Case report

Right parasternal approach for aortic valve replacement after retrosternal gastropexy

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Received 11 March 2003; received in revised form 2 July 2003; accepted 10 July 2003

Abstract

Aortic valve replacement had to be performed in a 77-year-old man with a history of esophageal carcinoma, which had been treated with two-staged esophageal resection and retrosternal gastropexy. Barium swallowing confirmed the retrosternal course of the stomach, which crossed the midline from the right upper abdomen to the left-sided neck anastomosis. Aortic valve replacement with a bioprosthesis was performed through a small right parasternal thoracotomy. The postoperative course was uneventful. We found that the right parasternal incision is an excellent surgical approach for aortic valve replacement in patients after retrosternal gastropexy.

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Keywords: Minimally invasive; Aortic valve replacement; Gastropexy

1. Case history

A 77-year-old man with esophageal carcinoma had been treated with two-staged transthoracic esophageal resection and retrosternal gastropexy. Eighteen months later he was admitted with dyspnea and congestive heart failure. Transesophageal echocardiography and angiography showed a critical aortic valve stenosis with a mean transvalvular pressure gradient of 80 mmHg and a valve orifice area of 0.4 cm². The left ventricular ejection fraction was severely impaired to 20%. Mild secondary mitral regurgitation was seen, but no significant coronary lesions. There were no signs for recurrence of the tumor.

After hemodynamical improvement had been achieved at ICU with dopamine and diuretics the patient was scheduled for AVR. Barium swallowing showed the retrosternal course of the stomach, which crossed the midline from the right upper abdomen to the left-sided neck anastomosis (Fig. 1).

2. Operative technique

After induction of anesthesia and before sterile draping defibrillation patches were placed.

An 8-cm right parasternal skin incision was performed between the 2nd and 4th intercostal spaces. The 3rd and 4th costal cartilages were cut at their insertion with a pediatric oscillating saw but not removed. The right mammary artery was doubly ligated. After opening the right pleural space the stomach was identified and carefully prepared from the pericardium with low energy coagulation. After pericardial stay sutures were placed and an excellent exposure of the aortic root and of the right atrial appendage was obtained (Fig. 2).

The distal ascending aorta was directly cannulated with a 22 Ch Fem-Flex arterial cannula (Edwards Lifesciences, Irvine, CA) and the right atrial appendage with a 29 Ch AviD dual stage venous cannula (Edwards Lifesciences, Irvine, CA). Adequate venous return was achieved with the help of vacuum assisted venous drainage, applying a suction of ~40 mmHg. A left ventricular vent was inserted through the right superior pulmonary vein, the aorta was cross-clamped and antegrade cold crystalloid cardioplegic solution infused in the aortic root. A 23-mm Perimount (Edwards Lifesciences, Irvine, CA) pericardial bioprosthesis was implanted. Before closing the aortotomy,
the patient was put in a Trendelenburg position and de-airing was accomplished through suction on the cardioplegia aortic root needle. Additionally, the operation field and the left ventricle were floated with CO2. Two ventricular and two atrial pace-maker wires were placed while CPB was running and the heart still decompressed.

The patient could be weaned without problems from CPB. The postoperative course was uneventful and he was discharged on the 10th postoperative day.

3. Comment

Since 1996 minimally invasive techniques, which had been used in general surgery for more than one decade, begun to be applied in cardiac surgery with the goal to reduce the morbidity of cardiac operations. Due to its anterior anatomical position, the aortic valve is particularly prone to be approached through alternative incisions than median sternotomy.

The technique of the right parasternal approach for AVR was described in 1996 by Cosgrove et al. [1]. Despite the excellent results reported with this technique, there are significant bias such as the need for femoro-femoral cannulation, the resection of costal cartilages with potential risk of lung hernias as well as the necessity to sacrifice the RIMA.

Finally, the asymmetrical position of the scar leads to a poor cosmetic result.

One year later, Benetti et al. reported about two patients, in which AVR was performed through a right transversal thoracotomy incision [2].

In 1997 Svensson introduced the ‘j’ incision’ [3]. AVR was performed through an upper mini-sternotomy extended to the 4th right ICS. At our institution, AVR has been performed through this approach in more than 150 cases with excellent results especially in terms of less postoperative bleeding and lower incidence of wound healing problems.

The partial upper sternotomy has significant advantages compared to the parasternal approach because the cannulation is intrathoracic, there is no need to open the pleural space and the right mammary artery is not sacrificed. Whenever necessary a full sternotomy can be performed easily and quickly. For all these reasons, the upper mini-sternotomy is our first choice approach for minimally invasive AVR.

Patients with a history of gastropexy needing aortic valve surgery represent a small but very challenging cohort. In these cases, median sternotomy should be avoided and an alternative approach to the aortic valve is mandatory.

Takahara et al. [4] performed AVR through a left thoracotomy in a patient after a retrosternal esophageal operation. Gillinov et al. [5] successfully chose the right parasternal incision for AVR in a similar case with a history of substernal colon interposition using femoro-femoral cannulation.

In our case, this was not necessary and CPB could be established with conventional intrathoracic cannulation.

This report confirms that the right parasternal approach is an excellent alternative surgical approach for AVR in cases of retrosternal mass or pathologies, which make a full or partial median sternotomy dangerous.

References


