Long-term Results after Maturity following Hemivertebra Resection in Early Childhood – Lessons Learned

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Disclosures

Lectures (honorarium/ travel expenses) DePuy, K2M, Medtronic
Long-term Results following Hemivertebra Resection

Introduction

- 1991: first posterior hemivertebra resection with transpedicular instrumentation in a two year old boy
- 2002: first publication in “Spine”

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Hemivertebra Resection by a Posterior Approach
Innovative Operative Technique and First Results

Michael Ruf, MD, and Jürgen Harms, MD

- long-term results at maturity required
- re-examination of the first patients operated in this technique
Long-term Results following Hemivertebra Resection

Methods

- 28 HV resections were performed between 1991 and 2001 in 25 one to six year old children.
- Mean age at time of surgery was 3 yrs. 3 mos.
- 22 pat. (25 HV resections) were re-examined at the age of 20 yrs. (15-27yrs.)
- We analyzed medical records, clinical examination, and radiographs with respect to complications/ reoperations, medical condition, Cobb angles, as well as spinal growth deficits.
Long-term Results following Hemivertebra Resection

Further Surgeries

- In 12 pat. (55%) no further surgery was performed
- In 10 pat. (45%) a total of 24 (range 1-4) further operations were necessary:
  - 8 removal of implants
  - 2 pedicle fractures
  - 4 implant failures
  - 10 new deformities

  at average 4 yrs. 8 mos. (5d to 14+7yrs.) after the initial surgery.

Clinical Examination

- At follow-up none of the patients complained of severe back pain,
- 5 patients reported slight pain in terms of muscle tenseness
Long-term Results following Hemivertebra Resection

Radiological Results

- Main Curve: preop. 47, postop. 15, follow-up 10
- Secondary Cranial Curve: preop. 17, postop. 5, follow-up 6
- Secondary Caudal Curve: preop. 22, postop. 9, follow-up 9
- Segmental Kyphosis: preop. 23, postop. 12, follow-up 9
D.J., f., *7/93
Hemivertebra L2a

10/1994 (14m)

09/2015 (22y)
S.G., f., *7/98
Hemivertebra L1a

HV resection 04/2000
Rev. 08/2013 + 10/2014
Long-term Results following Hemivertebra Resection

Total thoracic kyphosis at FU was average 34°

but

2 / 22 pat. were severly hypokyphotic (4° and -6°)

7 / 22 pat. had a significant spinal growth deficit of the thoracic spine (ratio thoracic/lumbar spinal length < 1.4, norm 1.75)

These patients suffered from complex malformations (>1 HV, bar formations) and were operated on with longer instrumentations: mean 5.9 vs. 1.3 segments.
A.A., m., *05/1996
Hemivertebrae T7a+T9a left, contralateral unsegmented bar T5-T10

HV resection 12/1997
B.P., m., *02/1999
Hemivertebrae T4 right + T8 left + T11 left

HV resection T4+8+11 09/2001, instr. T2-L1
Long-term Results following Hemivertebra Resection

Hypokyphosis and Short Trunk
- how to avoid

- patient selection
  - segmentation defects/ rib synostosis/
    expected further growth
- delay surgery
  - balanced deformity
- short fusion
- avoid posterior tethering
- distracting instrumentation/
  growth guidance
  - as short as possible
- opening wedge osteotomies
In case of a single HV without bar formations posterior HV resection with transpedicular instrumentation in very young children offers excellent long-term results and may be considered as the gold standard.

Complex malformations require individual approaches.

In case of multisegmental pathologies a distracting or growth guiding procedure should be considered.