonary bypass and cross-clamp times were 128 minutes and 94 minutes, respectively.

The patient received no intraoperative blood products and was extubated in the operating room.

Following an uncomplicated hospital course, the patient was discharged on post-operative day two and was seen at one-month follow-up with no shortness of breath or incisional/chest pain.

Conclusions

This report presents a case of HOCM treated with robotic endoscopic trans-mitral septal myectomy using the smallest known incisions for robotic arm and working port access.

With an experienced robotic surgeon and an appropriately selected patient, this appears to be an excellent treatment option compared to traditional sternotomy, thoracotomy, and endoscopic approaches for the potential to reduce post-operative pain and length of stay.

Disclosures

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

References

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