



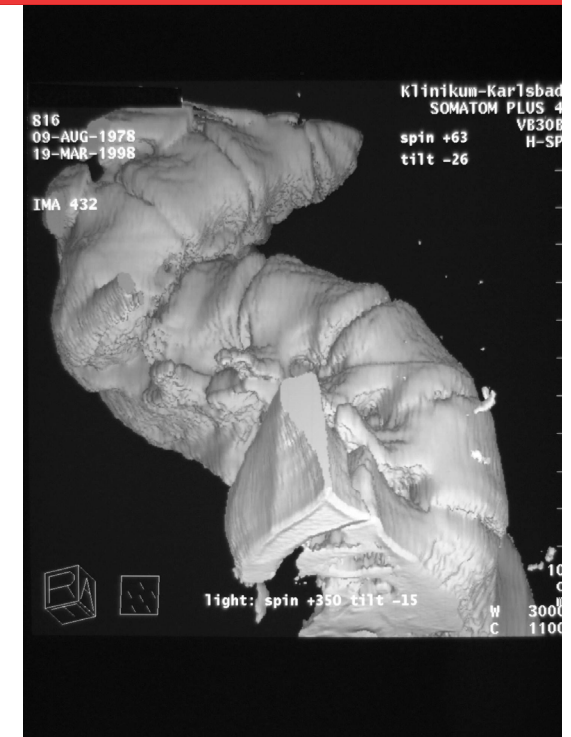
ICEOS
2016
Utrecht Holland

10th 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

Young children

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

Boachie-Adjei O, Bradford DS (1991) Vertebral column resection and arthrodesis for complex spinal deformities. *J Spin Disord* 4:193–202

Suk SI, Chung ER, Kim JH, Kim SS, Lee JS, Choi WK (2005) Posterior vertebral column resection for severe rigid scoliosis. *Spine (Phila Pa 1976)* 30:1682–1687

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Hamzaoglu A, Alanay A, Ozturk C, Sarier M, Karadereler S, Ganiyusufoglu K (2011) Posterior vertebral column resection in severe spinal deformities: a total of 102 cases. *Spine (Phila Pa 1976)* 36:E340–E344. doi:[10.1097/BRS.0b013e3182015712](https://doi.org/10.1097/BRS.0b013e3182015712)

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

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¹Department of Orthopaedic Surgery, Hospital for Special Surgery, New York, NY, USA

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³Department of Orthopaedic Surgery, Weill Cornell Medical College, New York, NY, USA

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?

Selim Ayhan¹ · Bilal Aykac¹ · Selcen Yukse² · Umit Ozgur Guler¹ · Ferran Pellise³ · Ahmet Alanay⁴ · Francisco Javier Sanchez Perez-Grueso⁴ · Emre Acaroglu¹ · ESSG European Spine Study Group

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Sponseller PD, Jain A, Lenke LG, Shah SA, Sucato DJ, Emans JB, Newton PO (2012) Vertebral column resection in children with neuromuscular spine deformity. *Spine (Phila Pa 1976)* 37:E655–E661. doi:[10.1097/BRS.0b013e318244460d](https://doi.org/10.1097/BRS.0b013e318244460d)

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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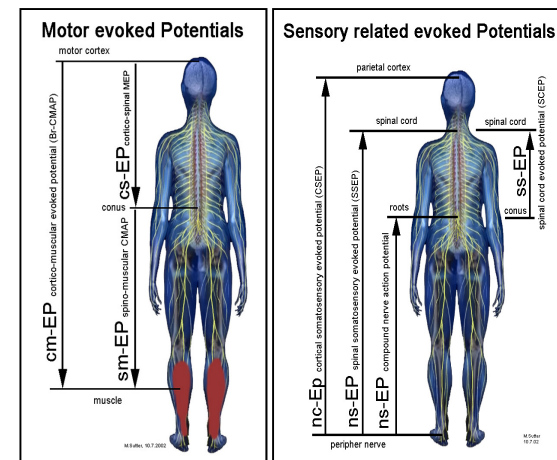
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VCR. What is similar?

- 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 normally
- 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

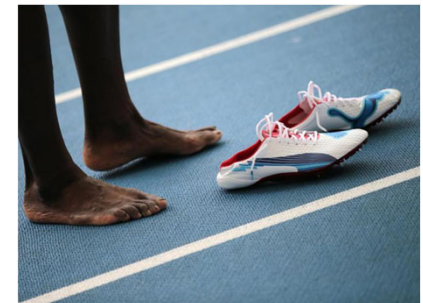
VCR. What is the difference?

For the young child the start is very important



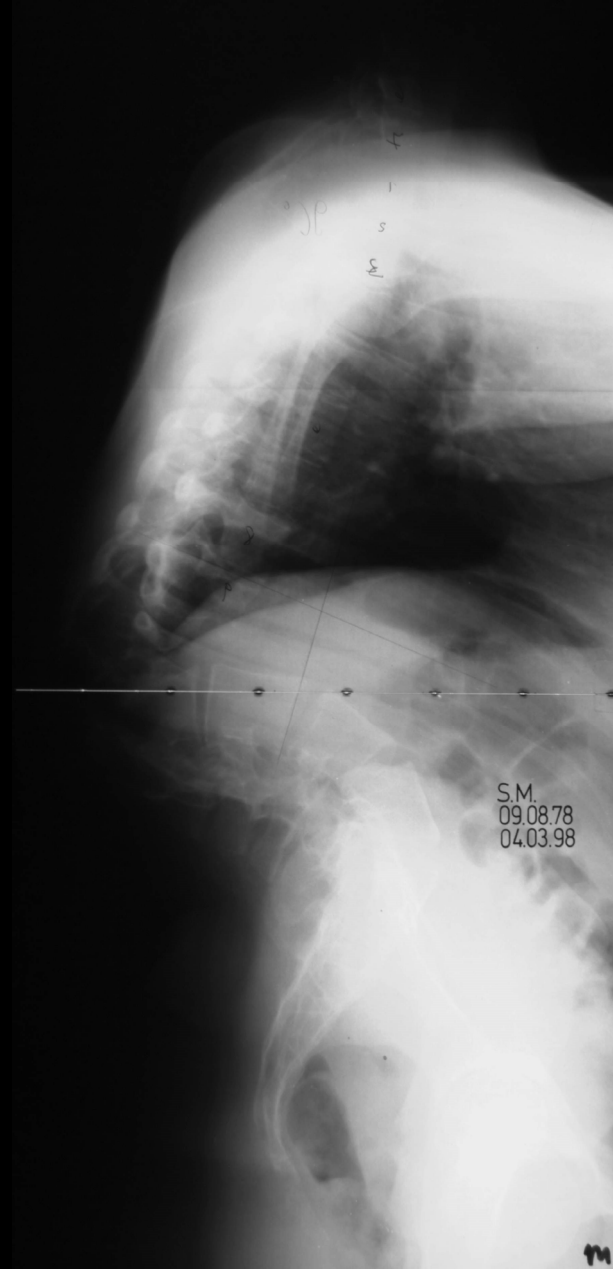
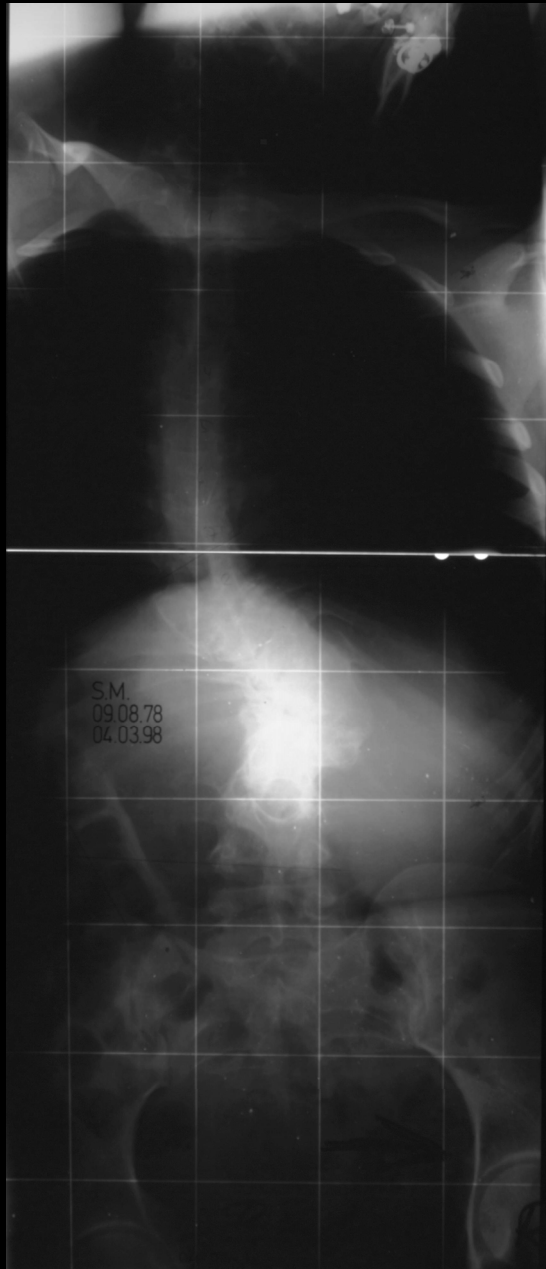
Allows a good direction for growing

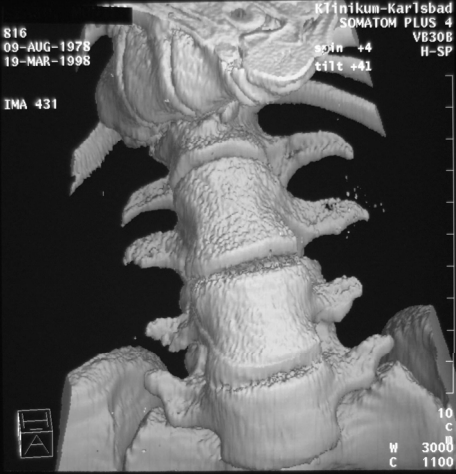
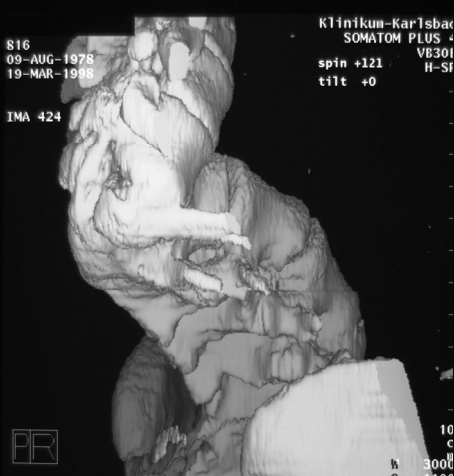
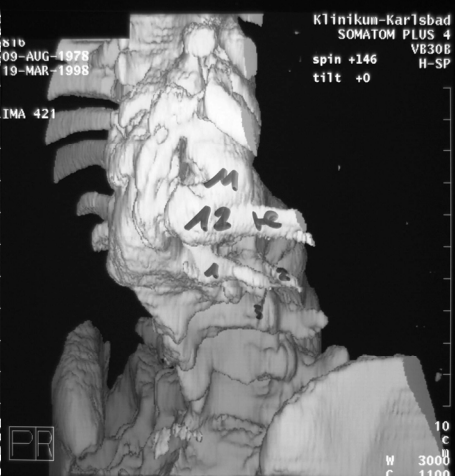
For the adults this way is not possible

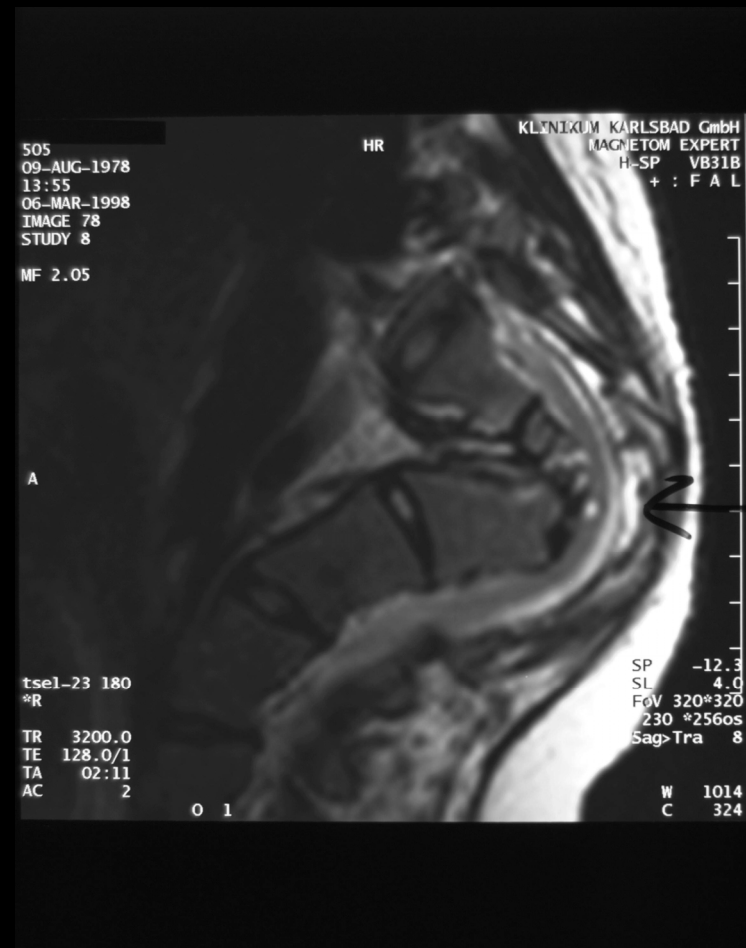


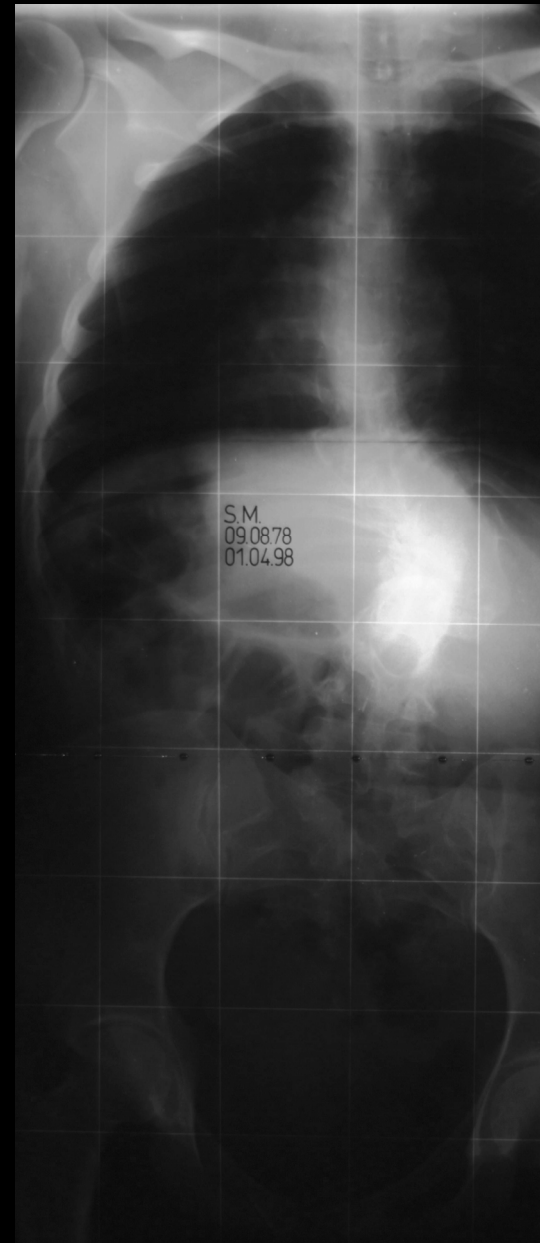
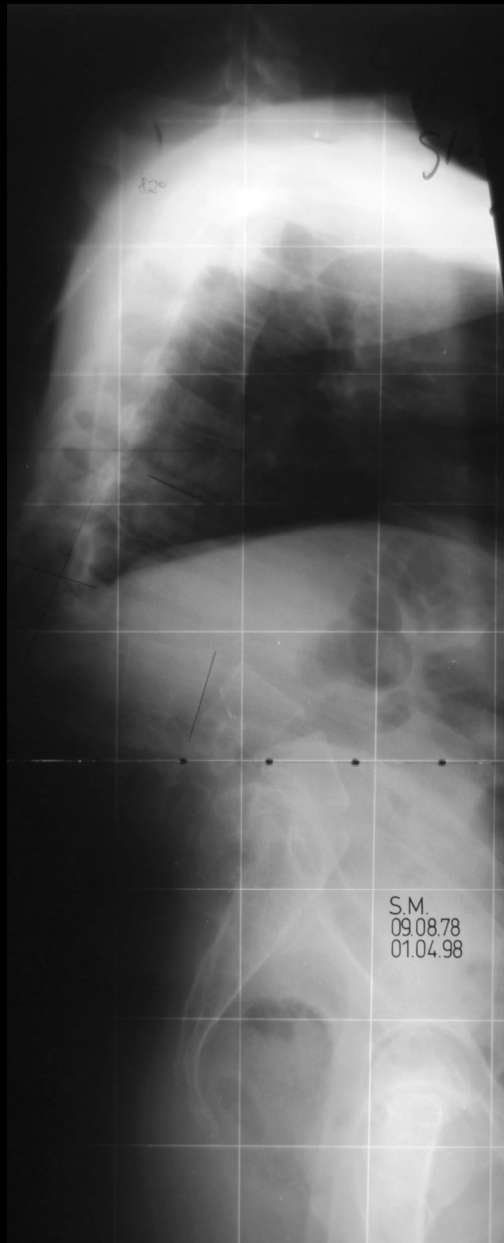
Case Report Adult, VCR

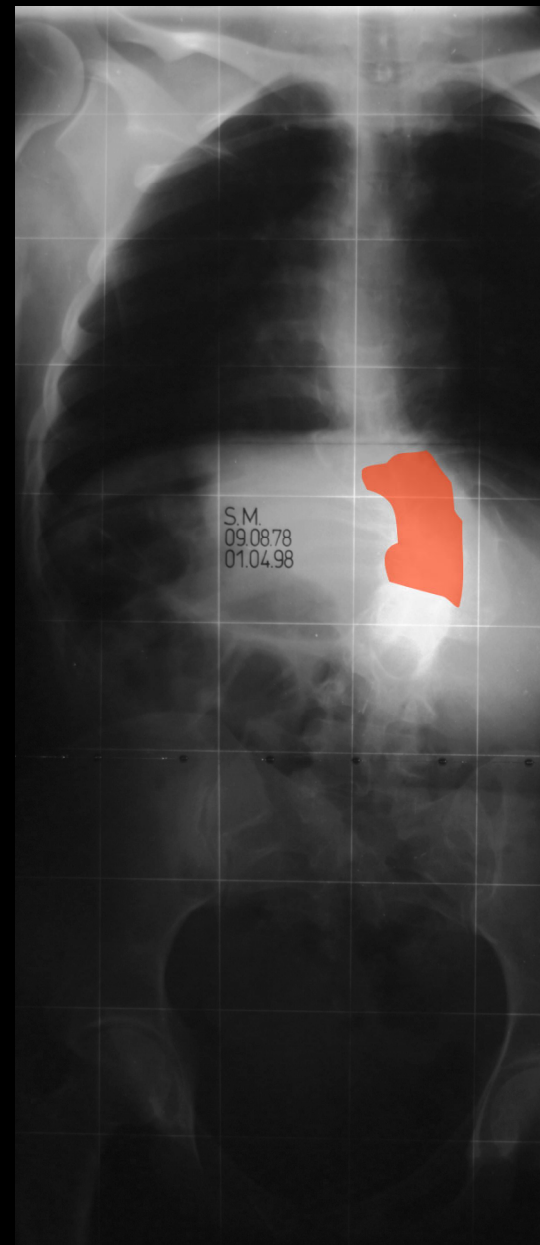
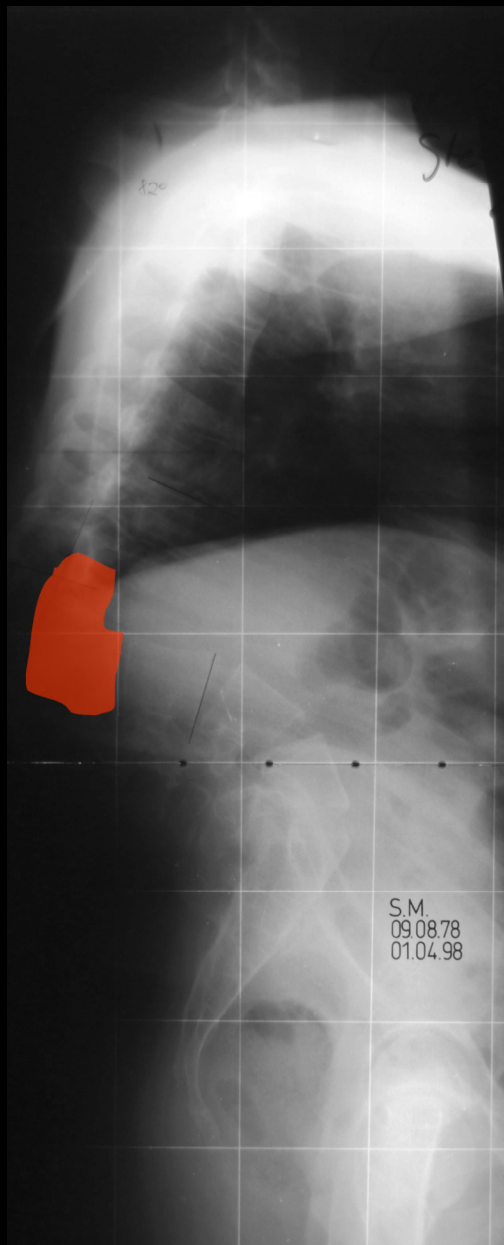
- SM, 20 yrs old female
- Congenital Th-L kyphoscoliosis
- Myelopathy, bladder dysfunction
- 1 session surgery:
 - 1. posterior release & instrumentation
 - 2. anterior vertebrectomy
 - 3. simultaneous anterior & posterior
- Few years later pseudoarthrosis, rod breakage
- Revision: Posterior-anterior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

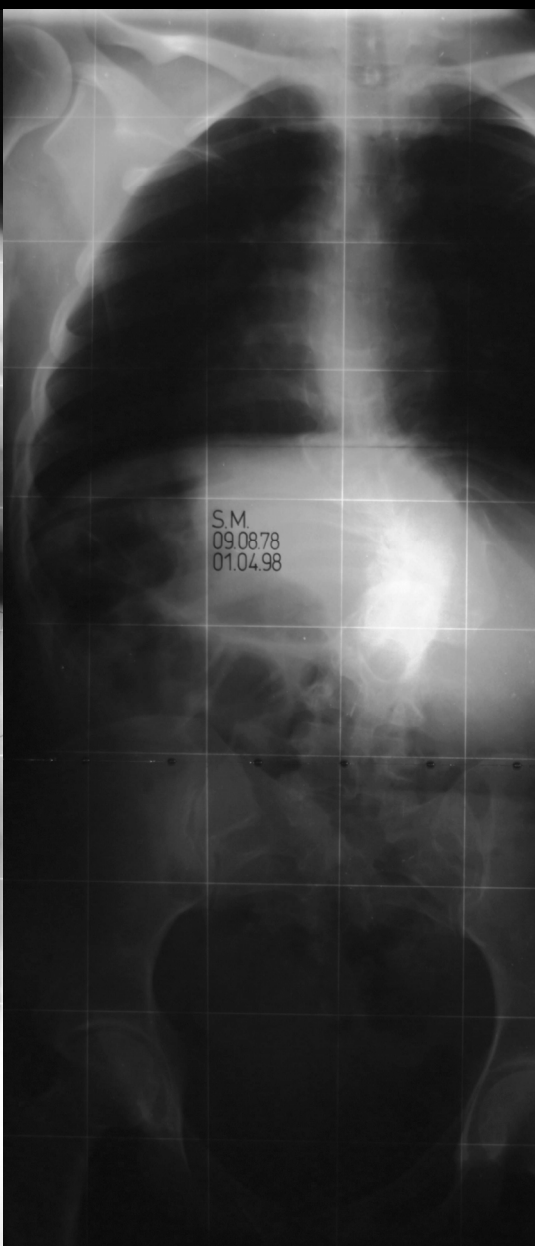
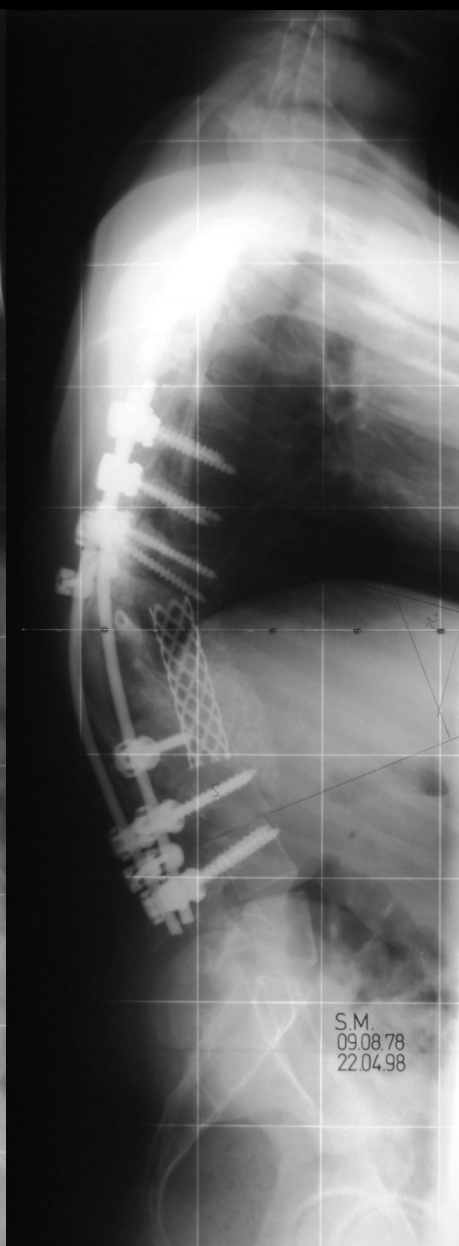
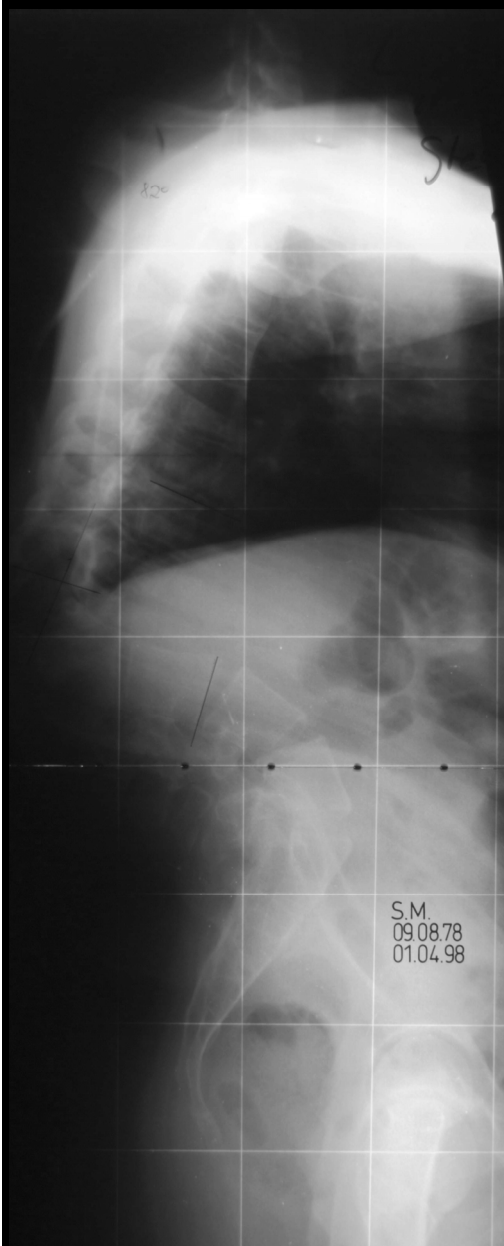












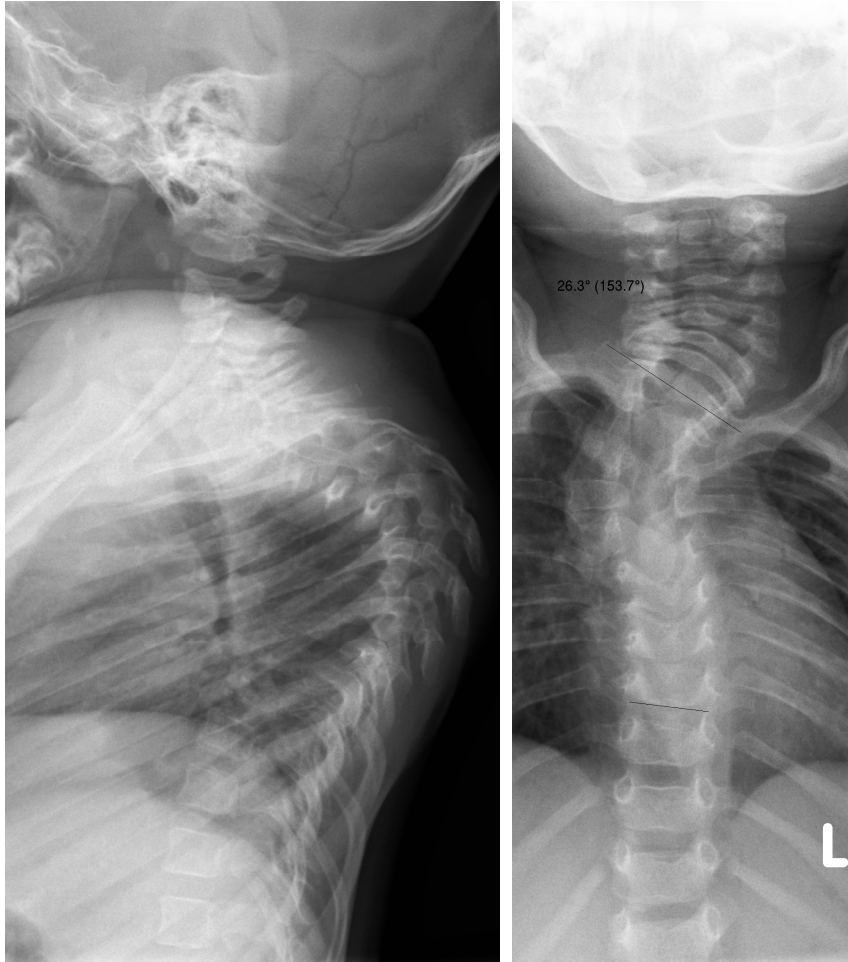


Shortening procedure

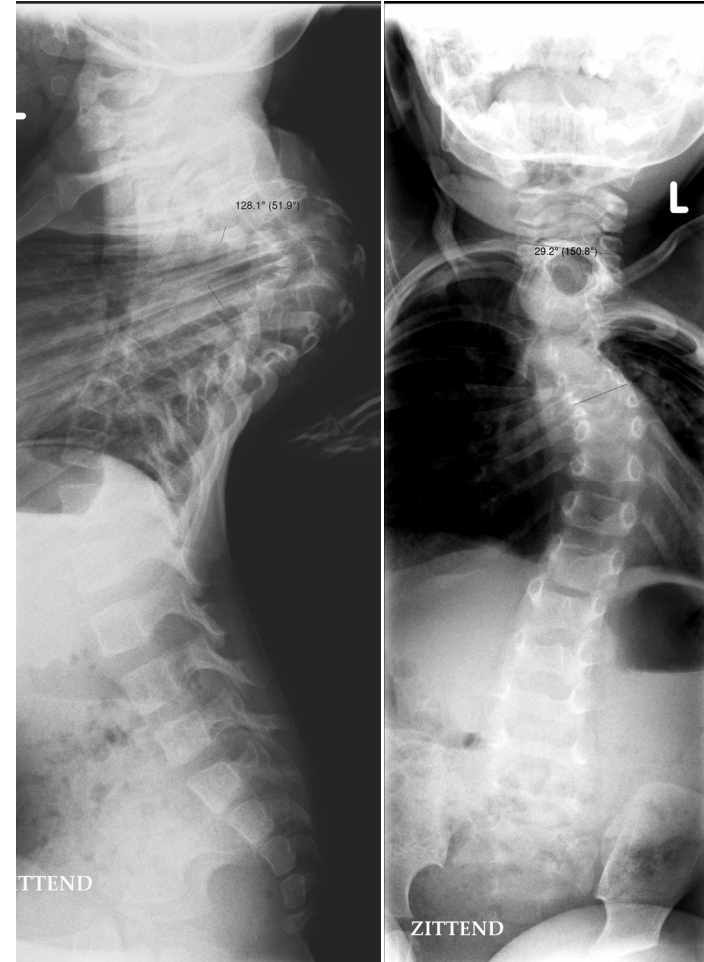
Case Report Child VCR

- 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

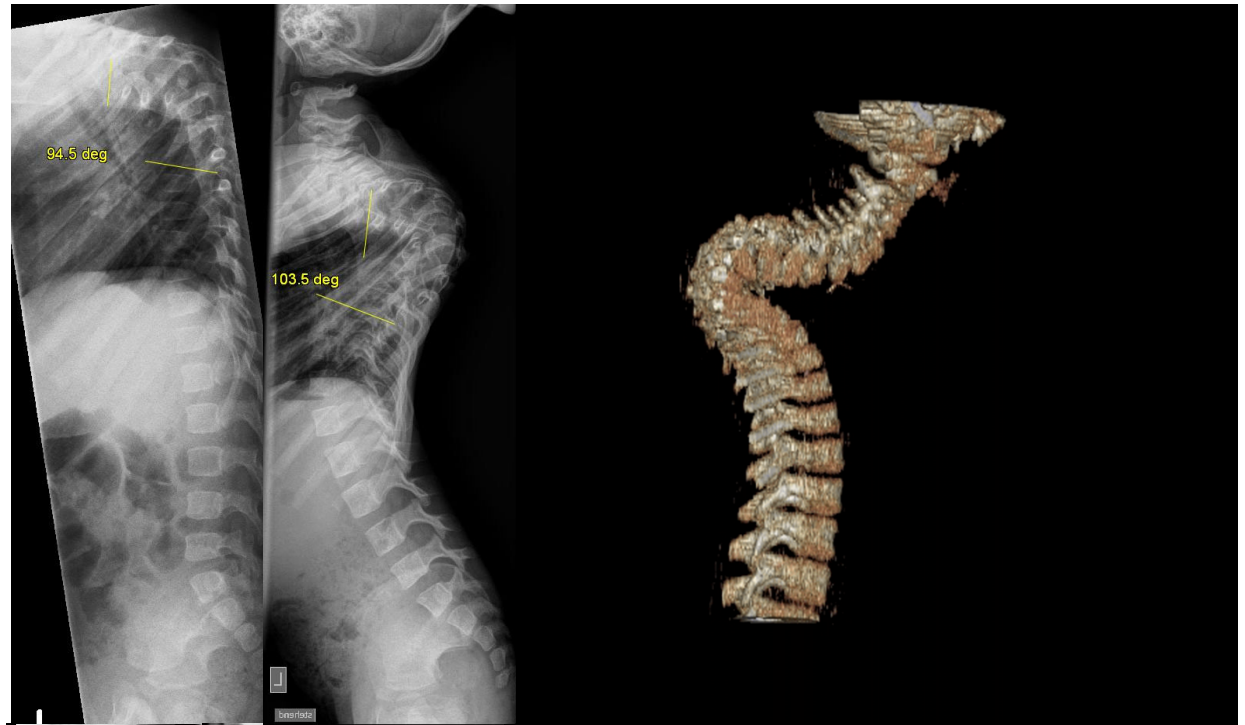
Pectus excavatum

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

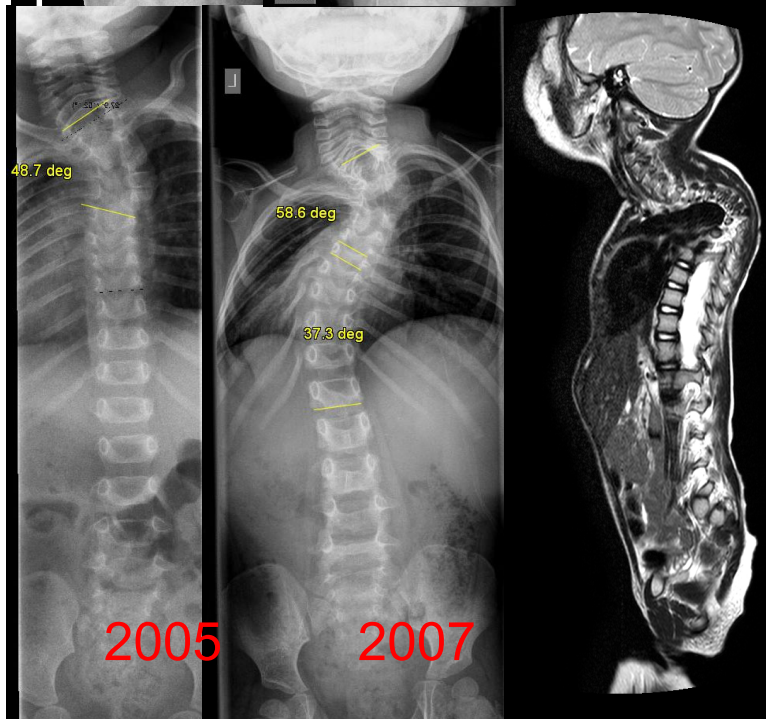
T1-T6 kyphosis

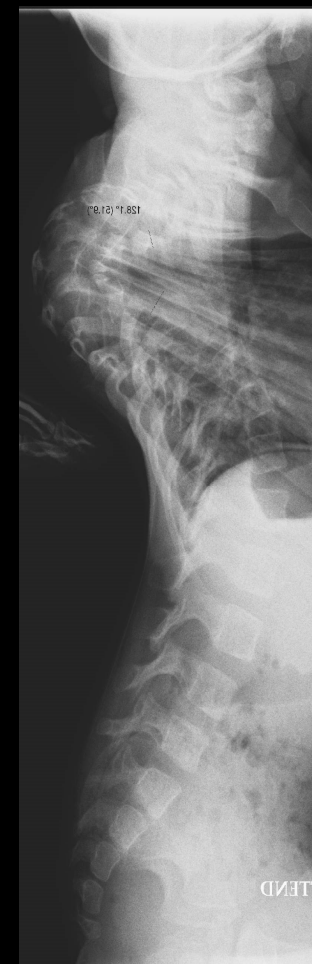
Subluxation-like rotation anomaly T3,
T4, T5

T5 wedge vertebra

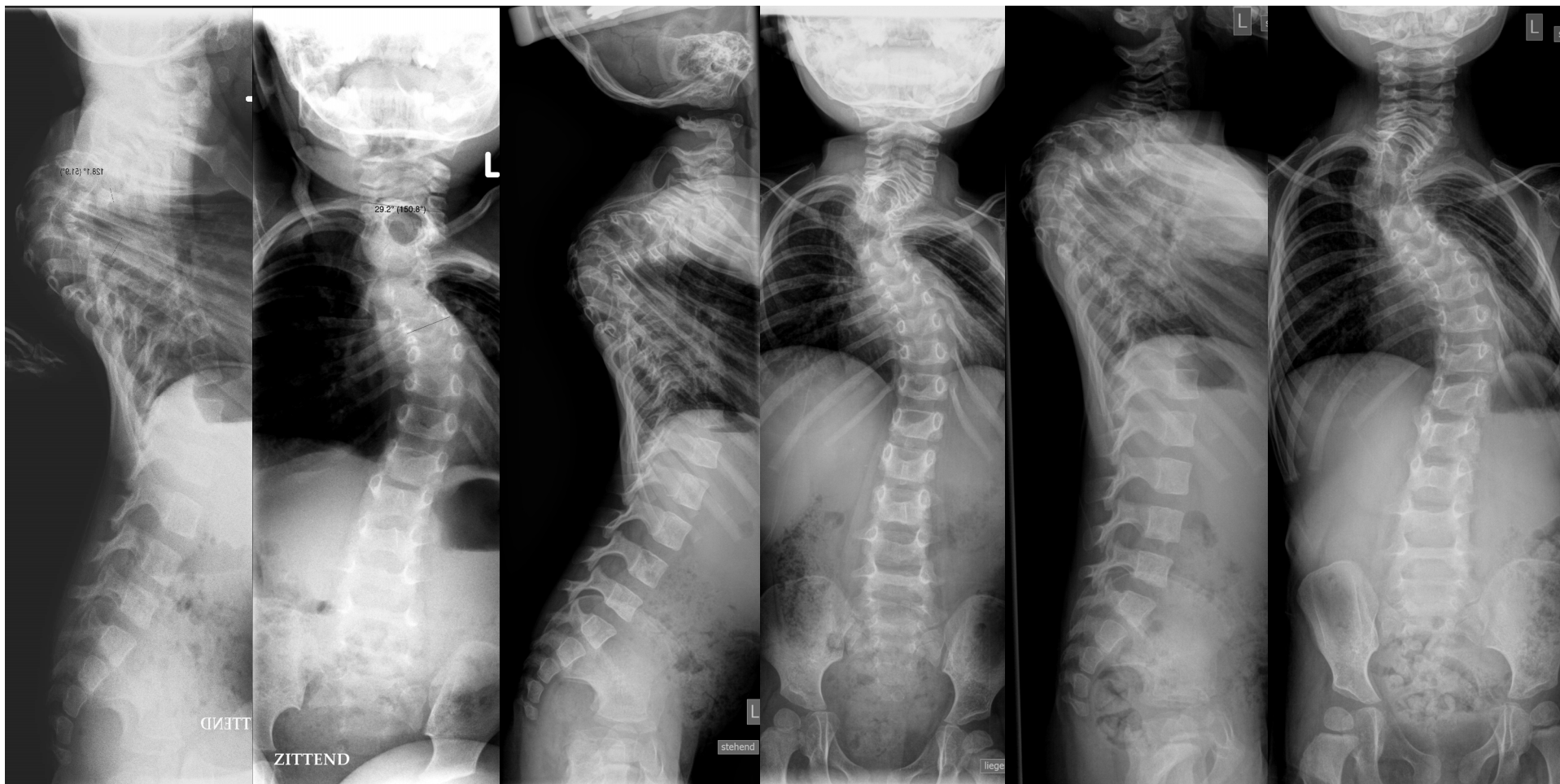
MRI:

No sign of intraspinal pathology





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

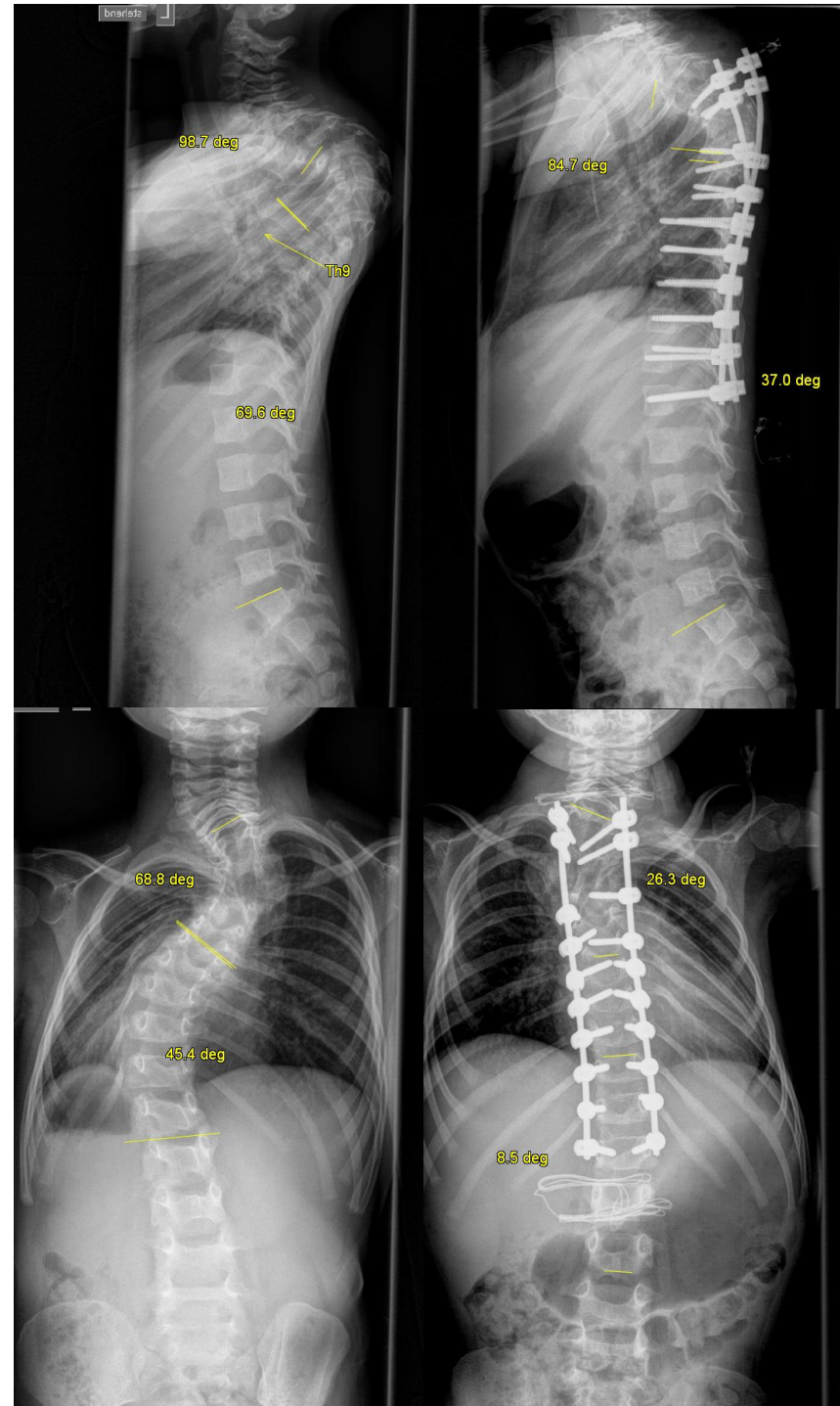
Resection of the fifth rib head on the right side

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

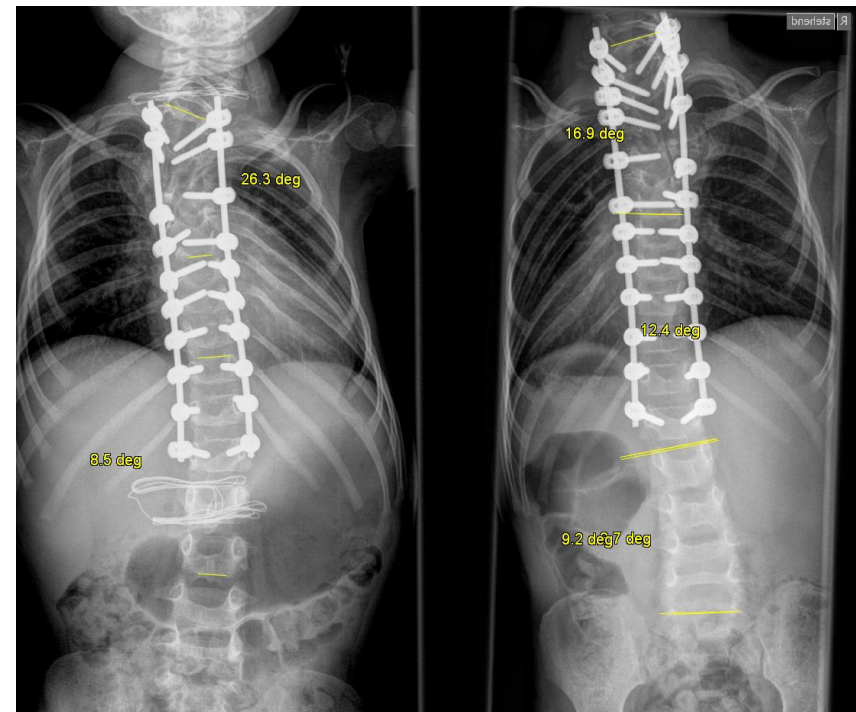
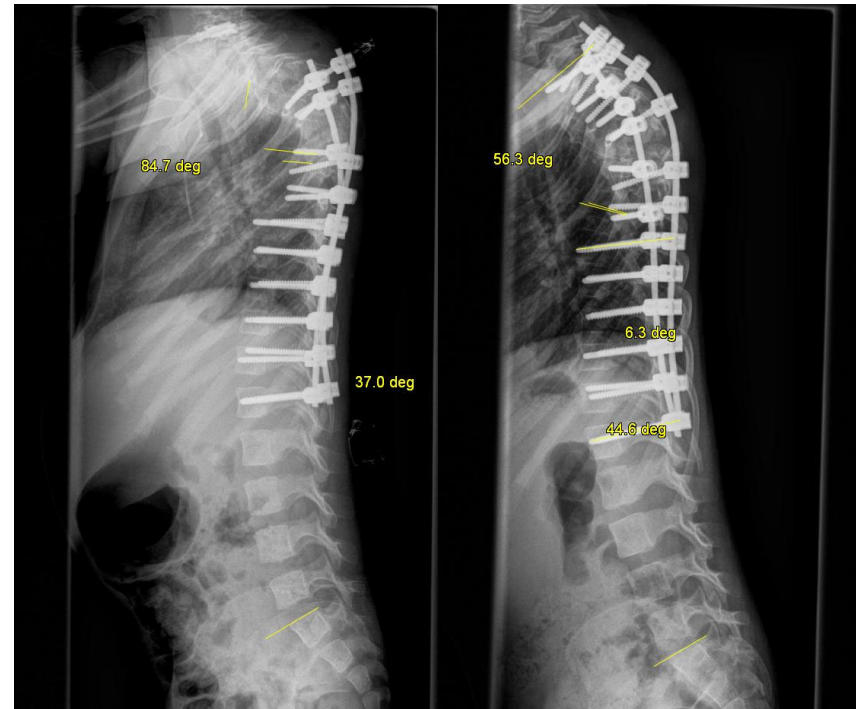
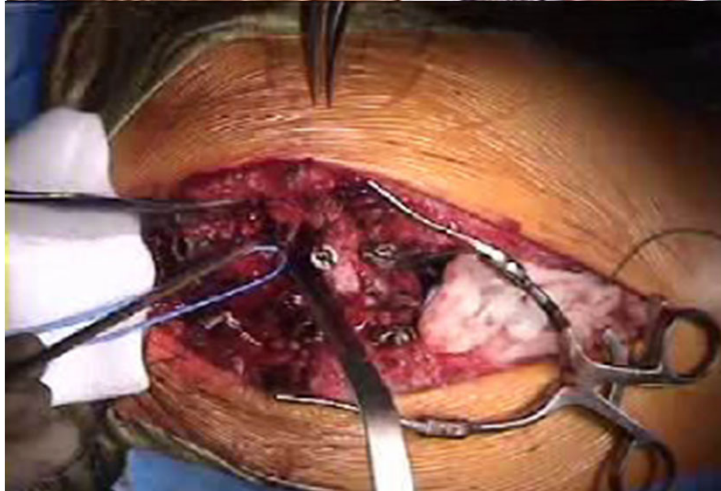
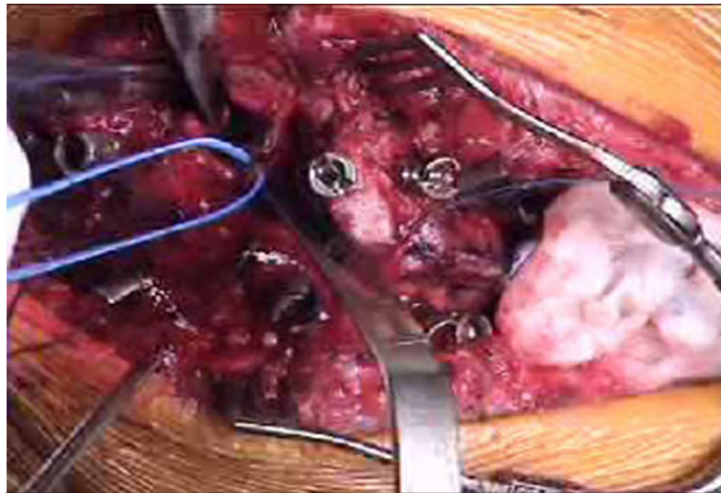


Further kyphosis correction

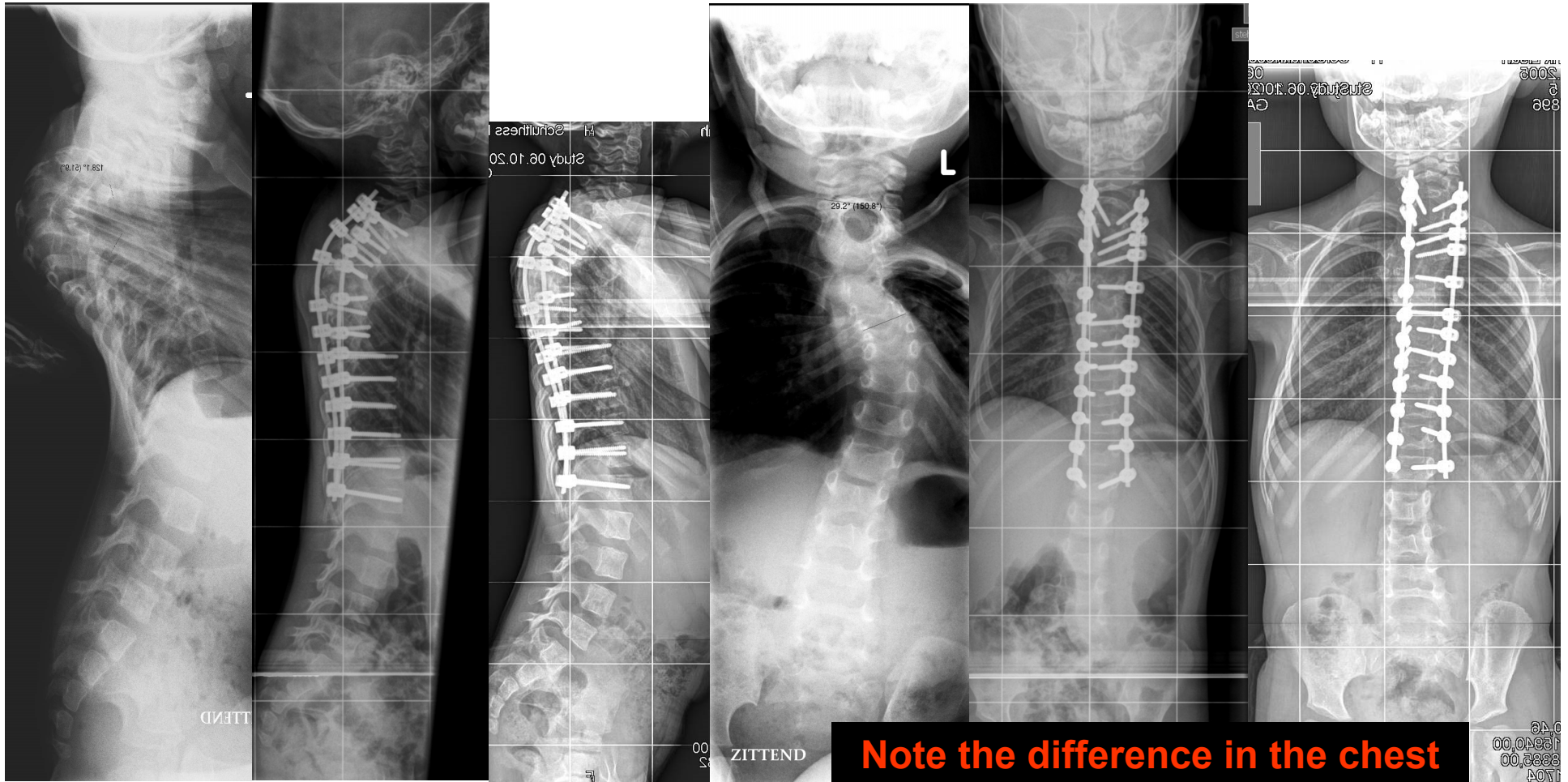
12-09-2007 2+8 years

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

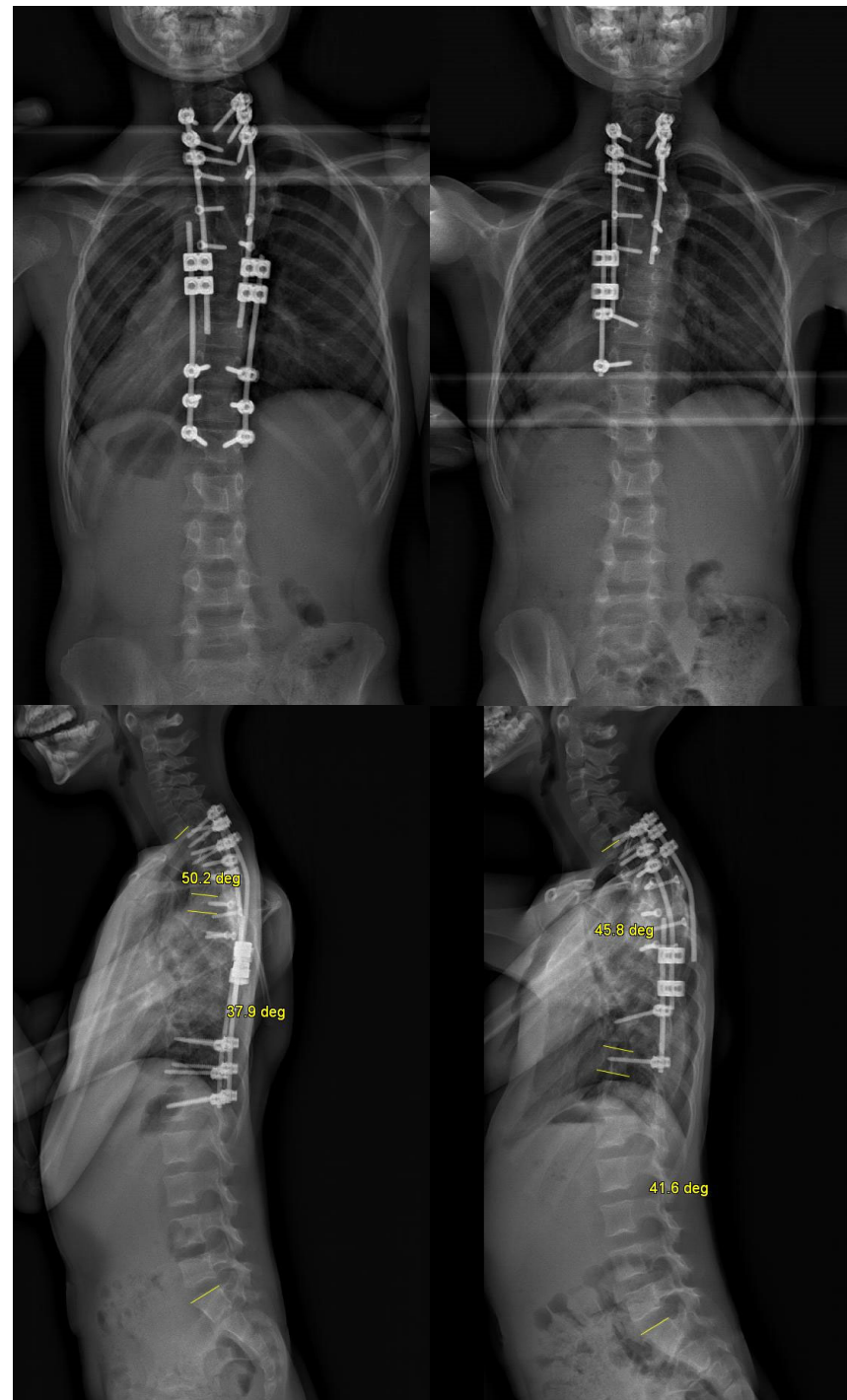
1 yr F/U



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

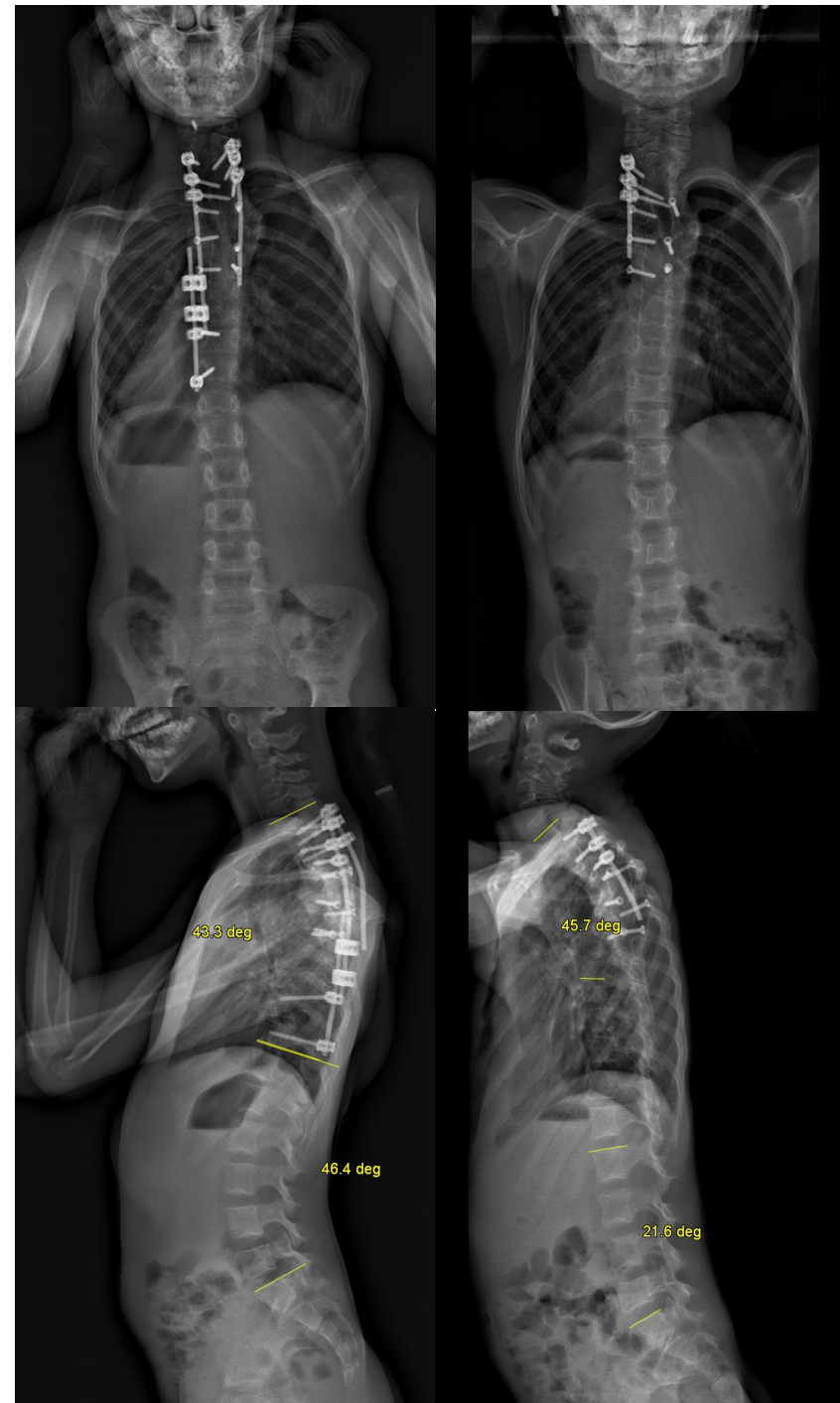
At the age of 7

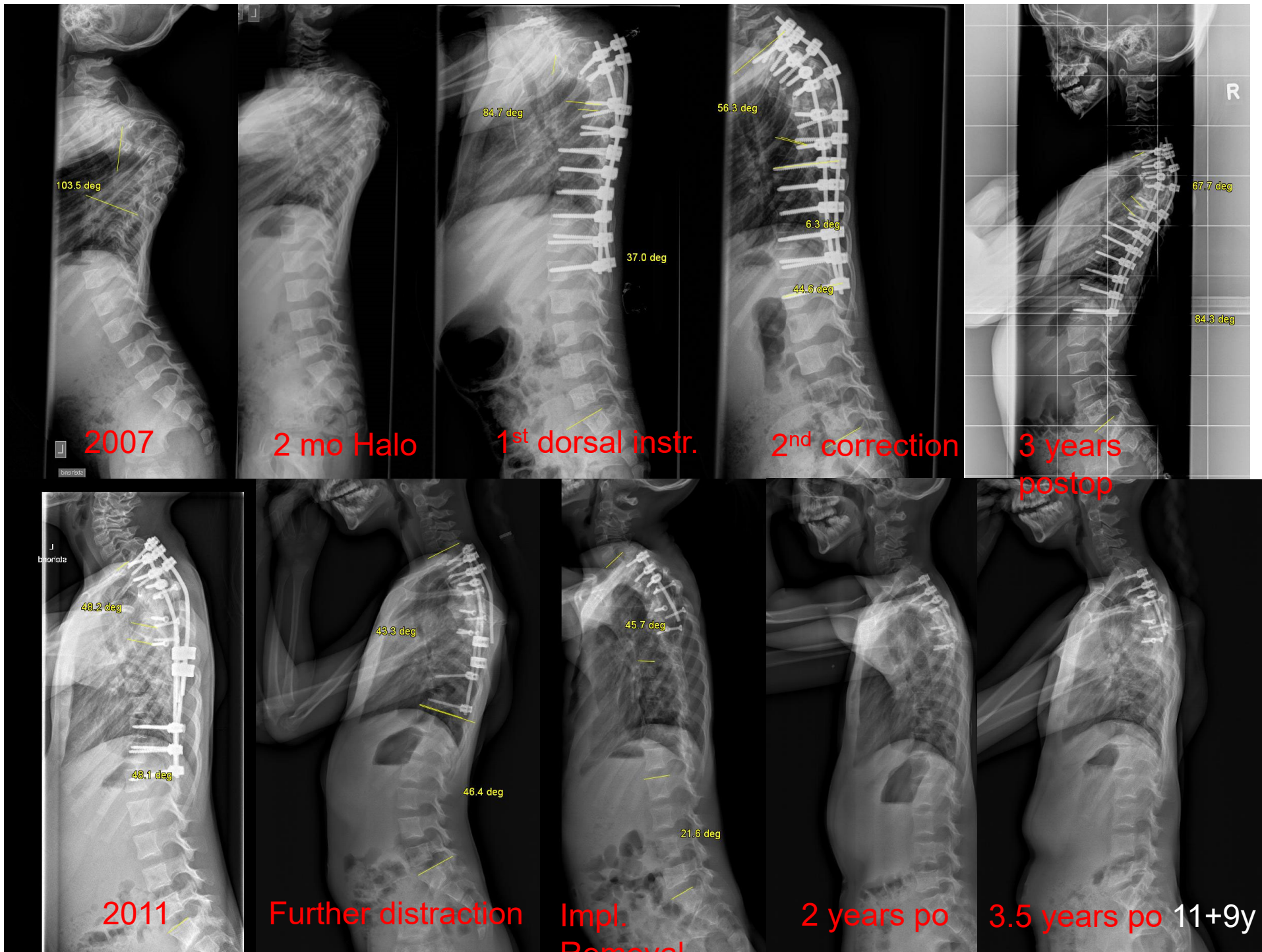
No more relevant distraction

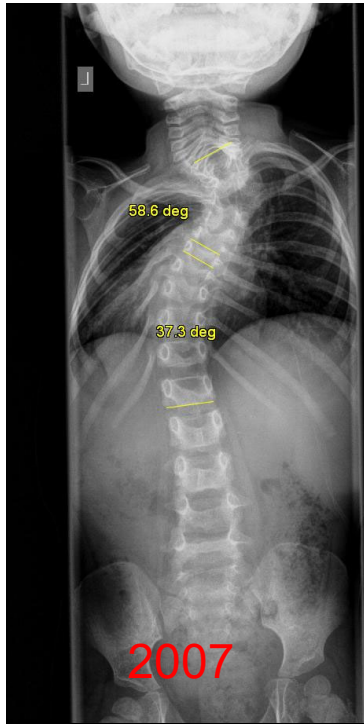
Partial instrument removal to create more moving segments

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



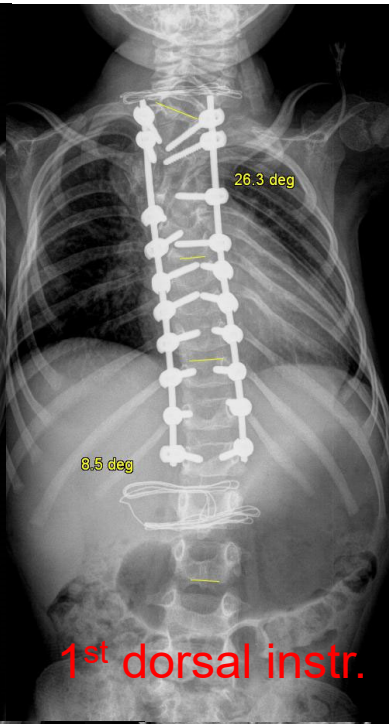




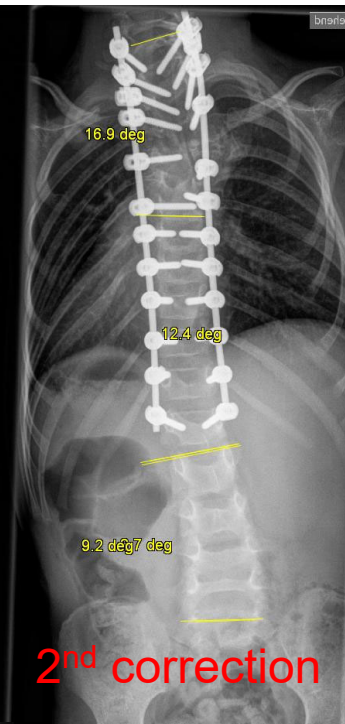
2007



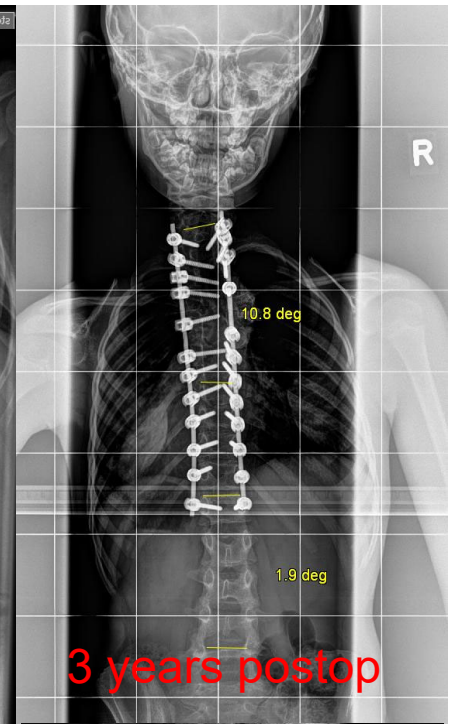
2 mo Halo



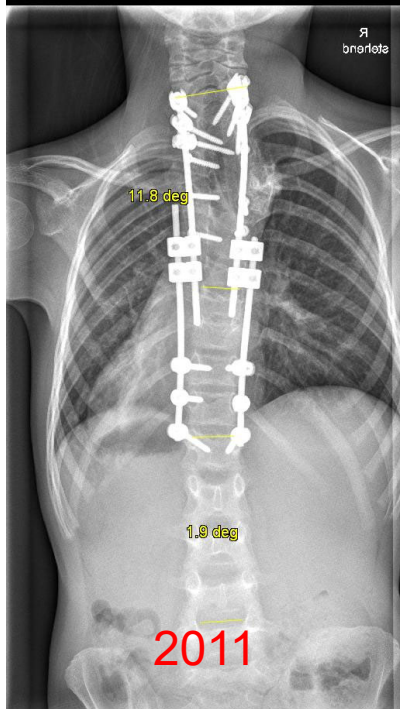
1st dorsal instr.



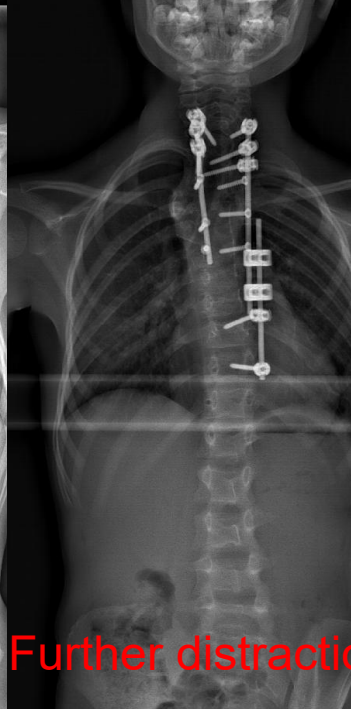
2nd correction



3 years postop



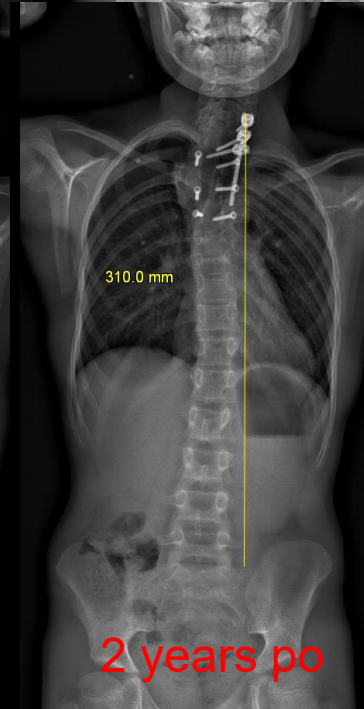
2011



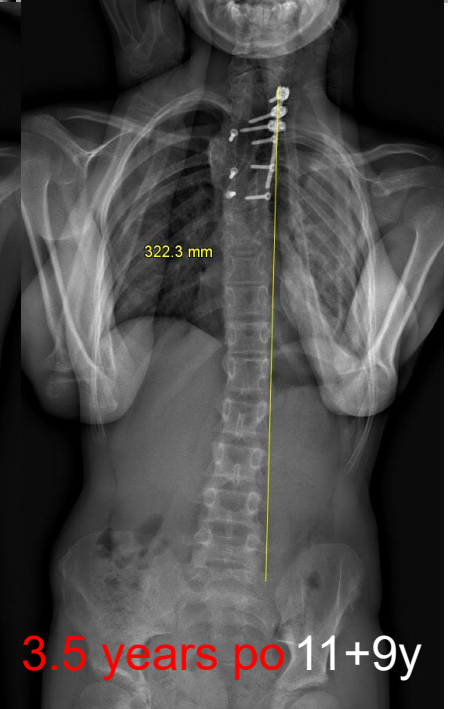
Further distraction



Impl.
Removal



2 years po



3.5 years po 11+9y



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



4 y

120.5 cm



4.5 y

126.5 cm



Preop



Postop



1 y



1.5 y



2 y



2.5 y



3 y



3.5 y



4 y



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!

