When four plus four is less than eight: the Nuss operation

In the course of the operation one or more (up to three) 2 × 12" metal bars are driven through both pleural cavities and the mediastinum in front of the heart and may be left there for years.

It is labeled as a 'Minimally invasive technique for the correction of pectus excavatum' [1].

Keywords: Nuss procedure; Stabilizer plates

The idea of using plates which gradually disintegrate seems to defy their purpose. As one may expect, in the series presented bar-dislodgement was frequent and the authors wisely discontinued their use. One, however, may question why they even tried to use degradable stabilizers in the first place, when removal of the steel-bars they are attached to makes reoperation inevitable anyhow?

Considering the issues, such as the one above, one may be inclined to address the entire subject of the new and undoubtedly controversial procedure of the Nuss operation itself.

Since Donald Nuss first introduced his operation entitled, 'Minimally invasive technique for the correction of pectus excavatum' [1] in 1997, at the 29th Meeting of the American Pediatric Surgical Association, there has been an abundance of publications describing technical details as well as short and mid-term results of this procedure. Most, if not all these studies were neither prospective nor randomized, and compared the Nuss operation to that described by Ravitch in 1949 [3]. While 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 which include not only bilateral resection of the costal cartilages, but also sternal remodeling and permanent sternal support [4]. During the last decade, complying with the trends of modern surgery, these methods have been further altered to be performed through a small (8—10 cm) submammary skin-incision.

While the jury is still out as far as late results are concerned, there is no data which even remotely suggests 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 while the skin incisions for the Nuss operation may be considered 'minimally invasive' compared to the extensive exposure of the classic Ravitch procedure [3], the two 3—4 cm cuts (plus the hole for the videoscope) needed to perform the Nuss procedure certainly 'adds up' to the single 7—8 cm submammary incision needed to perform an up-to-date limited-exposure 'open' pectus repair [4]. Also, how can anybody call an operation 'minimally invasive' where 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 time periods, and then a year or two later perform the same procedure in 'reverse'?

This particular aspect of the 'left-in' pre-cordial 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, flipping, rotation, lateral sliding and disruption 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 on. Unfortunately, most of these events occur not only as part of the ‘learning curve’, but also in experienced hands! [5] 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 cosmesis 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 unacceptable high.

Another specific concern is how the Nuss bars may affect the costal cartilages of the growing child? These metal girdles (sometimes as many of three) not only splint, but may also restrict the growth of the anterior chest wall. This recalls the disaster manifested many years after overzealous removal of the growth center of coastal cartilages resulting in iatrogenic restrictive thoracic dystrophy [6,7].

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 of all, the proponents of the procedure successfully injected into the debate the magic words of contemporary medicine: ‘non-surgical’ and ‘minimally invasive’; regardless of the fact that the Nuss procedure requires two operations, 4—5 incisions and it is more invasive than any other pectus operation save Juro Wada’s sternal turnover [8]. The second reason for the popularity of the Nuss procedure may be the lack of necessity of partial chest wall resection. This allowed specialists, not formally trained in thoracic surgery, to enter a new area uncharted by all but thoracic surgeons. As usually happens in the effort of turf-protection, many thoracic surgeons readily followed, especially because of the news that ‘pectus excavatum now may be corrected without surgery’, induced patients and pediatricians alike to accept the procedure who otherwise may have been reluctant to proceed with correction of the anomaly.

There are some overdue tasks regarding the Nuss procedure: we need well controlled, evidence-based trials which compare the major clinical and economical aspects of this innovative procedure, not the long-outmoded Ravitch operation, but up-to-date much more effective and less invasive open operations, such as the one-stage, mesh-supported sternoplasty [3]. In the meantime, it is our obligation that relevant information already available on the virtues and shortcomings of the Nuss operation be revealed to the parties involved, in a way to allow them to render a truly informed consent of choice.

References


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