

Aortic Valve Replacement in a Patient with a Retrosternal Gastric Tube and Porcelain Aorta

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A 66-year-old man with severe aortic stenosis had previously undergone esophagectomy with retrosternal gastric tube (GT) reconstruction for esophageal cancer. A chest computed tomography scan demonstrated severe aortic calcification, and we treated him with median sternotomy. A small upper laparotomy was made, and the surface of the GT was detected. The posterior and right sides of the GT were dissected, and the pericardium was then opened. An aortic cross clamp was performed in the least calcified lesion of the ascending aorta, and an aortotomy was performed just above the sinotubular junction. The aortic valve was successfully replaced with a mechanical valve. (Ann Thorac Cardiovasc Surg 2009; 15: 343–345)

Key words: aortic valve replacement, esophageal cancer

Introduction

Median sternotomy (MS) is a standard approach used in cardiac surgery, but it is sometimes difficult to perform in redo cases. Because the current average life span has become longer, we often encounter such cases following abdominal surgery. However, open heart surgery after subtotal esophagectomy involving a retrosternal gastric tube (GT) is still rare because only a short prognosis is made for esophageal cancer. On the other hand, aortic valve replacement (AVR) with severe aortic calcification is a challenging issue. We report here the successful treatment of severe aortic stenosis with a retrosternal GT and porcelain aorta.

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Case Report

A 66-year-old man was transferred to our institution for severe aortic stenosis from a nearby hospital. He presented with orthopnea and general lassitude. He had undergone a total thoracic esophagectomy, including right thoracotomy with retrosternal GT reconstruction, for esophageal cancer 4 years ago, followed by radiation therapy in the parasternal region. An echocardiogram showed severe aortic stenosis with a 70-mmHg pressure gradient across the aortic valve. The aortic valve orifice was 0.8 cm². A chest computed tomography (CT) scan demonstrated that the GT occupied the right side of the substernal space, and the gastroepiploic artery (GEA) was located on the left side of the GT (Fig. 1A). Moreover, severe aortic calcification was seen in the ascending aorta (Fig. 1B). Following our recommendations and informed consent, the patient underwent surgery. Although he had a retrosternal GT, we used MS. Before sternotomy, a small upper laparotomy was made, and the GT was easily detected. The anterior surface of the GT was dissected bluntly. An oscillating bone saw was repeatedly used up to the sternum notch. The GT needed to be mobilized to the left side to open the pericardium. Its left side was untouched because the GEA ran in the left side of the

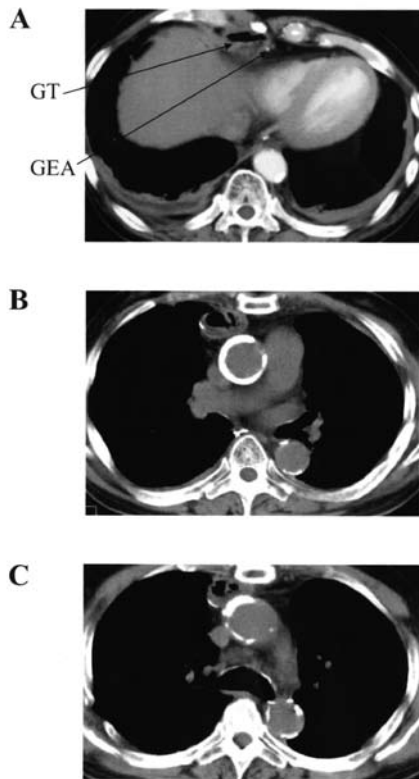


Fig. 1.

- A: Preoperative CT showing the GT located in the right of the substernal space, and the GEA located in the left side of the GT. GT, gastric tube; GEA, gastroepiploic artery.
- B: The ascending aorta was severely calcified.
- C: An aortic cross clamp was performed just below the BCA where there was least calcification.

GT (Figs. 1A and 2A). Therefore the posterior and right sides of the GT were dissected bluntly with a Chevalier retractor (Delacroix, France) to obtain a clear operating view (Fig. 2B). The pericardium was then opened. Adhesion was minimal in the pericardial space. A cardiopulmonary bypass (CPB) was initiated with femoral artery cannulation for severe ascending aortic calcification. An aortic cross clamp was performed in the least calcified lesion of the ascending aorta, just below the brachiocephalic artery (BCA) (Fig. 1C). An aortotomy was performed just above the sinotubular junction where calcification was the least. The aortic valve was excised and replaced by use of a 21-mm Sorin Bicarbon valve. The aortotomy was terminated after the excision of the calcified intima, and the CPB was uneventfully terminated. The patient had an uneventful postoperative course and was discharged on postoperative day 20.

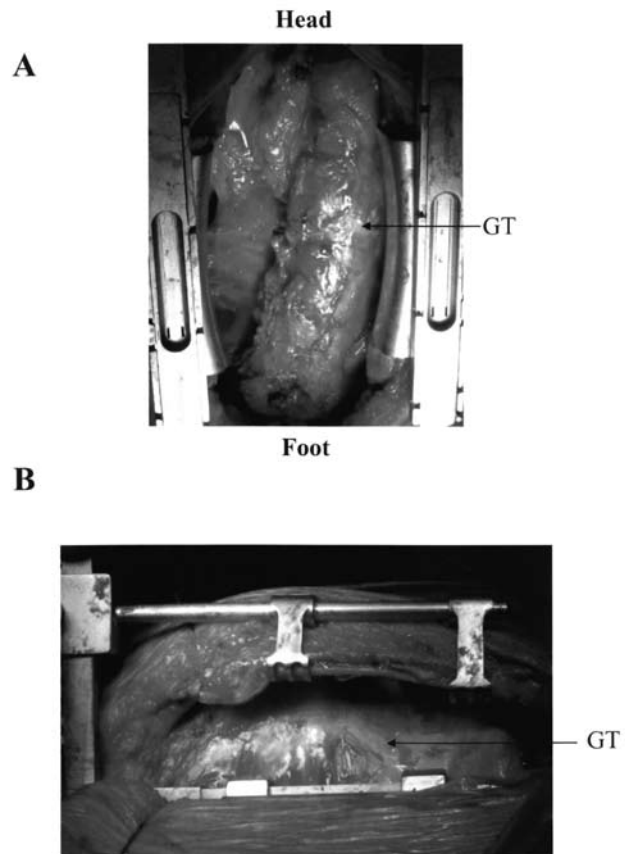


Fig. 2.

- A: The right and posterior sides of the GT were dissected bluntly.
- B: A Chevalier retractor was used to dissect the right side of the GT. GT, gastric tube.

Discussion

Cardiac surgery following surgery for gastric and colon cancers has not become rare as the average life span becomes longer. However, open heart surgery after subtotal esophagectomy for esophageal cancer is still rare because esophageal cancer has a short prognosis. When we encounter such cases, the major concern is which method will be used to approach the heart. The approach used will be different according to previous esophagectomy and whether the patient presents a retrosternal GT. In our case, an esophagectomy with a retrosternal GT was performed using a right thoracotomy. We therefore expected severe right pleural adhesion, though right thoracotomy might not require GT dissection.¹⁾ On the other hand, the use of left thoracotomy has been previously reported and recommended for AVR after esophagectomy with retro-

sternal GT reconstruction.^{2,3)} However, if the aortic valve during left thoracotomy is to be visualized, a division of the two great arteries, i.e., the aorta and the pulmonary artery, is needed or the pulmonary artery will significantly retract. In our case, because the aorta was strongly calcified and should be clamped just below the BCA, a left thoracotomy might not have been suitable to view the BCA. Moreover, because the aortic root is usually directed toward the right in aortic valve diseases, the visualization of the aortic valve is more difficult in a left thoracotomy. An apicoaortic conduit via a left thoracotomy might have been considered. However, its long-term result is still unknown. Moreover, a recent report has shown that a thrombus formation in the aortic arch resulted from stagnation of the blood flow after an apicoaortic conduit.⁴⁾ Therefore we concluded that in our case, MS was the most suitable procedure.

Once MS is selected, we need to identify where the GT and the GEA run, and this is best done by angiography or enhanced CT. To avoid damage, their locations should be considered before surgery.

AVR for calcification of the ascending aorta is still a challenging procedure in terms of aortotomy and clamping site. In particular, whether the aorta should be clamped remains controversial. Various types of porcelain aorta could be used according to the severity and distribution pattern of calcification. Plain CT is effective to evaluate the calcification degree of the aorta. In our case, plain CT revealed circumferential calcification. However, the ascending aorta just below the BCA was the least-calcified lesion, so we clamped the site at that point (Fig. 1C). In

more heavily calcified cases, several other strategies are necessary, including deep hypothermic circulatory arrest, endoaortic balloon occlusion, and endarterectomy.⁵⁻⁷⁾ Most of the time, however, the aorta just below the BCA is the least calcified and can be clamped.

In conclusion, MS is a safe approach for the treatment of aortic valve diseases with retrosternal GT by careful examination of the GEA and the GT. However, whether the porcelain aorta is clampable remains controversial.

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