Efficacy and Safety of Novel Modified Nuss Procedure for Pectus Excavatum with A New Steel Bar

Department of Cardiothoracic Surgery, Xinhua Hospital, Shanghai Jiaotong University School of Medicine, Shanghai, China

Ju Mei, Guoqing Li, Zhaolei Jiang, Fangbao Ding
No disclosure
Background

- Nuss procedure is considered the most popular minimally invasive technique for the correction of pectus excavatum.
- However, the installation and removal of steel bar sometimes is difficult and traumatic in Nuss procedure.
- To simplify the procedure and decrease the difficulty and trauma, we designed a new steel bar and applied it in minimally invasive surgical correction for pectus excavatum.
- The aim of this study is to examine the efficacy and safety of this novel modified Nuss procedure for pectus excavatum with the new steel bar.
Bar Configuration

- One end of the steel bar is fused with bar stabilizer, and the other end is designed to connect with the introducer or stabilizer.
- The steel bars are divided into large and small sizes according to different lengths, thicknesses, and widths. The small size is used for children, and the large size is used for adolescents or adults.
- The steel bars have 15 different specifications, which are distinguished by the different lengths, which vary from 12 to 26 cm.
Bar Accessories

- Bar accessories include the introducer, stabilizer, and gasket.
- The introducer and stabilizer are of different sizes to match the bars of different sizes.
Technique

- The distance between the bilateral anterior axillary lines of the intercostal level corresponding to the lowest point of the sternum is measured intraoperatively.
- The length of the bar is 2 to 3 cm longer than the distance.
- A 5mm diameter thoracoscope is used to guide the procedure.
- Bilateral vertical skin incisions about 1.5 to 2.5 cm are made near the middle axillary line.
Technique

- After the bar is tied to the end of the introducer, the introducer is inserted into the right thoracic cavity.
- The bar is pushed in and pulled out through the tunnel after the introducer without turning it over, and the deformity is corrected.
- After the introducer is removed, a stabilizer is placed on the left side of the bar to support and fix the bar.
Preoperative & Postoperative CT
Bar removal

- After the surgery, the bar is removed between 1.5 and 4 years depending on growth
Clinical Experience----Patients

- From July 2010 to July 2011, 147 patients with pectus excavatum underwent this novel modified Nuss procedure
- 118 male and 29 female
- Age: 3-35 years (mean, 10.35±6.72 years; median, 9 years)
- Haller index: 3.38 – 15.23 (mean, 4.83±1.41; median, 4.52)
- Symmetrical pectus excavatum 102 cases
- Asymmetrical pectus excavatum 35 cases
- Recurrent pectus excavatum 10 cases
Clinical Experience----Early results

- The novel modified Nuss procedure was successfully performed in all patients
  - 1 bar was placed in 144 cases (98.0%)
  - 2 bars were placed in 3 cases (2.0%)
- 3 patients (2.0%) had a unilateral thickening gasket placed
- 4 patients (2.7%) had lengthening gasket placed
  - 3 unilateral; 1 bilateral
Clinical Experience——Early results

- Operation time
  - 25.25±2.37 mins for primary pectus excavatum
  - 63.76±29.15 mins for recurrent pectus excavatum

- Postoperative hospital stays: 3 to 8 days (mean, 4.85±0.22 days)

- All patients had a satisfactory orthopedic result at discharge

- There was no perioperative death or cardiac perforation
Clinical Experience----Follow-up results

- Follow-up time: 32 – 44 months (mean, 35.8±5.2 months)
- Steel bars were in the original position in 132 patients (89.8%) before the bar was removed.
- Of the other 15 patients, 3 patients (2.0%) with significant bar shift required reoperation, the bar shifted slightly in 12 patients.
- 134 patients underwent bar removal during the follow-up.
  - Orthopedic and functional results were excellent in 121 cases (90.3%).
  - Haller index: 2.67±0.18; median, 2.59.
  - No patient had recurrence.
- The other 13 patients are waiting for the bar removal.
Conclusion

- This novel modified Nuss procedure is a safe, effective, and convenient treatment for pectus excavatum
- Main advantages of this novel modified Nuss procedure:
  - All the steel bars are premade into different sizes
  - Both bar installation and removal are convenient and less traumatic
  - Less postoperative pain and no limitation of the growth
- Long-term follow-up are warranted
Thanks