Small right vertical infra-axillary incision for minimally invasive port-access cardiac surgery: a moving window method

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Abstract

Port-access cardiac surgery via a right minithoracotomy has been developed to minimize skin incision and improve cosmetic outcomes. Using this method, a skin incision is generally made just above where the thoracotomy will be placed, horizontally along the intercostal space at the anterolateral submammary position. However, this type of incision can affect the frontal view and shape of the breast. Here, we report our experience with minimally invasive cardiac surgery using a port-access approach via a small vertical right infra-axillary incision and a moving window method. Twenty patients underwent surgical procedures with this approach from December 2010 to January 2012. Thirteen patients underwent mitral valvuloplasty, four mitral valve replacement, one mitral and tricuspid valve replacement and atrial septal defect closure and two atrial septal defect closure. All surgical procedures were completed using this minimally invasive method. All patients had an uneventful recovery and indicated that they were satisfied with the cosmetic results during the follow-up. Our experience suggests that this technique can effectively minimize skin incision and improve cosmetic outcomes.

Keywords: Minimally invasive cardiac surgery • Vertical infra-axillary incision • Port-access cardiac surgery

INTRODUCTION

Port-access cardiac surgery via a right minithoracotomy has been developed to improve cosmetic outcomes without affecting clinical results. With these advancements, cosmetic and functional satisfaction with surgical outcomes have become more important [1]. Here, we report our experience with minimally invasive cardiac surgery using a port-access approach via a small vertical right infra-axillary incision. Using this technique, we attempted to improve cosmetic and functional outcomes over previous surgical techniques.

METHODS

Anaesthesia was achieved using a conventional approach with double-lumen endotracheal intubation. The patient was placed in the supine position with a pillow under the right half of the body and was kept at an angle of 30°–45° from the horizontal plane. A 5- to 6-cm right vertical infra-axillary incision along the antero or midaxillary line was marked (Fig. 1A). The patient was disinfected and draped from neck to thigh. A drape was applied fixing in a suitable position, and the window made by the skin incision was also moved and fixed in a suitable position (Fig. 1C). Next, another incision was made in the right groin. After dissecting the femoral vessels, femoral cannulation for cardiopulmonary bypass was performed. The pericardium was then opened using stay sutures, which were pulled outside of the thoracic cage using a percutaneous suture passer. A purse string suture was made in the superior vena cava, and a drainage tube was inserted. Another purse string suture was then placed in the ascending aorta, and a cardioplegia cannula was inserted. A Chitwood transthoracic aortic cross-clamp was inserted through the second intercostal space, and a cardioplegic solution was delivered through the cardioplegia cannula. After cardiac arrest, appropriate intracardiac procedures were performed.

We performed minimally invasive port-access cardiac surgery via a small right vertical infra-axillary incision approach in 20 patients. Thirteen patients underwent mitral valvuloplasty, 4 mitral valve replacement, 1 mitral and tricuspid valve replacement and atrial septal defect closure and 2 atrial septal defect closure.

RESULTS

All surgical procedures were completed using this novel technique. There was no case of conversion to midline sternotomy. No perioperative or postoperative deaths occurred during the hospital stay or during the follow-up, and all patients had an uneventful recovery. The mean operation time was 347 (range 255–426) min, the mean cardiopulmonary bypass time was 177 (range 111–257) min and the mean aortic cross-clamp time was 121 (range 29–202) min. The mean incision...
length was 5.8 cm (range 4.7–6.8 cm). All patients indicated that they were satisfied with the cosmetic results during follow-up (Fig. 2A and B).

CONCLUSION

With the rapid development of surgical techniques and the assistance of advanced instrumentation, the clinical results of cardiac surgery have been dramatically improved in recent years. As a result of these advancements, cosmetic and functional satisfaction with surgical outcomes have become more important [1].

Port-access cardiac surgery via right minithoracotomy has been developed to minimize skin incision and improve cosmetic outcomes. In this method, the skin incision is generally made just above where the thoracotomy will be placed, horizontally along the intercostal space at the anterolateral submammary position [1, 2]. However, this incision may injure the pectoral muscles and mammary tissue, affecting the frontal view and shape of the breast. The right vertical infra-axillary incision can usually be used in a wide range of cardiac surgeries with favourable cosmetic and clinical results. In this method, the incision is placed vertically along the anterolateral incision along the intercostal space [3]. Also, although the incision may be longer than required for an ordinary port-access approach, it is not as conspicuous as the incision made in the port-access method. Many studies have demonstrated the cosmetic advantages of infra-axillary incisions in various surgeries, including pulmonary surgery, partial mastectomy, breast augmentation and thyroidectomy [4–7]. Moreover, infra-axillary incision is also functionally advantageous; several studies have suggested that vertical axillary incisions allow full-shoulder girdle motion soon after operation, and create scars that can be masked by the upper arm at rest [4]. Since December 2010, we have used an approach that combines these cosmetically advantageous approaches. The skin incision does not need to be placed directly above the thoracotomy of the intercostal space because the skin window is moved by fixing a retractor in the intercostal space. Therefore, the skin incision should be placed in the most cosmetically advantageous location. Noguchi et al. termed this method the moving window [8], where the location of the incision and the resection site was changed during surgery for partial mastectomy [8].

Our current study has demonstrated that we can also perform minimally invasive port-access cardiac surgery combined with right infra-axillary incision through this moving window method to place the incision in the most cosmetically advantageous location.

Figure 1: An incision line 5–6 cm in length is marked along an antero-axillary or midaxillary line (A). The layer under the pectoralis major muscle is dissected and the fourth intercostal space identified. The scheduled line moves ahead, and the window is retracted on the fourth intercostal space anterolaterally (B). The window is fixed to a suitable place with a retractor (C).

Figure 2: (A) The skin incision on the midaxillary line is not visible from a frontal view. (B) The incision line is not visible if the arm is not pulled back from a lateral view.
location. This technique can minimize skin incision and improve both cosmetic and functional outcomes compared with previously described methods.

Conflict of interest: none declared.

REFERENCES


