



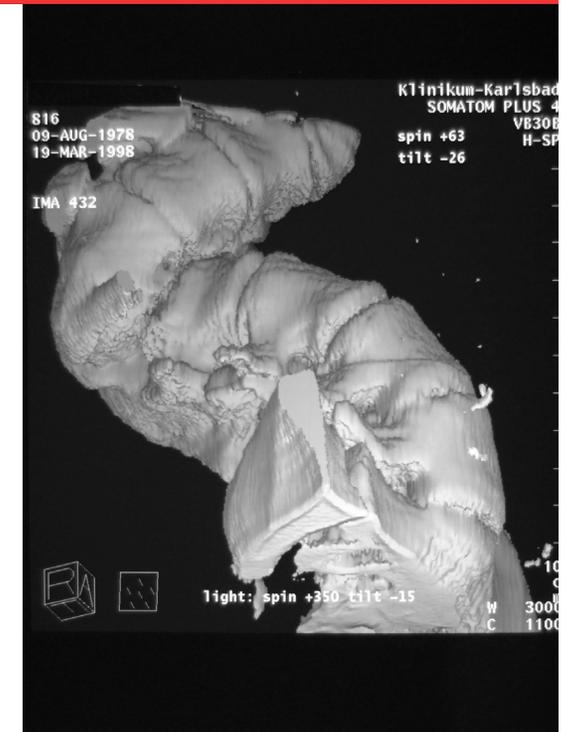
ICEOS  
2016  
Utrecht Holland

10<sup>th</sup> International  
Congress on Early  
Onset Scoliosis  
November  
17 & 18, 2016

## Is VCR a technique only for adolescent and adults? Can young children benefit from it?

**Dezső J. Jeszenszky MD. PhD.**

Chief, Spine Center  
Schulthess Clinic Zürich  
Switzerland

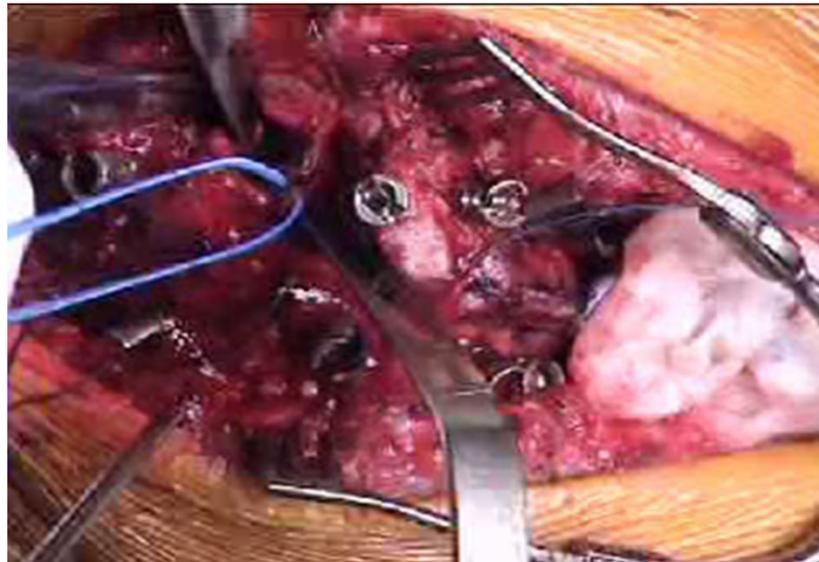


# Disclosures

- DePuy Synthes Spine: Royalties
- DePuy Synthes Spine: Research Support

# VCR

- This technique is useful for a few patients with complex and rigid spinal deformities associated with coronal and sagittal imbalance



# VCR

## Purpose:

- Adolescent and adults: the main purpose of VCR is to achieve spinal balance
- Early onset deformity: prevent structural deformities in secondary curves and achieve spinal balance (full correction when possible)

# VCR. Literature

## Adolescent & adults

Bradford DS, Tribus CB (1997) Vertebral column resection for the treatment of rigid coronal decompensation. *Spine (Phila Pa 1976)* 22:1590–1599

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ASIAN SPINE JOURNAL

Review Article

Asian Spine J 2016;10(3):601-609 • <http://dx.doi.org/10.4184/asj.2016.10.3.601>

### A Review of Complications and Outcomes following Vertebral Column Resection in Adults

Sravisht Iyer<sup>1</sup>, Venu M. Nemani<sup>2</sup>, Han Jo Kim<sup>1,3</sup>

<sup>1</sup>Department of Orthopaedic Surgery, Hospital for Special Surgery, New York, NY, USA

<sup>2</sup>Department of Orthopaedic Surgery, Washington University, St. Louis, MO, USA

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Eur Spine J (2016) 25:2471–2479  
DOI 10.1007/s00586-015-3981-3



ORIGINAL ARTICLE

**Safety and efficacy of osteotomies in adult spinal deformity: what happens in the first year?**

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JNS PEDIATRICS

CASE REPORT  
J Neurosurg Pediatr 15:207–213, 2015

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Loyola V. Gressot, MD, Javier A. Mata, MD, Thomas G. Luerssen, MD, and Andrew Jea, MD

Division of Pediatric Neurosurgery, Texas Children’s Hospital, Department of Neurosurgery, Baylor College of Medicine, Houston, Texas

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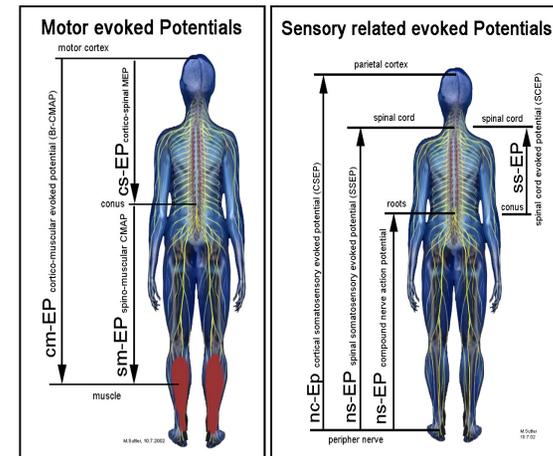
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# VCR. What is similar?

- Severe deformities
- Salvage procedure
- Combined or only posterior approach
- Major correction is possible
- High risk surgery
- IOM recommended



# VCR. What is the difference?

## Adolescent & adults

- Severe secondary structural changes, not reversible
  - Spine, Pelvic ,Thorax wall, Soft tissue ( ligaments, diaphragm, vessels, etc.)
- Lung development is closed
- Sagittal and coronal balance can be bad
- Growing is closed
- Neurological complication with myelopathy is possible
- Partially preventive (can be preventive)
- Usual surgical technique
- Influence on the trunk shape
- Final results/surgery

## Young children

- Reversible structural changes
- Capacity for lung development
- Balance is not important, hopefully it will develop normaly
- Growing is mandatory
- Neurological complications are less
- Mainly preventive
- Surgical technique with: „don't touch the spine“ (periosteum)
- Influence on the whole body shape
- A lot of possibilities during the growing process

# VCR. What is the difference?

For the young child the start is very important



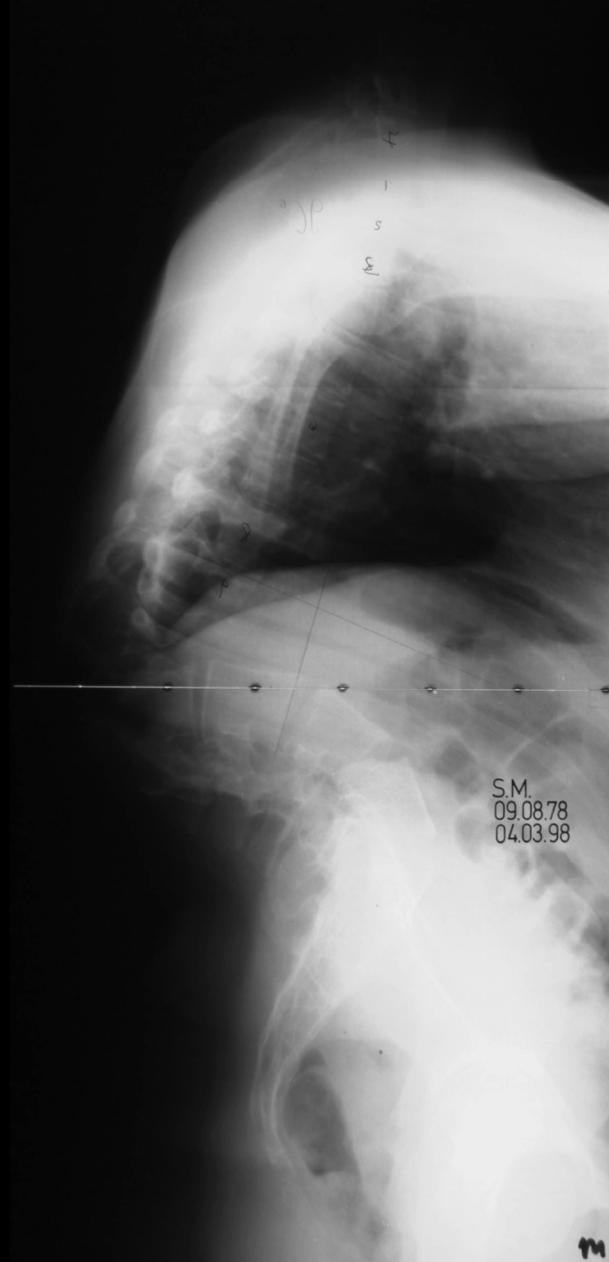
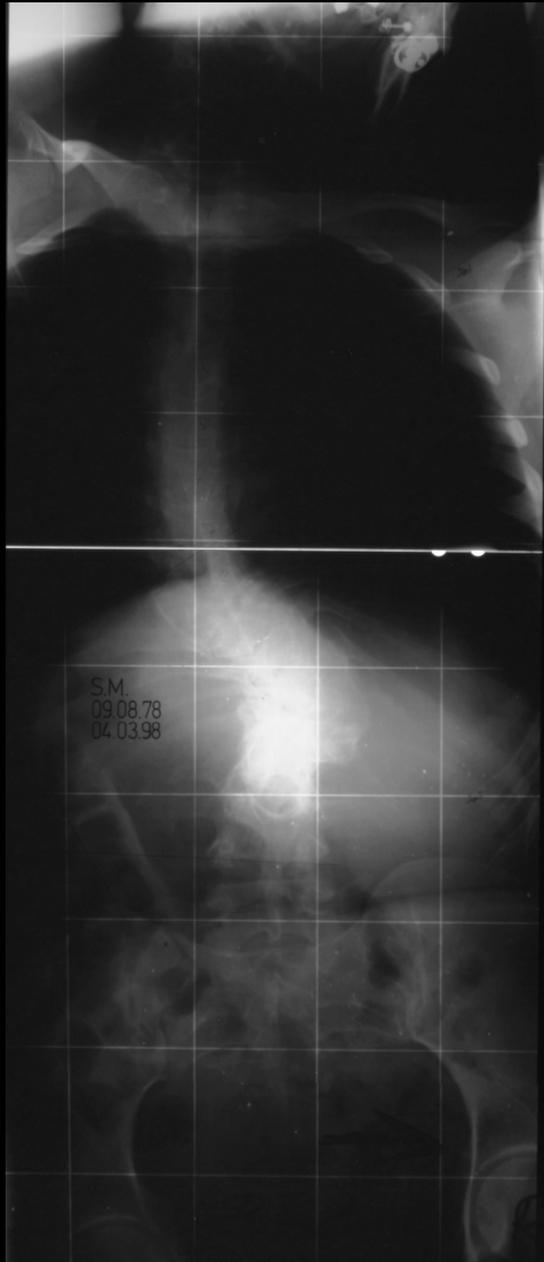
Allows a good direction for growing

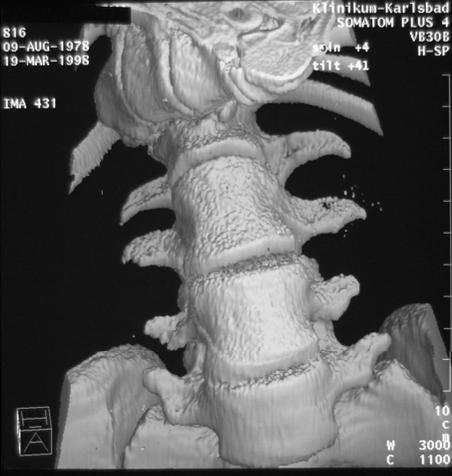
For the adults this way is not possible

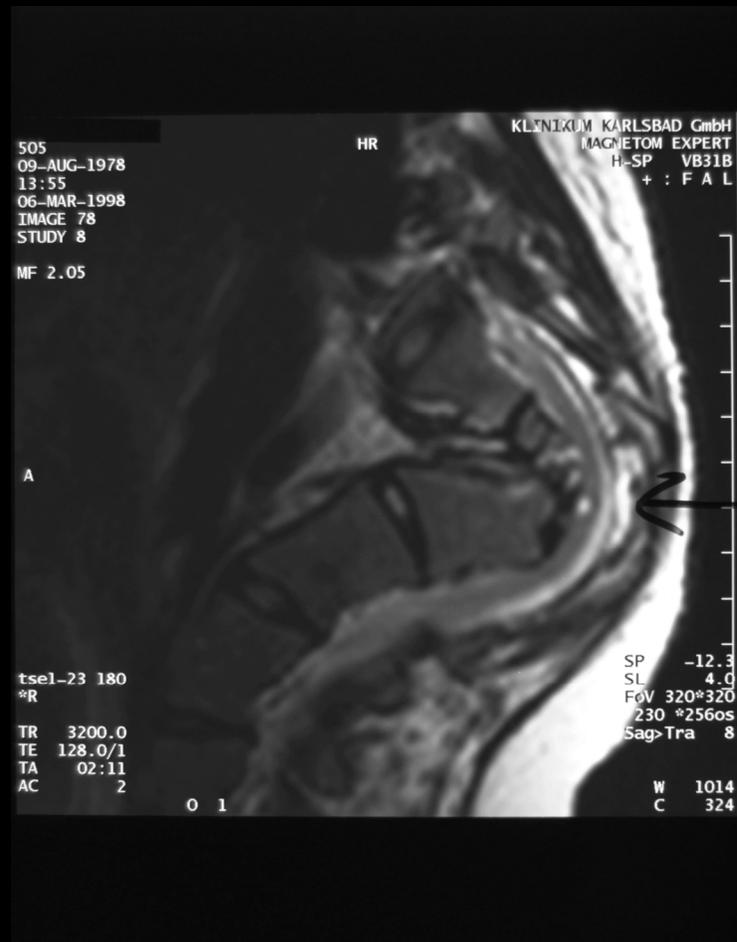


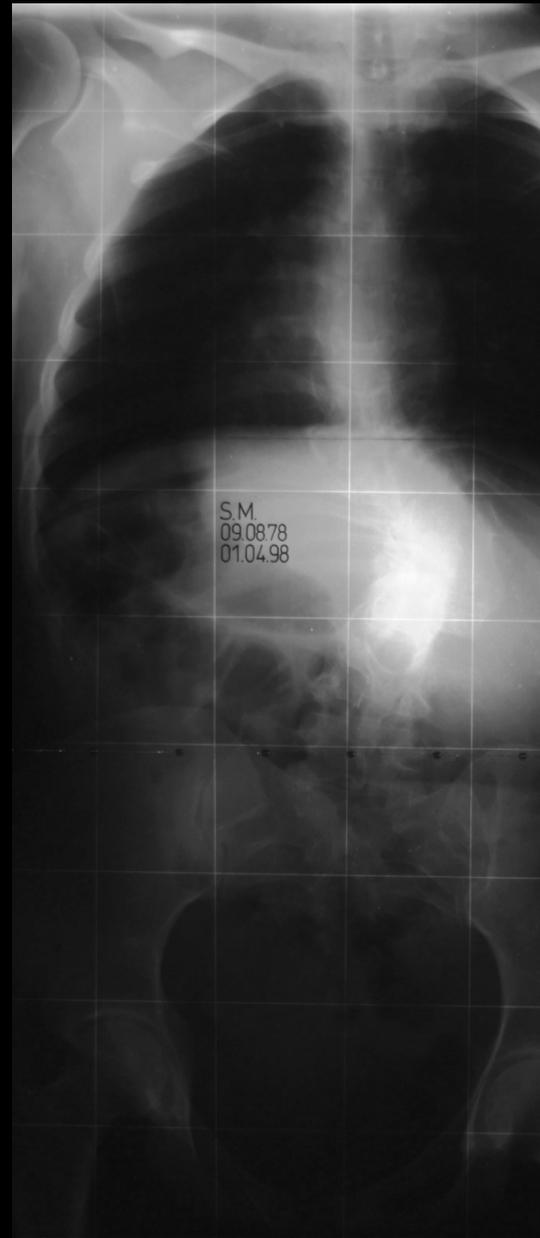
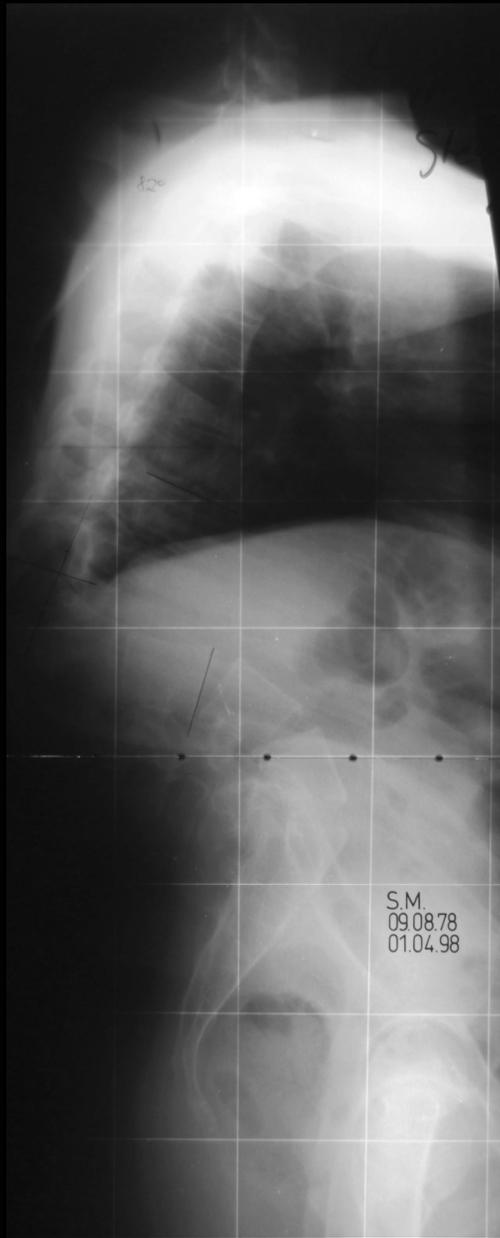
# Case Report Adult, VCR

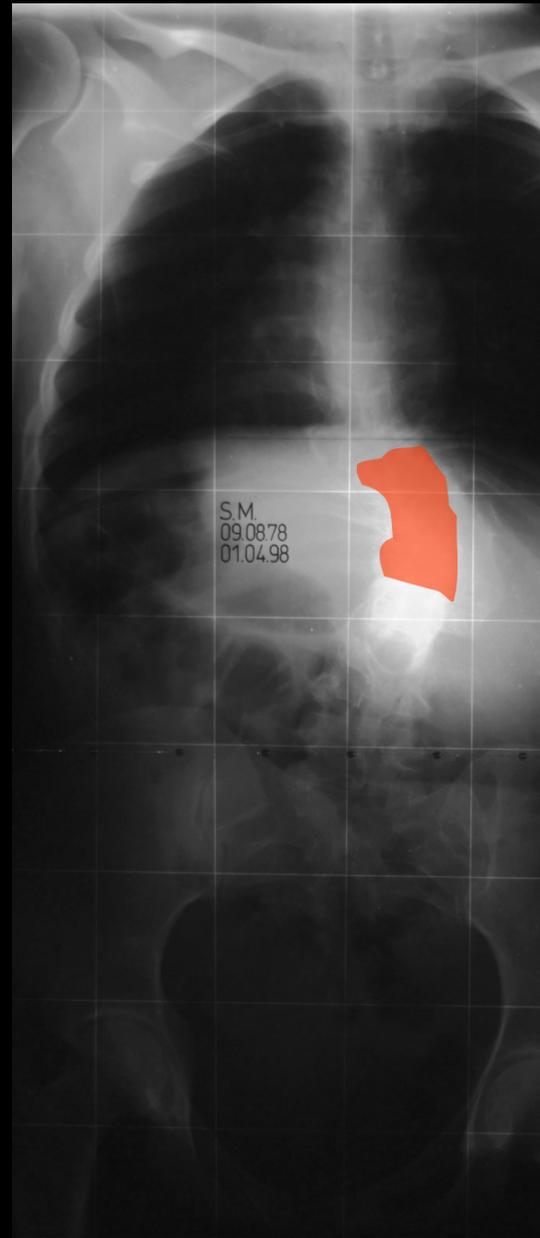
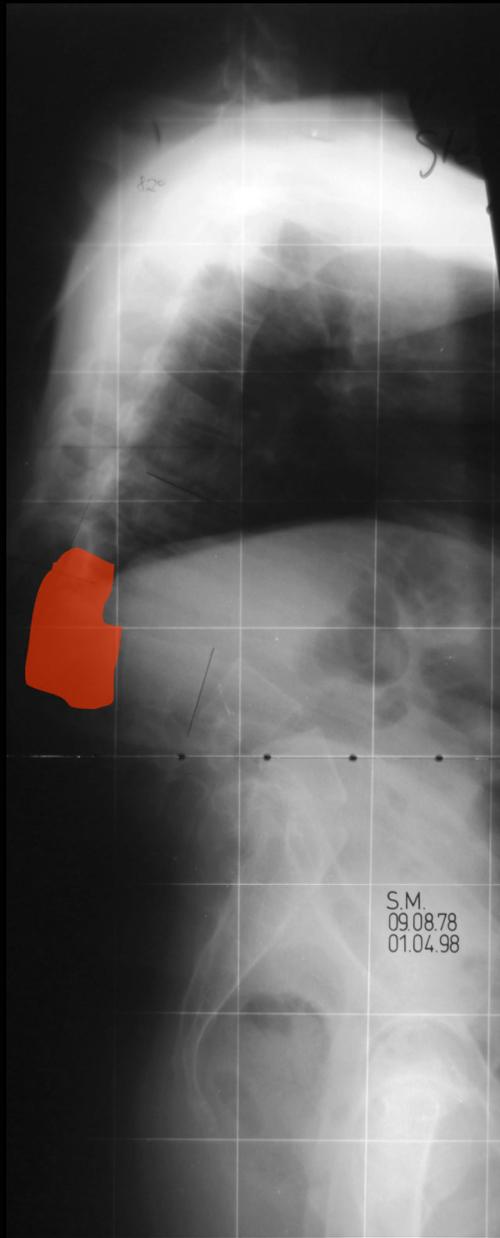
- SM, 20 yrs old female
- Congenital Th-L kyphoscoliosis
- Myelopathy, bladder dysfunction
- 1 session surgery:
  - 1. posterior release & instrumentation
  - 2. anterior vertebrectomy
  - 3. simultaneous anterior & posterior
- Few years later pseudoarthrosis, rod breakage
- Revision: Posterior-anterior approach, refusion

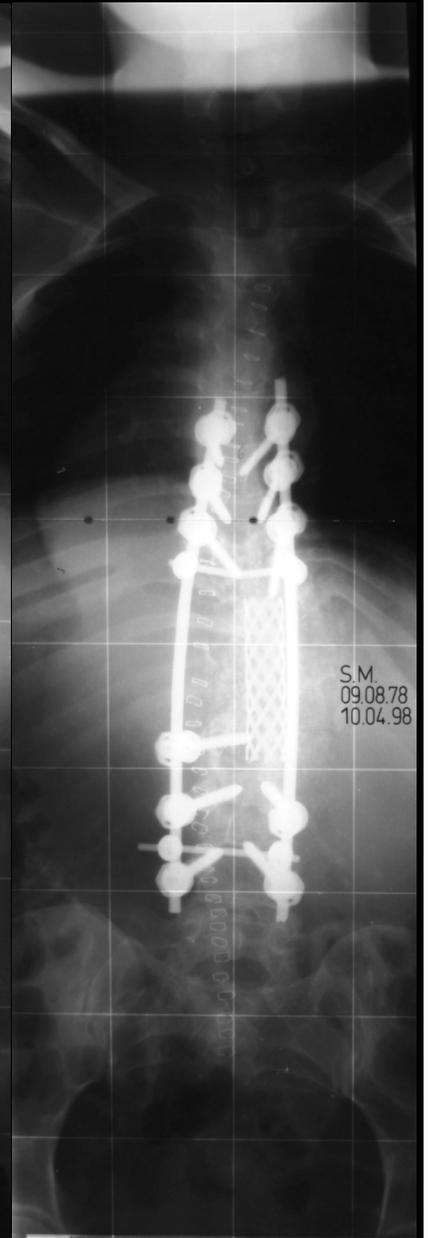
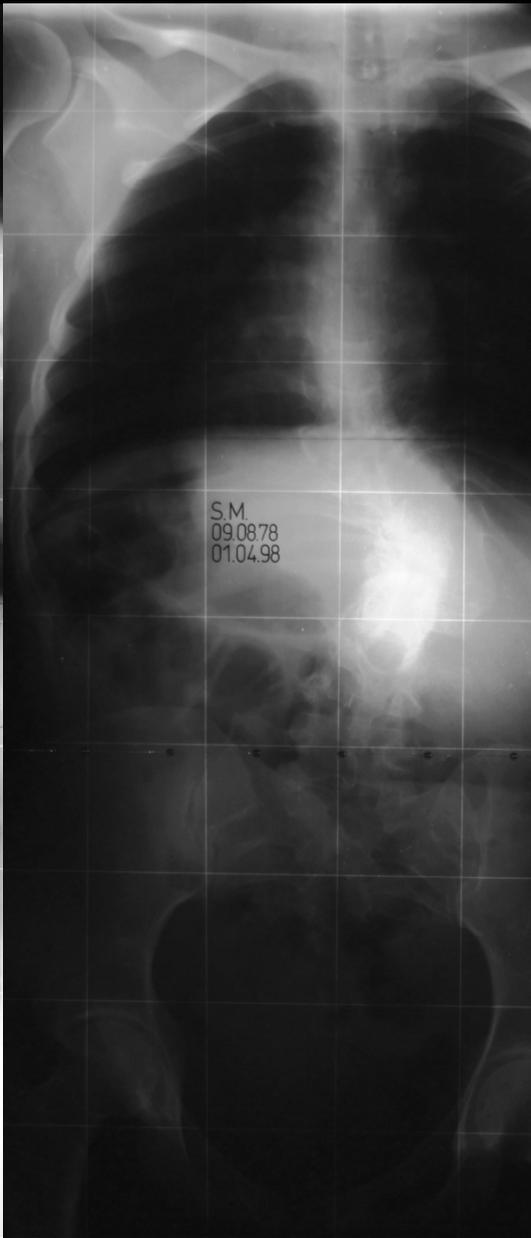
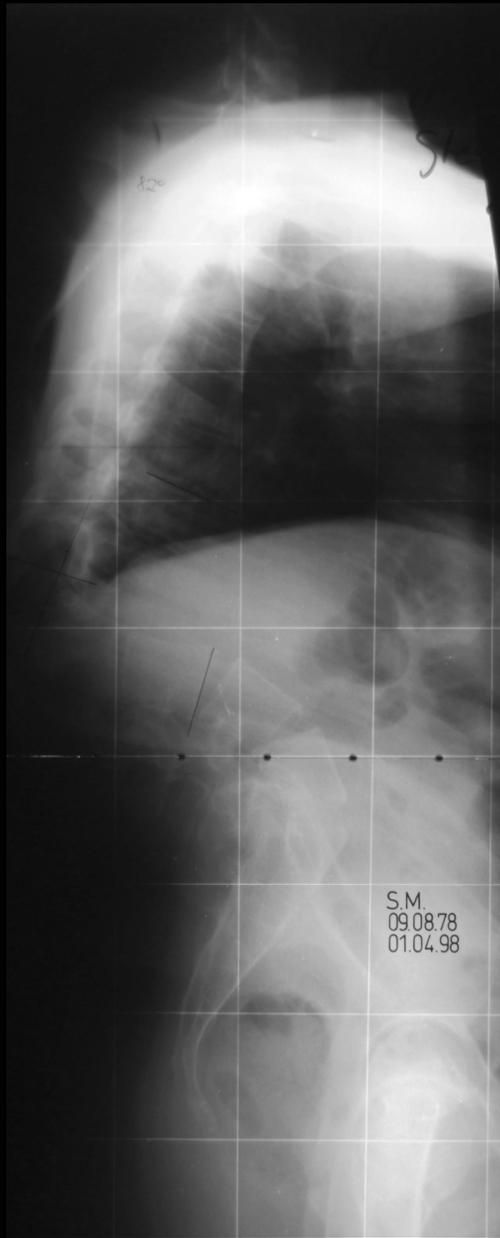












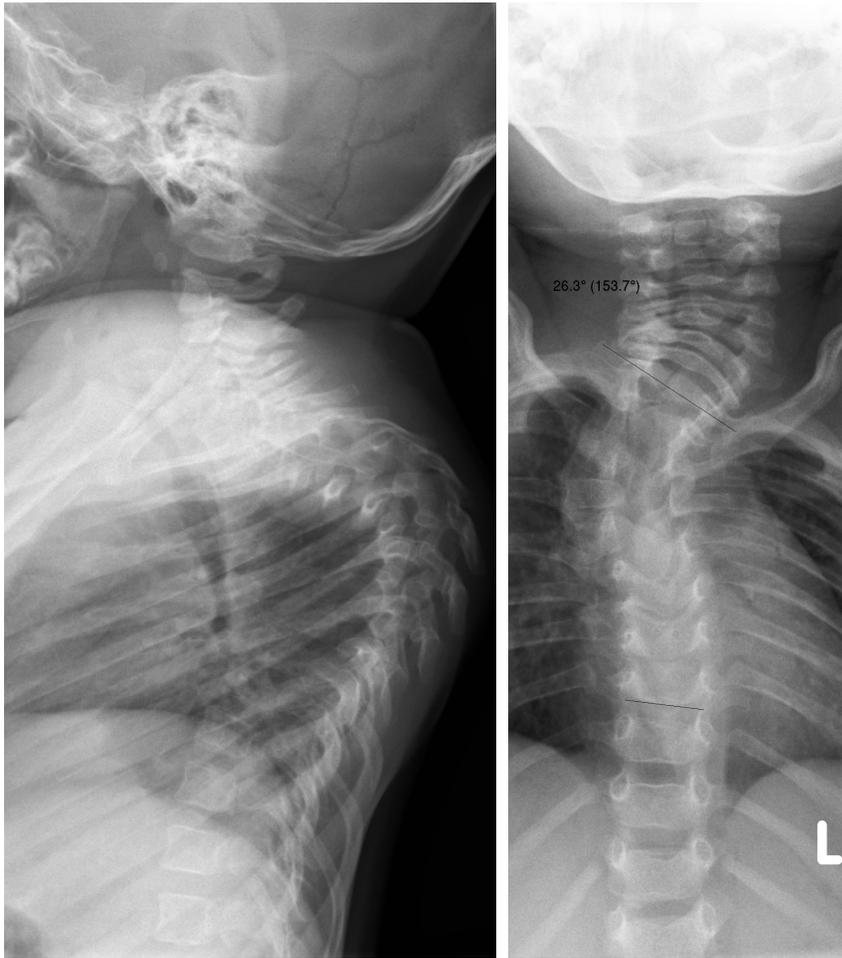


Shortening procedure

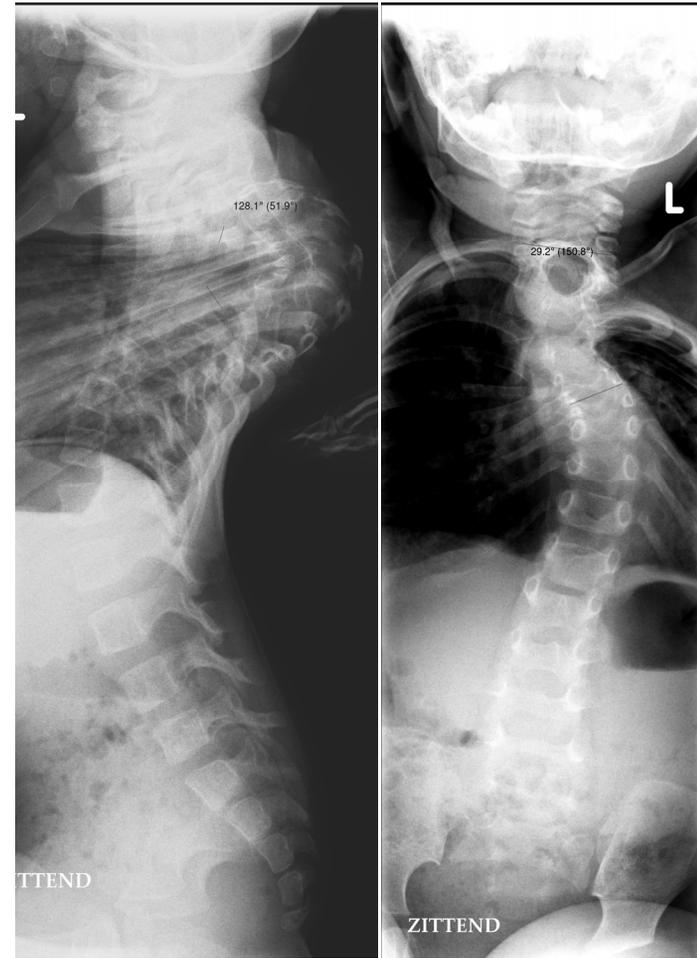
# Case Report Child VCR

- ML., Birth 22.01.2005, 2/6y, female
- Weight: 9.8 kg
- Unknown syndrome
- 2 months halo traction
  - Without traction surgery is not possible
- One-stage posterior surgery, T5 resection
  - Failed
- Revision surgery 3 weeks later

# Progression of kyphoscoliosis



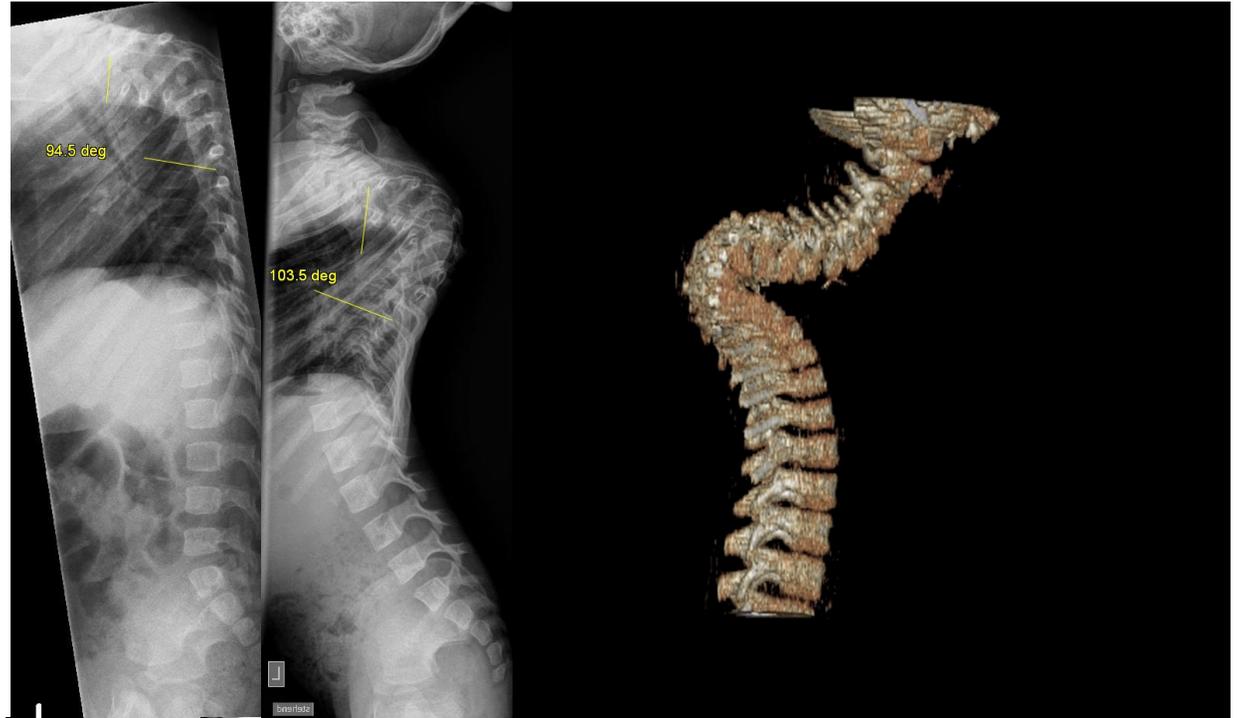
1/6 year



2/6 year

## First visit 2007

1.5 year-old little girl  
9.8 kg  
Unknown syndrome  
**Progressive right convex  
kyphoskoliosis**  
Large hump  
Chest deformity  
Pectus excavatum  
Knee and elbow subluxation  
Pes adductus  
Pectus excavatum  
No neurological symptom

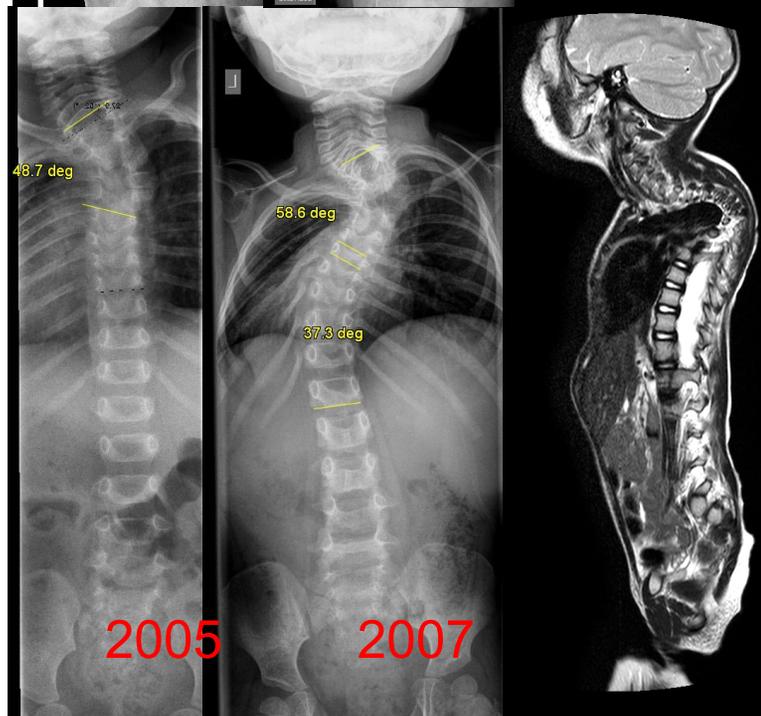


### CT, X-ray:

T1-T5 right convex scoliosis  
Compensatory left convex curves  
above and under  
T1-T6 kyphosis  
Subluxation-like rotation anomaly T3,  
T4, T5  
T5 wedge vertebra

### MRI:

No sign of intraspinal pathology

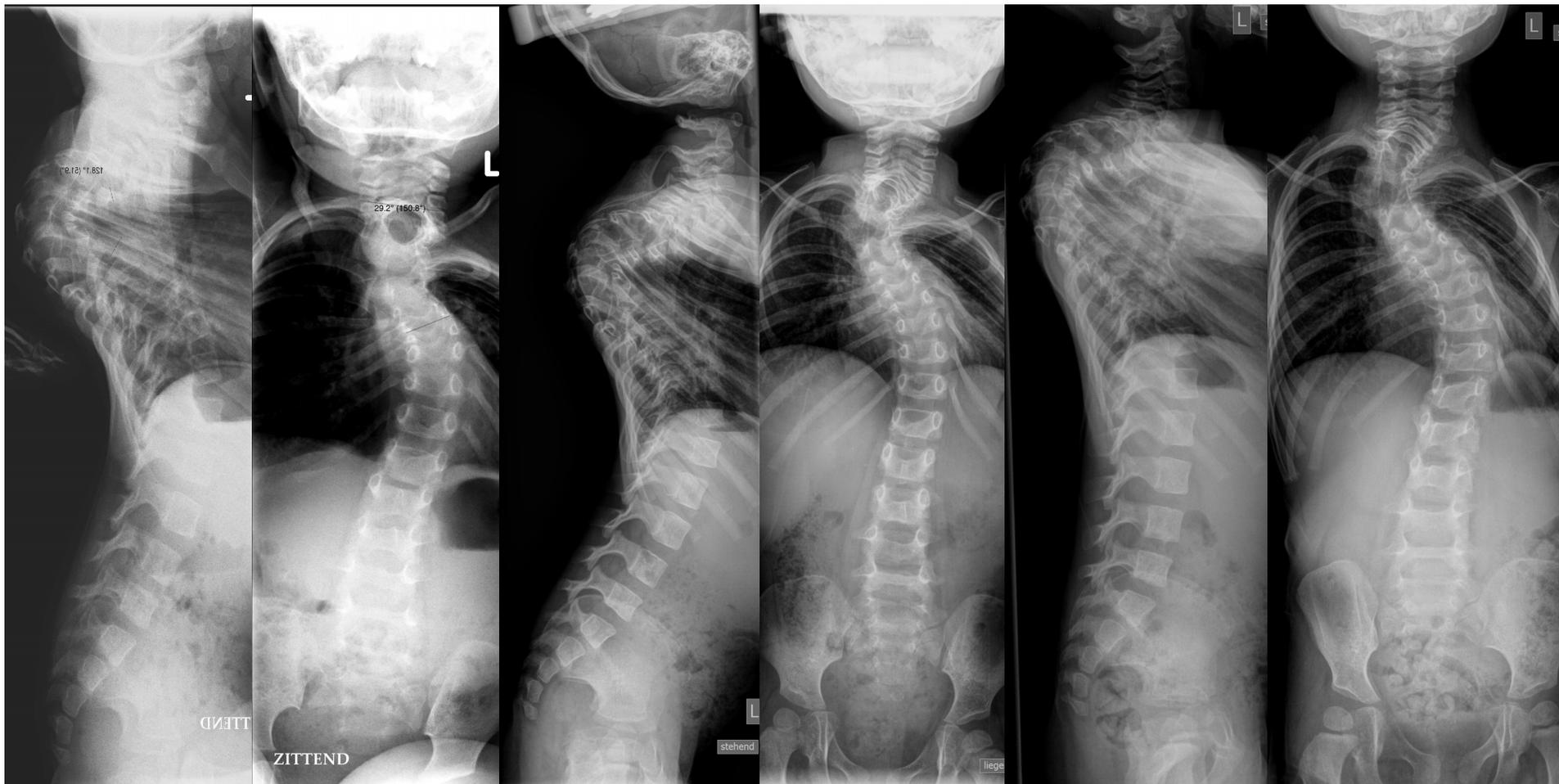


2005

2007



# Halo-traction



before

1 month

2 months

# First approach: dorsal instrumentation and resection

03-08-2007 2+7 years

Goal: maintained correction during growth

1 year after the first visit (age of 2.5 years)  
After 12 weeks of Halo traction

Instrumentation T3-L1

Laminectomy L5

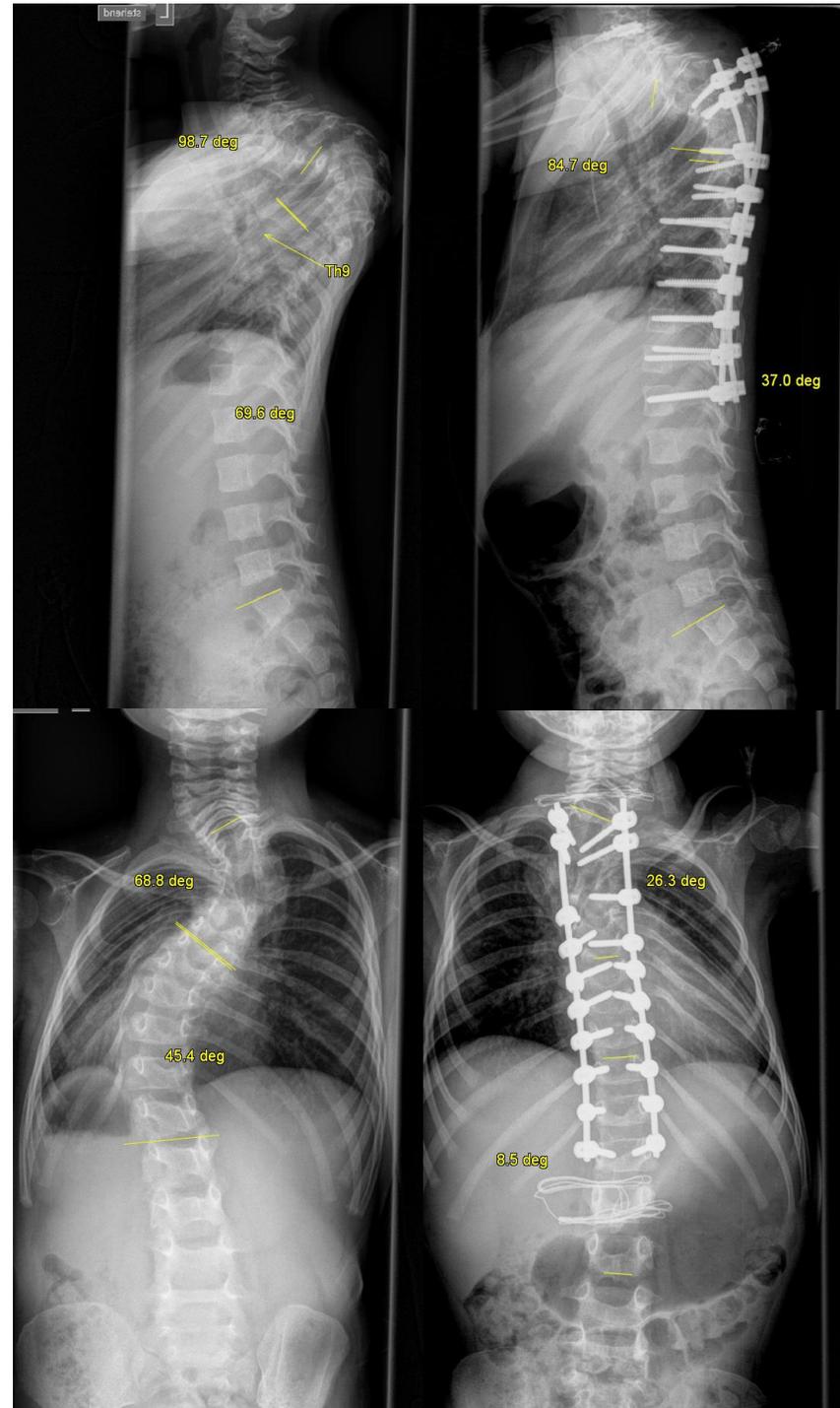
Resection of the fifth rib head on the right side

Complete removal of the T5 wedge-vertebra

Scoliosis improved very well

Good kyphosis correction, Halotraction made a very good correction at prone position

Patient positioning with traction

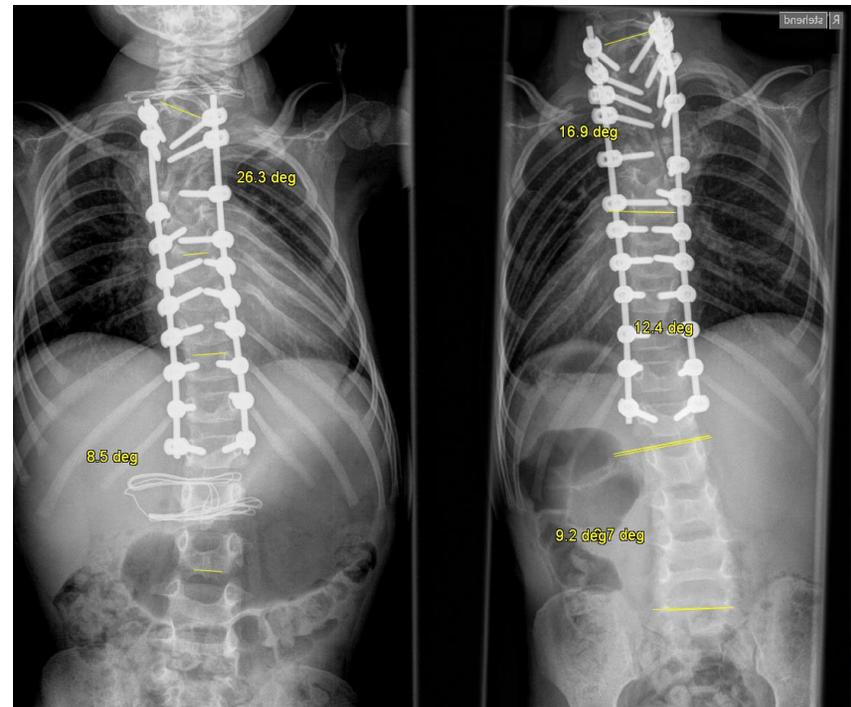
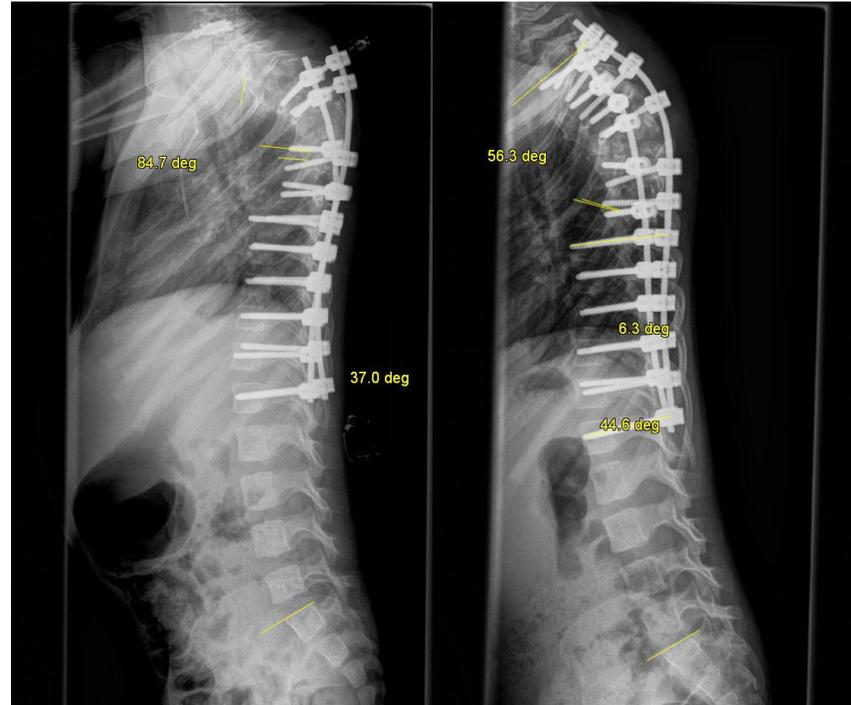
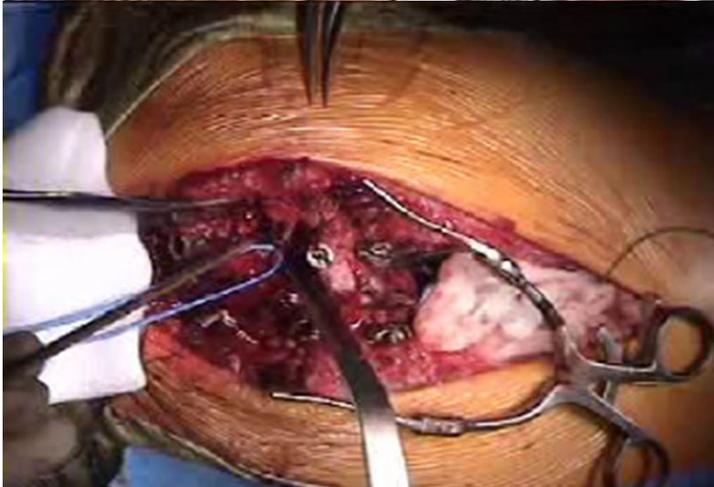
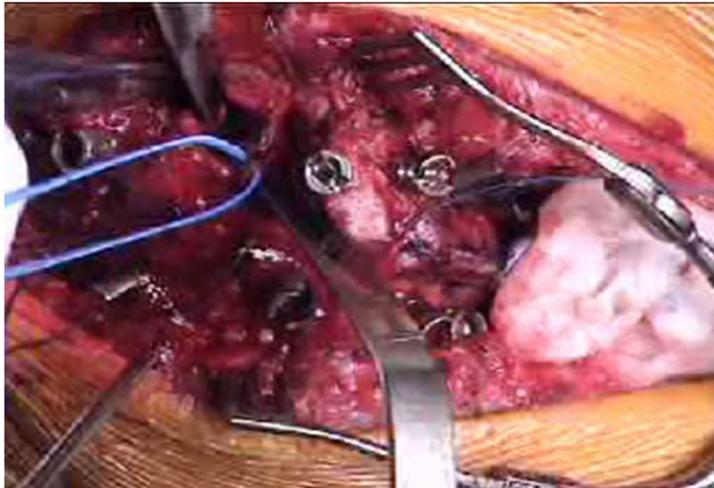


# Further kyphosis correction

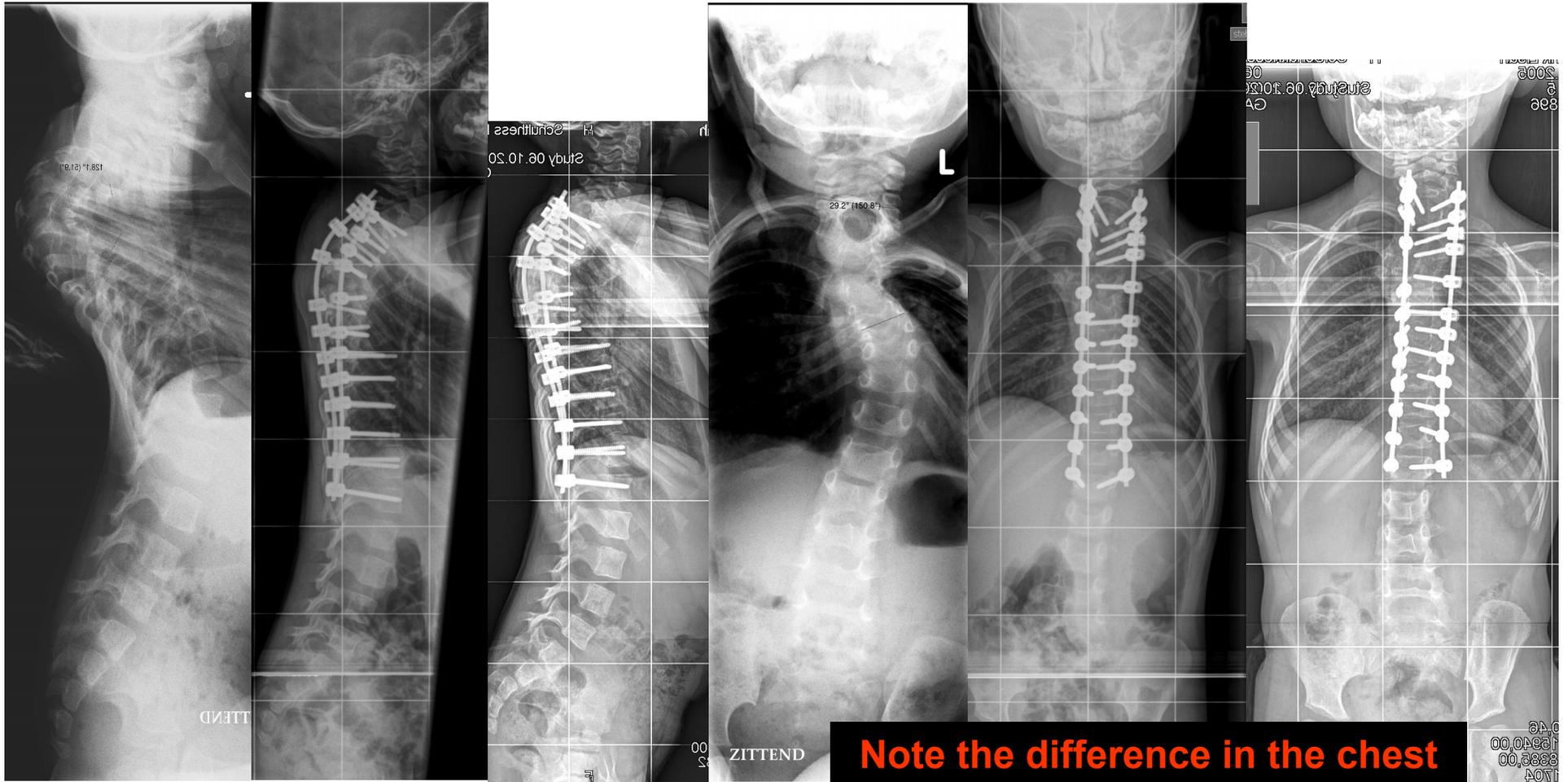
12-09-2007 2+8 years

Resection of the fifth rib head on the left side also

Instrumentation up to T1



# Post op. after revision



preop

postop

1 yr F/U

preop

postop

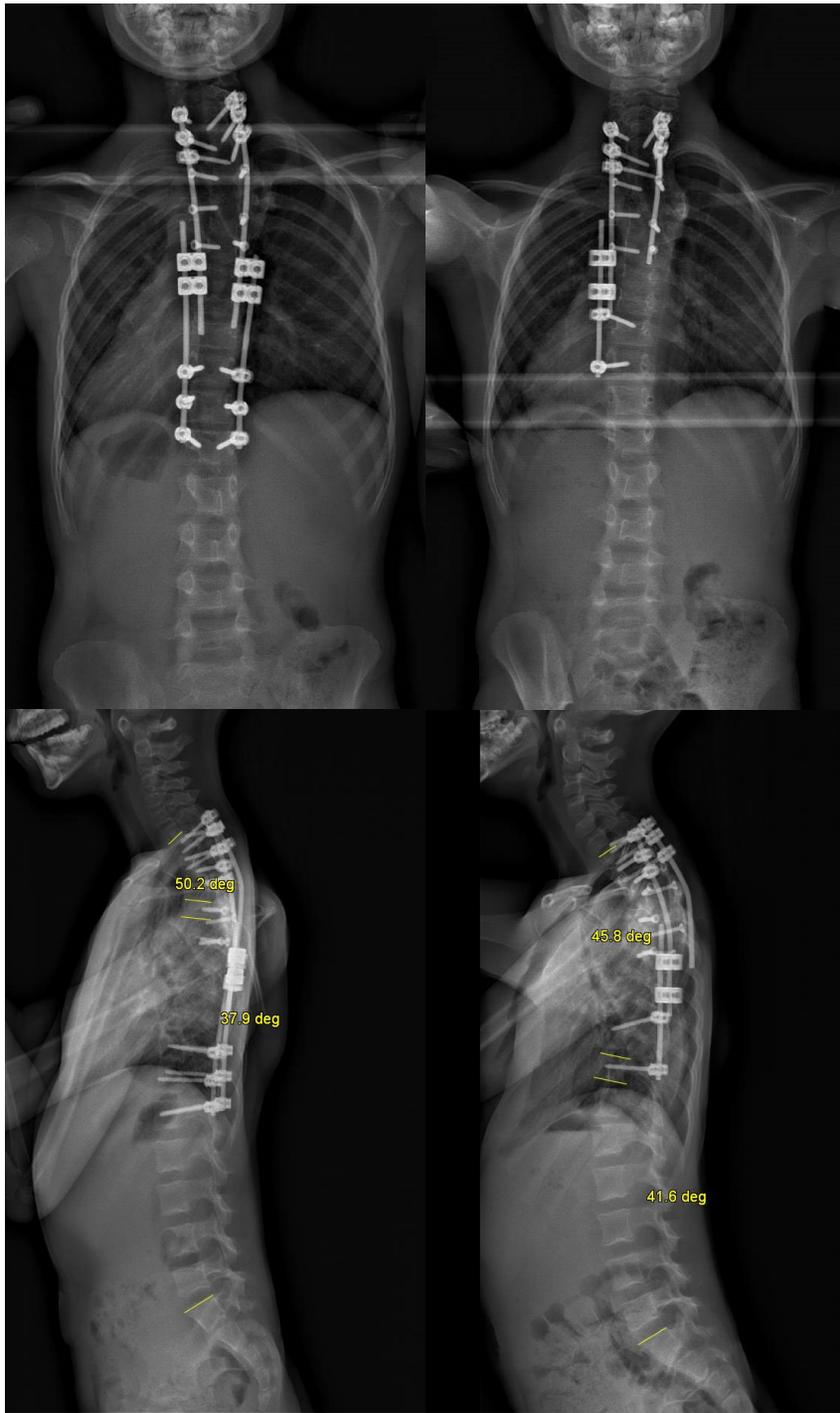
1 yr F/U



# Further distraction 07-10-2011 (6 months later)

Remove T11 on the right and T12, L1 on both sides

New rod system and an additional screw (T10) on the left side



## Last surgery 17-10-2012

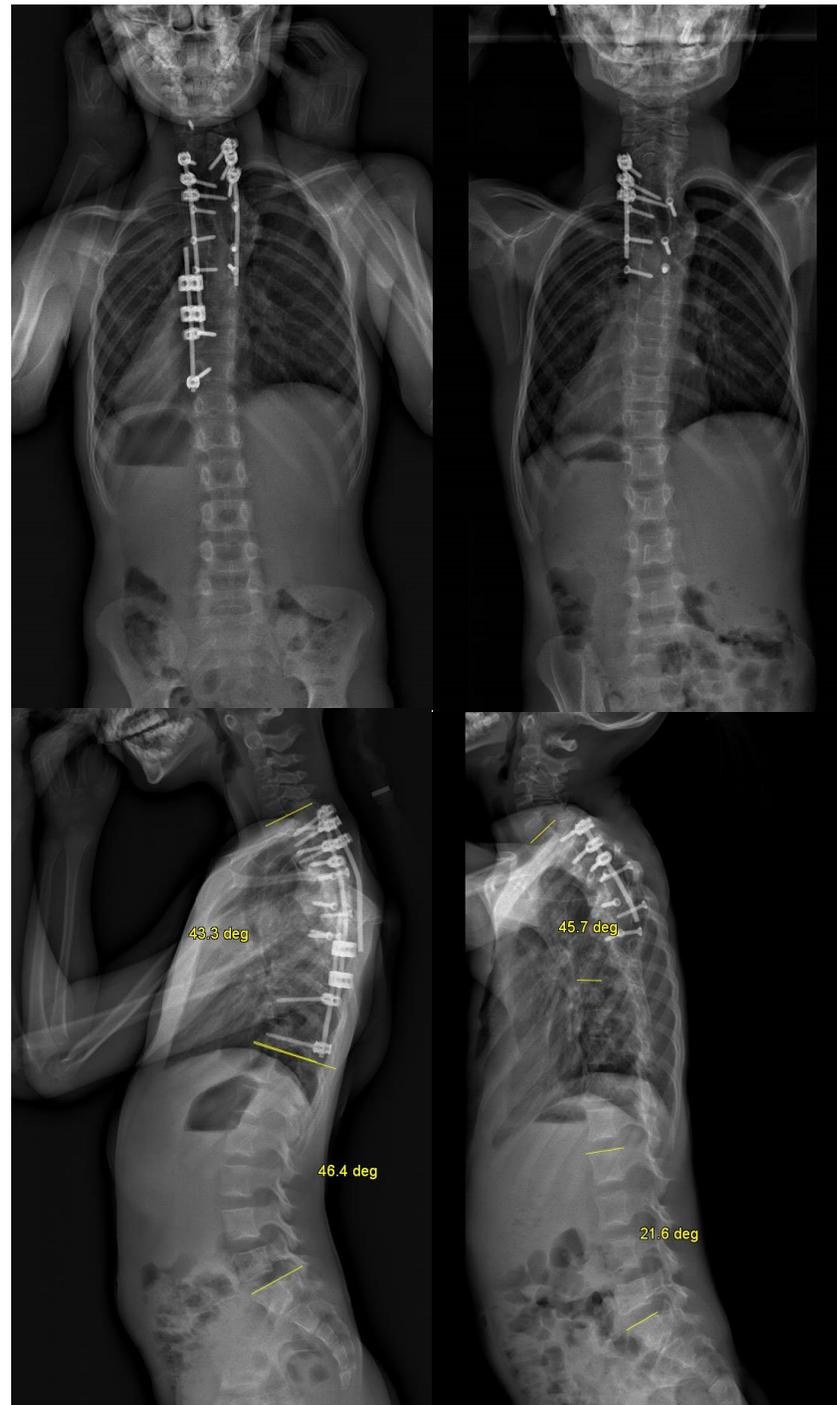
At the age of 7

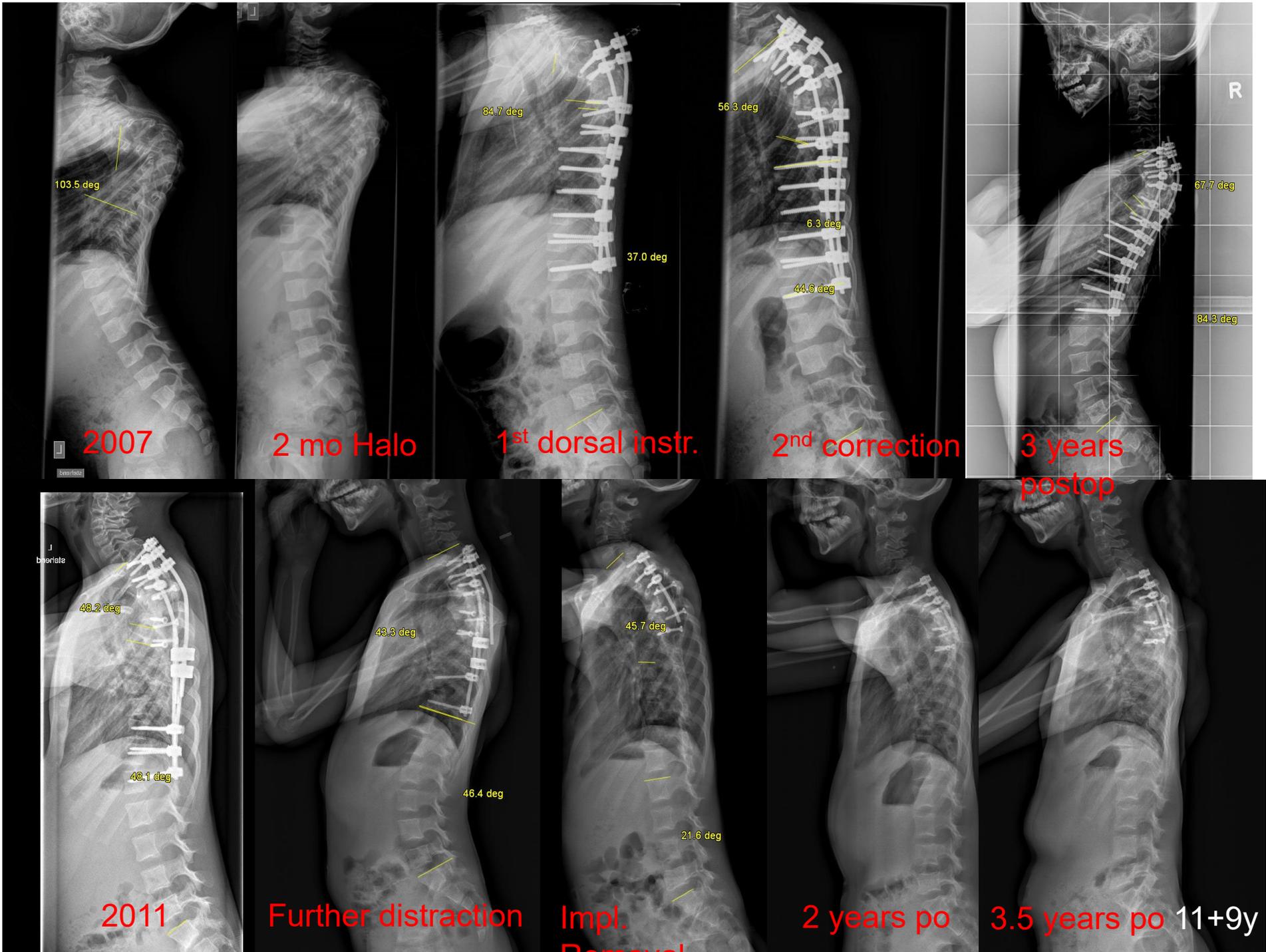
No more relevant distraction

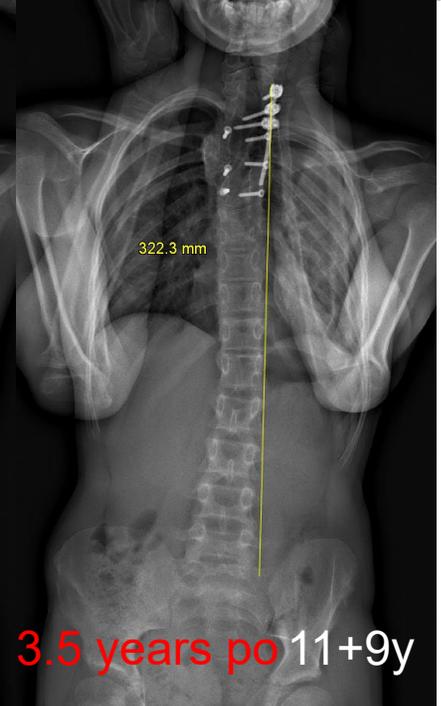
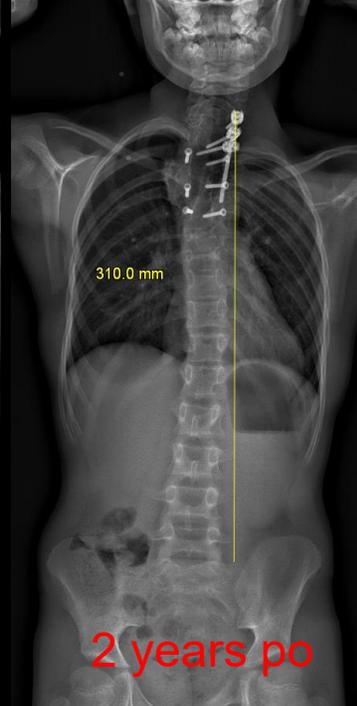
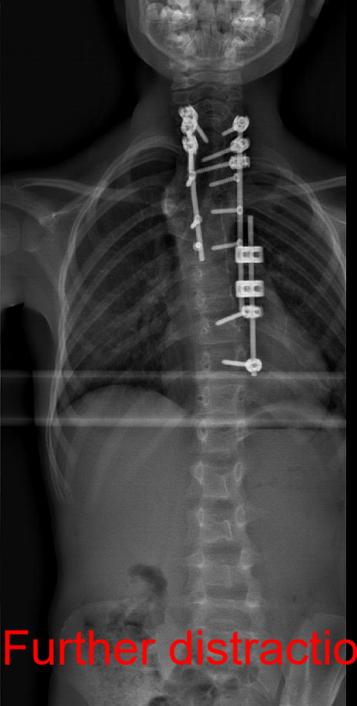
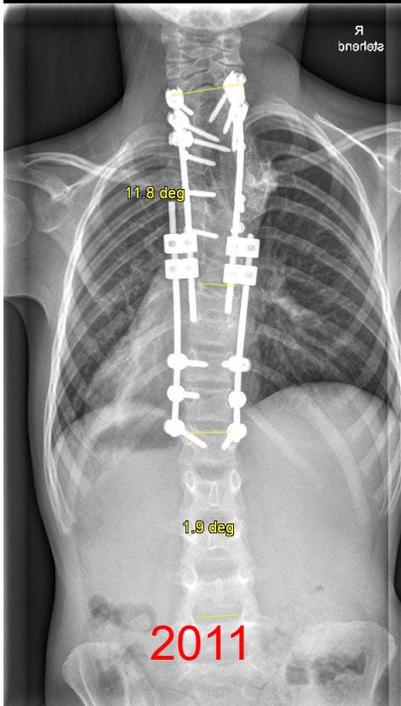
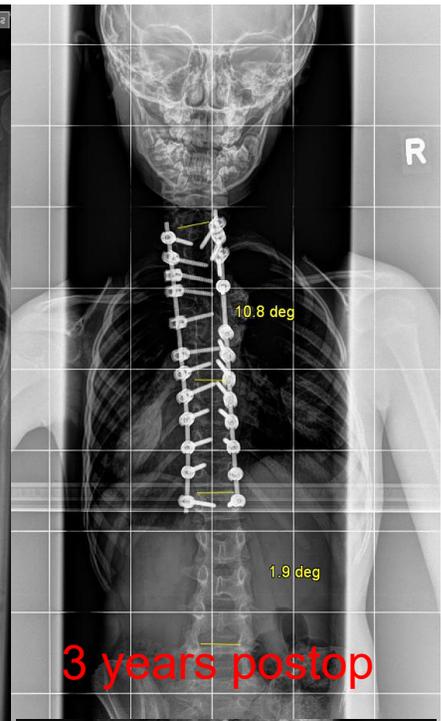
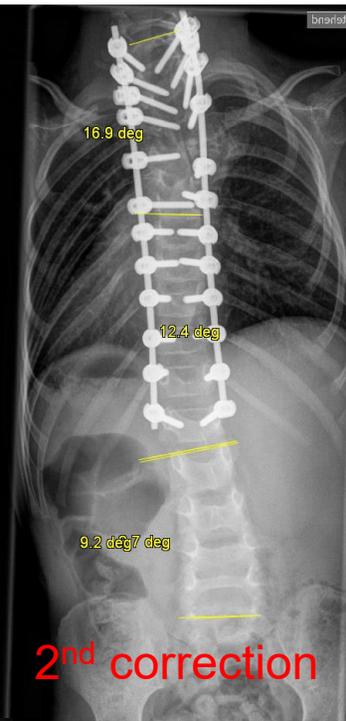
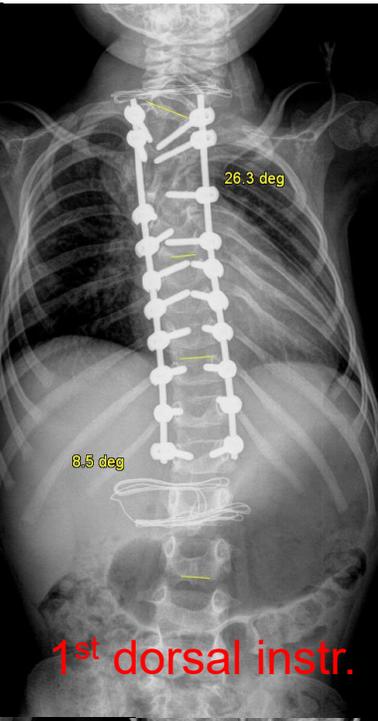
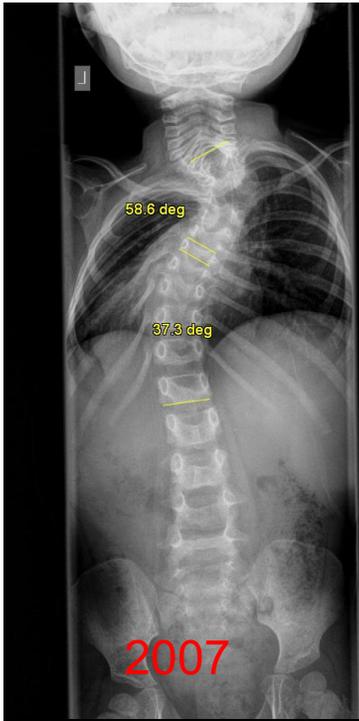
Partial instrument removal to create more moving segments

Just `marking screws` on the right side in case of further instrumentation

During screw measure we observed a connection between T1/2/3 screw and the C7/8 nerve root









Preop



Postop



95 cm

1 y



1.5 y



2 y



2.5 y



3 y



3.5 y



120.5 cm

4 y



126.5 cm

4.5 y



Preop



Postop

95 cm



1 y



1.5 y



2 y



2.5 y



3 y



3.5 y



120.5 cm

4 y



126.5 cm

4.5 y



Preop



Postop



95 cm

1 y



1.5 y



2 y



2.5 y



3 y



3.5 y



120.5 cm

4 y



126.5 cm

4.5 y

# Benefits from a VCR

- Adolescent and adults
  - To achieve spinal balance by means of major correction
  - Stop neurological deterioration
  - Vertebral column resection is a spinal shortening procedure that makes it possible to correct the most severe deformities safely without distraction, thus avoiding the high risk of neurologic deficit associated with other techniques

# Benefits from a VCR

- Young children
  - Prevent structural deformities in secondary curves and achieve spinal balance (full correction when possible)
  - Surgery as early as possible and with maximum correction at the site of the main deformity prevents the development of non structural compensatory curves in the intact spinal segments
  - Correction of the underlying spinal deformity helps to guide the development of the chest wall
  - VCR allows for immediate major correction resulting in improved development of the spine and thorax
  - Relatively short segments of the spine needs to be fused, but it is a shortening procedure
  - Conversion to a growing rod construct for the remaining curve should be considered
  - Time is important!

# Summary

**VCR provides more benefits for the growing child than adults!**



Thank you for your attention!

