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Madonna E. Lee, MD, Andrea Amabile, MD, Michael LaLonde, MHA PA-C, Markus Krane, MD, Arnar Geirsson, MD, Peter J. Gruber, MD PhD

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in a Pediatric Congenital Patient with Severe Mitral Regurgitation

Madonna E. Lee MD¹*, Andrea Amabile MD¹*, Michael LaLonde MHA PA-C²,
Markus Krane MD¹,², Arnar Geirsson MD¹,§, Peter J. Gruber MD PhD¹,§

1. Division of Cardiac Surgery, Department of Surgery, Yale School of Medicine, New
   Haven, CT
2. Department of Cardiovascular Surgery, Institute Insure, German Heart Center Munich,
   Technical University of Munich, Munich, Germany

*These Authors contributed equally.

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$Corresponding Authors

Dr. Arnar Geirsson, MD
Professor of Surgery
Division of Cardiac Surgery
Yale School of Medicine
330 Cedar Street, New Haven, CT
arnar.geirsson@gmail.com

Dr. Peter J. Gruber, MD, PhD
Professor of Surgery
Division of Pediatric Cardiac Surgery
Yale School of Medicine
330 Cedar Street, New Haven, CT
peter.gruber@yale.edu

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Central Picture Legend

Robotic mitral valve replacement in a pediatric congenital patient: final cosmetic result.

Central Message

This case video highlights technical details of a mitral valve replacement in a pediatric congenital patient with rheumatic heart disease using a minimally invasive robotic approach.

Case Video Word Count: 342/350
A 7-year-old, 20 kg female with history of rheumatic heart disease was admitted for significant shortness of breath (IRB #2000032417, 3/4/2023; informed written consent was obtained for publication of study data). On echocardiography, the patient had severe mitral regurgitation, significant left atrial dilation, and preserved left ventricular function. She was unable to tolerate an oral diuretic regimen. Thus, the recommendation was to proceed with surgery. There was no absolute contraindication for a robotic approach, so after discussion with the family, the decision was made to proceed to the OR for possible valve repair versus replacement. The patient was brought to the operating room and general anesthesia was induced. The right neck vessels were exposed for peripheral cannulation, using a surgical cutdown and being careful to avoid injury of adjacent structures within the carotid sheath (Video 1). A 19-French cannula was inserted into the right internal jugular vein, and a 14-French arterial cannula placed in the right carotid artery. One camera port, two robotic arm ports, and one retractor port were inserted into right intercostal spaces. The pericardium was entered. A cardioplegia needle was placed in the ascending aorta, and the transthoracic aortic cross-clamp was applied. Prompt cardioplegic arrest was obtained, then the left atrium was accessed through the interatrial groove. Utilization of DaVinci Xi Long Tip Forceps as a retractor, due to the narrow antero/posterior diameter, provided excellent exposure of the mitral valve, demonstrating rheumatic changes (see Figure 1a). The valve was severely dysplastic and deemed not repairable by the surgeon’s judgement. Due to the patient’s admission for heart failure, a prolonged bypass time for an attempt at repair with a questionable result was also not advisable. Thus, a mechanical mitral valve replacement was performed with a 25 mm St. Jude Medical mechanical prosthesis. After placement of Ticron valve sutures, using the Cor-knot device, the sewing ring was secured in place to the mitral valve annulus. Total
bypass and crossclamp times were 167 and 88 minutes, respectively. Post-operative transesophageal echocardiography demonstrated a functioning and well-seated mitral valve, with no regurgitation and good leaflet motion. Surgical incisions demonstrated an improved cosmetic result (see Figure 1b).

Post-operatively, the patient had an unremarkable course. She was extubated on postoperative day (POD) 1. For anticoagulation, coumadin was started with heparin bridge. She was discharged on POD 9 with transthoracic echocardiography demonstrating properly functioning mechanical mitral valve, with no pericardial effusion. At three month follow-up, this patient was still doing well with good function of the mechanical valve.

In conclusion, using a minimally invasive robotic approach with neck cannulation is feasible in smaller patients and should be considered when treating pediatric congenital mitral valve disease.
References


Figure 1.

(A) Intraoperative surgical view of the rheumatic mitral valve demonstrating thickened anterior leaflet; (B) postoperative incisions showing port placement with the largest being 3 cm.

Video 1. Narrated case video.