A cosmetic access for minimally invasive aortic valve replacement without sternotomy in women

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Key words:
Aortic valve; Surgery.

Background. **Different methods of replacing the aortic valve via a minimally invasive access have been reported in the recent literature. Although these strategies have clear advantages in terms of reduced surgical trauma, no further refinements in terms of cosmetic results have been made for women.**

Methods. **Aortic valve replacement was performed in 4 women via a right anterior submammary minithoracotomy without rib resection. The incision was made along the breast fold. The extracorporeal circulation was connected through the same access. Standard surgical technique and equipment were employed.**

Results. **No intraoperative complications or hospital deaths occurred. The 4 patients could be discharged home on the sixth postoperative day. The cosmetic result was excellent and the wound completely disappeared within the breast fold.**

Conclusions. **The advantages of the present method include the preservation of sternal integrity, early mobilization and rehabilitation and an excellent cosmetic result for women.**

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Introduction

During recent years, minimally invasive techniques have gained popularity even in surgery for cardiac valve replacement. Minimally invasive aortic valve replacement via a parasternal vertical thoracotomy was originally introduced by Cosgrove and Sabik[1]. Actually the method consisted of a double access, a small right vertical parasternal incision with removal of two costal cartilages for valve replacement, and a groin incision for the connections of the extracorporeal circulation. Soon after we modified this technique by performing the entire procedure through a single right parasternal access, similar to the one proposed by the group of Cosgrove, but without removing the two cartilages[2,3]. Thereafter, this trend became very popular, and there was a run of studies, all of them reporting on different minimally invasive approaches. The common denominator was quite univocally a ministernotomy performed in different fashions[4-6]. Despite the numerous advantages of all these accesses, the cosmetic result for women remained disappointing as the scar was generally evident.

To our knowledge, this is the first report in which the same approach used for other cardiac procedures such as mitral valve operations, closure of atrial septal defects and similar operations through the right atrium, has been extended to the replacement of the aortic valve in women. The access is minimized to improve the cosmetic result.

Methods

During the last 2 months, 4 women with severe aortic valve disease underwent aortic valve replacement via a right anterior submammary minithoracotomy at our Institution. The personal and preoperative data are listed in table I.

As an access route, a 6 cm long skin incision was made along the fold between the breast and the wall of the thorax, close to the sternal edge (Fig. 1). The extracorporeal circulation was connected through the same access (Fig. 2).

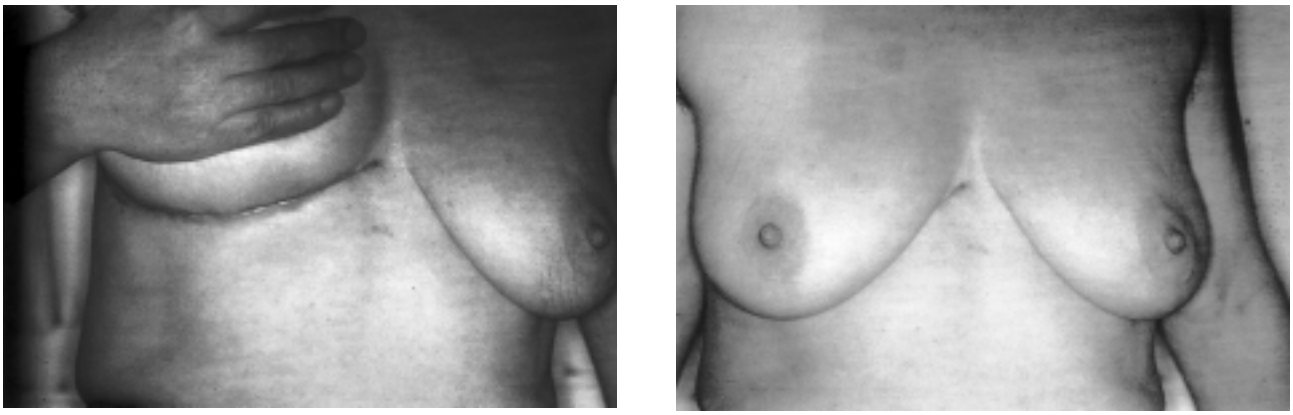
Results

There were no intraoperative complications requiring conversion to either an extended thoracotomy or median sternotomy.

Table I. Preoperative clinical and hemodynamic data.

Patient	Age (years)	Diagnosis	NYHA class	Peak Δ-p (mmHg)*	ARS (0-3)**
1	41	Aortic stenosis	III	78	0
2	41	Aortic regurgitation	III	0	3
3	45	Aortic stenosis	III	77	0
4	47	Aortic regurgitation	III	0	3

ARS = aortic regurgitation score. * = gradient across the aortic valve; ** = 0, absent; 1, minimal; 2, moderate; 3, severe.



A B

Figure 1. *The picture was taken just before discharge.* A: *6 cm wound below the right breast;* B: *view with the breast in its natural position.*

Figure 2. *Picture taken from the surgeon's position. Cannulation of the heart for cardiopulmonary bypass through the minithoracotomy access. AA = ascending aorta; 1 = aortic cannula; 2 = right atrial cannula.*

The cardiopulmonary bypass times were 100, 74, 65 and 60 min and the aortic cross-clamp times were 68, 65, 60 and 50 min. The patients were extubated at 8, 12, 1 and 2 hours after the end of the procedure respectively. All patients were discharged within the sixth postoperative day. Although the patients' conditions would have allowed an earlier discharge from the hospital, for social reasons in our region it is uncommon to discharge patients very early. At present, the women are alive and doing well.

Discussion

Minimally invasive replacement of the aortic valve is suitable for the majority of patients with isolated aortic defects. Generally, most papers report on different options of a partial sternotomy as an access route[4-7]. In previous reports[3,8] we described a single minimally invasive access in a series of patients in whom the sternum was left intact. However, even though in women we used a curved instead of a vertical parasternal skin incision, the scar was visible beyond the neck line when the patient was unclothed.

The cosmetic improvements mentioned above make the approach more convenient for women as the scar completely disappears within the breast fold. Besides, surgical trauma is still minimal as the integrity of the sternum is preserved and no rib resection is required.

Despite the limited access size, the total duration of the operation and of the single technical steps were only slightly longer than those observed with the conventional approach. In view of this one could hypothesize that this type of operation should not be employed in critically ill patients. However, the limited surgical trauma favored an early extubation and recovery in all cases. The avoidance of a sternotomy which generally requires at least 40 days for complete consolidation also resulted in an improved patient rehabilitation. In

case of reoperation, the sternal approach is advisable as this route would still be in native conditions. Heart injuries typically occurring in case of reoperations are thus less likely.

In conclusion, single access minimally invasive replacement of the aortic valve via a right anterior submammary minithoracotomy is an excellent cosmetic option for most women with aortic valve disease. The typical postoperative complications observed with the traditional approach, namely pain, sternal instability, pseudoarthrosis and overstretching of the sternum with resulting brachial plexus damage, are not expected to occur. It could be also postulated that mediastinal infections should be less frequent. Patients can be rehabilitated earlier without any fear of developing serious healing problems. In women, cosmetic and psychological requirements are also met. Improvements in surgical technique also allow for the use of simpler equipment and for an easier access if reoperation is needed.

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