

Surgical correction of pectus arcuatum

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Background: Pectus arcuatum is a rear congenital chest wall deformity and methods of surgical correction are debatable.

Methods: Surgical correction of pectus arcuatum always includes one or more horizontal sternal osteotomies, resection of deformed rib cartilages and finally anterior chest wall stabilization. The study is approved by the institutional ethical committee and has obtained the informed consent from every patient.

Results: In this video we show our modification of pectus arcuatum correction with only partial sternal osteotomy and further stabilization by vertical parallel titanium plates.

Conclusions: Reported method is a feasible option for surgical correction of pectus arcuatum.

Keywords: Chest wall deformities; pectus arcuatum; Currarino-Silverman syndrome; pouter pigeon chest; surgical correction

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Introduction

Pectus arcuatum (other names pouter pigeon chest, Currarino-Silverman syndrome, chondro-manubrial deformity, type 2 pectus carinatum) is a rear congenital chest wall deformity with main feature being protrusion and early ossification of Sternal (Lewis) angle together with bilateral deformity of 2nd to 4th cartilages (1). Pectus arcuatum is often misdiagnosed as combination of pectus carinatum and pectus excavatum, however, there is no sternal depression and visual appearance is formed by costal cartilages protrusion.

Methods

Patient selection

In majority of cases pectus arcuatum is a pure cosmetic problem (Figure 1). Congenital heart defects are reported occasionally as well as simultaneous Poland syndrome. CT scan with 3-D reconstruction is very informative for

surgery planning (Figure 2A and 2B). Routine preoperative check up is needed. Different opinions exist about age of surgery. Since it is more cosmetic there is no need in early interventions. Due to necessity to resect cartilages late puberty or adulthood is preferred, since by that age the growth of ribs is finished.

Preoperative preparation

Patients are usually young adults without comorbidities and no special preparation is needed.

Equipment preference card

- Basic thoracic instruments set;
- Instruments for cartilages/ribs/sternum resection (bone elevators, rongeurs, chisel and hummer or power saw);
- Titanium locking 2.4 mm reconstructive plates with self-tapping bicortical screws (DePuy Synthes, Switzerland).

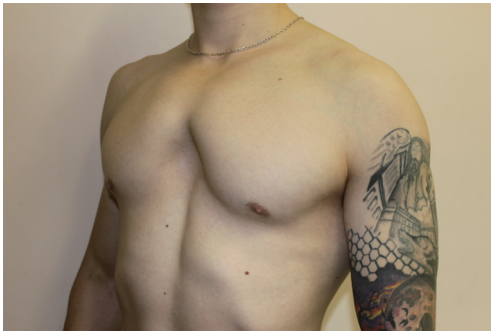


Figure 1 Pectus arcuatum.

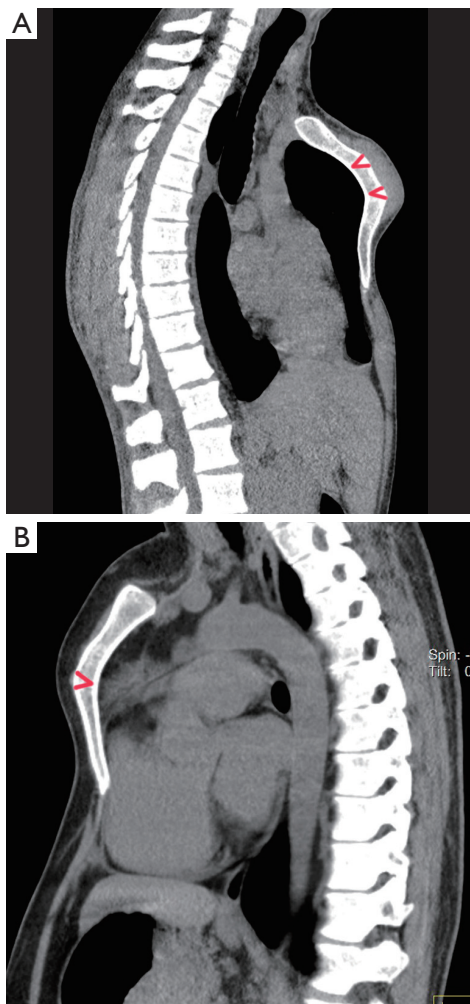


Figure 2 Planning of V-shape osteotomy. (A) 2-level osteotomy; (B) 1-level osteotomy.



Figure 3 Surgical correction of pectus arcuatum (2). This video shows steps of procedure in male (vertical midline incision) with 2-level osteotomy and female (submammary incision) with 1-level osteotomy. Available online: <http://www.asvide.com/articles/914>

Procedure

General anesthesia, endotracheal, epidural catheter for postoperative analgesia.

Supine position with hands aside.

Steps of procedure:

- Incision: submammary in females and vertical midline in males;
- Musculocutaneous flaps are raised till the level of sternal notch;
- Subperichondrial bilateral resection of 2nd till 4th rib cartilages with careful preservation of posterior perichondrium. In selected rigid cases addition limited resection or transection of 5–7 cartilages at the sternal end. Perichondrium is separated from cartilage easily in adolescents and young adults. With age it fuses to cartilage and sometimes it is difficult to find correct layer. Surgeon should keep in mind that complete removal of cartilage with perichondrium may result in irreversible chest wall weakness. In such situation we prefer partial cartilage removal and suturing it at the end of procedure;
- V-shape horizontal partial sternal resection at the top of deformity with preservation of posterior cortex. Can be done both by hummer and chisel [as shown in the video (*Figure 3*)] or by power saw;
- Remodeling of sternum by downward pressure at the top of deformity and upward pulling of sternal body.

This maneuver causes breakage (if sternum is rigid) or bending of posterior cortex but without disruption of posterior periosteum;

- Sternal osteosynthesis by parallel vertical low profile titanium plates (DePuy-Synthes, Switzerland). It is preferable to make bicortical fixation. Vertical parallel position of plates allows future possibility of midline sternotomy;
- Submuscular drainage, approximation of pectorals and wound closure.

Video (*Figure 3*) shows steps of surgical correction of pectus arcuatum in male (vertical midline incision) with 2-level osteotomy and female (submammary incision) with 1-level osteotomy.

Post-operative management

Early activation, usually next day walking under control, epidural catheter removed day 3–4, drains removed day 5 (if less than 50 cc drained), discharged from the hospital day 6. No contact sports for 6 months.

Results

In this video we show our modification of pectus arcuatum correction with only partial sternal osteotomy and further stabilization by vertical parallel titanium plates.

Conclusions

Several methods of surgical correction are described previously (3–5) sternal osteotomy being an essential part of correction. Method presented here is completely extrapleural, without retrosternal support and with no need

of second surgery for hardware removal.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: The study was approved by the University of Louisville IRB. Written informed consent was obtained from the patient. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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