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

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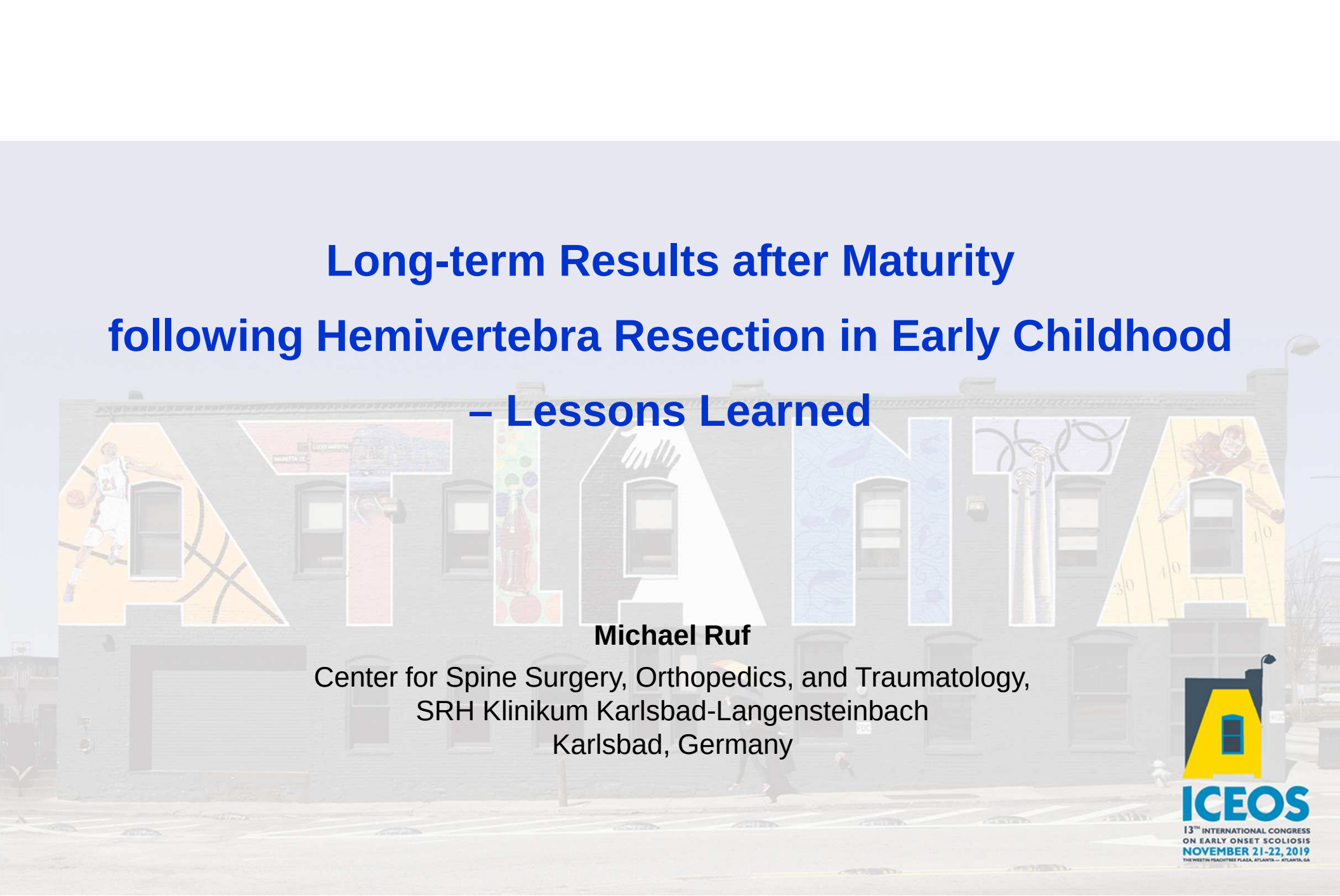

Disclosures

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”**

SPINE Volume 27, Number 10, pp 1116–1123

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**

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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

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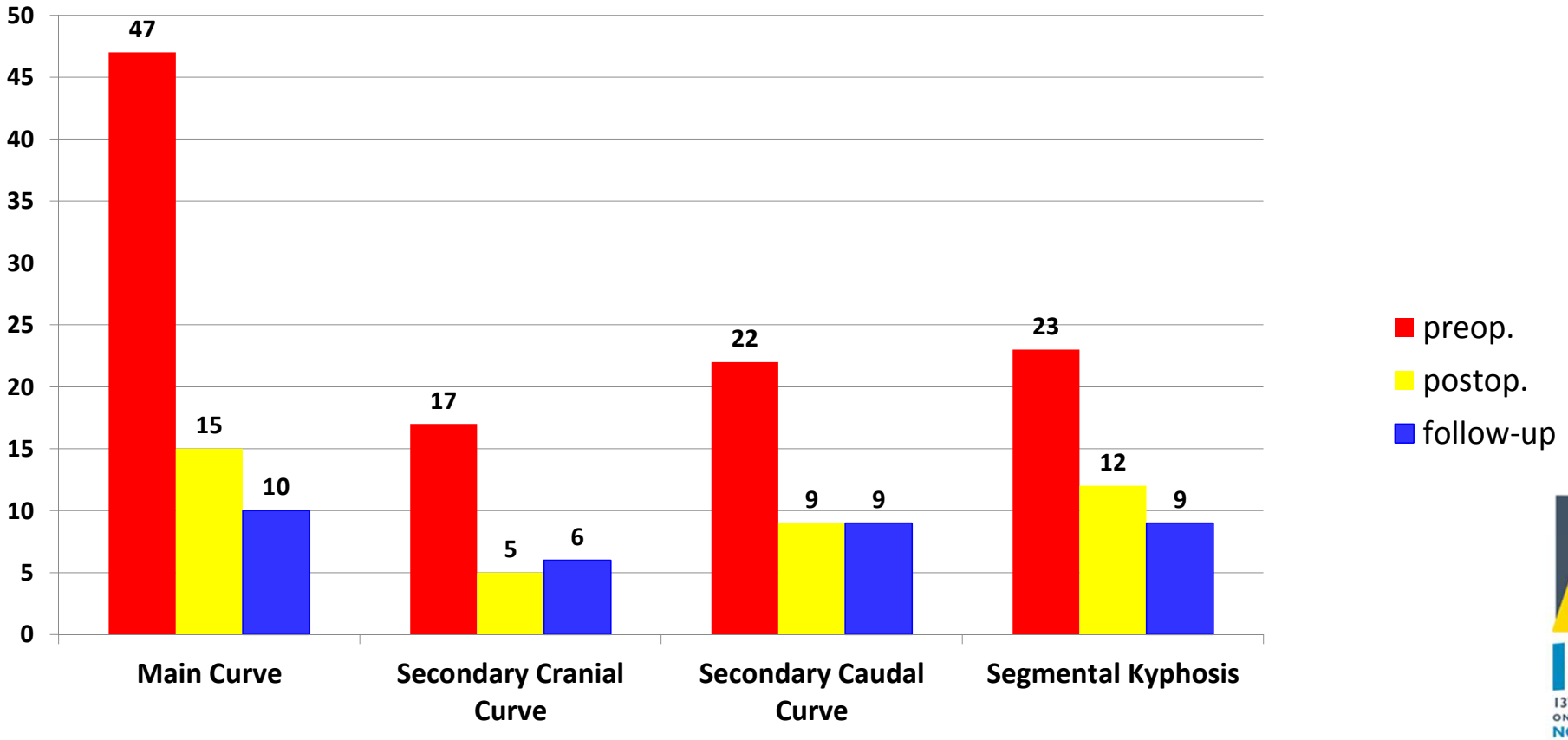
Long-term Results following Hemivertebra Resection

Radiological Results



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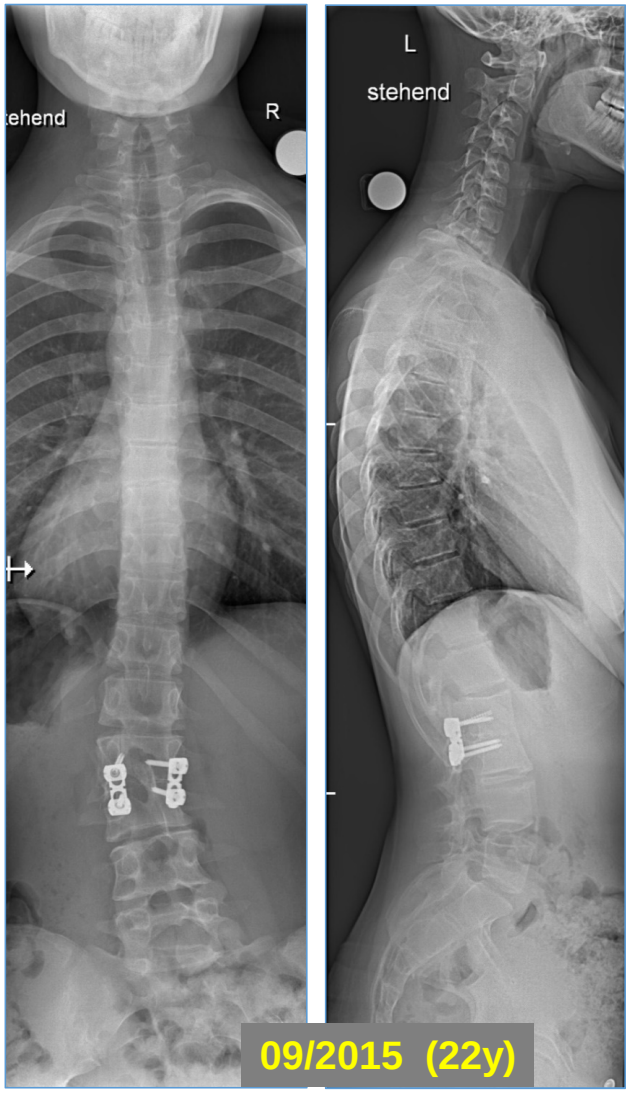
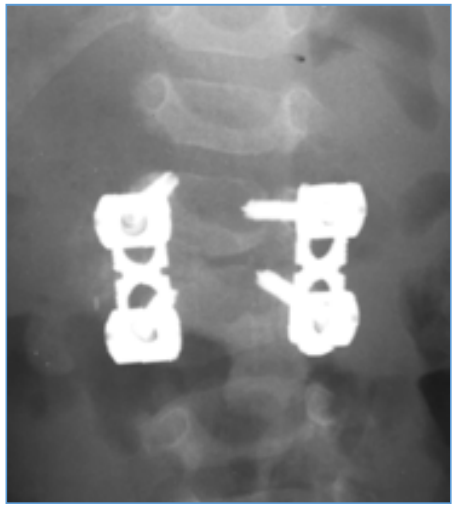
D.J., f., *7/93
Hemivertebra L2a

10/1994 (14m)

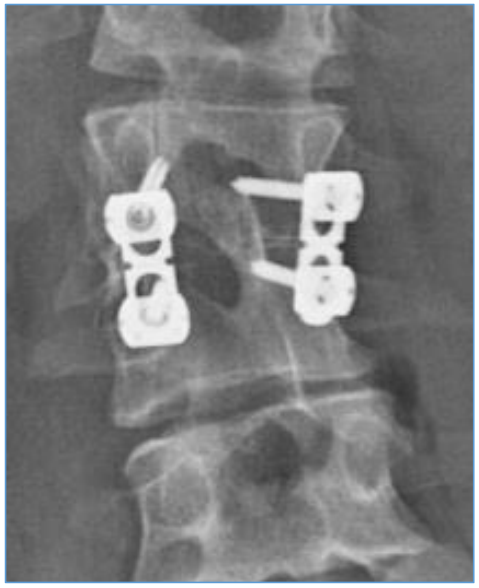


09/2015 (22y)

D.J., f., *7/93
Hemivertebra L2a

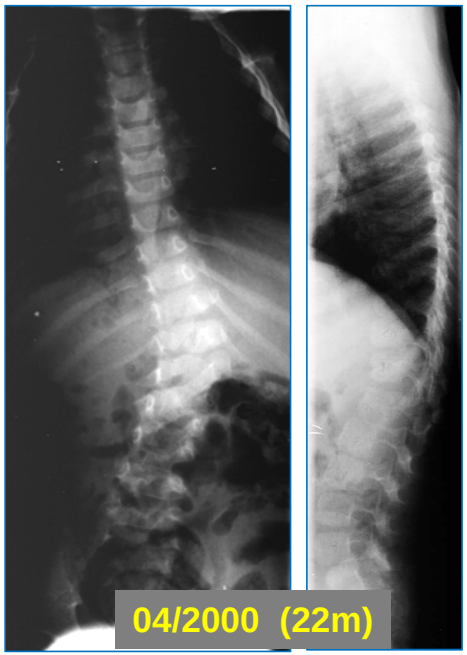


12/1994 (16m) pop.



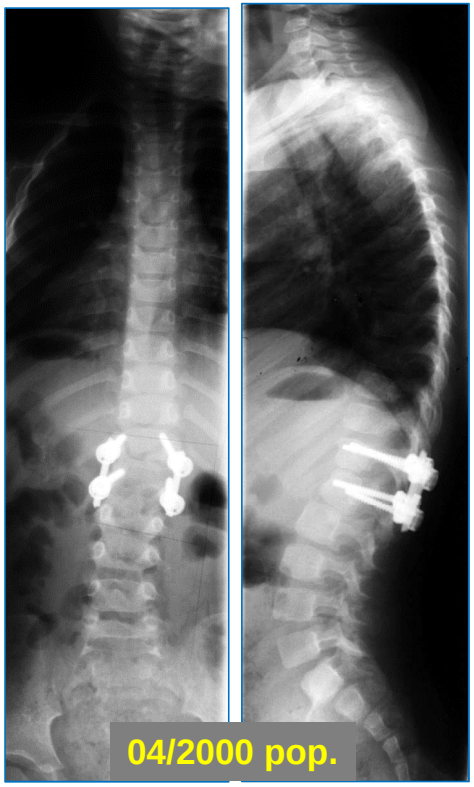
09/2015 (22y)

S.G., f., *7/98
Hemivertebra L1a

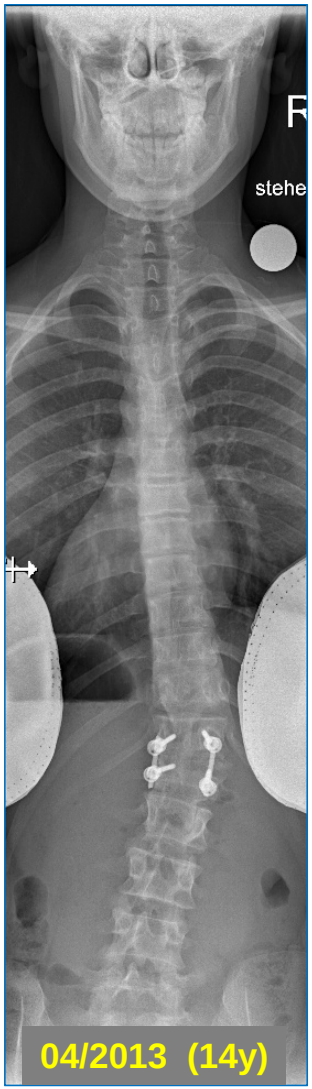


04/2000 (22m)

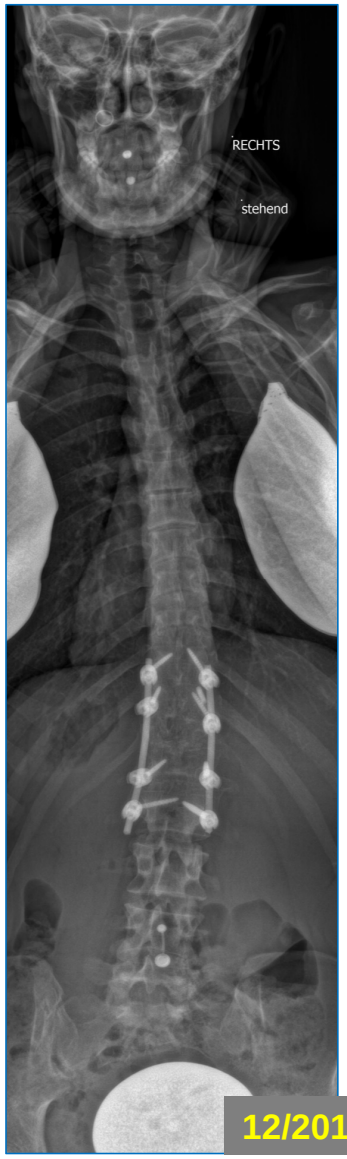
HV resection 04/2000
Rev. 08/2013 + 10/2014



04/2000 pop.



04/2013 (14y)



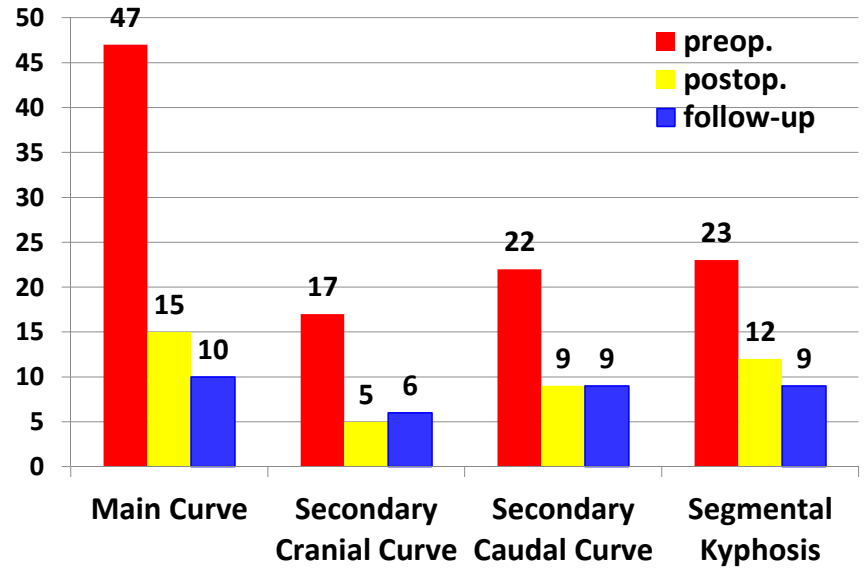
12/2018 (20y)

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.

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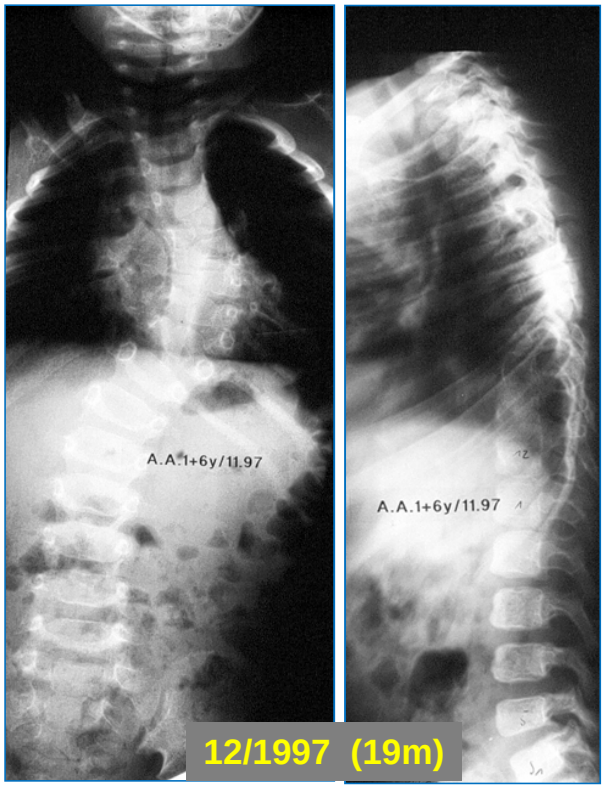
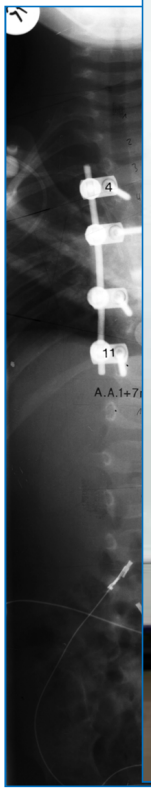
A.A., m., *05/1996
Hemivertebrae T7a+T9a left, contralateral unsegmented bar T5-T10

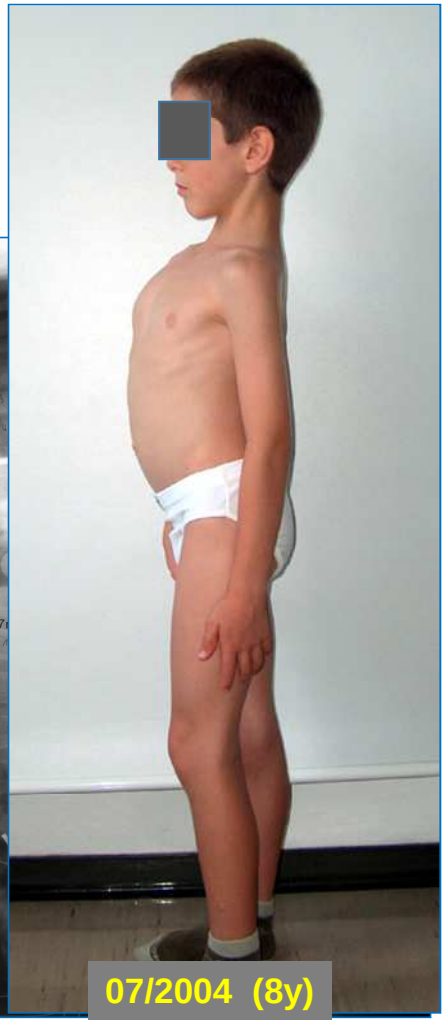
HV resection 12/1997

revisions 04/1999, 08/2000, 10/2002, 08/2005



12/1997 (19m)





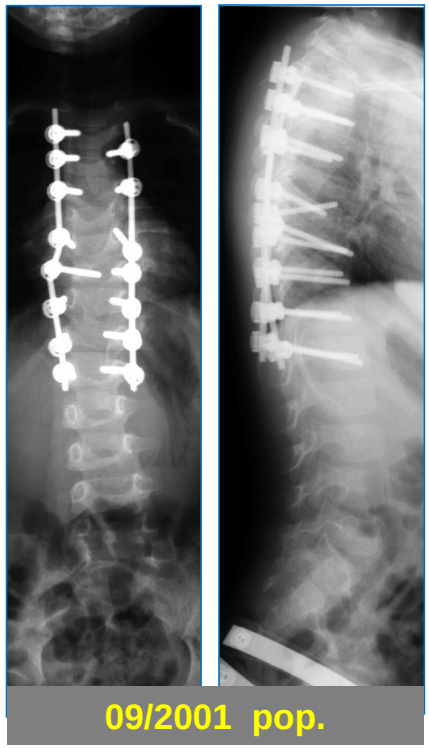
07/2004 (8y)

07/2016 (20y)

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

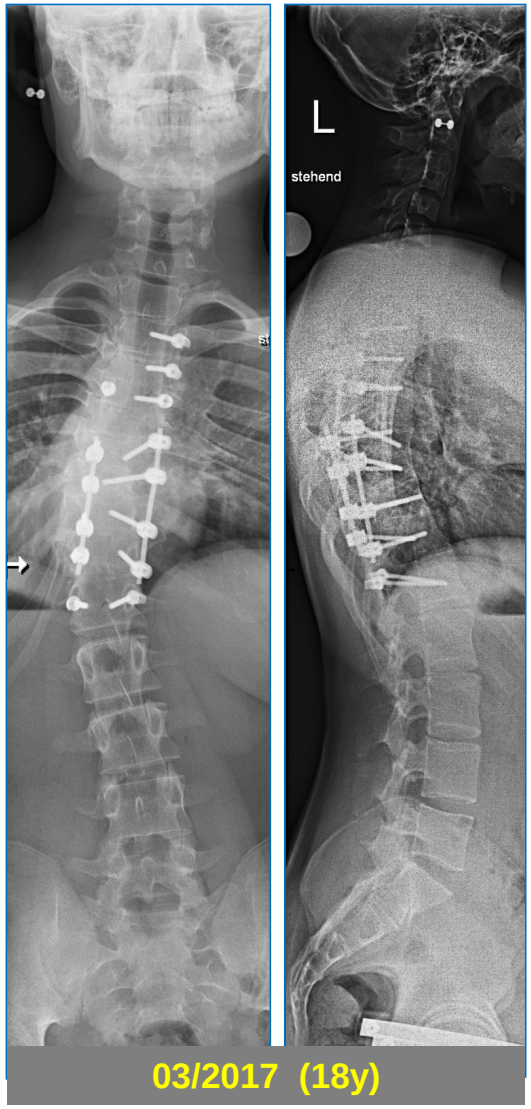
HV resection T4+8+11 09/2001, instr. T2-L1
revisions 12/2004, 12/2005, 05/2009, 11/2010


09/2001 (2.5y)


09/2001 pop.


3/05 (6y)


12/04 (6y)



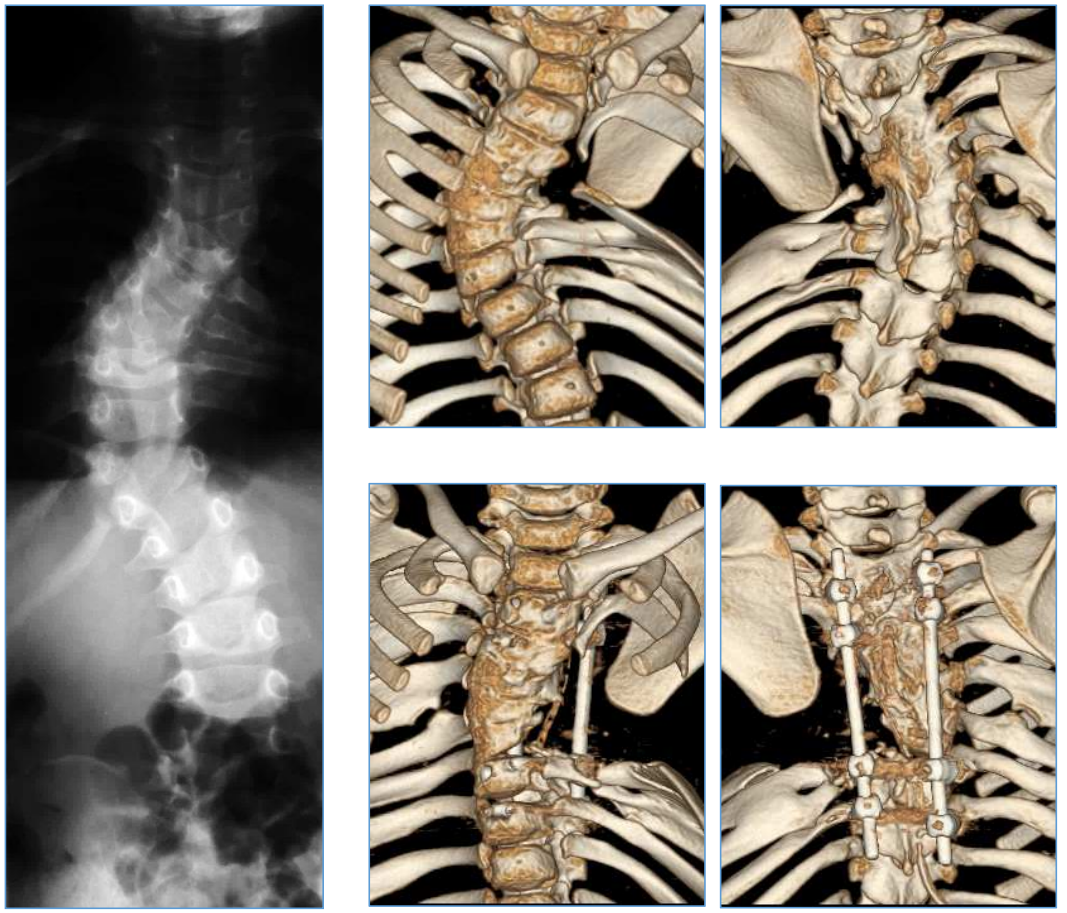
03/2017 (18y)

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**



Long-term Results following Hemivertebra Resection

Conclusion

- **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**

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