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## Wenlin chest: An independent thoracic deformity

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### Abstract

Wenlin chest is an independent thoracic deformity with obvious structural features. In the early years, it was only recognized that its chest wall was protrusive, and it was regarded as a kind of pectus carinatum. In the era of open surgery, there was no need to make a separate distinction between various protrusive deformities because the surgical principles were basically the same. However, when minimally invasive surgery is considered, because this kind of deformity can not be treated with general minimally invasive techniques, it is necessary to distinguish it from the general pectus carinatum and make a special design for its surgical treatment. After careful observations, we named this special deformity as Wenlin chest, and made a new design for the operation of it. Our experience shows that the nomenclature of Wenlin chest is not only conducive to the diagnosis of this deformity, but also conducive to its treatment, so it has clear clinical significance.

**Keywords:** Wenlin chest, Pectus carinatum, thoracic deformity, nomenclature

### Introduction

Thoracic deformity is the abnormal shape of the bony structures of the chest wall, which can have many different types [1-4]. The most common type is pectus excavatum, followed by pectus carinatum [5, 6]. Pectus carinatum has different names. Some people called it as pigeon breast [7-9]. The main feature of pectus carinatum is the protrusion of chest wall. In clinical practice, we found that some so-called pectus carinatum patient had not only protrusion but also local depression. The protrusion and depression in this deformity were not random combinations, but had fixed rules. We have noticed these rules very early. In order to facilitate the diagnosis and treatment of this deformity, we believe that it is necessary to treat this deformity as an independent deformity, so we named it as Wenlin chest. Here we report the clinical features and the surgical treatment of a typical Wenlin chest patient.

### Case Report

The patient, male, six-year-old, was found to have anterior chest wall deformity since neonatal period. In the early age, it showed obvious protrusion and local slight depression. After the age of 4, the deformity was aggravated, and the protrusion was more obvious, accompanied by obvious depression. The patient had no clinical symptoms, but the patient and his family were not satisfied with the appearance of the chest wall. In order to eliminate the deformity, he was admitted to our hospital for surgery. Before operation, we performed physical and imaging examination for him. Physical examination showed his anterior chest wall had a compound deformity [Fig 1]. The sternal angle plane was obviously protrusive, the protrusion range was wide, extending to both sides of the chest wall, and the lower edge of the protrusion of both sides of the chest wall extended downward. A depression could be seen in the middle. The depression was located below the sternum angle, and its bottom was the sternum body. There were protrusive edges above and on both sides of the depression. The protrusion and depression of the anterior chest wall were symmetrically located. X-ray examination showed that there was no obvious abnormality on the posterior-anterior radiograph [Fig 2A], but protrusion of the anterior chest wall could be seen on lateral radiograph [Fig 2B]. The protrusion was located near the sternal angle, the lower part was sunken, and the heart was obviously compressed. Sternum was in "S" shaped. On axial plane of CT examination, the protrusion on the anterior chest wall extended to the lateral chest wall, which was more serious than the central protrusion [Fig 3A]. Depression of the anterior chest wall could be showed in the lower sectional view [Fig 3B]. Coronal plane of CT examination showed that the sternal angle was protrusive and the sternal body was sunken [Fig 3C]. This patient was finally diagnosed as Wenlin chest, and we performed surgical treatment for him.

During the operation, a longitudinal incision was made in the middle at first, and the anterior periosteum of the sternum was locally resected at the protrusive sternal angle. Wenlin procedure was performed with one steel bar to flatten the protrusion<sup>[4, 10]</sup>, and then Wang procedure was performed with another steel bar to lift the depression<sup>[11, 12]</sup>. The deformity was corrected and satisfactory results were obtained [Fig 4]. The patient was discharged 5 days after operation. After 1 year follow-up, the chest shape was basically normal, and no complications occurred.

### Discussion

In the early years, the main surgical treatment for pectus carinatum was open surgery<sup>[5-9]</sup>. This kind of surgery needs to cut or resect part of the anterior protrusive structures, and then completely reshape the structures. The surgery is a complete plastic surgery, which does not need to pay too much attention to the details of deformity. Since there is protrusion in every individual patient, the operation principle for every patient is roughly the same. This therapeutic characteristic made no one classify the detailed characteristics of pectus carinatum in the early years. With the arrival of the era of minimally invasive surgery, some patients with pectus carinatum can complete be treated with minimally invasive means, while others can not be treated with this kind of surgery<sup>[13]</sup>. This shows that the chest wall structures of various patients are different. Because of these differences, it is necessary to design surgery for different patient, and it is also necessary to further distinguish or name the different deformities.

In the patients who were treated as pectus carinatum, some individuals have very obvious characteristics. In addition to the protrusion of the chest wall, they also have obvious depression, and the position and shape of the protrusion and depression are fixed. These characteristics make these patients have a completely different characteristic from others. In addition, because the treatment of this deformity cannot be completed by simple minimally invasive surgery such as Wenlin procedure<sup>[4, 10]</sup> or Abramson procedure<sup>[13]</sup>, it is necessary to name this deformity and redesign its operation method.

In the past literature, some authors have mentioned this kind of deformity, but they have always regarded it as a kind of pectus carinatum, and have not named it separately, which inevitably affect the diagnosis and treatment of this deformity. After we made a new name for this deformity, we also made a special design for its surgical treatment. Our work has played a positive role in the treatment of this deformity.

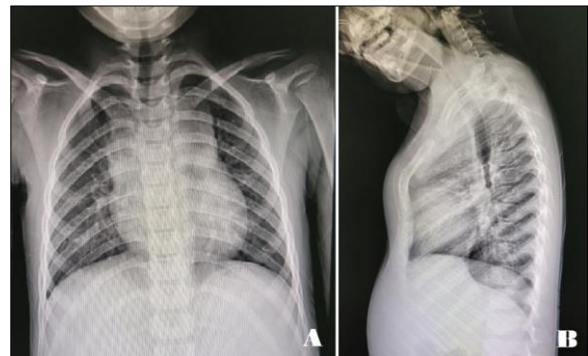
### Conclusion

Wenlin chest is an independent thoracic deformity. In the past, this deformity was regarded as a kind of pectus carinatum. If open surgery is used for treatment, there is no need to make a special name for this deformity. However, when minimally invasive surgery is performed, it is necessary to distinguish this kind of deformity and treat it as an independent deformity because it is completely different from the general pectus carinatum. We named the deformity and designed a special operation for it. Our experience shows that it is meaningful to separate this kind of deformity from the pectus carinatum and re-recognize it, which is not only helpful for the diagnosis of deformity, but

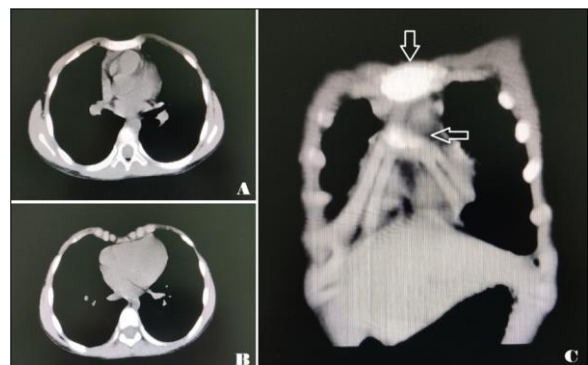
also convenient for its treatment. Therefore, it has important clinical significance.



**Fig 1:** The appearance of chest wall before operation.



**Fig 2:** X-ray examination of the thorax. A, posterior-anterior radiograph; B, lateral radiograph.



**Fig 3:** CT scan image of the thorax. A, axial plane of the upper part of the thorax; B, axial plane of the lower part of the thorax; C, coronal plane of the thorax.



**Fig 4:** Appearance of chest wall after operation. The deformity has completely disappeared and the appearance is basically normal.

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