



Modification of the Nuss procedure for pectus excavatum to prevent cardiac perforation

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Abstract

Purpose: In a few patients, cardiac perforation and aortic injury have occurred during the Nuss procedure for pectus excavatum. The article details a modification of this procedure that enables the prevention of fatal complications.

Methods: Our subjects were 22 males and 13 females with pectus excavatum who were aged 8.2 ± 3.7 years. Their Haller's computed tomography index was 5.2 ± 1.5 . An introducer is inserted into the pleura between the sternum and thymus instead of the thoracic depression under right thoracoscopic guidance. After the introducer reaches the internal cranial position of the left nipple, the thoracoscope is shifted to the left thoracic cavity. The introducer is subsequently guided to the left highest intercostal space under left thoracoscopic guidance.

Results: A single bar was inserted in 34 patients; 2 bars were required in 1 patient. The operating time was 95 ± 27 minutes and blood loss was 11 ± 6 g. Cardiac perforation did not occur in any patient.

Conclusions: Our modified technique has certain advantages: (1) the introducer does not rub against the pericardium and heart; (2) the tip of the introducer can be observed at all times with a thoracoscope; (3) the anterior mediastinum between the left and right thoracic cavities is very narrow at the cranial level; (4) the introducer can be accurately directed to the left highest intercostal space; and (5) hemostasis and no injury of the bilateral thoracic organs can be confirmed.

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The Nuss procedure is a widely accepted technique for correcting pectus excavatum. However, fatal complications such as cardiac perforation or aortic laceration have been reported in a few patients during the procedure [1-7]. This article details a modification of the Nuss procedure involving passing of an introducer through the anterior mediastinum to prevent these fatal complications.

1. Materials and methods

1.1. Patients

The subjects were 35 patients (22 males and 13 females) with pectus excavatum (age, 8.2 ± 3.7 years; range, 5.0-18.3 years) who had not undergone any surgery for correction of the same. Of the subjects, 1 had undergone the repair of the left diaphragm with an artificial sheet for congenital diaphragmatic hernia in the neonatal period; the remaining

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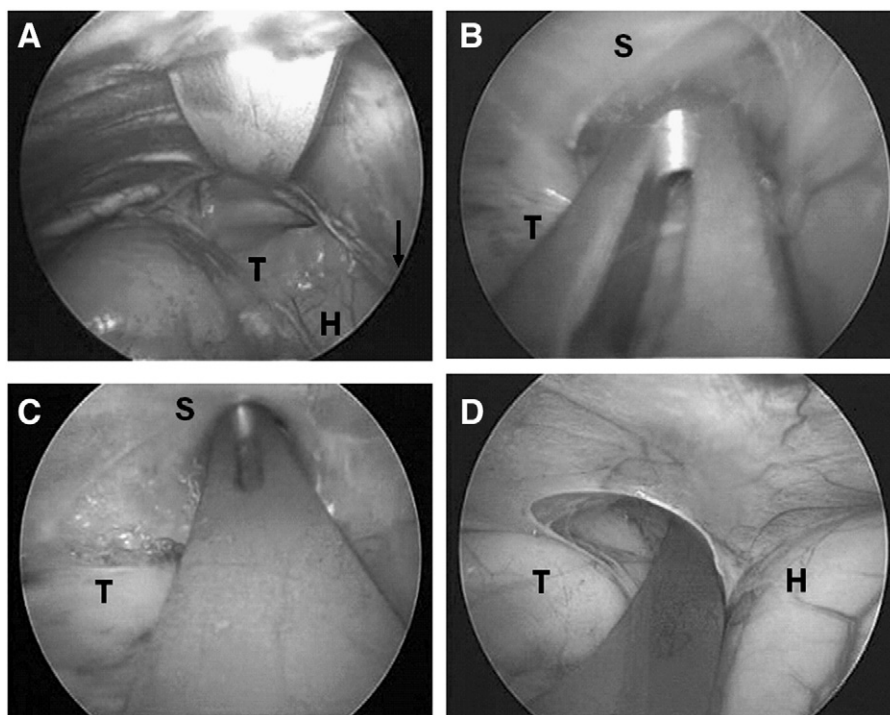


Fig. 1 Maneuvering of the introducer in the right thoracic cavity. A, The introducer is inserted into the mediastinal pleura between the upper sternum and caudal pole of the thymus instead of the excavatum deformity (arrow). B, It penetrates the mediastinal pleura between the sternum and thymus. C, It is passed through the anterior mediastinum toward the left thoracic cavity under right thoracoscopic guidance. D, After its tip reaches the internal cranial position of the left nipple, maneuvering of the introducer is suspended, and the thoracoscope is shifted to the left thoracic cavity. T indicates thymus; H, heart; S, sternum.

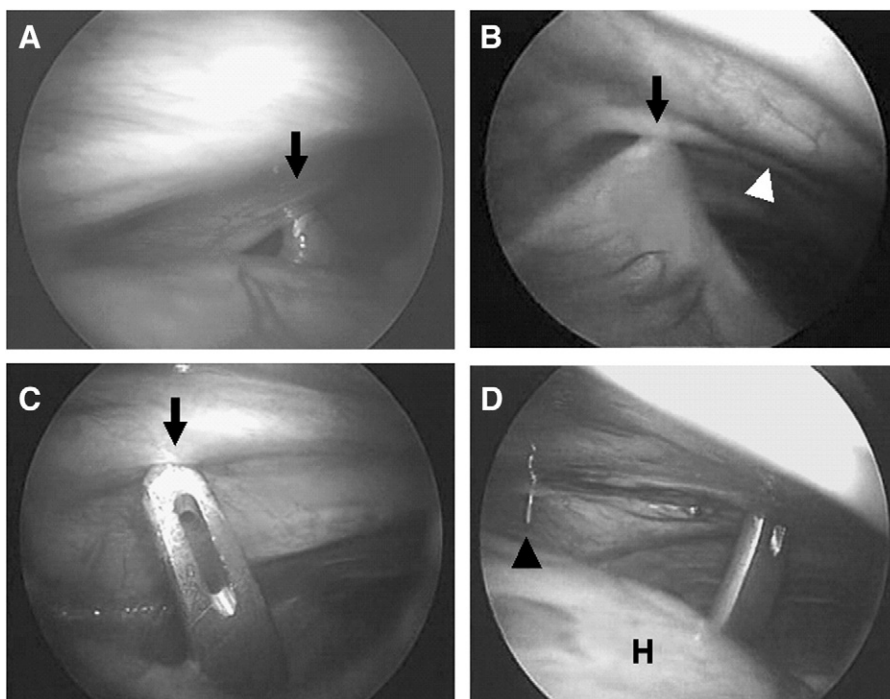


Fig. 2 Maneuvering of the introducer in the left thoracic cavity. A, When a thoracoscope is advanced cranially beyond the heart, the tip of the introducer that pushes up the pleura (arrow) can be observed. B, On pushing the left HICS from the surface, the destination can be indicated (white arrow head). C, The introducer is thoracoscopically guided toward the left HICS. D, If the left HICS cannot be identified clearly, inserting a needle (black arrow head) into the HICS shows the appropriate destination, and the tip of the introducer can penetrate the intercostal muscles at the left HICS accurately. H indicates heart.

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