Bilateral Minithoracotomy for Mitral Valve Repair and Coronary Bypass Grafting

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Thorac Cardiovasc Surg Rep 2023;12:e33–e35.

Abstract

Background Combined mitral valve and coronary artery surgery is usually accomplished via a median sternotomy and is associated with increased mortality and morbidity.

Case Description We report on a 67-year-old patient with mitral valve regurgitation and concomitant coronary artery disease (CAD). The mitral valve was repaired using the loops and ring technique, and the left anterior descending artery was revascularized using the left internal mammary artery through a bilateral minithoracotomy approach. The postoperative course was uneventful.

Conclusion Patients with mitral valve pathologies and concomitant CAD can be successfully operated via a bilateral minithoracotomy approach.

Keywords
- minimally invasive surgery
- mitral valve
- surgery
- coronary artery bypass grafting
- CABG

Introduction

Concomitant coronary artery disease (CAD) is diagnosed in many patients requiring surgery for mitral valve regurgitation.[1,2] Minimally invasive surgery for the treatment of mitral valve regurgitation is known to achieve similar perioperative outcomes and reduce hospitalization time and costs compared with surgery via a median sternotomy.[3,4] Also, minimally invasive direct coronary artery bypass (MIDCAB) is considered an excellent alternative to standard coronary artery bypass grafting for the treatment of left anterior descending (LAD) disease and combines the advantages of arterial grafting and minimal invasiveness.[5]

Case Description

A 67-year-old man with severe mitral valve regurgitation caused by a posterior leaflet (P2) prolapse (►**Fig. 1A**) and significant proximal LAD stenosis (►**Fig. 1B**) underwent mitral valve repair and surgical revascularization via a bilateral minithoracotomy approach. The patient was placed in a supine position, and two inflatable positioning cushions were used to recline him depending on the side being accessed. A left anterolateral 6-cm incision was made in the fourth intercostal space. The left pleural cavity was entered, and a single (right) lung ventilation was initiated. The left internal mammary artery (LIMA) was visualized using a combination of a IMAgate System Retractor (GEISTER Medizintechnik GmbH, Tuttlingen, Germany) and Cable Winch Retractor (according to Ulrich, GEISTER Medizintechnik GmbH) and was dissected in a skeletonized fashion using the appropriate microinstruments. The patient was then connected to cardiopulmonary bypass (CPB) through the right subclavian artery and the right femoral vein. We avoided common femoral arterial cannulation because of bilateral common iliac aneurysms. A 6-cm right anterior incision was made to access the right pleural cavity, and single (left) lung ventilation was initiated. The aorta was clamped from the right side and

received
August 5, 2022
accepted
October 26, 2022

DOI https://doi.org/10.1055/s-0043-1768982.
ISSN 2194-7635.

Georg Thieme Verlag KG, Rüdigerstraße 14, 70469 Stuttgart, Germany

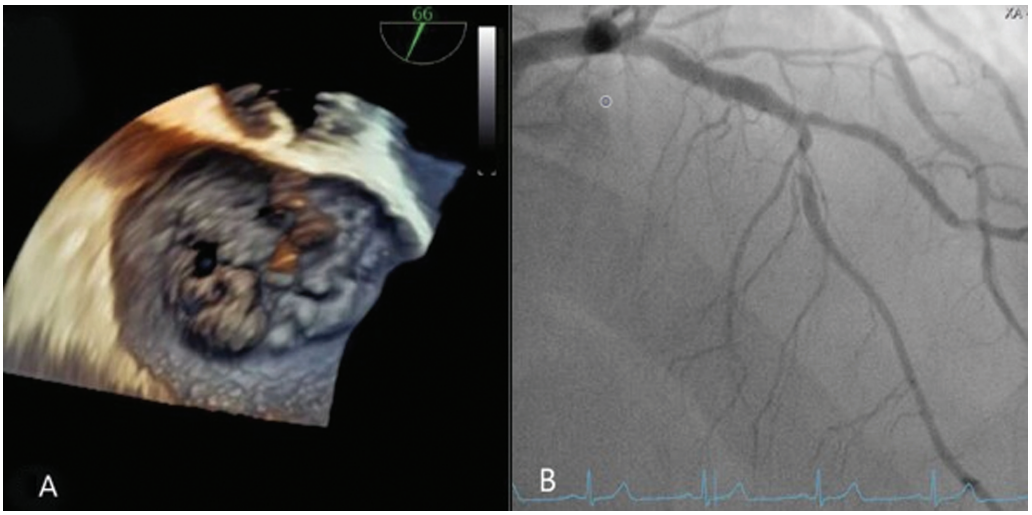

Fig. 1 (A) Preoperative three-dimensional view of the mitral valve prolapse. (B) Preoperative coronary angiography showing the left anterior descending stenosis.

antegrade cold blood cardioplegia was administered, followed by readministration every 20 minutes. The mitral valve was inspected and further addressed using video thoracoscopy. The P2 prolapse was repaired using 14-mm preformed loops (PTFE; Gore-Tex, W.L. Gore & Associates, Inc.) and the annular dilation was corrected using a 32-mm rigid annuloplasty ring (Edwards Lifesciences LLC, Irvine, California, United States). The functionality of the repaired mitral valve was assessed with an excellent result. During the closure of left atrium, the heart was repositioned allowing the second surgeon to simultaneously perform the LIMA–LAD bypass from the left side (►**Fig. 2**). The LAD was found in its middle segment, and

Fig. 2 Intraoperative setting.

Fig. 3 Patient before hospital discharge.

the anastomosis was created using 7/0 Prolene and standard instruments. Total CPB time was 3 hours 30 minutes. The cross-clamp time was 2 hours 28 minutes. Postoperative echocardiography revealed a competent mitral valve and no contraction abnormalities. Transit time flow measurement confirmed the graft patency. Bilateral intercostal catheters were placed for the local pain control, and the thoracotomies were closed in a standard fashion. The patient had an uneventful postoperative course and was sent home on day 9 postsurgery (►**Fig. 3**).

Discussion

During the past decades, many technical developments have led to the continuous propagation of minimally invasive cardiac surgery. However, there is some reluctancy in offering this treatment to patients who need combined procedures. While there are reports of patients who have undergone transapical aortic valve procedures and MIDCAB from a left anterolateral incision, we found only one series of six patients who were operated for concomitant mitral valve disease and CAD via a bilateral minithoracotomy.[6]

In this case report, we describe a successful combination of mitral valve repair and MIDCAB performed through a bilateral approach and performed with the simultaneous and overlapping activity of two surgeons. From a technical point of view, no major surgical problems and interferences were experienced while integrating the two procedures. Care is necessary to reduce the time for single lung ventilation of each side to avoid bilateral re-expansion edema as sometimes observed in minimally invasive mitral surgery.[7]

Meticulous preoperative planning and close collaboration with anesthesiology and between the dedicated minimally invasive mitral and coronary teams are of paramount importance for such combined surgical procedures. We strongly believe that a well-established and dedicated team performing this procedure often can achieve excellent results in terms of mortality, morbidity, and patient satisfaction.

Conclusion

Summarizing, our case demonstrates that concomitant mitral valve repair and MIDCAB represent a feasible and attractive surgical solution for combined mitral and coronary pathologies in a carefully selected group of patients.

Authors' Contribution

A.F. performed the operation and contributed toward drafting the manuscript and visualization. C.P. performed the operation and did the review and editing of the manuscript. T.B. contributed toward the conception of work and editing of the manuscript. M.S. performed the operation and critical revision of the article.

Conflict of Interest

None declared.

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