Thoracic and Cardiovascular Surgery

To Nuss or Not to Nuss? Two Opposing Views

Francis Robicsek, MD, PhD,* and André Hebra, MD†

Although the issue of the appropriate approach for the repair of pectus excavatum remained unsettled for decades, just when we thought that the consensus was clear, an entirely new method was introduced: the Nuss operation. This technique now challenges not only the previously established standards, but also the basic conceptual views of pectus surgery. In the following text, 2 opposing views on the subject are presented: the angle from which Francis Robicsek, a pioneer in conventional pectus excavatum surgery, views the issue, and the opinion of Andre Hebra, who has extensive experience with the Nuss operation.

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Francis Robicsek, MD, PhD

Since Donald Nuss introduced first his operation entitled, "Minimally invasive technique for the correction of pectus excavatum" in 1997, at the 29th meeting of the American Pediatric Surgical Association, there has been an abundance of publications describing the technical details as well as the short- and midterm results of this procedure. Most, if not all, of these studies were neither prospective nor randomized and compared the Nuss operation to that described by Ravitch in 1949. Although the Ravitch operation indeed paved the way for modern pectus surgery, because of the need for extensive exposure and the less than optimal late results achieved, it has been largely abandoned. Most surgeons experienced in the repair of pectus deformities now use modifications that include not only bilateral resection of the costal cartilages, but also sternal remodeling and permanent sternal support. During the last decade, complying with the trends of modern surgery, these methods have been further altered such that they are performed through a small (8-10 cm) submammary skin incision.

Although the jury is still out as far as late results are concerned, there are no data that even remotely suggest that the outcomes of the Nuss operation exceed those of "open" procedures performed by experienced hands. Also, the operating time of the Nuss operation, especially if endoscopically assisted, is longer and costs more to perform. Double, if one considers the need for frequent follow-ups and the necessity of reoperation to remove the bar. Complications are more frequent and, if they occur, because of the sustained presence of the metal bar(s), they might be far more serious than those encountered after "open" repair.

One may add to the above that, although the skin incisions for the Nuss operation may be considered "minimally invasive" compared to the extensive exposure of the classic Ravitch procedure, the two 3- to 4-cm incisions (plus the hole for the videoscope) needed to perform the Nuss procedure certainly "add up" to the single 7- to 8-cm submammary incision needed to perform an up-to-date limited-exposure "open" pectus repair. Also, how can anybody call an operation "minimally invasive" in which 2 × 12-cm metal rods are driven through both pleural cavities, passed by the width of a hair between the heart and the sternum and left there for extended periods, and then 2-4 years later the same procedure is performed in "reverse"?

This particular aspect of the "left-in" precordial metal bars which, like the sword of Damocles threatens health and life, outweighs all the perceived advantages of the Nuss operation. That this is indeed the case is proven by the virtually unprecedented number of case reports describing various and often serious complications heretofore unknown: fracture, rotation, displacement of the bar, metal allergy, infection, and hemorrhage occurring months, even years, after surgery, life-threatening, even deadly, injuries to adjacent organs (primarily the heart), either intraoperatively or late after surgery, stubborn pericardial and pleural effusions, obstruction of the thoracic inlet and/or the caval veins, erosion of the sternum, mammary artery pseudoaneurysm—and so

*Department of Cardiovascular and Thoracic Surgery, Carolinas Medical Center, Charlotte, North Carolina.
†Division of Pediatric Surgery, Medical University of South Carolina, Charleston, South Carolina.
Address reprint requests to Francis Robicsek, MD, PhD, 1001 Blythe Blvd., Ste. 300, Charlotte NC 28203. E-mail: FRobicsek@carolinashealthcare.org

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Figure 1 The average skin incision used in recent pectus excavatum and carinatum repairs.

on. Unfortunately, most of these events occur not only as part of the "learning curve" but also in experienced hands! Considering that the need for correction of pectus excavatum, even half a century after its introduction, is still unsettled and in the lion's share of cases indication is cosmetic rather than physiological need, it is rather difficult to reconcile it with the words of Hippocrates: "Thou should do no harm." Recent, large series report complications of 20%. This is unacceptably high.

The argument that open repair of pectus excavatum may induce development of acquired thoracic restrictive dystrophy does not hold water. We strongly believe that restrictive thoracic dystrophy should never occur following a properly performed open pectus excavatum repair. Furthermore, the repair may be performed even at a very early age, but it has to be performed correctly.

By contrast, it is a specific concern as how the Nuss bars may affect the costal cartilages of the growing child? These metal girdles (sometimes as many as 3) not only splint but may also restrict the growth of the anterior chest wall.

An issue that is clearly related to the changes observed (fractures, angulation) in the elongated and unresected rib cartilages that are forcefully reshaped by the insertion of a bar is the prolonged postoperative pain after the Nuss procedure, present especially in older patients.

Another important matter that should be pointed out is the length of postoperative evaluation of the outcome of surgical correction. The term "postoperative" after the Nuss procedure should be used only after the metal bars are removed. This could take up to 4 years!

After all the above is said, one may wonder how the Nuss operation became so popular and is now considered by many the "gold standard" of pectus excavatum repair?

The answer is complex and controversial. First, the proponents of the procedure successfully injected into the debate the magic words of contemporary medicine: "nonsurgical" and "minimally invasive"—nonetheless that the Nuss procedure requires 2 operations and 4-5 incisions and that it is more invasive than any other pectus operation save Juro Wada's sternal turnover. The second reason for the popularity of the

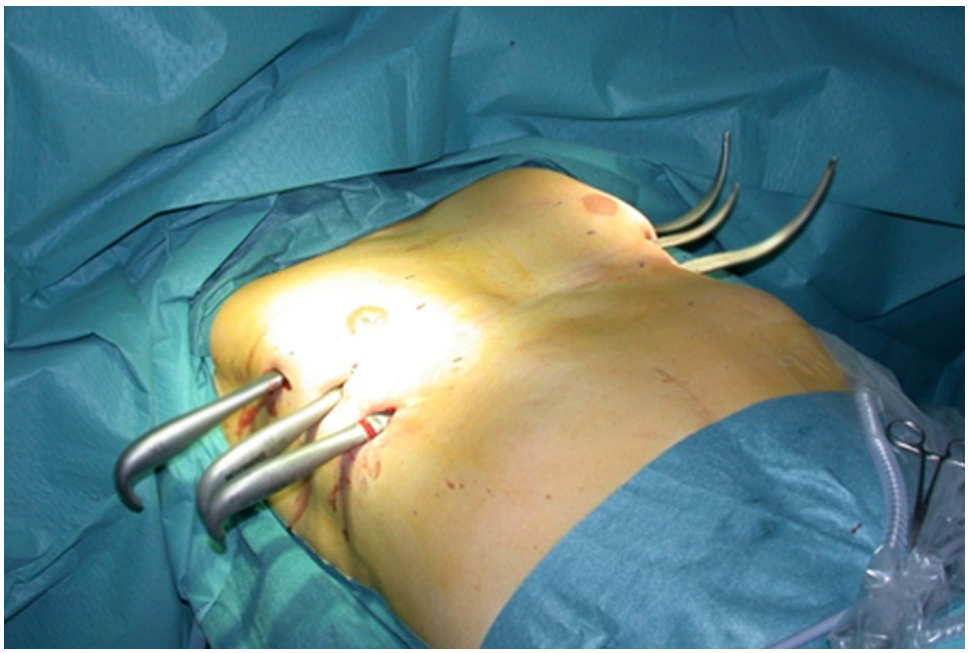

Figure 2 Metal introducers used in the course of a "minimally invasive" Nuss operation. (Photo courtesy of Dr. Hans Pilegaard.)