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Basic principle of chest wall reconstruction

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Abstract

Chest wall reconstruction is a kind of chest wall orthopedic surgery, which mainly refers to the reconstruction of chest wall structures. Considering the possibility of surgery, it is generally divided into bone structures reconstruction and skin and soft tissues reconstruction. On the basis of full consideration of structural integrity and function, if the appearance of chest wall can be considered as much as possible, the highest level of reconstruction effect will be obtained.

Keywords: Chest wall reconstruction, basic principle

Introduction

Thoracic wall surgery has two basic attributes, one is to diseases treatment, the other is orthopedic surgery [1-3]. Orthopedic surgery includes two basic operations, one is plastic surgery, the other is reconstruction. Plastic surgery does not involve the removal of the structures. Generally, it only adjusts the shape of the bone structures of the chest wall to achieve the desired shape. Its only concern is the appearance of the bone structures of the chest wall, not the shape of other tissues of the chest wall [4-10]. Reconstruction is to reconstruct the normal structures of the chest wall, which should not only emphasize the appearance, but also the chest wall structure itself [11-15]. Since the structures of the chest wall mainly include bone structures, soft tissues and skin, reconstruction has a completely different nature from plastic surgery [11-15, 16].

The premise of reconstruction is the defect of chest wall. That is, when some chest wall structures are absent, reconstruction is needed. The defect of chest wall can be either primary or secondary. Primary defects are rare, mainly involving bone structures. Skin and soft tissue defects can be seen in some extremely rare congenital diseases, such as some patients with sternal cleft, who may have such defects [17-19]. Secondary defects can be caused by many reasons, including infection, trauma, tumor and other factors. When these factors are serious to a certain extent, corresponding defects can occur. In clinic, the common secondary defects come from various chest wall operations [11-15]. When the focus of chest wall has to be removed, it means that the secondary defect will occur. This is the most common secondary defect in clinic. Whether it is a primary defect or a secondary defect, when its scope reaches a certain extent, it must be reconstructed. This is the reason for the existence of reconstruction surgery.

Since the defect may involve multiple structures, in principle, reconstruction of various structures is also required. Considering the possibility of operation, the structures to be reconstructed are generally divided into two main parts, one part is the bone structures, the other part is the skin and soft tissues [11-15]. Bone structures constitute the structures of the thorax, which are the structural basis for maintaining respiratory and circulatory functions, so reconstruction for these structures must be considered first. However, not all bone structural defects need reconstruction. The indications for reconstruction have been discussed in many literatures. Some people think that the loss of a single rib does not need reconstruction, some people think that the loss of a rib at a specific location does not need reconstruction, and others think that the bone structure defect within a certain range does not need reconstruction. Different authors have their own specific reasons for their different approaches, but the basic principle should first consider the impact on respiratory function. If there is no abnormal breathing, a decision can be made according to the actual situation. If there is local abnormal respiration, it should be reconstructed. In addition to the consideration of respiratory function, another problem should be considered is the influence on the appearance of chest wall. If the appearance is obviously affected and the patient is concerned about the appearance, reconstruction is required.

The reconstruction of skin and soft tissue also involves two considerations, one is the function, the other is the appearance. Functional consideration include two aspects, one is respiratory function, the other is wound healing. After the reconstruction of bone structures, there may be large gaps in the material. If these gaps are too large, it is equivalent that there are still defects, which may also affect the respiratory function, so they need to be eliminated. Gap elimination is one of the content of skin and soft tissues reconstruction. Another functional issue is the healing of incisions. If the defect is too large, it will be very difficult to heal. At this time, it is necessary to consider the reconstruction of skin and soft tissue. In addition to the function problem, there is another problem to be considered is the appearance. Although some chest wall surgeries are very destructive and it is difficult to take care of the appearance of the chest wall after surgery, it is still one of the requirements for skin and soft tissue reconstruction to obtain a more beautiful appearance as far as possible.

The reconstruction of bone structures requires the replacement of bone structures with special materials. In the past, there were many materials used in clinic, each of which had its own advantages, but there were also problems [11-15]. In recent years, digital materials have attracted much attention. The biggest feature of this material is personalized design, but its wide use is limited due to the need for temporary processing [20-22]. Another commonly used material is MatrixRIB [15]. This material has many advantages. If it is used for rib or costal cartilage reconstruction, it can be used as the preferred material. For reconstruction of sternal defect, the material can also obtain ideal results.

The reconstruction of soft tissues mainly depends on the human body's own materials. The soft tissues can be either muscle tissues or fat tissues. The purpose of soft tissues reconstruction is to fully cover the bone structures and ensure that the wound has sufficient blood supply to ensure wound healing. Of course, soft tissue reconstruction is also conducive to obtaining a more beautiful appearance.

Skin reconstruction is often done at the same time as soft tissue reconstruction. When the defect area is small, the surrounding skin can be directly pulled to complete reconstruction. If the area is large, it needs to be reconstructed with various flaps [11-15]. Reconstruction can come from around, or from pedicled or free skin flaps of other parts of the body.

In chest wall reconstruction surgery, there is a special structure that needs to be emphasized, that is, the reconstruction of intercostal structure. Large gaps will remain in the process of chest wall reconstruction with some artificial materials. If these gaps are not eliminated, the reconstruction effect will be affected, so further reconstruction is required for these parts. The common method is to use various membrane materials for reconstruction. This reconstruction is called pleura reconstruction by some authors. Obviously, this name is not appropriate, because the essence of the operation is to eliminate the gap, not to repair the pleura. In fact, the pleura cannot be reconstructed.

The purpose of reconstruction is to restore the normal structure of chest wall [23]. The closer the reconstruction result is to normal, the more satisfactory the effect will be. However, in many cases, due to the limitations of the disease and conditions, it is impossible to completely restore

the normal structure, so the reconstruction effect can be divided into two levels. The primary effect is to ensure wound healing and maintain lung function and heart function. On this basis, if the appearance can be made as close to normal as possible, a high-level effect will be achieved. In the actual operation, if the primary effect is achieved, it can be regarded that the operation has been successful. Of course, if the appearance can be made as normal as possible, it will be the most satisfactory result.

Conflict of Interest

Not available

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Reference

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