

Native mitral valve endocarditis: Robotic cardiac surgical repair



Robinson Poffo, MD, MSc,^{a,b} Henry Eiji Toma, MD,^b Sergio Augusto Fudaba Curcio, MD,^{a,b} Alisson Parrilha Toschi, MD,^{a,b} Renato Bastos Pope, MD,^{a,b} and Leandro Echenique, MD,^c São Paulo, Brazil

From the ^aDivision of Cardiovascular Surgery, Instituto Poffo de Cirurgia Cardiovascular, São Paulo, Brazil; and Divisions of ^bCardiovascular Surgery and ^cCardiology, Hospital Israelita Albert Einstein, São Paulo, Brazil. Read at *The American Association for Thoracic Surgery Mitral Conclave Workshop, New York, New York, May 4-5, 2023.*

Received for publication April 25, 2023; revisions received Nov 3, 2023; accepted for publication Nov 17, 2023; available ahead of print Dec 14, 2023.

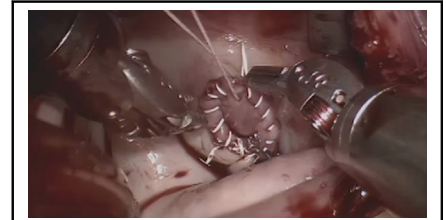
Address for reprints: Robinson Poffo, MD, MSc, Division of Cardiovascular Surgery, Hospital Israelita Albert Einstein, Avenida Albert Einstein, 627 – Bloco A1 Consultório Sala 421 – 4 andar, São Paulo 05652-901, SP, Brazil (E-mail: drpoffo@institutopoffo.com).

JTCVS Techniques 2024;23:44-6

2666-2507

Copyright © 2023 The Author(s). Published by Elsevier Inc. on behalf of The American Association for Thoracic Surgery. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.jtc.2023.11.019>



Operative view of robotic mitral valve reconstruction.

CENTRAL MESSAGE

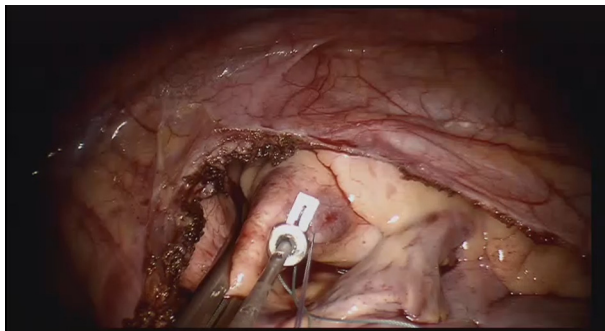
Mitral valve repair in native valve endocarditis is often a challenging procedure. Robotic cardiac surgery is a safe approach and can be an asset for valve reconstruction, especially in complex cases.

▶ Video clip is available online.

Mitral valve (MV) endocarditis is associated with a high mortality rate and the need for surgical treatment. When possible, MV repair (MVR) is preferable to replacement.^{1,2} A robotic approach might prove to be a useful asset in cases requiring complex valve reconstruction.²⁻⁴

A previously healthy 31-year-old woman was admitted due to persistent fever and shortness of breath that began

after a dental procedure. Transesophageal echocardiography (TEE) revealed a 10 mm vegetation in the MV. After initial unsuccessful antibiotic treatment with ceftriaxone and gentamicin, therapy was changed to daptomycin and



VIDEO 1. Robotic mitral valve repair in native mitral valve endocarditis. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00471-6/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00471-6/fulltext).



FIGURE 1. Patient position with incision markings and the breast prosthesis. The *left* arm and work port sites remained in the standard sites for robotic mitral valve surgery, in the second and third intercostal spaces, respectively, at the level of the anterior axillary line. The *right* arm and left atrium retractor trocar sites were marked in the fourth intercostal space but were dislocated toward the inframammary breast crest.

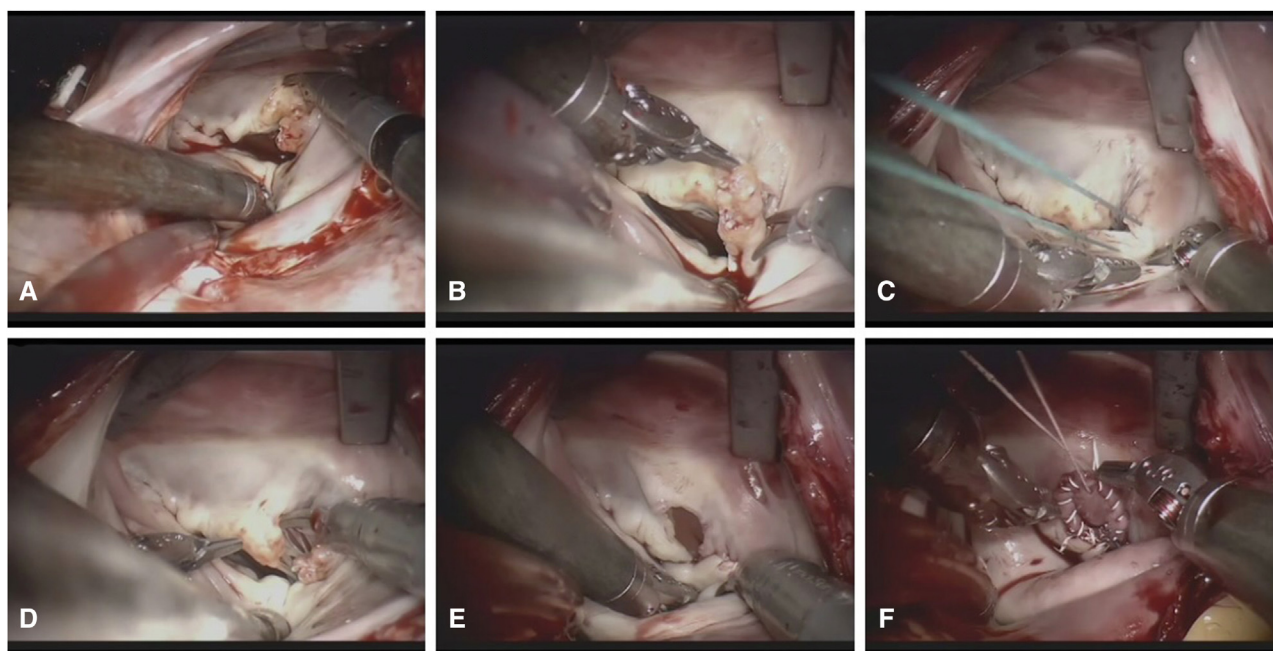


FIGURE 2. Identified vegetations on the posterior leaflet (A), with P3 resection (B), annular plication and leaflet reconstruction with a 5-0 polytetrafluoroethylene running suture (C). Exposure of the infected area of the anterior leaflet of the mitral valve before (D) and after the resection of the infected tissues (E), followed by reconstruction of the with a bovine pericardium patch (F).

meropenem. All cultures remained negative during the entire treatment course.

After 30 days, the new TEE showed severe MV regurgitation with thickening of the P2 segment and a ruptured chord in the P3 segment. There was also a large vegetation in the A3 segment. This was compatible with MV endocarditis. There were no signs of perivalvular complications. Biventricular systolic function and dimensions were preserved.

After multidisciplinary discussion by members of the endocarditis team, surgical treatment was indicated. The patient strongly wished for a minimally invasive approach. Because we are Latin America's first cardiac surgery service with more than 10 years' experience in robotic MVr, she was referred for our evaluation. Robotic-assisted cardiac surgery was deemed the best approach to facilitate MVr and provide a faster recovery.³⁻⁵ The patient was fully informed of all treatment options available, and a consent form for publication was signed under Research Ethics Committee Registry No. 11/1501-02/2011.

The patient was positioned for a standard robotic mitral valve repair (Video 1), and incision markings were made considering the presence of a breast prosthesis, as shown in Figure 1. After systemic heparinization, peripheral cannulation was performed guided by TEE, using the right common femoral artery and vein, and the right internal jugular vein. A 7Fr arterial distal

shunt was placed, and limb perfusion was monitored with an INVOS system (Medtronic).

With cardiopulmonary bypass (CPB) set up and selective left pulmonary ventilation, the microcamera was put in. Following right pleural space inspection, the remaining trocars were put in place, and the DaVinci robotic system (Intuitive Surgical) was docked. Continuous insufflation of carbon dioxide was started. After initiation of CPB and under 32 °C hypothermia, the aorta was crossclamped with a Chitwood transthoracic clamp (Fehling Instruments) placed through the second intercostal space. Custodiol HTK cardioplegic solution (Köhler Chemie) was administered in the ascending aorta with a 30 cm metal needle.

The left atriotomy was made anteriorly to the right pulmonary veins. A large vegetation was identified on the atrial surface of P3, as well as important leaflet thickening of the A2 segment (Figure 2, A).

The compromised segment of P3 was excised with a quadrangular resection with a 2-mm margin (Figure 2, B). Two U-shaped stitches were used for annular plication, and a 5-0 polytetrafluoroethylene (PFTE) running suture was used for P3 reconstruction (Figure 2, C). The infusion of saline solution for the static valve test showed adequate valve coaptation without regurgitation, and a number-32 prosthetic ring sizer properly fitted the valve.

The thickened portion of A2 (Figure 2, D) was removed with a wide circular resection, ensuring adequate margins (Figure 2, E). It was reconstructed using a bovine pericardium patch with a continuous 5–0 PTFE suture, which was then reattached to the native chord of the posteromedial papillary muscle (Figure 2, F).

Mitral annuloplasty was performed using a size-32 Memo 3D ring (Sorin Biomedica Cardio SrL). A small leak was detected in the posteromedial commissure and closed with a single 5–0 PTFE stitch. The final static saline test confirmed adequate mitral valve coaptation without regurgitation (Video 1).

The left atrium was closed, followed by thorough de-airing maneuvers, patient warming, CPB weaning, and decannulation. Heparinization was reversed with protamine administration. Aortic crossclamp and CPB times were 210 and 250 minutes, respectively. Intraoperative TEE confirmed a successful MVr. A 24Fr drain was positioned in the pericardial sac and right pleural cavity. The wounds were then closed and dressed.

The patient developed no complications. After 12 hours in the intensive care unit and 4 days in the cardiology ward, she was discharged home. Antibiotic treatment was completed in an outpatient setting. Six-year follow-up has been free of events, with excellent wound healing. An echocardiogram confirmed preserved mitral valve function (Video 1).

CONCLUSIONS

In this case of mitral infective endocarditis, robotic surgery facilitated a complex MVr while also allowing a fast recovery and excellent short- and midterm surgical results.

Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

References

1. Otto CM, Nishimura RA, Bonow RO, Carabello BA, Erwin JP III, Gentile F, et al. 2020 ACC/AHA Guideline for the management of patients with valvular heart disease: a report of the American college of cardiology/American heart association joint committee on clinical practice guidelines. *Circulation*. 2021;143:e35-71.
2. Solari S, Navarra E, de Kerchove L, El Khoury G. Mitral valve repair for endocarditis. *J Cardiac Surg*. 2022;37:4097-102.
3. Suri RM, Dearani JA, Mihaljevic T, Chitwood WR Jr, Murphy DA, Trento A, et al. Mitral valve repair using robotic technology: safe, effective, and durable. *J Thorac Cardiovasc Surg*. 2016;151:1450-4.
4. Chi NH, Huang CH, Huang SC, Yu HS, Chen YS, Wang SS, et al. Robotic mitral valve repair in infective endocarditis. *J Thorac Dis*. 2014;6:56-60.
5. Montanhesi PK, Curcio SAF, Poffo R. Robotic mitral valve surgery in Latin America. *Ann Cardiothorac Surg*. 2022;11:540-2.