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Chest wall reconstruction with MatrixRIB after resection of primary chest wall abscess and sternal osteomyelitis

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Abstract
Primary chest wall abscess is a rare chest wall disease. With the continuous enhancement of antibacterial efficacy of antibacterial drugs, such diseases showed a downward trend. Recently, we received a 65-year-old male patient with primary chest wall abscess and sternal osteomyelitis. We first removed his lesion completely, and then reconstructed the chest wall with MatrixRIB plates and achieved satisfactory results. This article reports the operation of this patient.

Keywords: Primary chest wall abscess, sternal osteomyelitis, chest wall reconstruction, MatrixRIB

Introduction
Thoracic wall infection is a form of thoracic wall surgical disease [1-3], which can be manifested in many forms, including abscess and ulcerated wound. Generally, most chest wall abscesses are secondary, which can be secondary to surgery, trauma or tumor necrosis [4-6]. Primary chest wall abscess is rare. With the continuous improvement of the efficacy of antibiotics, especially the improvement of the treatment tuberculosis, primary chest wall abscesses are becoming rarer [5, 6]. Recently, we received an elderly male patient with primary chest wall abscess and sternal osteomyelitis. We performed surgical treatment for him and obtained satisfactory results. This article reports the treatment of this patient.

Case Report
The patient was a 65-year-old male. Two months before admission, the patient felt pain just above the front chest wall. At the beginning, the focus was small, which was considered as a boil. Later, the focus gradually increased and spread around. He went to the local hospital and was diagnosed as upper chest wall mass. In order to have a surgical treatment, he was admitted to our hospital. Physical examination on admission showed there was a mass in the suprasternal fossa, which was 5X5cm in size, the skin color was reddish brown, the base was wide, and it spaned the suprasternal fossa and neck, with poor mobility and tenderness (Fig 1). Imaging examination showed that there was a mass in the suprasternal fossa and the upper part of the anterior chest wall, the sternal manubrium and the sternal angle were involved, and the mass extended to the anterior superior mediastinum (Fig 2, 3). The preoperative diagnosis was anterior chest wall abscess and sternal osteomyelitis. After full preoperative preparation, the operation was performed under general anesthesia. In the supine position, a thick needle was used to aspirate pus for decompression, then a fusiform skin incision was made around the base of the mass to fully free the lesion. The first and second costal cartilages on both sides were cut off and the sternal body was transected below the sternal angle. The upper half of the sternum was turned upward to expose the anterior superior mediastinum lesions and remove them completely. The bilateral sternoclavicular joints were incised to remove all the cervical lesions. After the surgical field was cleaned thoroughly, the chest wall was reconstructed with 4 MatrixRIB plates. After reconstruction, the MatrixRIB plates were covered with fiber membranes both inside and outside. Drainage tubes were placed in the surgical field and bilateral thoracic cavities, and the incision was directly sutured without obvious tension (Fig 4). The operation was smooth without complications. Postoperative X-ray examination showed that the positions of the MatrixRIB plates were normal and the reconstruction effect was satisfactory (Fig 5). Half a month after the operation, the patient was discharged and the incision healed well.

Fig 1: Appearance of anterior chest wall abscess before operation

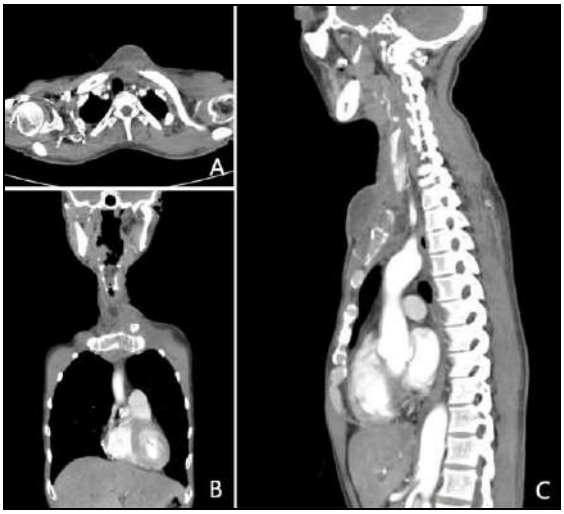

Fig 2: Preoperative CT examination. A. Horizontal plane; B. Coronal plane; C. Sagittal plane

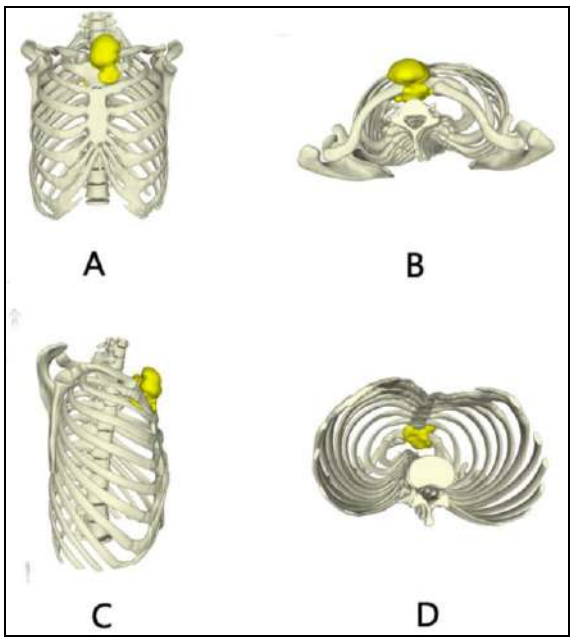

Fig 3: Preoperative three-dimensional figures. A. Front view; B. Top view; C. Side view; D. Bottom view

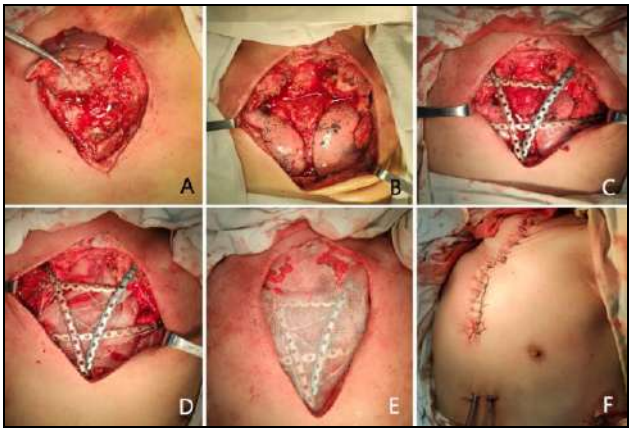

Fig 4: Surgical pictures. A. The abscess was removed; B. Chest wall defect after lesion resection; C. Chest wall reconstruction with MatrixRIB plates; D. The inner side of MatrixRIB plates is covered with fiber membrane; E. The outer side of MatrixRIB plates is covered with fiber membrane; F. The incision was closed

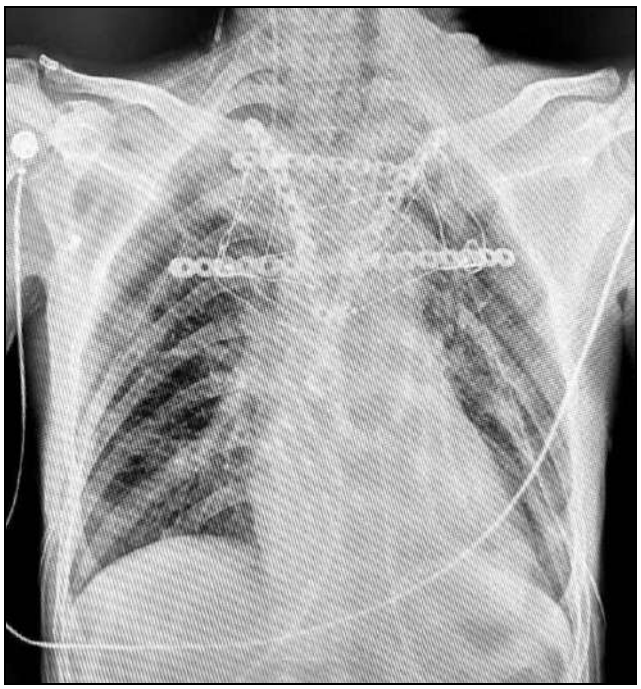

Fig 5: Postoperative X-ray examination

Discussion

Chest wall abscess is a form of chest wall infection [1-3]. Secondary abscesses are common in clinic, which are mostly caused by infection of surgical incision on chest wall. In addition, local abscesses can also be caused by trauma or necrosis of chest wall tumors. The common feature of secondary abscesses is that they have clear causes, while primary chest wall abscesses are the opposite [4-6]. Generally, there is no clear cause, but they originate from the chest wall itself. The main sign of abscess is local mass. If the abscess ruptures, it may form an ulcer on the chest wall.

The basic principle of abscess treatment is incision and drainage. For most patients with chest wall abscess, this technique can achieve good results. However, if combined with deep osteomyelitis, the effect of simple incision and drainage is not well, and the focus must be completely removed. The removal included not only the wall of the pus cavity, but also the bone structures with osteomyelitis. In this case, the abscess was extensive and deep, and involved

the upper part of the sternum. Therefore, not only the abscess tissue should be removed, but also the diseased sternum must be respected. This is the key to the success of the operation.

The sternum is an important structure of the thorax. After resection, the integrity of the thorax is damaged and must be reconstructed [7]. A variety of materials can be used for reconstruction, and digital materials have attracted much attention in recent years [8-11]. The biggest feature of this material is personalized design, which can design special materials according to the characteristics of special lesions [10, 11]. Theoretically, this material is the most ideal choice. However, in actual operation, there are sometimes many problems, so this material needs to be constantly improved. In previous operations, we have used this material to complete many chest wall reconstruction operations, and achieved good results. However, an obvious defect of this material limits its use, which is the disadvantage of temporary processing. If the patient's condition does not allow waiting, this material will not be ideal. The focus of this patient progressed rapidly, and it was not allowed to wait too long for digital material processing. Therefore, we chose another material for reconstruction, namely Matrix RIB plate [7].

MatrixRIB plate is a kind of fixation material for rib fracture [12-14]. In the process of use, we found that this material can also be used for chest wall reconstruction, so we used it in such operations in a large area and achieved ideal results. Since the length and the radian of this material can be determined according to the operation, and there are ready-made products that can be used, it is an ideal reconstruction material to avoid the corresponding disadvantages of digital material [7, 15, 16].

Thoracic wall abscess is infectious lesion, and it is generally not recommended to place artificial materials in the surgery of such lesions. However, because the bone structures of the chest wall need to be reconstructed, artificial materials are indispensable. In order to avoid reinfection of the lesion after surgery, surgical details must be strictly handled. First, the infected focus must be completely removed; Secondly, the necrotic lesions must be completely removed; Third, the dead space in the surgical field must be completely eliminated; Fourth, adequate blood supply should be ensured for the surrounding structures; Fifth, the artificial materials should have sufficient soft tissue coverage; Sixth, effective drainage tubes must be placed; Seventh, effective antibiotics must be used after surgery. During the operation of this patient, we performed the operation in strict accordance with the above details, thus ensuring the smooth completion of the operation.

Conclusion

If the primary chest wall abscess involves the chest wall bone structures, the diseased structures should be removed completely. After the resection, artificial materials should be used for reconstruction. In order to avoid reinfection, some technical details should be noticed, which is the premise to ensure the smooth completion of the operation.

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Author's Contribution

Not available

Conflict of Interest

Not available

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