A technique for complex pectus excavatum repair: the cross-bar technique for grand canyon type deformity (Park classification)

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Clinical vignette

I report a case of pectus excavatum repair using the "cross-bar technique". The patient was an 18-year-old male. According to the Park classification (1), the deformity was type 2A3R, eccentric long canal type (the Grand Canyon type). The computerized tomography indices were depression index 1.57, Haller index 3.67, asymmetric index 1.05, and eccentricity index 1.62.

Surgical techniques

Preparation

In the supine position, both arms are hanging freely to the overhead crossbar on the operating table. The entire anterior chest and both groins are prepared and draped.

Exposition

One-centimeter skin incisions on both lateral chests were made. The pectus bars were introduced into the respective hinge points, where the pectus bar entered the thoracic cavity through the subcutaneous dissection. The bar was positioned under the depressed chest wall with its convexity facing downward.

Operation

I shaped the pectus bar (Primemed, Seoul, Korea) asymmetrically to conform to the patient's eccentric deformity (Terrain Contour Matching) (2). The sternum was elevated using the table mounted crane system (the Omni Crane, Primemed, Seoul, Korea) with sternal wiring (2). The bars were introduced with the visually guided dissection, using the Pectoscope (Primemed, Seoul, Korea). I planned to use three bars to lift the long canal shaped chest wall depression and remodel the whole anterior chest wall (The Cross-Bar Technique). To accomplish this, the first and second bars were positioned to cross each other at the target in the pleural cavity. The third bar was placed horizontally above the level of the nipples to lift the second target at the upper chest. All three bars were connected to the bridge plate (Primemed, Seoul, Korea) on both sides (3). To support the hinge points, I mounted hinge plates (Primemed, Seoul, Korea) on both principal hinges (4) (*Video 1*).

Completion

I placed a small bore catheter (Hemo-vac) in the pleural space to prevent pneumothorax and in the wound pockets to drain the fluid. The wounds were closed after inserting local anesthetic infusion catheters (On-Q Pain Relief System, I-Flow, Lake Forest, CA, USA).

Comments

Clinical results

In my database with 2,658 consecutive pectus deformity repair, 384 (14.4%) patients were the Grand Canyon type according to Park morphological classification (1). I have been using this cross bar technique since January 2016 in 14 patients and obtained satisfactory aesthetic outcomes

without complications such as bar displacements or reoperations.

Advantages

This technique enabled us to save the lateral part of the chest wall where the pectus bars compress the ribs at the hinges, and lift the multiple targets without residual depressions. The bridge connection of all three bars together eliminates bar dislocation.

Caveats

I feel that this technique is the best so far, in terms of quality of repair outcomes and stability of pectus bars. However, longer-term evaluation in a larger patient cohort is necessary to confirm our early findings. It is noteworthy that crane elevation of the sternum and bridge fixation of the bars seems to be the crucial technique for the safe and successful procedure. There was a similar approach with the cross bars in the literature (5). My technique of cross-bar aims to cover not only the promontory of the depression, but also the whole anterior chest wall, including lateral parts by avoiding hinge compressions and residual depressions. The bridge fixation makes the bars un-rotatable.

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None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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