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OPEN OPERATING THEATRE (OOT)

Circumferential convex growth arrest by posterior approach for double cervicothoracic curves in congenital scoliosis

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Keywords Epiphysiodesis · Spinal growth arrest · Congenial scoliosis · Cervical hemivertebra · Thoracic hemivertebra · Navigation · Free hand technique · Pedicle screw

Learning targets

- To achieve anterior and posterior spinal growth arrest using pedicle screw and posterior approach.
- To learn free hand technique pedicle screw insertion in thoracic congenital scoliosis.
- To learn navigated pedicle screw positioning in cervicothoracic congenital scoliosis.

Introduction

Hemivertebra resection is a standard treatment for congenital scoliosis due to an isolated hemivertebra.

There is no well-defined treatment for hemivertebra associated with an opposite concave bar. Vertebral column resection, concave distraction and epiphysiodesis are possible options.

The goal of convex epiphysiodesis is to stop the spinal growth at the convex side anteriorly and posteriorly. This is usually done with combined anterior and posterior approaches. The use of pedicle screws and rigid posterior instrumentation enable posterior and anterior growth arrest by blocking the vertebral body cartilage as it is used to be in long bone metaphysis by Blount staple.

We report a case requiring growth arrest at two segments to stop the progression of two congenital spinal curves.

Case description (Figs. 1, 2)

A 13-year-old boy presented complex congenital double curve scoliosis.

EOS radiographies and CT scan show 40° cervicothoracic congenital scoliosis with left convex hemivertebrae in C7, right concave bar between C6 and T1 and 39° thoracic congenital scoliosis with right convex segmented hemivertebrae in T7. The patient does not reach skeletal maturity; he is Risser 0 with skeletal age of 11 (Fig. 1), [1, 2].

He is clinically free of symptoms. Magnetic resonance image revealed cervical (C7) and thoracic hemivertebrae (T7) without intra spinal canal lesions. There are no other congenital anomalies.

Global coronal balance of the spine is acceptable. No sagittal plane deformity is noticed.

The curve rapidly worsened by almost 1.5-fold over the past 12 months, leading to the decision to perform a short convex epiphysiodesis for both curves to stop further progression.

Watch surgery online

Electronic supplementary material The online version of this article (doi:10.1007/s00586-013-2941-z) contains supplementary material, which is available to authorized users.

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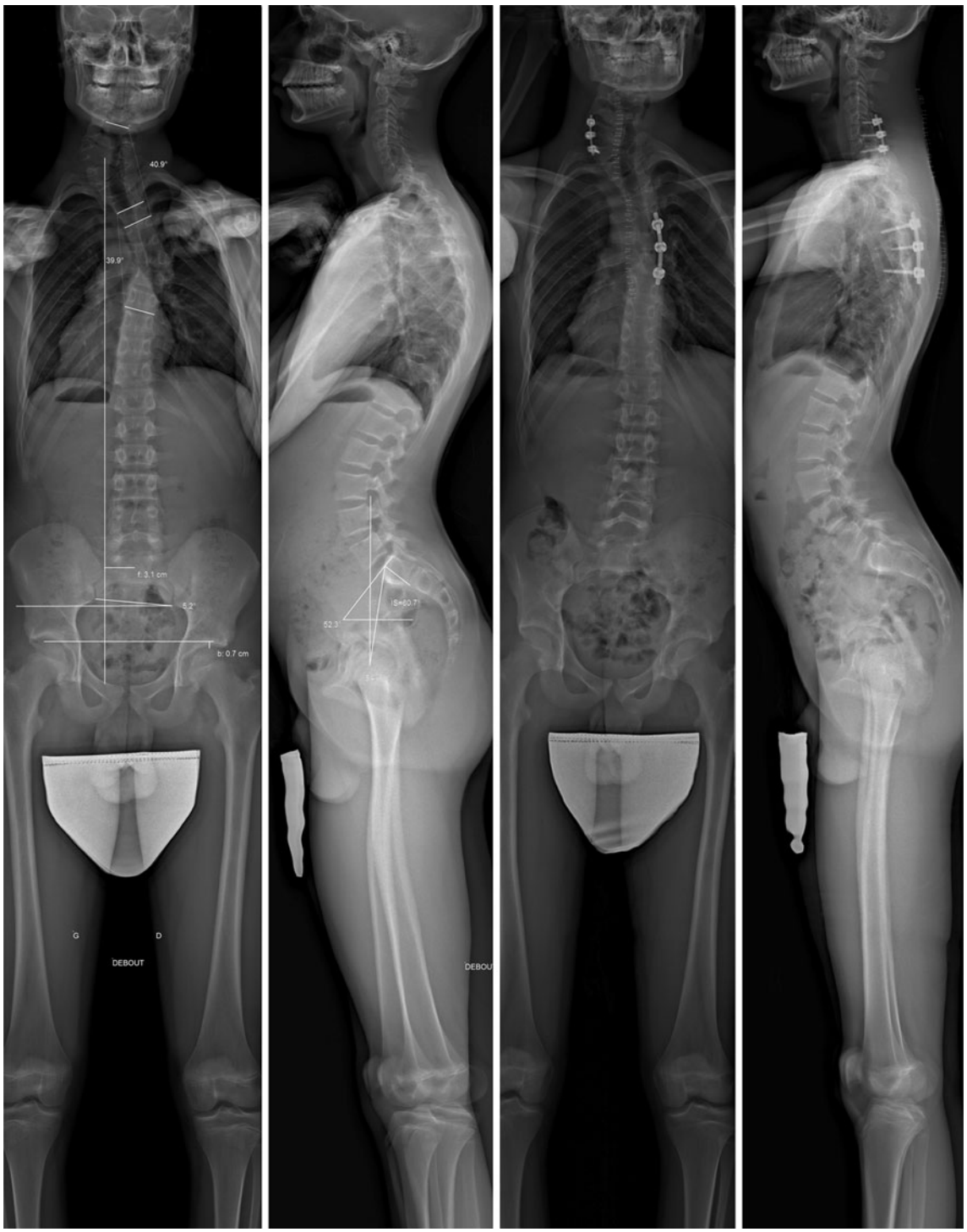

Fig. 1 Pre- and postoperative EOS radiographies of 13-year-old boy with cervicothoracic congenital scoliosis

Surgical procedure

The surgery was performed with a unilateral posterior approach at the convex side of each curve. Pedicle screws were inserted unilateral at the level of the hemivertebra and adjacent levels, one above and one below. In the thoracic curve a T6/T8, right side growth arrest was achieved using free hand technique to insert the pedicle screws. In the cervicothoracic curve a C6/T1, left side growth arrest was performed using O-arm (R) for navigated pedicle screw insertion. Fusion with local bone graft was done posteriorly.

Fig. 2 Pre- and postoperative radiographies showing the congenital scoliosis and the position on the implants

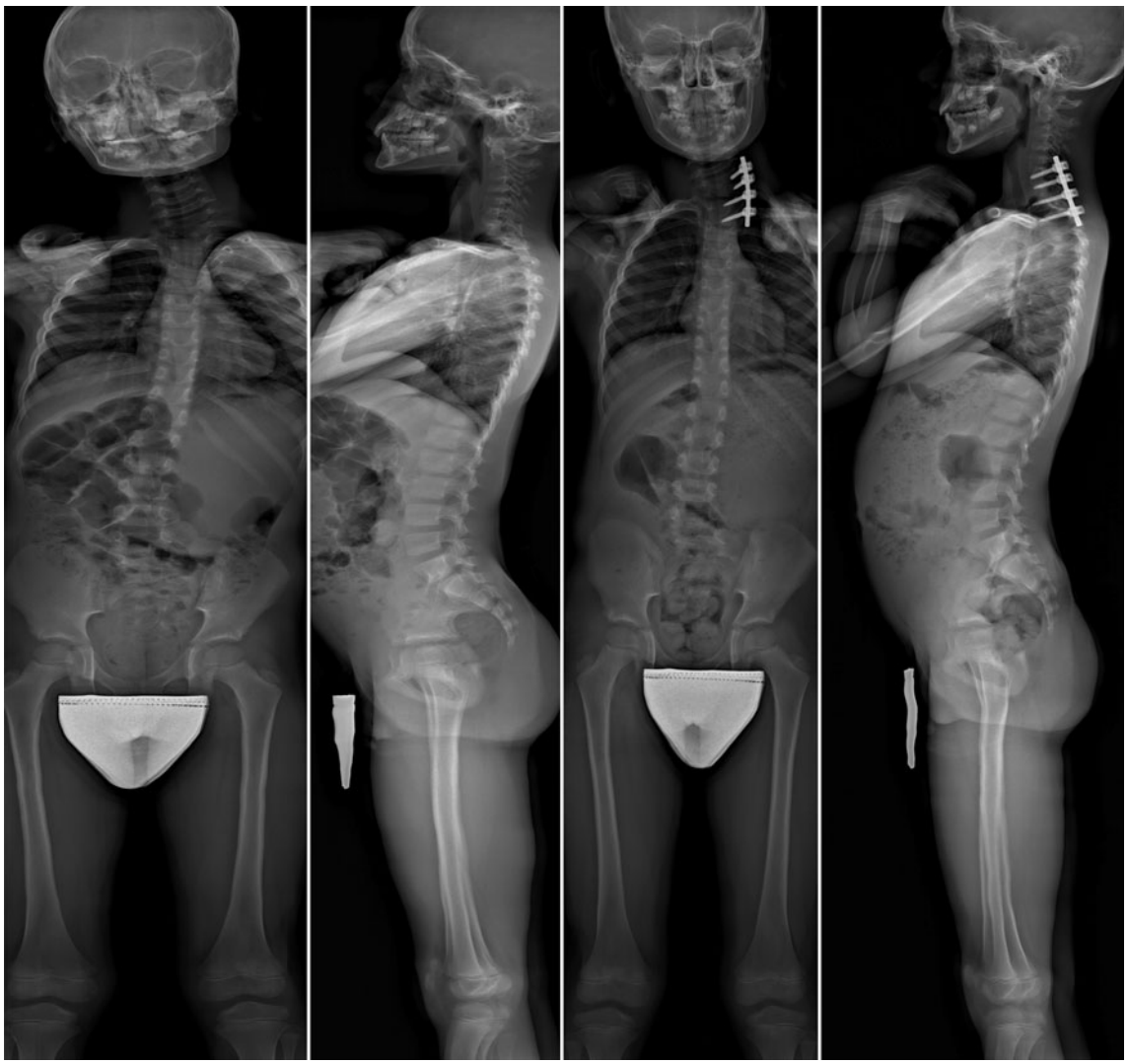

Fig. 3 EOS Radiographies of 8-year-old boy with concave bar and costal synostosis, congenital cervicothoracic scoliosis treated by the same technique: circumferential convex growth arrest by posterior approach

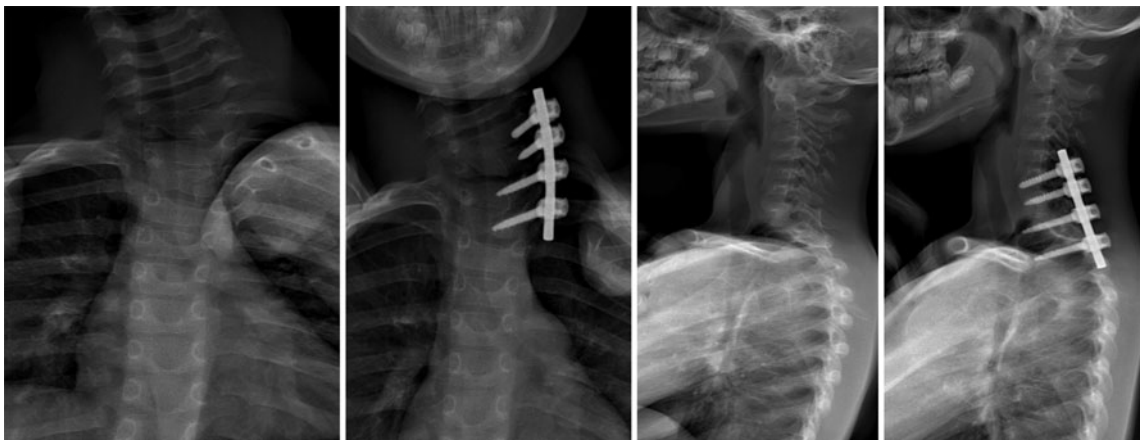

Fig. 4 Eight year old boy with concave bar and costal synostosis, congenital cervicothoracic scoliosis treated by the same technique: circumferential convex growth arrest by posterior approach and the position on the implants

Postoperative information

The patient was discharged after 5 days. Postop X-rays on day 5 showed good screw position (Fig. 2).

Discussion and conclusion

In this particular case hemivertebra resection and correction would be a difficult choice. C7 resection associated to concave bar osteotomy and correction is a risky procedure and must be followed by a T7 resection to avoid coronal imbalance. For this reason, our choice was to stop the progression of these curves by a posterior epiphysiodesis and anterior growth arrest by squeezing the vertebral body growth cartilage between a rigid pedicle screw construct [3].

In the thoracic segment, anatomical landmarks allowed a free hand technique to insert the pedicle screws. At the cervicothoracic junction, navigated screw insertion allowed a more accurate positioning in the C6, C7 and T1 pedicles [4, 5].

We think that this technique enables circumferential growth arrest without the need to approach the vertebral body.

This technique is more effective in younger children (Figs. 3, 4).

Conflict of interest None.

References

1. Winter RB (2012) Congenital thoracic scoliosis with unilateral unsegmented bar, convex hemivertebrae, and fused concave ribs with severe progression after posterior fusion at age 2: 40-year follow-up after revision anterior and posterior surgery at age 8. Spine 37(8):E507–E510
2. Sarlak AY, Atmaca H, Tosun B, Musaoglu R, Buluc L (2010) Isolated pedicle screw instrumented correction for the treatment of thoracic congenital scoliosis. J Spinal Disord Tech 23(8):525–529
3. Ginsburg G, Mulconrey D, Browdy J (2007) Transpedicular hemiepiphysiodesis and posterior instrumentation as a treatment for congenital scoliosis. Journal Pediatr Orthop 27(4):387–391
4. Santos ER, Ledonio CG, Castro CA, Truong WH, Sembrano JN (2012) The accuracy of intraoperative O-arm images for the assessment of pedicle screw position. Spine 37(2):E119–E125
5. Larson AN, Polly DW, Guidera KJ, Mielke CH, Santos ER, Ledonio CG, Sembrano JN (2012) The accuracy of navigation and 3D image-guided placement for the placement of pedicle screws in congenital spine deformity. J Pediatr Orthop 32(6):e23–e29