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Surgical treatment of Wenlin chest

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Abstract

Wenlin chest is a rare deformity, which was previously regarded as a kind of pectus carinatum. Due to its special structure, it should be an independent deformity. The obvious feature of this deformity is that it includes both protrusion and depression on the anterior chest wall, which is a special type of complex deformity. Because of the abnormal thickening of the sternum, the general sandwich technique cannot obtain satisfactory results. We used special pre-shaping technique for preparation, and then used Wenlin procedure and Wang procedure for correction, and achieved good results. This article introduces the operation of a 22-year-old male Wenlin chest patient.

Keywords: Wenlin chest, Wenlin procedure, Wang procedure, pre-shaping technique, pectus arcuatum, Currarino-Silverman syndrome

Introduction

Wenlin chest is a special thoracic deformity named by us, the incidence of which is low and it is a rare deformity^[1, 2]. In early years, this deformity was regarded as a kind of pectus carinatum, and was even called type 2 pectus carinatum by some authors^[3-7]. Considering the difference from the typical pectus carinatum, other authors thought it was necessary to treat it as an independent deformity, so they gave it the new names. The other names of this deformity included pectus arcuatum, Currarino-Silverman syndrome, pouter pigeon chest and chondromanurial deformation, etc.^[3-13]. Too many names undoubtedly caused conceptual confusion, which not only affected the understanding of the deformity, but also affected the treatment of it. Our department is an independent chest wall surgery department, and thoracic deformity surgery is one of our main works^[14-16]. The nature of our work gives us access to a large number of patients with this deformity. In order to facilitate our work, we made a new name for this deformity, and designed special operations of this deformity^[1, 2]. In this article, we report the operation of A 22-year-old male Wenlin chest patient.

Case Report

The patient was a 22-year-old male. When he was 10 years old, he was first found to have a thoracic deformity by my family. At that time, his main manifestation was mild protrusion in the middle of the anterior chest wall. At the beginning of puberty, the protrusion gradually aggravated, the surface of it is uneven, and the lower part of the anterior chest wall gradually appeared sunken. The patient did not have any symptoms, but was dissatisfied with the appearance of the chest wall and longed for surgical correction. The patient was admitted to hospital for operation at the age of 22. The preoperative physical examination showed that the upper half of the anterior chest wall was protrusive, the middle part of it was obvious, and the protrusive surface was uneven; the middle part of the lower half of anterior chest wall was slightly depressed (Fig. 1A). Imaging examination showed that the upper half of the chest wall was protrusive, and the middle and lower parts were slightly depressed, with his sternum being "S"-shaped. The patient was diagnosed as Wenlin chest before operation. After full preparation, the operation was performed under general anesthesia. The operation mainly included two procedures, namely Wenlin procedure^[17-21] and Wang procedure^[22-25]. Two incisions were made on the lateral chest wall. The soft tissues and muscles were dissected to expose the ribs. Two tunnels were made in the directions of protrusion and depression respectively, which were located on the surface of the bone structures. A steel bar guiding pipe was placed in the upper tunnel. A longitudinal incision was made in the middle to expose the protrusion and depression of sternum. A bone rongeur was used to bite off the surface structures of the protruding sternum, so that the local sternum had certain plasticity.

A steel bar was put into the upper tunnel by the guiding pipe. The protrusion was compressed with the middle part of the steel bar, and its two ends were fixed on the ribs on both sides. The fixation method of steel bar was that of Wang technique [26]. The depression at the lower part of the sternum and bilateral rib arches were exposed through the median incision. Several traction steel wires were placed across these structures. The second steel bar was inserted into the lower tunnel. The central part of the steel bar was located on the front of the depression. After the traction steel wires were pulled and fixed on the steel bar, the depression was successfully eliminated. A drainage tube was placed in the median surgical field, the incision was closed, and the operation was completed finally (Fig. 1B). The operation was smooth without complications. He was discharged 10 days after operation.

Discussion

Wenlin chest is a special thoracic deformity. Because the main lesion is the protrusion of the anterior chest wall, it is easy to be regarded as a kind of pectus carinatum [3, 4]. In the early years, this deformity was generally treated with Ravitch procedure [3]. Since there is no essential difference between this operation and that of the general pectus carinatum operation, it is of little significance to distinguish it from the pectus carinatum. With the deepening of the understanding of this deformity, more attention has been paid to the combined depressed lesion, so it is necessary to make a new name. However, the operation of this new named deformity has not changed, and it was still the Ravich procedure, which means that the particularity of deformity has not been noticed seriously [3-13].

In essence, Wenlin chest is a complex deformity. Due to the obvious protrusion and depression, it is obviously different from the general pectus carinatum [1, 2]. However, this kind of deformity is different from the common compound deformity. Although the latter is the combination of protrusion and depression, the arrangement order and structures are not fixed, which is a random combination. This deformity can be treated by sandwich technique [27]. Wenlin chest has protrusion and depression at the same time, but its sternum structure is special. Since the sternum is abnormally thickened and extremely stiff, and its shape cannot be easily changed, the general sandwich technique cannot achieve good results for this deformity. In order to get satisfactory treatment, we designed a special operation. We first performed pre-shaping for the hardest part of the sternum [28], and then used Wenlin procedure and Wang procedure for correction, so good results can be obtained.

Wenlin procedure is designed for protrusive deformity of the chest wall. It can be used for a variety of deformities including pectus carinatum and barrel chest [17-21]. Wang procedure is designed for depressed chest wall deformities. It was initially used only in the young pectus excavatum [24]. Since then, the application scope has gradually increased and can be used in many kinds of depressed deformities [22-25]. The combination of Wenlin procedure and Wang procedure is different from that of sandwich technique [27], but the same effect can be achieved. If such a combination is to achieve good results, the premise is that the difficulty of the second procedure will not be significantly increased after the completion of the first procedure. However, in Wenlin chest, the sternum itself plays two roles. The sternum angle is the highest part of the protrusion, and the

sternum body is the lowest part of the depression. Because the sternum itself is unusually thickened and extremely hard, when one of the procedures is completed, it will be extremely difficult and almost impossible to complete the second procedure. This is the fundamental reason why sandwich technique cannot be used for this deformity. In order to make the operation feasible, there must be a prerequisite, that is, to do pre-shaping to make the sternum having certain plasticity [28]. Our method is to directly use the bone rongeur to remove the prominent part of the sternum protrusion, which will not only help to eliminate protrusion directly, but also increase the plasticity of the sternum, thus laying the foundation for the next correction.



Fig 1: Appearance of chest wall. A. Before operation; B. After operation

Conclusion

Our experience shows that although Wenlin chest is a complex thoracic deformity, it does not necessarily need to be treated with traditional Ravitch procedure. If some special techniques, such as the pre-shaping technique, can be applied, the deformity can be treated by some minimally invasive means. Wenlin procedure and Wang procedure are commonly used minimally invasive surgeries. The application of these procedures can not only reduce the surgical trauma, but also achieve better orthopedic effect.

Conflict of Interest

Not available

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Not available

Reference

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