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Short Communication

Minimally invasive surgical technique for barrel chest

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ABSTRACT

Barrel chest in young adults and adolescents is very rare. Because this deformity often causes appearance problems, many patients are expected to receive treatment. Unfortunately, operation for barrel chest has not been reported so far. We designed a technique for this deformity with minimally invasive skills. Our experience shows that this technique is a satisfactory method for barrel chest treatment.

Introduction

Barrel chest is a special thoracic deformity. Compared with other malformations, this deformity always occurred in the elderly, and secondary to chronic respiratory diseases. For elderly patients, this deformity does not cause too much trouble for their physiological function, so nobody seeks for surgical treatment. However, in young adults and adolescents, although such deformities are rare, they can cause special appearance problem to patients, so many patients are eager to be treated. Unfortunately, operation for barrel chest surgery has not been reported so far. It is necessary to develop a surgical method for this deformity.

Technique

The patient is placed in a supine position, with both upper limbs located in abduction position. Longitudinal incision is completed on each side of the chest wall near the axillary midline, at about the level of the nipples. The length of incision is 3cm respectively. After subcutaneous tissue is dissected, the muscles of the chest wall are incised to expose the fourth, fifth, sixth and seventh ribs. The tissues between pectoralis major and the bony structures of the chest wall are dissected, from incision to the anterior median line of the chest, and three tunnels are constructed. Three steel bars in curved shape are introduced into the tunnels with guide tubes at first, and then they are placed on the surface of the bony structures with the concave surface appressing the chest wall (Fig 1). The bars are fixed with the ribs just beneath them using steel wires. Fixation are completed at two points: one located near the front axillary line, and the other located near the axillary midline. Each bar is fixed with two adjacent ribs (Fig 1). The uppermost bar is fixed with the fourth and fifth ribs, the middle bar is fixed with the fifth and sixth ribs, and the lowermost bar is fixed with the sixth and seventh ribs (Fig 1). The bars are fixed at the anterior axillary line at first, and then fixed in the axillary midline. After the fixation was completed, the incised muscles were sutured, with the three bars embedded beneath the muscle. The incision was closed, and the operation was completed (Fig 2).

Comment

Barrel chest is rare in young adults and adolescents. Because it has protrusion rather than depression on the chest wall, its only harm comes from the psychological aspect, and the patient usually want to be treated because of the unusual appearance. But until now, there has been no report about the surgery of barrel chest.

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The inspiration of our technique came from minimally invasive pectus carinatum operation [1, 2]. We treat barrel chest as an extreme case of pectus carinatum, so similar techniques can be used in treatment of this deformity.

We use steel bars to accomplish this task, just as the bars are used in other thoracic deformities operations [3]. Since the rigidity of the bars is significantly stronger than the chest skeleton, they can be competent for the surgery. We recommend three bars use in the operation, so that enough pressure can be made.

Since the steel bar play an important role during the operation, special attention should be paid to the properties of the bars. Theoretically, the bars act as a template for the thoracic deformities, and the deformed bones on the chest wall will be shaped according to the shape of the bar, thus its shape must be carefully designed. The bar must have a proper radian. Too curved radian cannot achieve satisfactory results. The bar must be in a small radian, so that enough pressure can be generated during the operation.

In addition, attention should also be paid to length of the steel bar. Too long or too short will affect the shaping effect. We recommend that the length of the bar should be a little longer than the distance between the two anterior axillary lines.

During the operation, the bar should be fixed properly. We fix the bars with the ribs using steel wires directly, and this technique turns out to be an easy and effective method.

In our techniques, the biggest concern is rib fracture. In order to avoid such accidents, we suggest that the bars should be fixed in special order. The fixation should begin at the point near anterior axillary line. After six points of fixation on both sides of the chest wall being completed, the fixations at the midaxillary line are underwent. With this order, the shape of the chest wall can be changed gradually, but not suddenly.

Figures

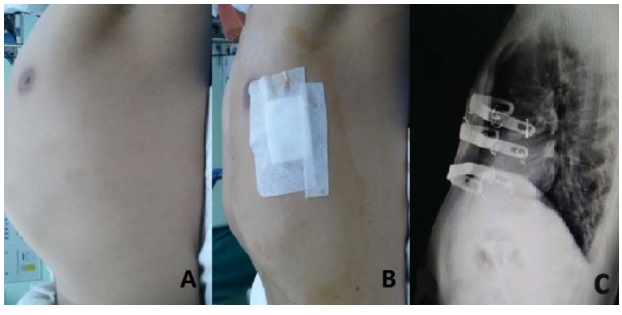

Figure 1: (A) Thoracic structure of barrel chest. (B) Position and the fixation methods of steel bars.

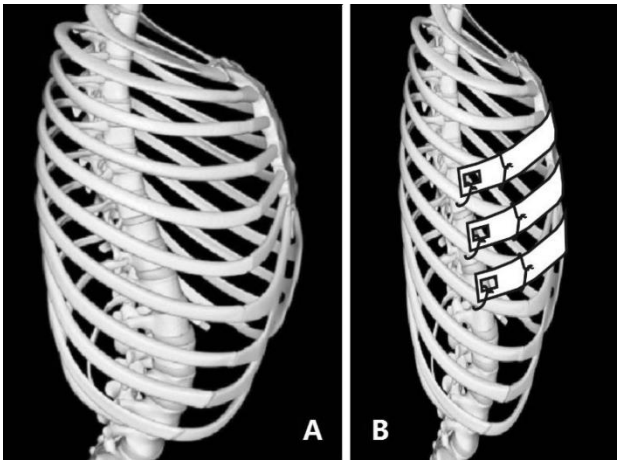

Figure 2: (A) One of our patients before operation. (B) Just finished the operation. (C) X-ray images after operation.

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