

Aortic Valve Replacement after Esophagectomy with Substernal Gastric Tube Reconstruction

Satoru Tobinaga, MD, Keiichiro Tayama, MD, Hiroshi Kawano, MD, Hideki Teshima, MD, Hiromasa Fujita, MD, Toru Takaseya, MD, Takahiro Shoujima, MD, Kazuyoshi Takagi, MD, Hidetoshi Akashi, MD, and Shigeaki Aoyagi, MD

A 67-year-old woman with a history of esophagectomy with substernal gastric tube (GT) reconstruction and left lower lobectomy required aortic valve replacement (AVR) for aortic valve regurgitation and stenosis. Through a median sternotomy (MS) with cardiopulmonary bypass (CPB), we performed AVR without injury to the GT. Careful peeling of the GT and detailed information of the operative field by multidetector-row computed tomography (MDCT) scan enabled us to carry out the operation safely in the usual operative view. (*Ann Thorac Cardiovasc Surg* 2006; 12: 213–5)

Key words: aortic valve replacement, esophagectomy, gastric tube reconstruction

Introduction

Median sternotomy (MS) is the standard approach for cardiac operations. However, this approach is considered to be difficult in patients with a substernal reconstructed gastric tube (GT) or colon interposition. We present a case that has a history of esophagectomy with substernal GT reconstruction and left lower lobectomy, who underwent aortic valve replacement (AVR) through MS.

Case Report

A 67-year-old woman was referred to our department for surgical treatment of aortic valve stenosis with regurgitation. She had a history of esophagectomy reconstructed with a substernal GT through a right thoracotomy and left lower lobectomy for primary lung cancer through a left thoracotomy. She had restrictive respiratory impairment with a vital capacity of 1,070 mL and percent vital capacity of 47.3% due to a left lobectomy. Two months

before admission, she underwent percutaneous coronary intervention for the right coronary artery of segment 1 successfully. A chest roentgenogram showed no pulmonary artery congestion or pleural effusion (Fig. 1). An echocardiography demonstrated left ventricular dysfunction with an ejection fraction of 48%. The aortic valve area was 0.5 cm², peak pressure gradient was 40 mmHg, and regurgitation grade was III°. Multidetector-row computed tomography (MDCT) scan showed the GT occupied the right side of the substernal space and demonstrated calcification on the ascending aorta (Fig. 2). Although she had substernal GT reconstruction, we approached through MS. During surgery, the sternum was elevated using clasps and the posterior surface of the sternum was ablated either manually or using metzenbaum scissors, following which a sternotomy was performed several times. The GT was completely mobilized to the left side. Subsequently, we could obtain the usual operative field after the pericardium was opened. When we dissected the GT, we inadvertently injured the right phrenic nerve so we performed nerve suture using 9-0 Nylon in an interrupted fashion. Cardiopulmonary bypass (CPB) initiated through an 8 mm expanded polytetrafluoroethylene (ePTFE) graft sutured in the right axillary artery and venous cannulas were placed in the right atrium and inferior vena cava. Under the hypothermic CPB, we performed aortic clamping at the less calcified lesion on the

From The Department of Surgery, Kurume University School of Medicine, Kurume, Japan

Received September 5, 2005; accepted for publication December 2, 2005.

Address reprint requests to Satoru Tobinaga, MD: The Department of Surgery, Kurume University School of Medicine, 67 Asahi-machi, Kurume, Fukuoka 830-0011, Japan.

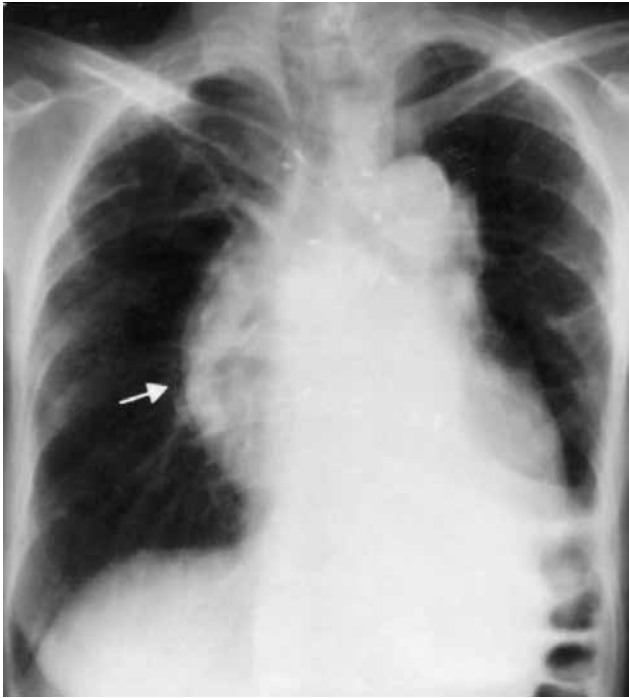


Fig. 1. Chest roentgenogram.

The GT is located on the right-anterior side of the heart (arrow) and the left diaphragm is elevated.



Fig. 2. MDCT.

This image clearly demonstrates GT and gastroepiploic artery (arrow).

basis of the findings of preoperative MDCT scan and intraoperative epiaortic ultrasound. The aorta was opened and cardioplegia was administered direct into the coronary ostium initially, and then intermittently in retrograde fashion. The patient underwent AVR with a 19-mm ATS prosthetic valve. Postoperatively, the patient required a tracheostomy because of respiratory dysfunction caused by the phrenic nerve injury. However, the respiratory function was gradually improved by long-term respiratory training. She was removed from the ventilator on day 60 and discharged on postoperative day 90 on foot.

Discussion

MS is the standard approach in cardiac surgery, however, difficult cases are encountered via a median approach. If MS is difficult, other approaches should be considered. In so far as we could determine, there were 5 cases that had cardiac surgery following an esophagectomy with a reconstructed substernal GT¹⁻⁴⁾ or colon interposition.⁵⁾ All cases had AVR with a prosthetic valve. The cases included 3 approached via MS,^{2,4)} 2 left thoracotomy,^{1,3)} and 1 via a parasternal approach.⁵⁾ For approaches other than

MS, it is not necessary to dissect the GT from the sternum. However, it is not possible to obtain a good operative view with these techniques, which presents inherent risks. Moreover, she had a history of bilateral thoracotomy. For these reasons, we approached through MS. Extreme attention should be paid in order to avoid injury to GT and gastroepiploic artery through MS. With regards to this, the MDCT scan enables us to understand detailed information in the mediastinum especially in such an unusual case.⁶⁾ In addition, we thought it possible to dissect the GT without major problems, because the GT was only tunneled through the anterior mediastinum in the previous operation. It takes time for dissecting the GT, but does not require prolonged CPB time.

References

1. Hirose H, Umeda S, Mori Y, Murakawa S, Azuma K, Hashimoto T. Another approach for aortic valve replacement through left thoracotomy. *Ann Thorac Surg* 1994; **58**: 884-6.
2. Matsuda H, Okada M, Yamashita C, Sugimoto T, Watanabe Y. Aortic valve replacement after retrosternal

- gastric tube reconstruction for esophageal cancer. *Jpn J Thorac Cardiovasc Surg* 1999; **47**: 234–6.
3. Takahara Y, Sudo Y, Nakazima N. Aortic valve replacement via left thoracotomy after an esophageal operation. *Ann Thorac Surg* 1997; **63**: 225–7.
 4. Takami H, Doki Y, Yachiku K, Takeuchi D, Arisawa J, Kobayashi T. Aortic valve replacement for a patient with porcelain aorta and retrosternal gastric tube reconstruction after esophageal resection. *Jpn J Thorac Cardiovasc Surg* 2003; **51**: 685–7.
 5. Gillinov AM, Casselman FP, Cosgrove DM 3rd. Aortic valve replacement after substernal colon interposition. *Ann Thorac Surg* 1999; **67**: 838–9.
 6. Quint LE, Francis IR, Williams DM, et al. Evaluation of thoracic aortic disease with the use of helical CT and multiplanar reconstructions: comparison with surgical findings. *Radiology* 1996; **201**: 37–41.