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## Surgical treatment of secondary thoracic deformity caused by empyema

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### Abstract

Empyema is often accompanied by secondary chest wall deformity, mainly manifested as a depression of one side of the chest wall. So far, the treatment of empyema worldwide is only limited to the treatment of the lesions in the thoracic cavity, but no one pays attention to the deformity of the chest wall. This will not benefit the patient's complete recovery. We designed a special operation for this kind of patient. We not only eliminated the abscess focus, but also corrected the chest wall deformity simultaneously, which has achieved good surgical results. In this article, we introduce the operation of a 29-year-old female patient with empyema. After the lesions in the thoracic cavity were cleared, we used MatrixRIB to correct the thoracic deformity and achieved satisfactory results.

**Keywords:** Secondary thoracic deformity, empyema, operation, MatrixRIB

### Introduction

Empyema is an ancient thoracic surgery disease [1-3]. In the early years, antibiotics were not widely used, and many chest inflammation could be turned into empyema due to poor control [1-3]. With the development and application of highly effective antibiotics, this disease is now rare. However, in some remote areas, this disease is still not uncommon. Empyema may be acute or chronic. Acute patients will become chronic if they are not treated timely. Chronic empyema may affect the structures of the chest wall in addition to the direct intrathoracic structures [3]. The common chest wall change is the depression of on the lateral chest wall. This is a special secondary thoracic deformity. Because this deformity is only located on the side of the empyema, it may affect the force balance on both sides of the spine, which will result in forming scoliosis. The scoliosis is another serious consequence of the empyema. The thoracic deformity and the scoliosis may cause unexpected consequences to the human body, so appropriate treatment is required. However, in the past, the treatment of empyema was limited to the removal of lesions in the thoracic cavity, and no one dealt with the thoracic deformity [1-5]. This will undoubtedly affect the effect of treatment. Our department is an independent chest wall surgery department [6-8]. Our work mainly focuses on five diseases, namely, chest wall infection, trauma, tumor, defect and deformity, among which deformity is our most important disease [6-8]. The deformity can be either primary or secondary. The lateral chest wall depression caused by empyema is a typical secondary deformity, so it is also one of the objects of our treatment. This paper reports the operation of a 29-year-old female patient. Her primary disease was empyema, but it resulted in severe secondary chest wall deformity. We first cleared the lesions in the thoracic cavity, and then reconstructed the chest wall with MatrixRIB, and achieved satisfactory results.

### Case Report

The patient, a 29-year-old female, was diagnosed with pulmonary tuberculosis and received antituberculosis treatment in the local hospital 15 years ago, but the effect was poor. Three years later, she was diagnosed with empyema and received intermittent conservative treatment. Since then, empyema has become chronic, and the right chest wall depression and scoliosis gradually appeared. Recently, since she felt dyspnea and flustered, she was admitted to our hospital for surgical treatment. The physical examination found that the left and right thorax were asymmetric, the right chest wall was sunken, and she also had obvious scoliosis (Fig 1). The auscultation found that the right respiratory sound was low. Imaging examination showed that the chest wall was asymmetric, the right chest wall was depressed,

and the intercostal space was narrow; she also had scoliosis; there were chronic lesions in the right thoracic cavity, pleural thickening was obvious, accompanied by local calcification (Fig 2). The patient's operation was performed under general anesthesia. With left side lying position, longitudinal axillary incision was made. The soft tissues and muscles of the chest wall were dissected to expose the ribs. The ribs were cut crosswise at different levels to expose the thickened pleura. Decortication was performed at first, then the abscess was removed. After the surgical field was cleaned thoroughly, the chest wall was reconstructed with MatrixRIB. The two ends of the cut rib were pulled apart, and were fixed with MatrixRIB. After all the cut ribs are fixed, reconstruction of the chest wall was completed (Fig 3). The thoracic cavity and operative field were cleaned again, and drainages were placed in them. Finally, the incision was closed and the operation was completed. The right chest wall depression was basically eliminated after operation. The operation was smooth without any complications, and she was discharged 10 days later.

### Discussion

Empyema is a serious infectious disease in the thoracic cavity [1-5]. If not treated in time, it may develop into chronic empyema [1-5]. The main pathological changes of chronic empyema are pleural thickening and calcification. Under the traction of these pathological structures, the bony structures of chest wall may appear depression [3]. If it occurs before puberty, it will seriously affect the development of chest wall. After the chest wall depression appears, because it is only limited to one side of the chest wall, which will directly affect the force balance on both sides of the spine, the spine will result in scoliosis inevitably. This is a more serious complication. The chest wall deformity and scoliosis not only affect the appearance of patients' chest wall, but also aggravate the impact of respiratory and circulatory functions. Therefore, effective treatment is needed. However, the treatment of empyema worldwide is limited to the treatment of intrathoracic lesions, and there is no report on the treatment of secondary thoracic deformity [1-5]. Obviously, this is a major defect of previous treatment strategy.

The secondary thoracic deformity caused by empyema is a large depression of one side of the chest wall, which cannot be treated by minimally invasive surgeries for primary depression [9, 10]. Considering that the length of many ribs is significantly shortened, we use MatrixRIB to lengthen the ribs, so as to achieve the purpose of correction for deformity.

MatrixRIB is a material designed for rib fracture fixation [11]. In our previous work, we found that it can be used for chest wall reconstruction [11-15]. In surgery of the secondary deformity caused by empyema, the use of MatrixRIB can easily extend the length of ribs, so it is an ideal surgical material for this special secondary deformity.

Reconstruction of the secondary deformity caused by empyema has the following advantages: (1) Since several ribs need to be cut off, it can facilitate the exposure of the lesions in the thoracic cavity; (2) The elimination of chest wall deformity is beneficial to the recovery of cardiopulmonary function; (3) This operation not only completely clear the lesions in the thoracic cavity, but also correct the secondary thoracic deformity, which mean a complete treatment of the disease.

However, this kind of operation also has potential risks. Since the surgical field itself is the infection focus, and foreign bodies such as MatrixRIB need to be used for chest wall reconstruction, the difficulty of wound healing will undoubtedly increase. In order to eliminate this risk, we repeatedly cleaned the surgical field and incision during the operation, thus ensuring satisfactory healing of the incision.



**Fig 1:** The appearance of the patient's back. There is obvious right chest wall depression and scoliosis



**Fig 2:** CT images showed that the right chest wall was depressed and there were obvious lesions in the right thoracic cavity



**Fig 3:** MatrixRIB is used to reconstruct chest wall and eliminate depression

### Conclusion

Our experience shows that for empyema with secondary chest wall depression, it is necessary to treat the lesions in the thoracic cavity and chest wall simultaneously, which will be the most reasonable choice.

**Conflict of Interest**

Not available

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