Endoscopic repair for left ventricular pseudoaneurysm with right minithoracotomy

Arudo Hiraoka*, Masahiko Kuinose, Genta Chikazawa and Hidenori Yoshitaka

Department of Cardiovascular Surgery, The Sakakibara Heart Institute of Okayama, Okayama, Japan

* Corresponding author. Department of Cardiovascular Surgery, The Sakakibara Heart Institute of Okayama, 2-1-10 Marunouchi, Okayama 700-0823, Japan.
Tel: +81-86-2257111; fax: +81-86-2235265; e-mail: bassbord1028@yahoo.co.jp (A. Hiraoka)

Received 16 July 2012; received in revised form 22 August 2012; accepted 12 September 2012

Abstract

Left ventricular pseudoaneurysm (LVPA) is a known serious complication of myocardial infarction or mitral valve replacement. As an alternative option, transmural patch repair for LVPA has been reported. However, it is very difficult to complete the procedure for LVPA with a large defect. A 68-year-old man with a history of inferior myocardial infarction had undergone mitral valve repair. At 4 months after surgery, the presence of a giant LVPA in the posteroinferior left ventricular wall was revealed. We performed transmural patch repair through a minithoracotomy under a three-dimensional videoscope. Since the intracardiac operation was performed under only camera vision, the perspective supplied by the three-dimensional videoscope was very useful. Endoscopic patch repair was a much less invasive procedure, and we could obtain a great intracardiac view. This technique can be an appropriate option for the treatment of LVPA after cardiac surgery.

Keywords: Left ventricular pseudoaneurysm • Endoscopic surgery • Minithoracotomy • Myocardial infarction • Mitral valve replacement

INTRODUCTION

Left ventricular pseudoaneurysm (LVPA) is a known serious complication of myocardial infarction or mitral valve replacement (MVR), and it can occur after cardiac operation, trauma or infection. Although the strategy of surgical treatment of LVPA is still controversial, several successful repairs utilizing transmural endocavitary patch repair have been previously reported [1, 2]. We report a case of a giant LVPA repair with the transmural patch technique through minithoracotomy under a twin-lens three-dimensional videoscope (Shinko Optical Co. Ltd., Tokyo, Japan). Intracardiac operation was performed under videoscopic guidance. This endoscopic technique and procedure were much less invasive than conventional surgery for LVPA.

CASE REPORT

A 68-year-old man with a history of inferior myocardial infarction had undergone mitral valve repair with a 28-mm Physio annuloplasty ring (Edwards Lifesciences, Irvine, CA, USA). One month after surgery, there were no findings of LVPA, however, transthoracic echocardiography revealed the presence of a giant LVPA in the posteroinferior left ventricular wall at 4 months after surgery. His vital signs and physical examination were normal, and New York Heart Association Functional Class was II. Chest X-ray showed dilatation of the heart and the cardiothoracic ratio was 52%. Coronary angiography showed total occlusion in the right coronary artery. Follow-up cardiac magnetic resonance imaging (Fig. 1A) and computed tomography (CT); (Fig. 1B-D) showed that a giant LVPA had been progressively expanding (78 × 80 × 53 mm). The defect opened just below the annulus of the mitral valve and extended over the origin of the papillary muscles. Transthoracic echocardiography showed moderate mitral regurgitation, and the LV ejection fraction was 31%. Therefore, corrective surgery for the giant LVPA and mitral valve regurgitation (MR) were scheduled and performed.

After intubation with a double lumen endotracheal tube, transoesophageal echocardiography was placed and used for cardiac monitoring. The chest was opened through a 7-cm minithoracotomy at the right fourth intercostal space under single-lung ventilation. The endoscopic port was placed at the right third lateral intercostal space and used as a CO2 port. After full heparinization, an arterial catheter was inserted from the right femoral artery, and venous cannulae were placed through the right femoral vein and the right internal jugular vein. Cardiopulmonary bypass was then instituted. After the pericardium was opened, the adhesion around the ascending aorta and previous left atriotomy was dissected. After direct aortic cross-clamping via the right third intercostal space with a Chitwood sliding clamp, antegrade cold cardioplegic solution was administered and cardiac arrest was easily obtained.

The left atrium was opened, and the previous mitral annuloplasty (MAP) ring was removed. After the anterior and posterior leaflets were partially resected, the neck of the LVPA was clearly observed by using a three-dimensional videoscope. The LVPA was excluded by closing the defect with a patch of the Teflon-backed glutaraldehyde-preserved equine pericardium (Xenomedica; Baxter Healthcare Corp., Horw, Switzerland) and sutured in place with interrupted, pledgeted sutures. Continuous over-and-over suture was additionally performed. As the defect was very large (57 × 50 mm) and the previous MAP made it difficult to obtain...
great exposure, the intracardiac operation could be performed under only videoscopic guidance (Fig. 2A and B). After the patch repair, the mitral valve was replaced with a bioprosthetic valve. The patient's recovery was uneventful, and postoperative echocardiography and CT revealed the LVPA tended to be filled with thrombus and without prosthetic paravalvular leakage.

DISCUSSION

LVPA is reported to occur in 0.8% of cases after MVR. Surgical treatment for LVPA was supported, since untreated LVPA have an approximately 30–45% risk of rupture. Additionally, high mortality rates in patients who underwent surgery (23%), as well as in those who were treated medically (48%), were reported [3]. The general surgical technique for the treatment of LVPA is a combination of direct resection of the pseudoaneurysm and closure of the defect primarily or with patch repair. As dissection around the LVPA is required in this technique, the risk of bleeding and embolization is very high. Patients with LVPA frequently have a low cardiac function, and therefore, resection and closure of the LV wall may affect mortality. Additionally, concomitant MVR and redo operations increase mortality significantly [4]. Overall, it is necessary and highly desirable to avoid various complications and difficulties for the successful repair of LVPA. As an alternative procedure, transmural endocavitary patch repair or percutaneous closure of LVPA has been previously reported [1, 2, 5]. The percutaneous approach is reasonable for high-risk surgical candidates. However, patients with MR requiring treatment are not candidates. On the other hand, transmural endocavitary patch repair is very reasonable for these patients to avoid various difficulties, and its volume reduction of LV can decrease LV wall stress. In the median sternotomy approach, the dissection of the adhesions around the apex is required to achieve an optimal operative view and it is very difficult to complete a patch repair for LVPA with a huge defect. In our case with previous mitral valve annuloplasty, the annulus became very rigid and the exposure of the posterior LV wall could not be obtained under direct vision. The right thoracotomy approach can achieve an excellent operative view of both the mitral valve and left ventricle without dissection of the adhesions to the apex. By using three-dimensional videoscope and instruments of minimally invasive cardiac surgery, we could approach the defect of LVPA easily and patch repair for the LVPA with a huge defect after MAP could be successfully performed. Since all intracardiac operations were performed under only videoscope, the perspective supplied by the three-dimensional videoscope was very useful. Endoscopic patch repair was a much less invasive procedure and we could obtain a great intracardiac view. Though we could not avoid MVR and preserve the posterior leaflet because of a rigid change of the leaflets, the combination of the right thoracotomy approach and three-dimensional videoscope would help to spare mitral valve or preserve the posterior leaflet in MVR.

Conflict of interest: none declared.

REFERENCES

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