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Mini Research Article

A Novel Sternal Crane for Pectus Excavatum Using Standard Surgical Instruments - The Kolvekar Technique

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Abstract

Purpose: The crane proposed uses standard surgical equipment to elevate the sternum for the correction of pectus excavatum which has advantages over traditional methods requiring specific instruments.

Description: The design uses equipment readily available in the repair of pectus excavatum to reduce the cost and relieve the requirement of additional equipment.

Evaluation: In a cohort of 10 people to assess the feasibility and efficiency of the crane, the technique was used successfully 10 times to allow for the repair of pectus excavatum.

Conclusions: This low-cost, practical sternal crane system facilitates safe sternal elevation and improves visualisation during Nuss procedures. It can be easily adopted by surgical teams worldwide without the need for specialised equipment.

Keywords: Sternal Crane; Pectus Excavatum

Introduction

In minimally invasive repair of pectus excavatum (MIRPE), adequate elevation of the sternum is critical for safe and effective passage of the introducer and bar [1]. Traditional methods such as the vacuum bell or external retraction systems have limitations, especially in adult patients or cases with deep deformities [2]. We propose a cost-effective and reproducible method using standard instruments readily available in most operating theatres.

Technique

Our novel sternal crane construct involves the following components to set up the Kolvekar Crane Technique. These are readily used during the insertion of a corrective bar.

- **Seller's Rib Approximator**: Used as the structural backbone of the crane (Figure 1).
- **Side Bar Drape (Metal)**: Clamped securely to the operating table side rail to anchor the crane (Figure 2).

- **Sternal Wires (Stainless Steel)**: Passed through the anterior table of the sternum using a sternal needle, then looped and secured to the arm of the rib approximator.
- **Artery Forceps**: Used to tension and fix the wire over the arm of the crane.

Figure 1: Sellors Rib Approximator Jaws (side profile).

Figure 2: Sellors on Side bar for lift.

Method

- Under general anaesthesia, a small anterior parasternal incision is made.
- A sternal wire is inserted into the anterior cortex of the sternum (avoiding the posterior table).
- The wire is externalised and looped around the arm of the Seller's rib approximator.
- The approximator is anchored via the drape clamp to the surgical side bar.
- Gradual tension is applied using artery forceps or the approximator screw mechanism.
- The elevated sternum allows safe retrosternal passage of the introducer and bar (Figure 3).

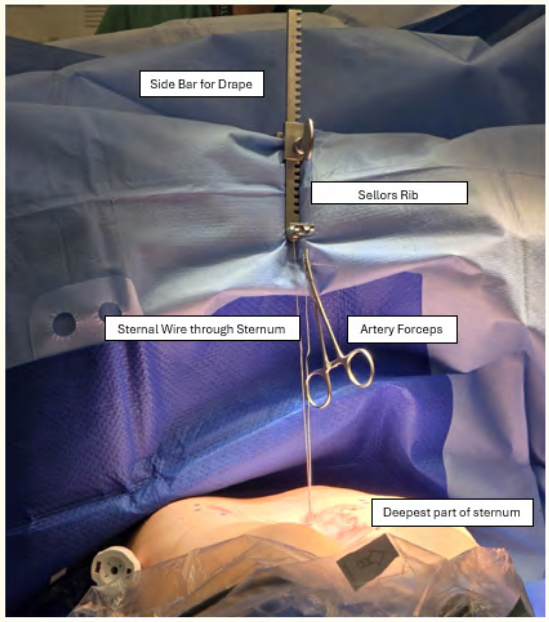

Figure 3: Kolvekar Crane Technique.

Clinical experience

This method has been used successfully for 10 corrections of Pectus excavatum during this trial across different trust. It successfully elevated the sternum to allow for a safe passage of the bar through the thoracic cavity.

Comments

Advantages

- No need for expensive proprietary devices.
- Readily available instruments.
- Controlled, steady elevation.
- Particularly useful in deep or rigid chest wall deformities.
- Avoids risk of compression or displacement compared to vacuum elevation.

Freedom of investigation

The equipment was already available as part of the instruments used for the surgery.

The authors had full control over the use, design and method of the technology, as well as outcome parameter, analysis of data, and production of the written report.

Bibliography

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