Robotic Mitral Valve Repair, Left Atrial Appendage Exclusion and CryoMAZE

In Pectus Excavatum

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Disclosure Statement

Dr. Amabile receives consulting fees from JOMDD/Sanamedi. Michael LaLonde receives consulting fees from Edwards Lifesciences and Intuitive Surgical. Dr. Krane is a physician proctor and a member of the medical advisory board for JOMDD/Sanamedi, a physician proctor for Peter Duschek, is a medical consultant for EVOTEC and Moderna and has received speakers’ honoraria from Medtronic and Terumo. Dr. Geirsson receives consulting fees for being a member of the Medtronic Strategic Surgical Advisory Board and from Edwards Lifesciences.

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None.

Central Picture Legend

Initial port placement showing very narrow operative window due to depressed sternum.

Central Message

Robotic mitral valve repair is safe and feasible in select patients with pectus excavatum.

Case Video Word Count: 345/350
Severe pectus excavatum is considered a relative contraindication to robotic cardiac surgery. In these patients, open surgery can also be challenging due to altered chest and mediastinal anatomy. Compared to endoscopic mini-thoracotomy approaches, a key advantage of the robotic approach is the freedom of instrumentation in a three-dimensional plane. This is limited in endoscopic approaches where movements are restricted by the arms of the endoscope. We demonstrate the feasibility and advantages of the robotic approach to the mitral valve in patients with severe pectus excavatum (IRB #2000020356, 10/19/2021). Written consent was obtained for publication of study data.

We present the case of a 69-year-old man with severely restricting chest anatomy due to pectus excavatum referred for dyspnea on exertion and paroxysmal atrial fibrillation. Pre-operative imaging showed thickened leaflets with anterior leaflet prolapse, causing severe posteriorly directed mitral regurgitation jet (regurgitant volume 68ml, effective regurgitant orifice area 0.44cm², proximal isovelocity surface area 1.2cm). Pre-operative computed tomography was performed to assess thoracic anatomy and peripheral vasculature for robotic access planning and percutaneous cannulation, respectively. Percutaneous cannulation with 21Fr arterial cannula and 23Fr venous cannula were performed and endoaortic balloon pump was deployed into the aorta. One inch access incision was placed in the 3rd intercostal space with a camera port placed medial to it in the same intercostal space, a left arm port in the 2nd intercostal space and the right arm port in the 5th intercostal space. An additional retractor port was placed in the 4th intercostal space more medially under direct vision. Exposure was challenging due to the depressed sternum. The low chest height in our patient would have made a non-robotic approach very challenging and the advantage of the robotic approach in this kind of anatomy can
be appreciated in Video 1. After opening of the pericardium, we entered the left atrium through
the interatrial groove and used the retractor to expose the mitral valve. The mitral valve was
noted to have myxomatous degenerative changes and prolapse of A1 and A2. A left sided
CryoMAZE (epicardial coronary sinus, mitral line, bilateral pulmonary veins, and base of left
atrial appendage) was performed with 2-minute freezes. The mitral valve was repaired by placing
three separate neochords to A2x2, A1x1. We then placed a 32-mm annuloplasty band. Height
adjustment of the neochords was performed and the leaflets appeared to coapt nicely on saline
testing (coaptation length 12mm). There was no mitral regurgitation at the end of the operation
with a mean gradient of 1 mmHg. The patient came off bypass without issues and the
percutaneous cannulation sites were closed by deployment of Proglide sutures at 90-degree
angles followed by manual pressure. Hemostasis was confirmed and pedal pulses were examined
to confirm distal perfusion. Complete exclusion of the left atrial appendage was confirmed by
verifying absence of flow on transesophageal echocardiography.

In conclusion, a robotic-assisted approach in selected patients with pectus excavatum can
lead to satisfactory outcomes, with superior exposure of the mitral valve and avoidance of
sternotomy-related postoperative complications.
References


Figures

N/A

Video 1. Narrated case video.