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Minimally invasive surgical treatment for severe wenlin chest

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Abstract

Wenlin chest is a kind of complex deformity, the cause of which comes from the abnormality of the shape and structure of the sternum. Because the whole sternum is "S"-shaped, the structures connected with it is abnormal in location, and finally form an obvious deformity with both depression and protrusion. Nevertheless, due to the obvious thickening and hardening of the sternum, the general sandwich technique cannot complete the treatment. To treat this deformity effectively, we designed a special operation for it. At first, we perform pre-shaping technique for the sternum to make it have some plasticity, and then we correct the deformity with minimally invasive techniques. In this article the treatment of a case of 27-year-old patient with severe Wenlin chest was introduced. We use the combination of Wung procedure and Wenlin procedure for treatment, and the deformity was corrected successfully.

Keywords: Wenlin chest, wenlin procedure, wung procedure, minimally invasive surgery

Introduction

Wenlin chest is a rare and special thoracic deformity, which is characterized by a protrusion on the anterior chest wall and a depression on the lower half in the middle ^[1, 2]. In essence, it is a complex deformity. In early clinical practice, this deformity was only regarded as a sort of pectus carinatum, in which the existence of depression was obviously ignored. In the later clinical work, some authors recognized the existence of depression and gave the deformity other names, including: pouter pigeon chest, pigeon breast, Currarino-Silverman syndrome, chondromal deformation and pectus arcuatum, etc. ^[3-6]. For a rare deformity, the appearance of all these names inevitably leads to cognitive confusion, which is not conducive to the diagnosis and treatment of this deformity. In our work, we have contacted many cases of such a deformity ^[7-10], and we gave it a new name, Wenlin chest. In the past work, we have made a variety of designs for the operation of this deformity. Herein, we reports the minimally invasive surgery of a 27-year-old patient with severe Wenlin chest.

Case Report

The patient was a 27-year-old male. He had no abnormality on his chest wall in childhood. At the beginning of puberty, the anterior chest wall gradually appeared protrusive. The protrusion was located in the upper half of the chest wall, and the sternal angle is most obvious. Thereafter, the lower half of the chest wall gradually appeared depressed. The patient did not feel unwell, but was dissatisfied with the chest wall appearance and was admitted to our hospital at the age of 27 for treatment. Physical examination: the upper half of the anterior chest wall was protrusive, and the lower part was depressed in the middle (Fig 1). Imaging examination: the upper half of the chest wall was protrusive, with the lower part being depressed, and the side view of the sternum was "S"-shaped; the sternal angle formed the highest part of the protrusion, while the sternal body formed the bottom of the depression; and the heart is obviously pressed by the anterior chest wall (Fig 2, 3). The patient was diagnosed as severe Wenlin chest. The operation mainly included three parts, namely the pre-shaping of sternum ^[11, 12], Wenlin procedure ^[13-15] and Wung procedure ^[15, 16]. A longitudinal incision was made in the middle to expose the sternal angle and sternal body. Two wedge resections were made at the top of the sternal angle and the sternal body respectively to make the sternum have certain elasticity, which was the technique of the pre-shaping of sternum. Two additional incisions were made on both laterals of the chest wall. After the soft tissues and muscle tissues were dissected, the ribs were exposed. Three tunnels were made from the lateral incisions towards the center, with interval about 3 cm between the tunnels, and the tunnels were located between the muscles and the bone structures.

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The upper two tunnels passed through the top of the protrusion, while the lower tunnel passed beneath the depression, which is through the bilateral thoracic cavities and mediastinum. Two steel bars were placed in the upper two tunnels respectively, and the protrusion was flattened by the middle parts of the two steel bars (Fig 4). After their ends were fixed to the ribs on the lateral chest wall, Wenlin procedure was completed. The third steel bar was put into the lower tunnel (Fig 4). The bar was turned over to prop up the depression, with both ends being fixed on the ribs, thus completing the Wung procedure. Drainage tubes were placed in bilateral thoracic cavities. After the incisions were closed, the operation ended. The operation was smooth without complications. The appearance of the chest wall returned to normal after operation (Fig 5, 6), and the patient was discharged 9 days postoperatively.

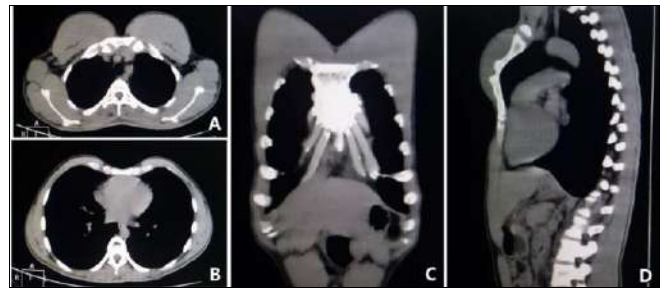


Fig 3: CT examination. A. Section view showing thickened sternal angle; B. Section view showing the sternal body; C. Coronal view showing diseased sternum; D. Sagittal view showing diseased sternal angle and sternal body



Fig 1: Preoperative appearance of chest wall



Fig 4: Three steel bars used during operation



Fig 5: Postoperative appearance of chest wall

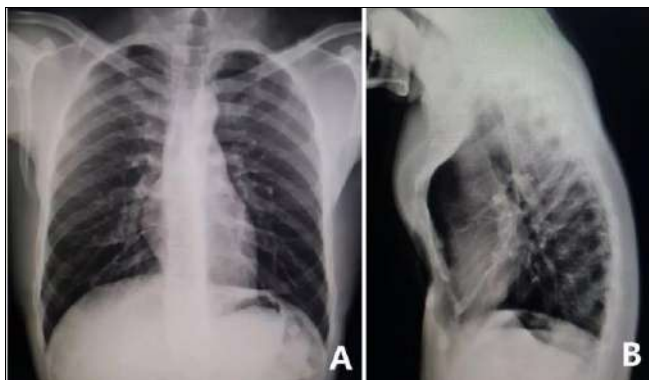


Fig 2: Preoperative X-ray examination. A. Posteroanterior radiograph; B. lateral radiograph

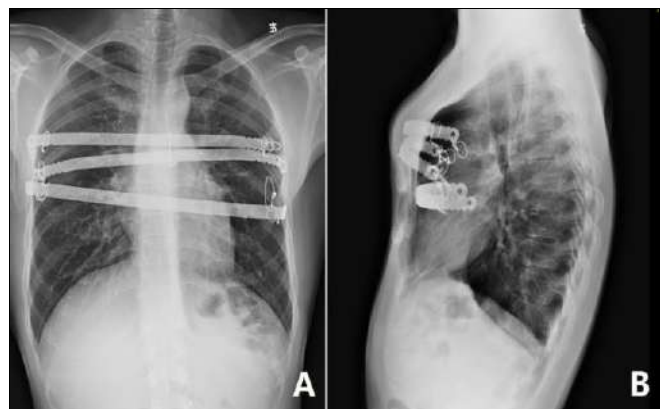


Fig 6: Postoperative X-ray examination. The position of the steel bars and the shape of the thorax were showed. A. Posteroanterior radiograph; B. lateral radiograph

Discussion

Wenlin chest has been recognized for many years^[1-3]. Since the deformity was treated as pectus carinatum in early years, Ravitch procedure was widely used for its treatment^[3]. This operation was not an ideal choice because of its great trauma and many other disadvantages. In the subsequent clinical practice, the depression was gradually recognized, and some new names appeared in the clinic^[4-6]. However, the corresponding operation was still Ravitch procedure^[3-6]. This has become a defect in the treatment.

In essence, Wenlin chest is a complex deformity^[1, 2]. However, because the root cause of the deformity is from the sternum, and the sternum is unusually hard and has abnormal shape, it is clearly different from the general complex deformity^[1, 2]. In general, sandwich technique can be used to treat complex deformities^[17]. Nevertheless, for Wenlin chest, because the shape of sternum is difficult to be changed by common methods, sandwich technique cannot be used for treatment.

After in-depth observation, we found that the premise of treating Wenlin chest was to change the elasticity of sternum, which was the content of pre-shaping technique^[7-10]. In order to achieve this goal, we used wedge incisions to treat the hardest part of the sternum. By this means, the sternum was much less rigid and had enough elasticity. This laid the foundation for the next correction.

Wenlin procedure is specially designed for the correction of protrusive deformities^[13, 14, 18-20], while Wung procedure is designed for depressive deformities^[16]. For the patient with both protrusive and depressive deformities, we use combination of Wung procedure and Wenlin procedure in the operation, thus both protrusion and depression can be corrected simultaneously^[21-25].

Conclusion

Our experience shows that Wenlin chest cannot be treated as a common complex deformity because of the extremely hard sternum. However, if the sternum is pre-shaped, Wenlin chest can be transformed into a common complex deformity, which can be treated by minimally invasive surgery.

Conflict of Interest

Not available

Financial Support

Not available

Reference

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