

Thoracic hemivertebra resection by posterior approach for congenital scoliosis

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Learning targets

In this video you learn:

- How to approach the thoracic vertebral body after rib head resection
- The surgical technique for complete thoracic hemivertebra and adjacent discs resection by posterior approach
- To identify and obtain the correction goal: parallel endplates below and above the resection
- To identify the strategy to obtain and maintain correction and fusion
- How to manage the spinal cord when resecting the vertebral body by posterior approach.

Introduction

Hemivertebrae are the most frequent cause of congenital scoliosis. Many procedures have been traditionally described to treat this pathology including in situ posterior or anterior-posterior fusion with or without instrumentation, combined anterior and posterior convex hemiepiphysiodesis and hemivertebra excision with fusion. The

latter technique can be performed by either a combined anterior and posterior approach, or a single posterior approach [1–3].

Case description

The patient is a 9-year-old boy with a right thoracic congenital scoliosis, due to a right fully segmented hemivertebra of T9. The scoliosis was discovered 5 years ago, at which time braces were fitted without any notable relief of improvement. Curve progression was obvious during the follow-up period.

We saw the patient for the first time 3 months ago. The Cobb angle was 35°. Lateral bending X-rays showed no modification of the Cobb angle in relation to the fixed deformity.

A hemivertebra resection using a posterior only approach was chosen with a short instrumentation from T8 to T10 using segmental pedicle screws (Figs. 1, 2).

Surgical procedure

Hemivertebra resection by a posterior only approach was decided with a short instrumentation from T8 to T10 using segmental pedicle screws.

The surgery was performed under motor-evoked potentials and somatosensory-evoked potentials neuro-monitoring. After a standard midline incision, a full thickness

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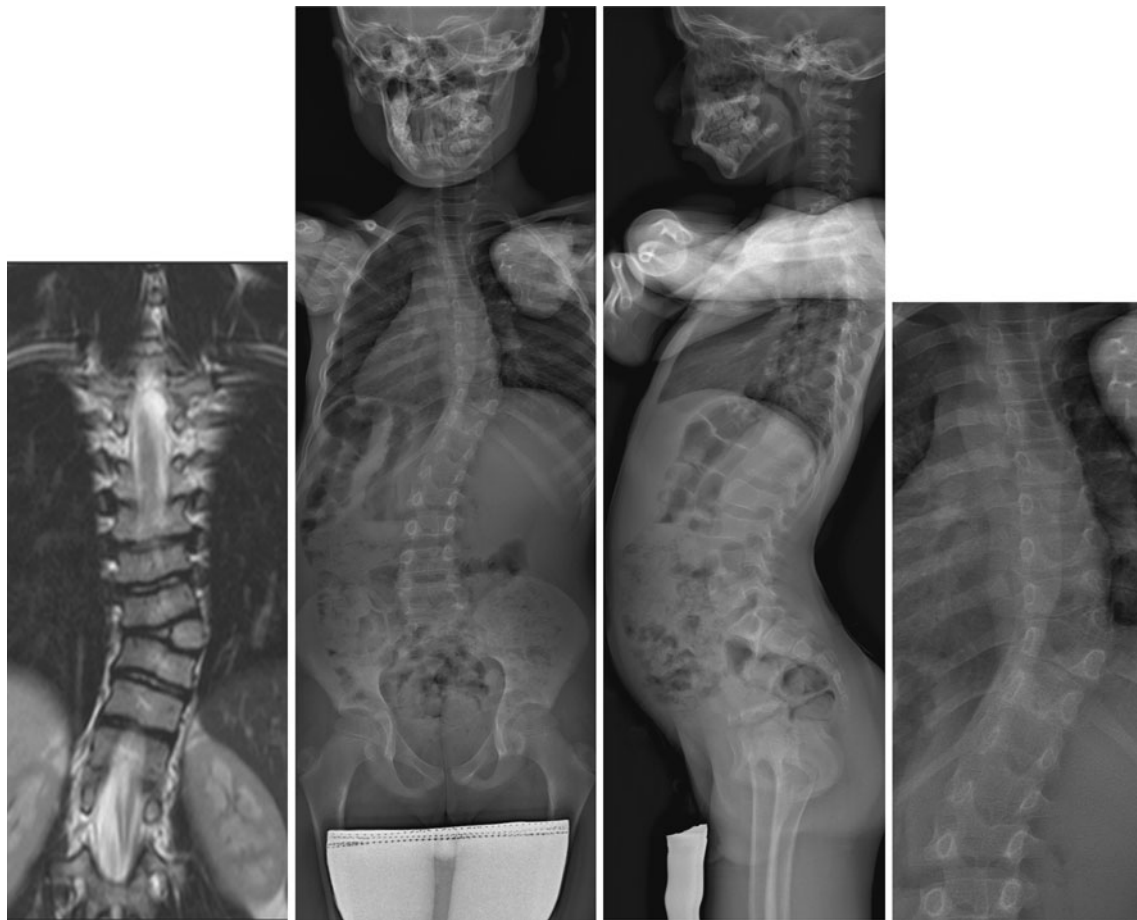


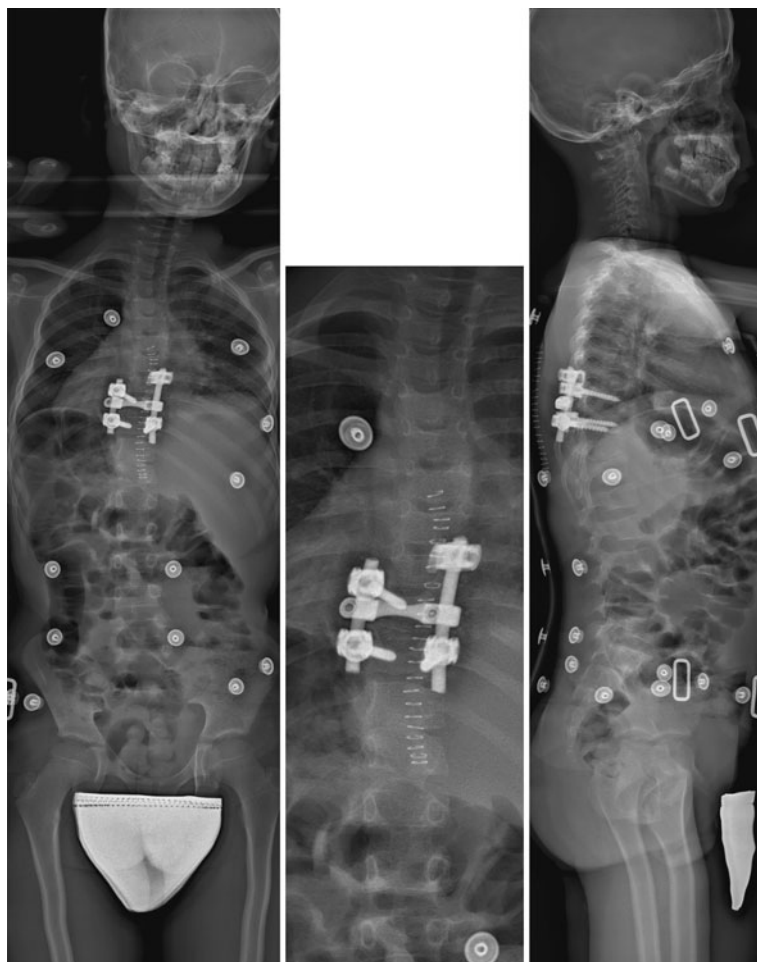
Fig. 1 Pre-operative MRI and EOS X-rays showing T9 right hemivertebra and congenital scoliosis

subperiosteal dissection going laterally to the transverse processes is performed to expose the hemivertebra and the vertebra above and below with care taken to limit dissection to the concerned levels as spontaneous fusion after exposure only is common in young children. Inferior facetectomies of T8 and T9 are performed to provide maximum flexibility to the spine. The spinous processes are also resected, and the bone recovered prepared for use as a graft at the end of the procedure. Pedicle screws are then placed in T8 and T10. Resection is first performed by removing the proximal part of the 9th rib and the transverse process of T9, followed by the hemilamina. Both foramina, above and below the hemivertebra are opened by removing the superior articular processes. After a careful and complete removal of the 9th rib head, a Cobb elevator is placed outside the lateral portion of the hemivertebra and moved anteriorly to the anterolateral quadrant. The pedicle of the hemivertebra is then removed with a rongeur and the nerve roots above and below is identified. Body of the hemivertebra is then removed with the use of osteotoms, including the discs above and below,

this must include the concave disc material; no retraction of the dural sac is authorised in this region. Venous bleeding in the epidural space should be controlled by bipolar cautery. The convex rod is then placed into the screws. Gradual compression is done to close the resection site with careful control of the exiting nerve roots and dura. In this particular case, during the closure of the resection site, the pedicle above has broken in relation to the high strains due to the important reduction needed. The T8 screw was removed and replaced by a T7 supralaminar hook. Reduction was then completed and the implants were fastened down, the second rod was then placed on the concave side and blocked. The goal of the correction was achieved and checked with fluoroscopy. Inferior endplate of T8 and superior endplate of T10 were parallel at the end of the correction maneuver. Decortication of the posterior elements was then done and autograft from the resected vertebra was applied.

Remaining bone defect at the anterior column was filled by autologous bone graft to obtain anterior bony contact and avoid pseudarthrosis.

Fig. 2 5 days post-operative EOS X-rays showing complete scoliosis correction after posterior hemivertebra resection



Postoperative information

The patient is mobilized on day 3 and a control X-ray is performed on day 6. A TLSO brace is fitted for 3 months to protect the construct. The postoperative X-rays show an improvement of the Cobb angle of 4°.

Discussion and conclusion

Posterior hemivertebra resection is an option in the treatment of congenital scoliosis in children. Compared to convex epiphysiodesis hemivertebra resection allows better correction with shorter fusion. Compared to double approach, this technique allows the same result with less morbidity especially in thoracic spine but is technically more demanding. In thoracic spine, complete rib head removal is necessary to get access to the vertebral body.

The aim of the treatment is to achieve a straight spine with respect to sagittal contour, and as short a construct as possible. This can be achieved by transpedicular instrumentation even

in very young patients down to 1 year old [1]. In this case, pedicle fracture could be avoided by using the 3 rods technique and by doing simultaneous compression on pedicles and hooks applied on the posterior arch [2].

Complete disc and cartilage removal, anterior bony contact either by direct contact or by bone grafting, complete correction of the deformity and solid fixation are the guaranty of a good long-term result.

Conflict of interest None.

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