



# International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958  
P-ISSN: 2706-6630  
IJOS 2022; 8(3): 217-219  
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[www.orthopaper.com](http://www.orthopaper.com)  
Received: 01-04-2022  
Accepted: 08-05-2022

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## The highest level of surgical treatment of pectus excavatum

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**DOI:** <https://doi.org/10.22271/ortho.2022.v8.i3d.3200>

### Abstract

Pectus excavatum is the most common thoracic deformity, and there are many surgical methods used in clinic. Almost all the previous operations were limited to one kind of procedure. The completion of the operation will directly affect the effect of the treatment of pectus excavatum. After long-term clinical Practice, we found that pectus excavatum can be treated with multiple methods at the same time. The use of these methods can completely correct the deformity and achieve the most satisfactory results. Thus, we have a new understanding of the treatment of this deformity. The treatment level of pectus excavatum itself is not the same as the level of mastering a certain surgical method. The highest level of pectus excavatum surgery is to make the most perfect treatment for this deformity, and it is absolutely not to skillfully complete a certain operation.

**Keywords:** Pectus excavatum, operation, evaluation

### Introduction

Pectus excavatum is the most common thoracic deformity and the most frequently treated deformity. The operation in the early years was an open operation. At that time, there were many specific methods, and generally they were destructive plastic surgeries [1, 2]. Because the characteristics of each patient's deformity are different, different methods need to be used for treatment. At that time, the surgery fully reflected the personalized content, so it was difficult to say which surgery was more ideal. In this period, the focus was on the effect of surgery, and no one overemphasized the role of a certain operation.

The second stage of pectus excavatum treatment is minimally invasive surgery, and the representative surgery is Nuss procedure [3]. Compared with open surgery, this operation has obvious advantages, which makes this operation rapidly popularized. For a long time, this operation became the only choice for the treatment of pectus excavatum. The doctor does not do anything except this operation, and the patient does not want to accept anything except this operation. Nuss procedure was thoroughly mythologized and became the synonym of pectus excavatum operation.

However, when the vast majority of people worship this kind of surgery blindly, some rational doctors also realize the disadvantages of it, and have been trying to eliminate these disadvantages [4]. It's obvious sign is the emergence of various improved surgical methods, but some defects of Nuss procedure cannot be eliminated by simple improvement, such as the possibility of heart injury and the limitation of operation for young children, which are directly related to the basic principle of Nuss procedure. As long as this operation is performed, these disadvantages cannot be eliminated no matter how much improvement is made. It is precisely because of the recognition of this cruel reality that the foundation for the emergence of new surgical methods has been laid.

In 2018, 20 years after the birth of Nuss procedure, a new surgical method appeared, which is Wang procedure [5, 6]. This operation adopts completely different principles and methods, which not only eliminates the disadvantages of Nuss procedure, but also has more advantages. Thus, the operation of pectus excavatum has undergone revolutionary changes.

The appearance of Wang procedure brought new breath to the treatment of pectus excavatum, but it also brought controversy. One of the controversies is that compared with Nuss procedure, namely, it is better and worse. For a long time, Nuss procedure has attracted a large number of fans around the world. The emergence of Wang procedure will inevitably cause such disputes. However, the superiority of the new operation cannot be denied after rational treatment, which provides more options for the treatment of pectus excavatum.

The appearance of new surgery makes the pectus excavatum surgery safer and simpler. However, Wang procedure also has disadvantages. In order to make the operation of pectus excavatum more perfect, it is necessary to abandon the preconceptions about the surgical methods. Only by making the correct choice according to the specific deformity characteristics can the operation be more perfect.

After the status of the new surgical method was confirmed, the treatment of pectus excavatum was undoubtedly improved. However, doctors still haven't got out of their conceptual problems. In the Nuss procedure era, the treatment effect of pectus excavatum is often measured by the completion quality of Nuss procedure itself. When the new surgery appears, doctors tend to choose a specific surgical method. They directly use the effect of this operation to evaluate the effect of pectus excavatum treatment. If the operation itself is defective, it will be regarded as the cost of the operation itself by the doctor, instead of reflecting on the operation method.

There are many examples in this regard. For example, Nuss procedure and Wang procedure are powerless to solve the problem of rib arch flaring. For these two operations themselves, even if there is rib arch flaring after the operation, it cannot be said that the operation is not done well. However, for the specific deformity of pectus excavatum, it is obviously not an ideal result that the rib arch flaring still exists. When a doctor can skillfully complete Nuss procedure and Wang procedure, it can be said that his technique is excellent. However, judging from the therapeutic effect of pectus excavatum, his technique is not flattering.

It can be seen that the treatment of pectus excavatum is not directly related to the doctor's mastery of a specific surgical technique. The ultimate criterion for evaluating the surgical effect should be the degree of deformity elimination. However, it can be known from a lot of clinical experience that in many cases, pectus excavatum cannot be completed by a single operation. Therefore, in order to do better, it is necessary to combine multiple methods to perform surgery. The simplest combination is Nuss procedure and Wang procedure. This combination can achieve a perfect effect in some special cases, and this effect is obviously better than that of a single operation.

However, in clinical practice, we found that even if Nuss procedure and Wang procedure were used at the same time, there would still be unsatisfactory results. At this time, to further improve the technology, it is even necessary to use more methods to participate in the operation. Our experience is to use Wenlin procedure in combination<sup>[7-12]</sup>. Since this operation can not only eliminate the protrusion but also eliminate the depression at the same time, it will obtain extremely satisfactory results.

To summarize the technical level of pectus excavatum treatment, it can be divided into four basic levels.

**Level 1:** Only open surgery can be used. Open surgery is not

an absolutely backward operation. For some special malformations, open surgery will have good results. However, for most ordinary pectus excavatum, the disadvantages of open surgery are obvious. Therefore, when doctors only use such surgery to complete the treatment, the level is not too high.

**Level 2:** Only Nuss procedure can be used. Compared with open surgery, Nuss procedure has many advantages. However, the disadvantages of this operation are also very clear. Due to its own design, this kind of operation cannot achieve the most perfect effect. Especially for some special patients, this kind of operation will have obvious complications. Therefore, the level of doctors who can only perform Nuss procedure cannot be regarded as too high.

**Level 3:** Wang procedure can be used on the basis of Nuss procedure. Wang procedure is different from Nuss procedure in principle, method and effect. However, Wang procedure has its own limitations, so this operation may not necessarily achieve perfect results. However, the two procedures can compensate for each other's shortcomings. If the two kinds of surgery can be skillfully selected and used, the technical level will be significantly improved, so as to reach a new height.

**Level 4:** The operations can be freely chosen according to the deformity characteristics and the best effect can be ensured. This is obviously the highest level. Nuss procedure and Wang procedure are both used for concave deformity. The flexible application of these two operations can achieve good results. However, in practice, sometimes these two operations alone cannot completely eliminate the deformity. If the field of vision can be expanded and all available thoracic deformity techniques can be used in the operation, the most perfect effect may be obtained. At this time, doctors are required not only to thoroughly understand the nature of deformity, but also to master all the techniques of deformity correction. When the doctor can choose the operation to correct the pectus excavatum according to his desire, he will reach the highest level.

From the above level division, it can be seen that the treatment level of pectus excavatum itself is not the same as the level of mastering a certain surgical method. The highest level of pectus excavatum surgery is to make the most perfect treatment for this deformity, and it is absolutely not to skillfully complete a certain operation.

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