Dangerous complication following Nuss procedure for recurrent pectus excavatum.

Xenophon Sinopidis¹, Evangelia Rahmani², Athanasios Zavitsanakis³

¹Lecturer of Pediatric Surgery, Clinic of Pediatric Surgery, University of Patras Medical School, Patras, Greece
²First Clinic of Pediatric Surgery, Gennimatas Hospital, Aristotle University of Thessaloniki Medical School, Thessaloniki, Greece
³Professor of Pediatric Surgery, First Clinic of Pediatric Surgery, Gennimatas Hospital, Aristotle University of Thessaloniki Medical School, Thessaloniki, Greece

ABSTRACT: A 12 year old male patient underwent Nuss operation for pectus excavatum, after a failed Sulamaa operation. Tension pneumothorax and subcutaneous emphysema followed. Combination of subcutaneous emphysema with bilateral tension pneumothorax is extremely uncommon. Subcutaneous emphysema should be regarded as an early clinical sign for further respiratory deterioration.

Key Words: Nuss operation, Pectus excavatum, Subcutaneous emphysema, Tension pneumothorax, Children.

INTRODUCTION

When Nuss operation was introduced, the method with the curved strut, positioned thoracoscopically under the sternum, outshone every other technique used for the repair of pectus excavatum. However, even the most minimally invasive procedures cannot escape complications. Under this perspective, we mention an uncommon combination of subcutaneous emphysema with bilateral tension pneumothorax.

CASE REPORT

A twelve year old male patient was operated for pectus excavatum after a failed previous Sulamaa operation performed three years earlier. The metallic strut of the first operation was broken, and was removed during the tenth postoperative month. The patient presented with pectus excavatum (Haller index 4.7). After normal cardiac and respiratory tests and thorax computed tomography scanning, he underwent Nuss operation. The procedure was performed by an experienced pediatric surgical team. Under thoracoscopic vision, multiple adhesions between the right lung and pleura were divided, in order to insert safely the malleable metal bar. A Medexpert pectus excavatum system was used. The bar slid easily under the sternum, rotated 180°, resulting to complete correction of the sternal anomaly. An underwater pleural drainage seal system was placed through the lower of the two thoracoscope entrances at the right side of thorax.

On the second postoperative day, the patient presented major discomfort, including tachypnea, tachycardia, thoracic pain, and subcutaneous emphysema of bilateral distribution at the upper chest. A plain chest radiograph showed bilateral tension pneumothorax (Figure 1). A second chest tube, connected to continuous suction, was placed higher from the first one. Both drains were removed after ten days, when the lungs expanded completely. Subcutaneous emphysema persisted for five more days.

Corresponding author: Xenophon Sinopidis, Mailing address: 20B Marikas Kotopouli St, Patras 264 42, Greece, Tel. 26136 03813, 2610 431873, 6944 462924, email: xsinopid@otenet.gr
Nuss operation is already a milestone in the treatment of pectus excavatum, twenty years after it was introduced. The curved bar which is inserted behind the sternum, to correct the chest deformity aided by thoracoscopy, lifted the burden of sophisticated, though traumatizing, hemorrhagic and complicate techniques such as the Ravitch, the Rehbein and others.

During this period of experience, the complications of minimally invasive pectus excavatum repair have been already recognized and codified. In a review including 19 reports within 20 years (1987-2007) on 1949 children, the overall incidence of morbidity was 15.4%, with most common complications being bar displacement (5.7%), pneumothorax (3.5%), wound infection (2.2%), and atelectasis or pneumonia (2%)\(^5\). Similar complication rates were noted in a report on 335 patients treated with Nuss operation: bar displacement 3.6%, pneumothorax 6.9%, including one case of tension pneumothorax, wound seroma 4.5%, pericarditis 2.4%, pneumonia 0.9%, and hemothorax 0.9\(^6\).

A report from the first team of Donald Nuss, regarding 50 patients undergone re-do operation for pectus excavatum, showed increased frequency of pneumothorax on 35 patients (70%), with 12 (24%) requiring a chest tube. Hemothorax, pericarditis, pleural effusion, wound infection and pneumonia ranged from 2 to 8%, while bar displacement affected 14% of patients\(^5\). Nuss suggests that a postoperative chest tube is helpful in managing the inevitable lung leak and oozing that follows the lysis of pulmonary adhesions in redo operations\(^6\).

Among postoperative complications after secondary Nuss procedures, among them frequently present pneumothorax, the combination of subcutaneous emphysema, combined with bilateral tension pneumothorax is extremely uncommon\(^7\)\(^-\)\(^11\). We attributed the cause of this complication to the dissection of the pleural adhesions from the first unsuccessful operation. We suggest, and give as a message, that at in any case where subcutaneous emphysema is present, it should alert for incoming tension pneumothorax, and severe respiratory deterioration.

**DISCUSSION**

Nuss operation is already a milestone in the treatment of pectus excavatum, twenty years after it was introduced. The curved bar which is inserted behind the sternum, to correct the chest deformity aided by thoracoscopy, lifted the burden of sophisticated, though traumatizing, hemorrhagic and complicate techniques such as the Ravitch, the Rehbein and others\(^1\)\(^,\)\(^2\).

During this period of experience, the complications of minimally invasive pectus excavatum repair have been already recognized and codified. In a review including 19 reports within 20 years (1987-2007) on 1949 children, the overall incidence of morbidity was 15.4%, with most common complications being bar displacement (5.7%), pneumothorax (3.5%), wound infection (2.2%), and atelectasis or pneumonia (2%)\(^5\). Similar complication rates were noted in a report on 335 patients treated with Nuss operation: bar displacement 3.6%, pneumothorax 6.9%, including one...
Επικίνδυνη επιπλοκή εγχείρησης Nuss για την αντιμετώπιση υποτροπής σκαφοειδούς στέρνου.

Ξενοφών Σινωπίδης1, Ευαγγελία Ραχμάν2, Αθανάσιος Ζαβιτσανάκης3

1 Λέκτορας Παιδοχειρουργικής Παιδοχειρουργική Κλινική Ιατρικής Σχολής Πανεπιστημίου Πατρών
2 Α’ Κλινική Χειρουργικής Παιδιών Ιατρικής Σχολής Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης
3 Καθηγητής Χειρουργικής Παιδιών. Α’ Κλινική Χειρουργικής Παιδιών. Ιατρικής Σχολής Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης

ΠΕΡΙΛΗΨΗ: Αγόρι ηλικίας 12 ετών υποβλήθηκε σε εγχείρηση Nuss για τη διόρθωση σκαφοειδούς στέρνου, μετά από αποτυχημένη εγχείρηση Sulamaa. Ακολούθησε συνδυασμός πνευμοθώρακα υπό τάση και υποδόριου εμφυσήματος. Ο συν-δυασμός των δύο επιπλοκών είναι εξαιρετικά σπάνιος και η εμφάνιση υποδορίου εμφυσήματος θα πρέπει να θεωρείται ως πρόκειται για πρώτο κλινικό σημείο επικίνδυνης αναπνευστικής δυσχέρειας.

Αξέχαστα Κλειδιά: Εγχείρηση Nuss, Σκαφοειδός στέρνο, Υποδόριο εμφύσημα, υπό τάση πνευμοθώρακα, Παιδιά.

REFERENCES