Case Report

Wenlin procedure for chest wall reconstruction after tumor resection

Wenlin Wang*, Weiguang Long, Yang Liu, Bin Cai and Juan Luo

Department of Chest Wall Surgery, Guangdong Second Provincial General Hospital, Guangzhou, China

*Correspondence address. Department of Chest Wall Surgery, Guangdong Second Provincial General Hospital, No. 466, Xingangzhonglu, Guangzhou, China. Tel: +86-13719027196; E-mail: willinew@126.com

Abstract

After the resection of the chest wall tumor, there will be obvious defects in the chest wall, which needs to be reconstructed. In the past, reconstruction surgery mainly focused on the selection of materials rather than the surgical methods. Recently, We used Wenlin procedure to reconstruct the chest wall defect after tumor resection in a 65-year-old patient, and achieved satisfactory results.

INTRODUCTION

Chest wall tumor is a common disease in chest wall surgery and generally needs to be removed [1, 2]. Because there will be residual defects in the chest wall after resection, reconstruction is required [3–5]. In the past, reconstruction surgery mainly focused on materials, and few people pay attention to the method of surgery [3–5]. Recently, we performed Wenlin procedure [6, 7] for reconstruction on a patient with chest wall tumor and achieved satisfactory results.

CASE REPORT

The patient is a 65-year-old male. He was found to have a mass in the middle of the chest wall 1 year ago, without any discomfort. In the past 2 months, the mass grew rapidly with local pain. The patient was recently admitted to our hospital for surgery. Preoperative physical examination showed that there was a mass in the middle of the anterior chest wall, about 5 × 5 cm in size, with obvious tenderness and unclear boundary (Fig. 1). Imaging examination revealed a sternal tumor, which was located in the sternal body and invaded the surrounding costal cartilages (Fig. 2).
Figure 3. (A) Exposing tumor; (B) Resection of tumor; (C) Complete Wenlin procedure with two steel bars; (D) Wires mesh; (E), Fiber membrane is placed inside the steel bars and (F) The fiber membrane is placed outside the steel bars.

Figure 4. Appearance of chest wall after operation.

The operation was performed under general anesthesia. In supine position, a longitudinal incision was made in the middle of the anterior chest wall to expose the tumor, and the tumor was removed along the periphery. The resection location was ∼3 cm away from the border of tumor. After resection, a huge defect was formed in the middle of the anterior chest wall. Incisions were made on the lateral chest wall to expose the surrounding ribs. Wenlin procedure was performed with two steel bars [6, 7]. The curvature of the bar was the normal curvature of the chest wall. Both ends of the bar were firmly fixed with two adjacent ribs [8]. A mesh was woven between the two steel bars and the upper and lower ribs with steel wires, and the inner and outer sides of the steel bars were padded and fixed with fiber membranes. Drainage tubes were placed in both thoracic cavities and surgical fields (Fig. 3). After the incisions were closed, the operation was completed (Fig. 4). The operation time was 95 min, the intraoperative bleeding was 30 ml, and no complications occurred during the operation. The patient recovered smoothly after operation.

Postoperative X-ray examination showed that the positions of the steel bars were normal (Fig. 5). He was discharged 10 days after operation.

DISCUSSION

Chest wall tumor operation generally includes two parts, one is tumor resection, and the other is chest wall reconstruction [3–5]. Since the location of the tumor is superficial, and the resection is not difficult. The focus of the operation is considered to be chest wall reconstruction. In the past, the main point of reconstruction was the choice of materials, and no one paid much attention to the surgical method itself [3–5]. Considering the particularity of the chest wall itself, reconstruction should not only restore the integrity of the chest wall, but also obtain a normal appearance as far as possible. Therefore, the surgical method should also be emphasized.
Figure 5. Postoperative X-ray examination.

Wenlin procedure is a surgical method for correcting thoracic deformity, which is especially suitable for correcting chest wall protrusion [6, 9–12]. Because the nature of this procedure is template plastic surgery, the shape of the chest wall can be restored to the maximum [1, 6, 7]. In Wenlin procedure, special steel bar is indispensable, which not only has certain elasticity, but also has great mechanical strength. Such physical properties make the bar also suitable for replacing general bone structures. It can be seen that Wenlin procedure can be used not only for the correction of deformities, but also for the reconstruction of the chest wall. We used this procedure in reconstructive surgery and achieved satisfactory results.

In order to make the chest wall more stable, we used a special fixation method to fix both ends of the steel bar during the reconstruction [8]. In addition, we also use steel wires to weave a mesh between the two steel bars and the surrounding ribs, which not only further strengthens the steel bars, but also eliminates the large gap between the bars. This will help eliminate possible paradoxical respiration after surgery. We used fibrous membranes to make cushions on the inside and outside of the steel bars, which is also conducive to eliminating a paradoxical respiration after surgery.

Our experience shows that Wenlin procedure is a reasonable choice for chest wall reconstruction. If there are suitable steel bars and correct techniques, the ideal effect may be obtained.

**CONFLICT OF INTEREST STATEMENT**

None declared.

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**REFERENCES**

1. Wang W. Basic theories and concepts of chest wall surgery. Int J Surg Sci 2022;6:12–4.
2. Wang W. Chest wall surgery: chest wall plastic surgery or chest wall orthopedics. Int J Orthop Sci 2022;8:82–4.
3. Sanna S, Brandolini J, Pardolesi A, Argnani D, Mengozzi M, Dell’Amore A, et al. Materials and techniques in chest wall reconstruction: a review. J Vis Surg 2017;3:95.
4. Turna A, Kavakli K, Sapmaz E, Arslan H, Caylak H, Suat H, et al. Reconstruction with a patient-specific titanium implant after a wide anterior chest wall resection. Interact Cardiovasc Thorac Surg 2014;18:234–6.
5. Gonfiotti A, Viggiano D, Vokrri E, Lucchi M, Divisi D, Crisci R, et al. Chest wall reconstruction with implantable cross-linked porcine dermal collagen matrix: evaluation of clinical outcomes. JTCVS Tech 2022;13:250–60.
6. Wang W, Long W, Liu Y, Bin C, Juan L. Wenlin procedure: a novel surgical technique for pectus carinatum. Int J Case Rep Surg 2022;4:10–2.
7. Wang W, Long W, Liu Y, Bin C, Juan L. Wenlin procedure for treatment of pectus carinatum. Int J Surg Sci 2022;6:74–7.
8. Wang W, Long W, Liu Y, Bin C, Juan L. Wang technique: a simple and practical steel bar fixation technique in thoracic deformity surgery. Int J Surg Sci 2022;6:78–83.
9. Wang W, Long W, Liu Y, Bin C, Juan L. Wenlin procedure for treatment of barrel chest. Int J Orthop Sci 2022;8:43–5.
10. Wang W. Surgical treatment of a 36-year-old patient with asphyxiating thoracic dysplasia. Interact Cardiovasc Thorac Surg 2022;34:153–5.
11. Wang W, Long W, Liu Y, Bin C, Juan L. Wenlin procedure for asphyxiating thoracic dystrophy with severe pulmonary hypertension. Int J Case Rep Surg 2022;4:11–2.
12. Wang W, Long W, Liu Y, Bin C, Juan L. Application of Wenlin procedure combined with Wang procedure in operation of severe pectus carinatum. Natl J Clin Orthop 2022;6:09–16.