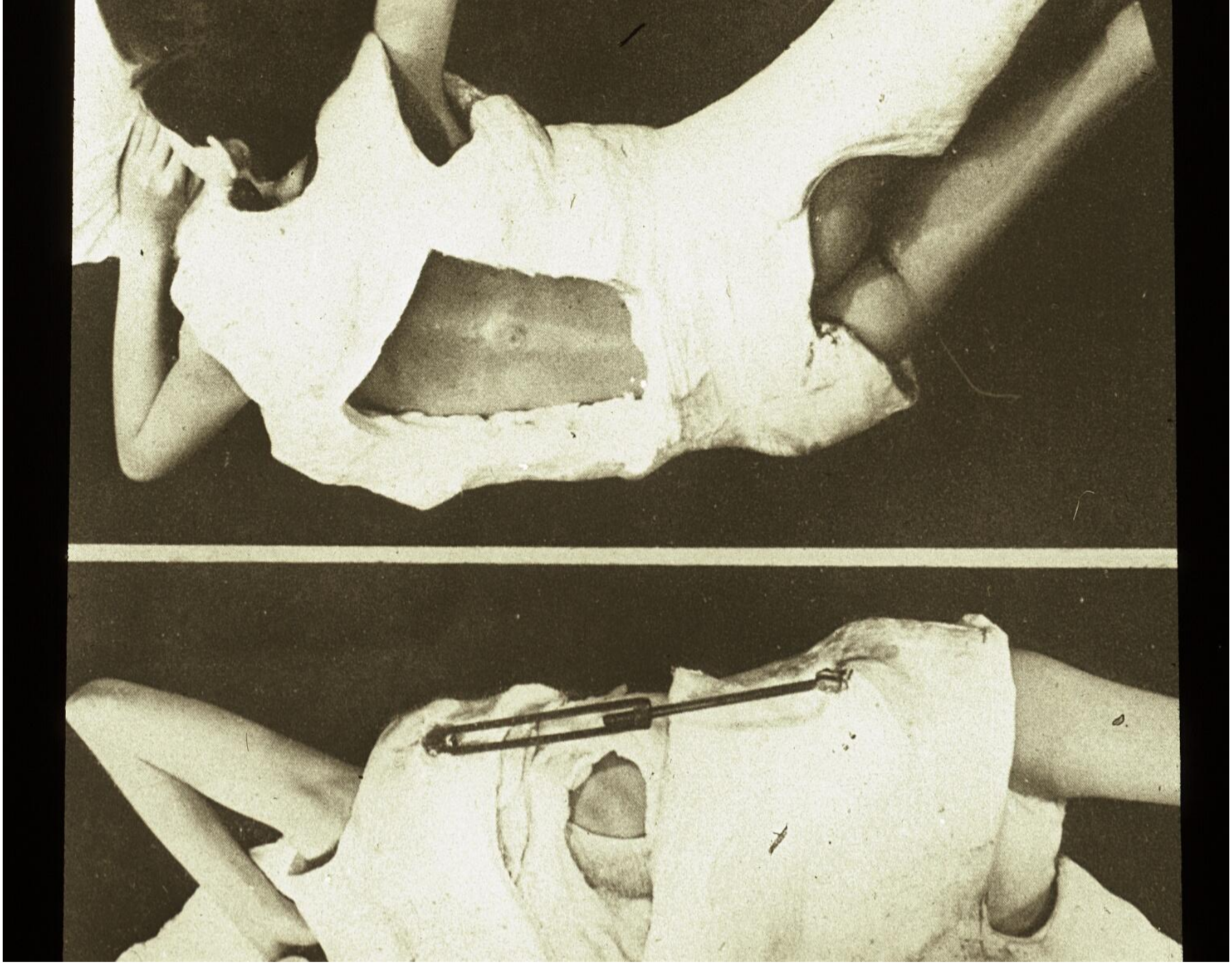
Scolioser

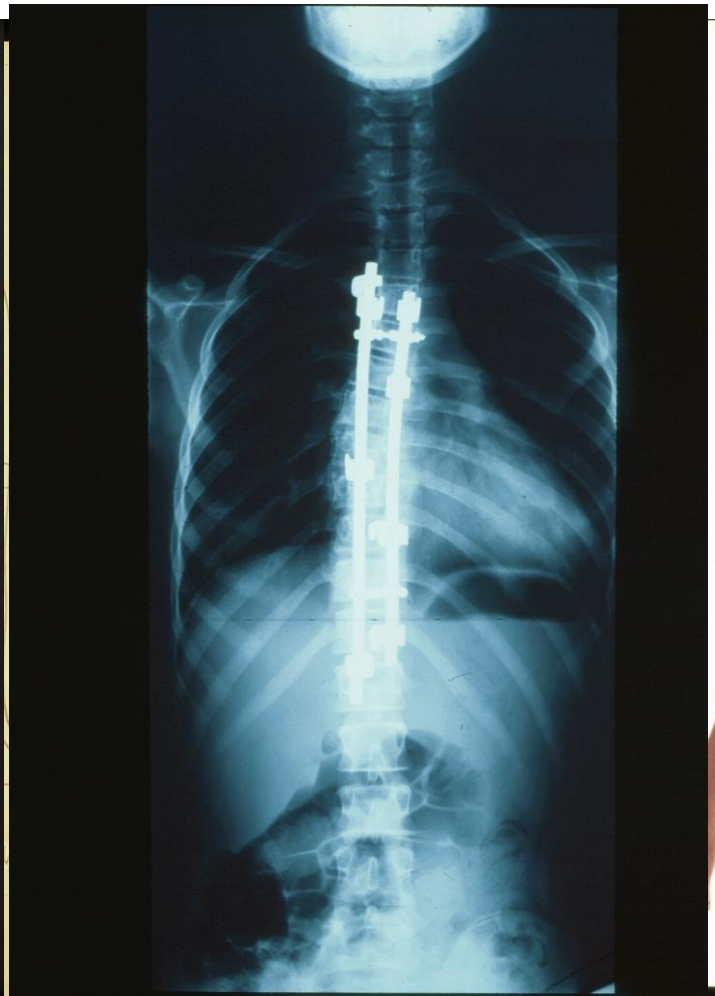
Neuromuskulære og Congenitte

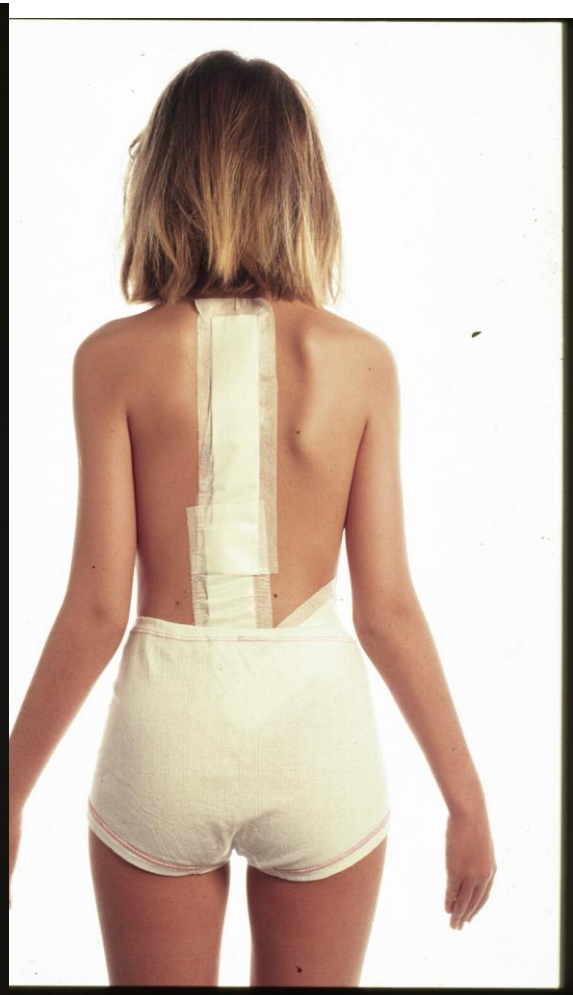
Symposium 21.03.2011

www.orf-aarhus.dk



Aarhus 1988-2010
Development of Spine Surgery
3-D Correction





Rygsektion Aarhus 2010

Kirurger

- Thomas Andersen
- Dorte Clemmesen NK
- Peter Duel NK
- Ebbe Stender Hansen
- Peter Helmig
- Kristian Høy
- Haisheng Li
- Bent Niedermann
- Thomas Bender

Forskere

- Efe Aras
- Tina Senholt
- Miao Wang
- Yu Wang
- Ming Sun
- Kresten Rickers
- Lisa Østergaard
- Shallu Sharma
- Kutaiba
- Michael Bendtsen
- Rikke Søgaard

Skoliose typer hos børn

- Infantile idiopatiske
- Juvenile idiopatiske
- Congenitte
- Adolescente idiopatiske
- Neuromuskulære
- Syndrom relaterede
- Sekundære til tumorer og betændelse

The Painful Back in Childhood

- Spondylodiscitis
- Eosinophilic granuloma
- Osteoid osteoma
- Spondylolysis
- Juvenile rheumatoid arthritis
- Mb Scheuermann
- Trauma

Our experience
Aarhus University Hospital (Aug 2000-Sept 2010)

- Infantile scoliosis n=12
- Juvenile scoliosis n=71
- Adolescent idiopathic scoliosis n=396
- Adult scoliosis n=188
- Neuromuscular scoliosis n=256
- Kyphosis n=40
- Ankylosing Spondylitis n=60
- Congenital scoliosis n=70

Total n=1093

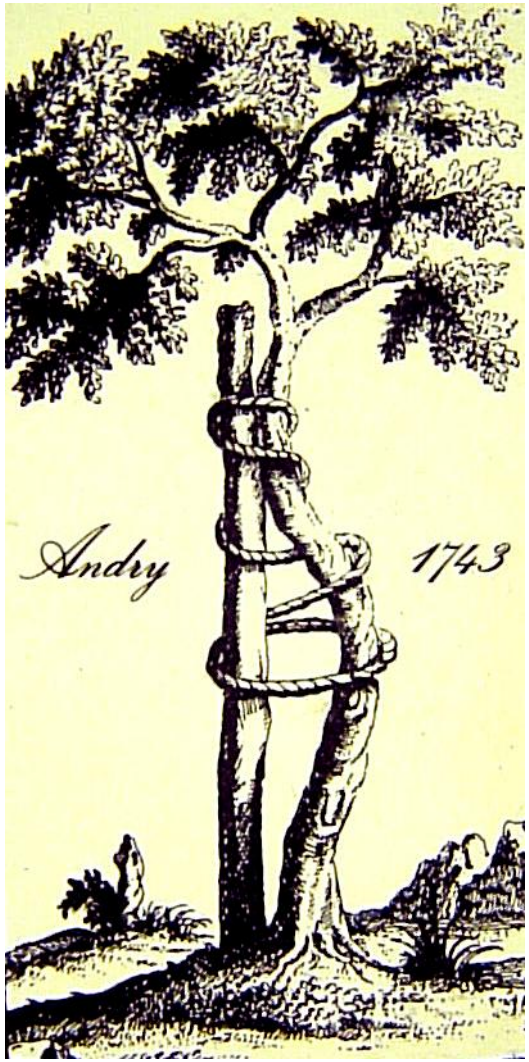
Introduction

Spinal fusion in children with significant growth potential can have deleterious effects:

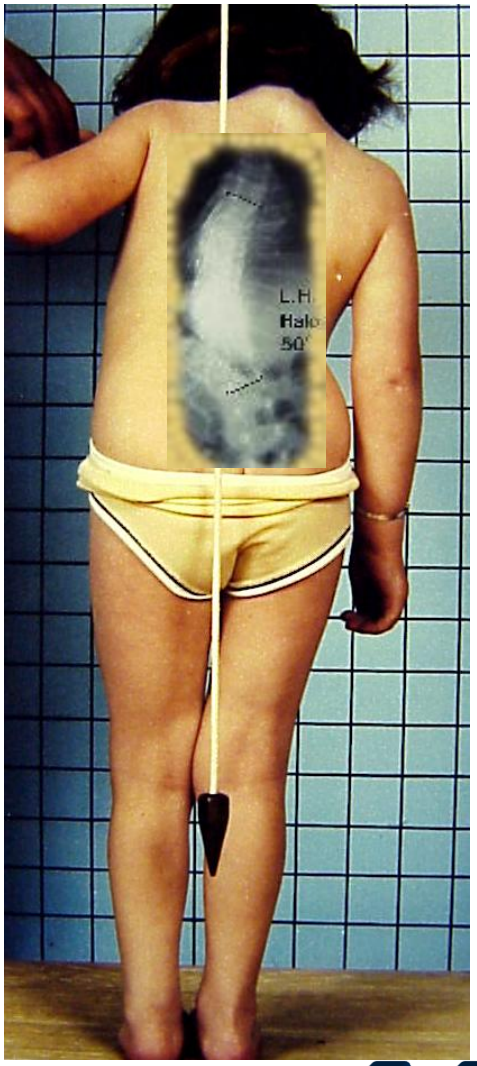
1. loss of growth potential
2. loss of motion
3. Crankshift phenomenon
4. Decreased pulmonary development
5. risk of adjacent segment disease

Our goal is to achieve and maintain deformity correction while allowing for important inherent growth potential for truncal height and pulmonary development.

EARLY ONSET SCOLIOSIS

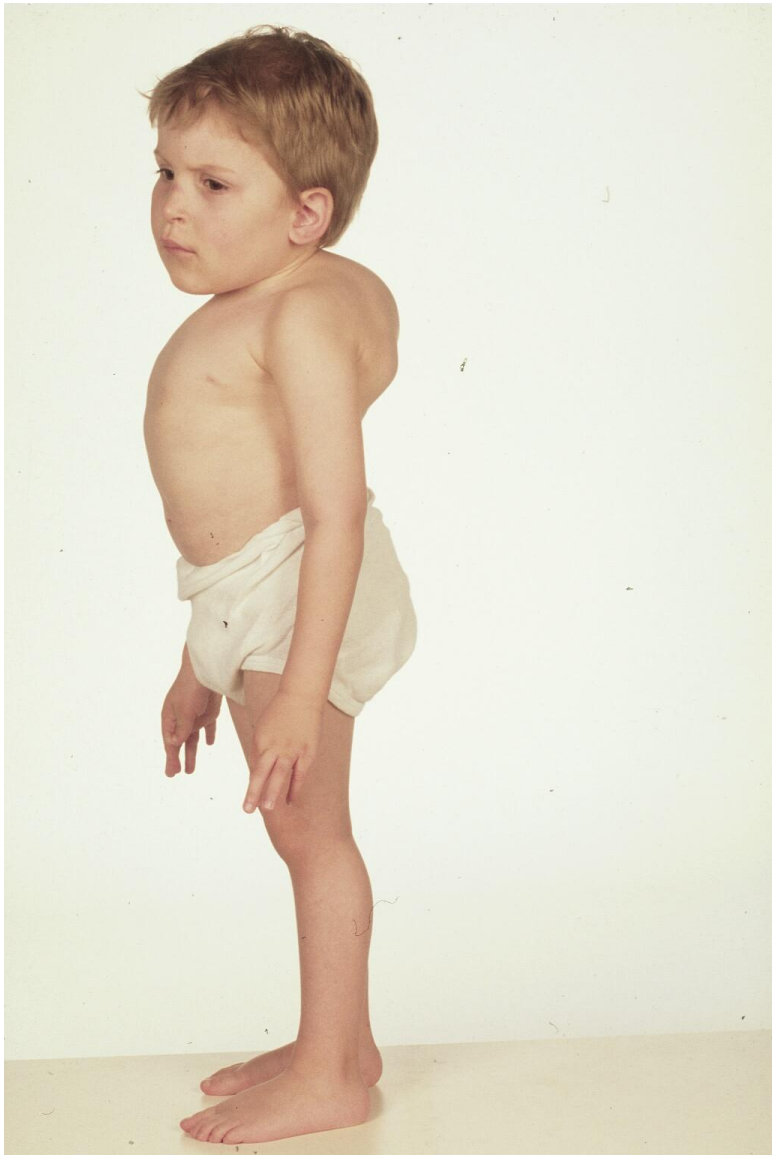


- Idiopathic
- Congenital
- Neuromuscular
- Syndrome related
- Osteogenesis I
- Neurofibromatosis



AIMS IN MANAGEMENT OF PREPUBERTY SCOLIOSIS

- Obtain underlying diagnosis
- Prevent curve progression
- 3D Correction (coronal, sagittal and axial)
- Correct or maintain balance
- Maintain growth and mobility
- Avoid complications



Characteristics of Congenital Scoliosis - Classifications

- Location in the spine
- Pattern of deformity (scoliosis, kyphoscoliosis, lordoscoliosis, kyphosis)
- Specific type of anomalous malformation

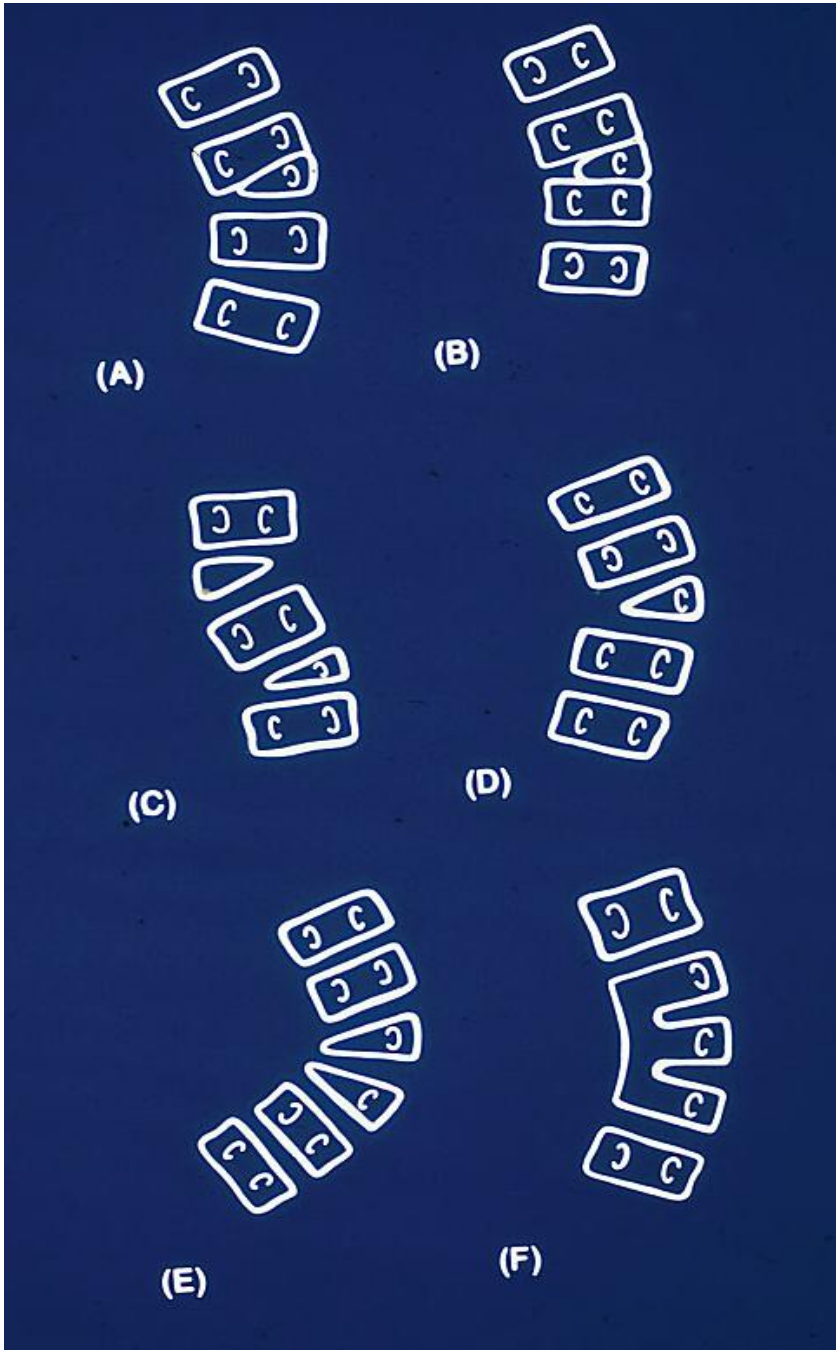
Characteristics of Congenital Scoliosis - Natural History

- Very benign or incredibly severe
- Paraphlegia from posterior hemivertebra
- Death from cor pulmonale
- Associated congenital abnormalities:
  Cardiac 10%, urogenital 25-40%, neural tissue abnormality 40%

Characteristics of Congenital Scoliosis - Patient Evaluation

- Outline associated assocated congenital malformation of the neural axis (dysraphisme) and nonspinal congenital abnormalities
- Neurologic involvement
- Associated lower limb abnormalities
- Routine biplanar X-rays of the spine, chest X-rays, MRI, CT-myelography
- Prenatal diagnostics, Renal ultrasound, eccocardiography

MRI is mandatory before any surgical intervention !



A + B: Unsegmented hemivertebra

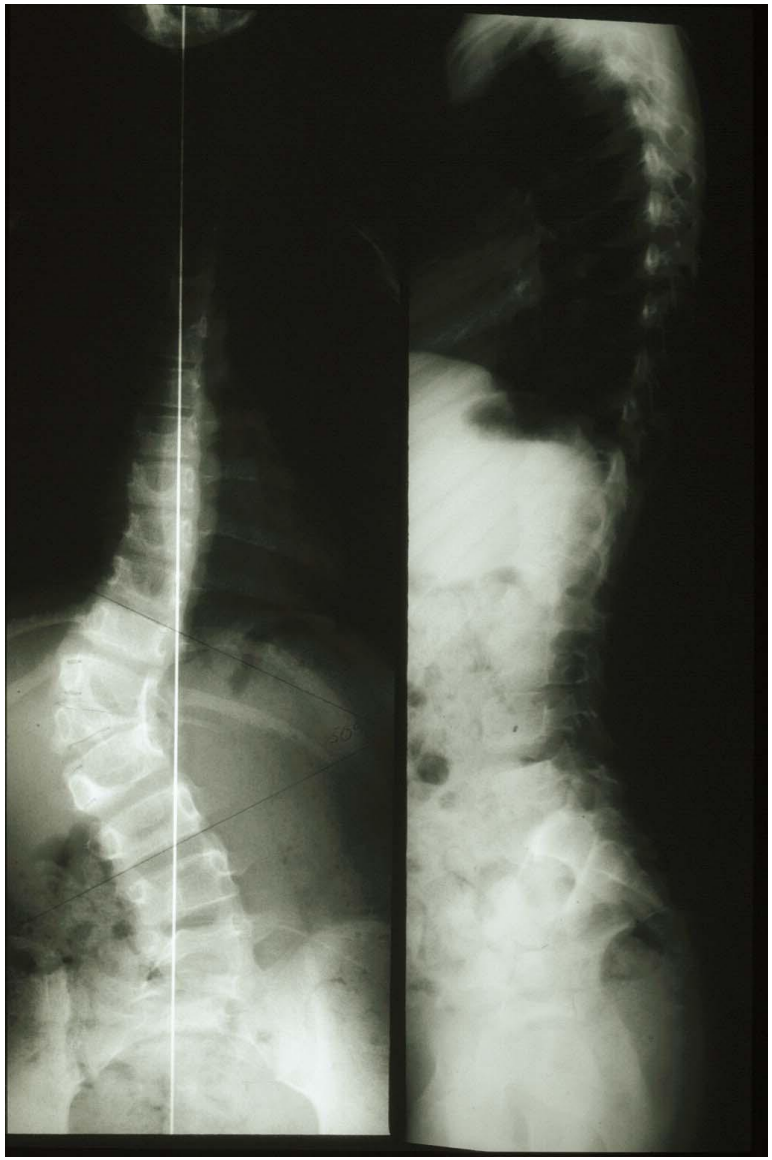
C + D: Segmented hemivertebra

E + F: Double segmented hemiv. And bar formation.

Most often associated rib abnormality

Congenital Kyphoscoliosis
M.J. McMaster & K. Ohtsuka, 1982

- 11% of curves were nonprogressive
- 14% progressed slightly
- 75% progressed significantly
- Worst anomaly: unilateral unsegmented bar with a convex hemivertebrae or double convex hemivertebrae
- Least progressive: bloc vertebrae



Hemivertebra:

Progression > 10 degrees per year: surgery should be considered.

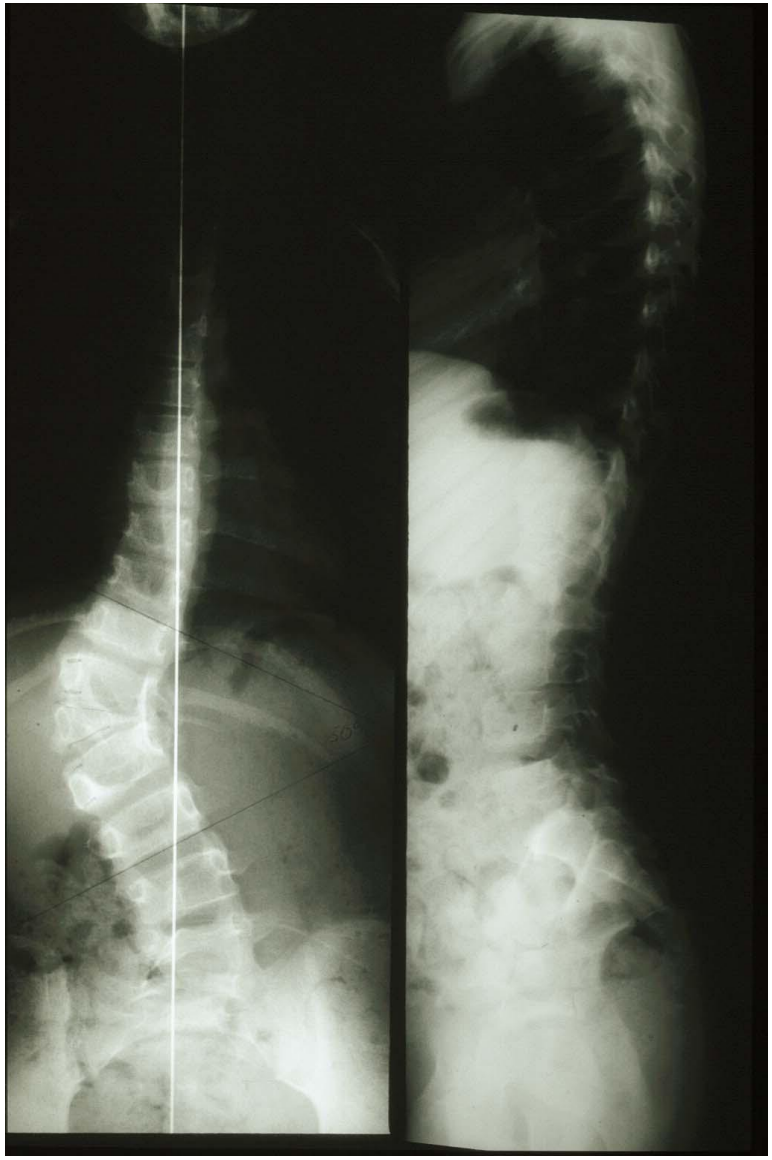
Congenital bar:

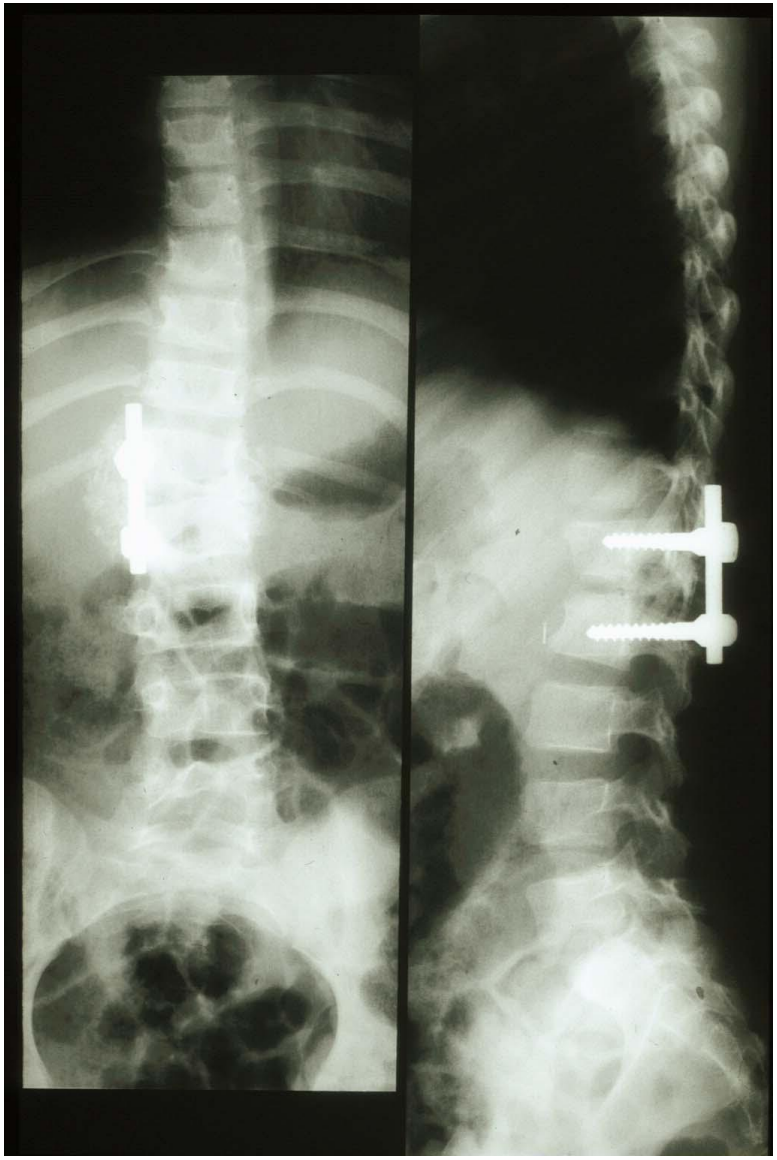
'Surgery down to age 2 to 3 years.

Congenital kyphoscoliosis:

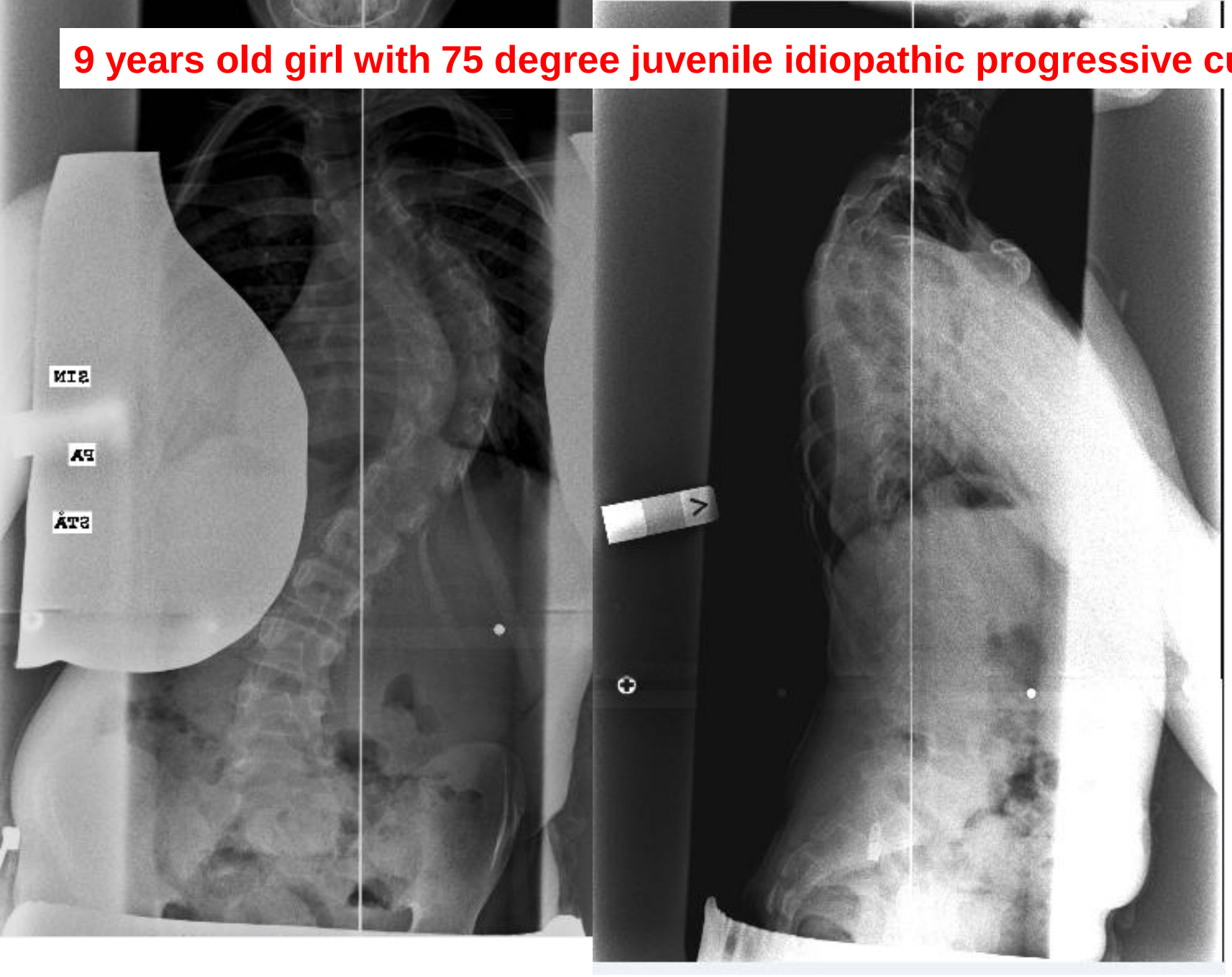
Surgery with kyphosis > 45 degress.

Hemivertebra excision (front and back)





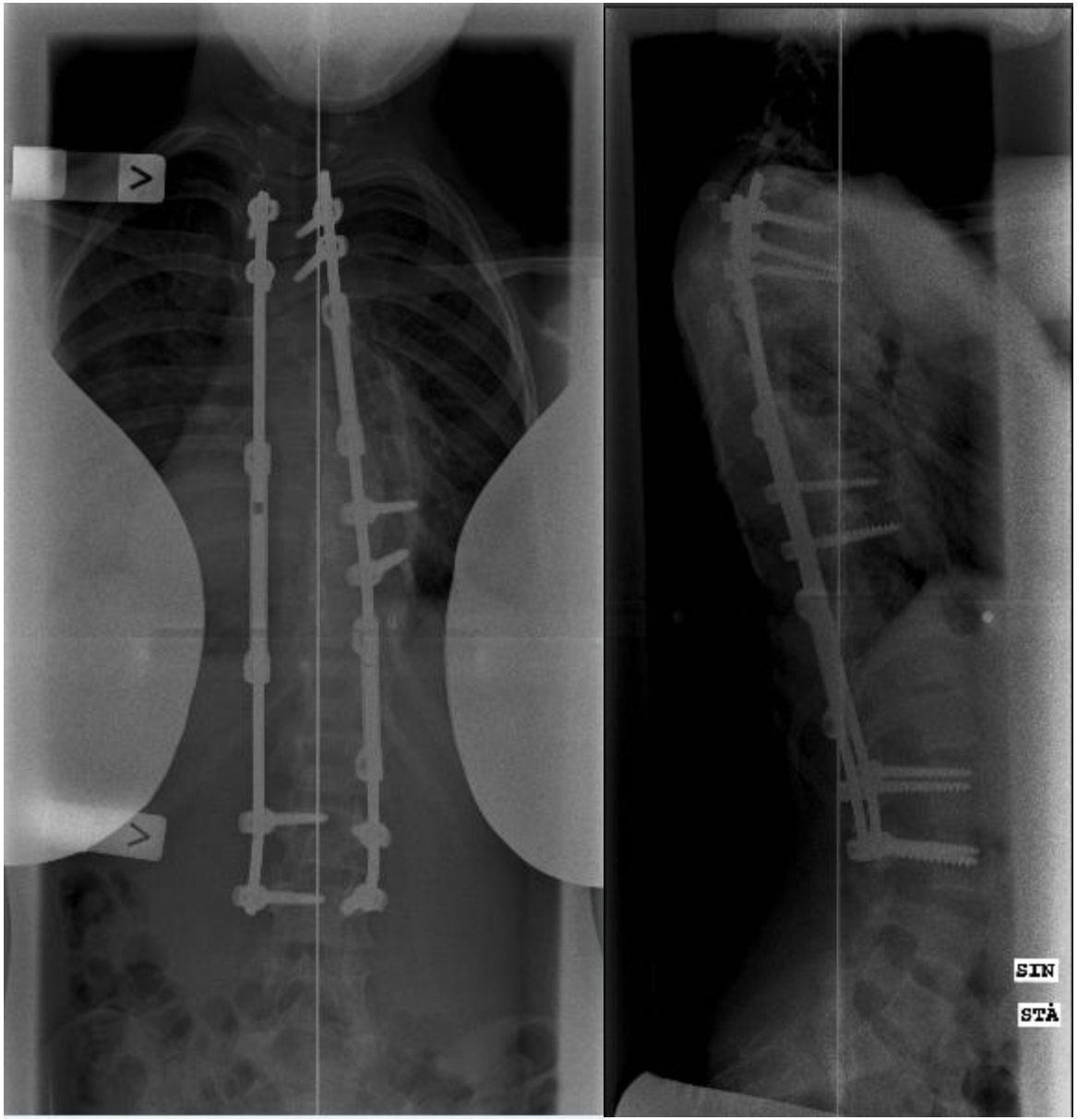
9 years old girl with 75 degree juvenile idiopathic progressive curve



08/10/2009

Post-op

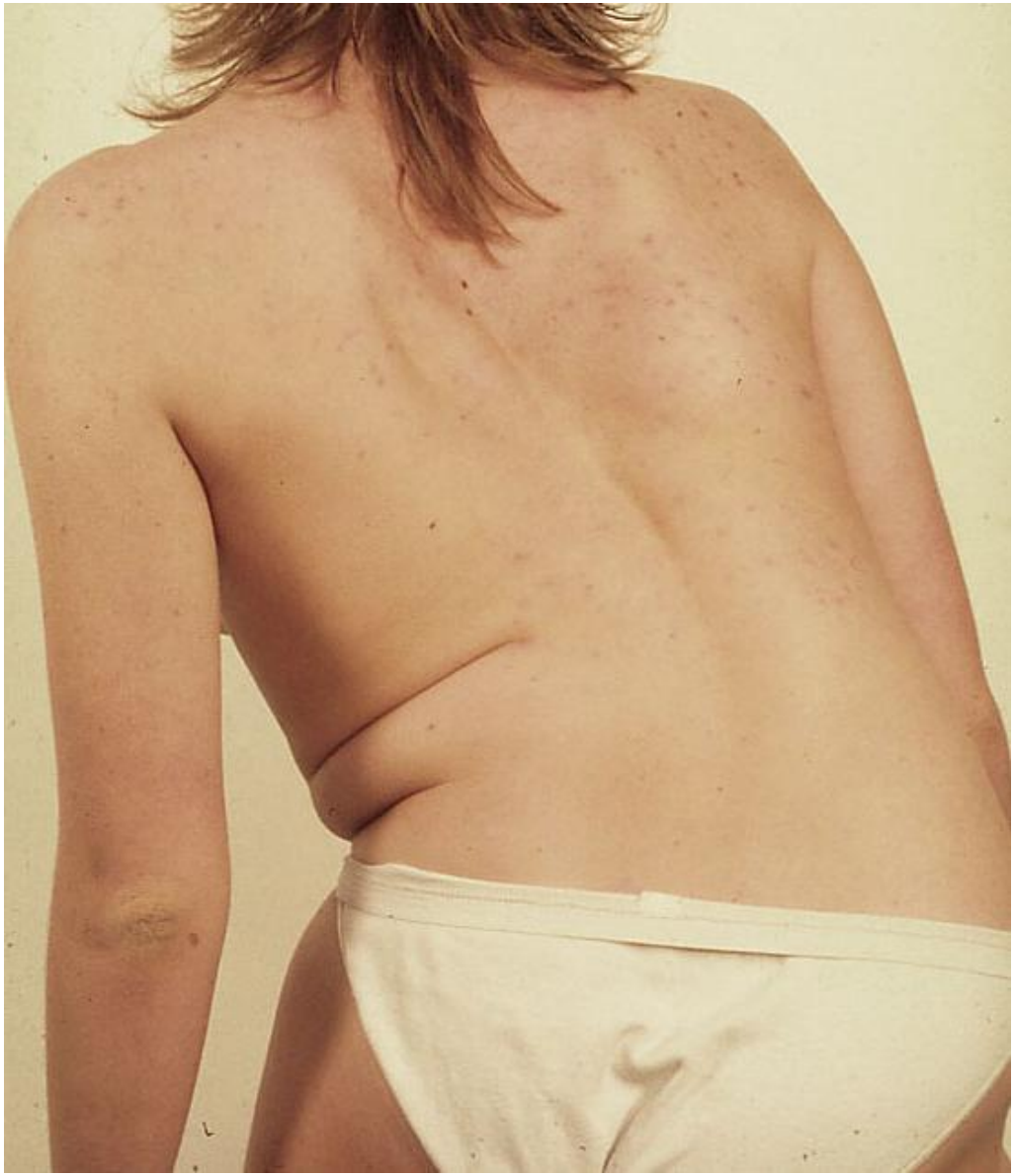
29/03/2010



Neuromuscular Scoliosis
SRS- Classification

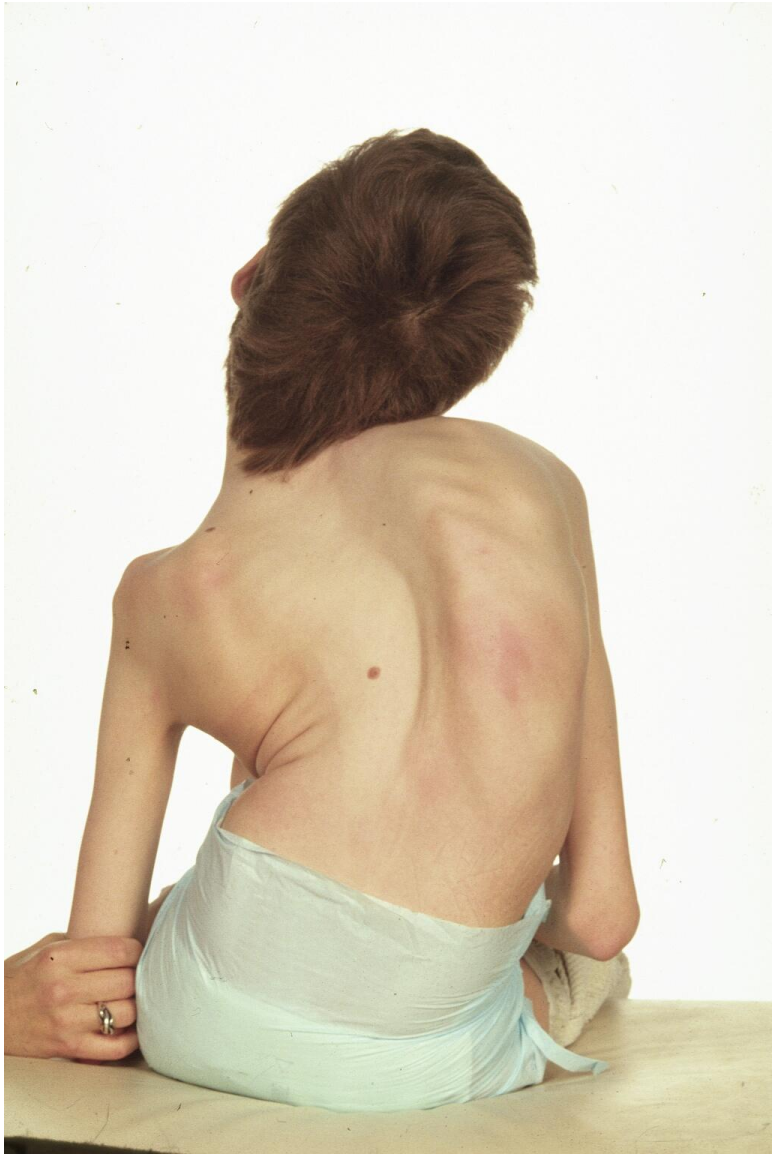
- **Neuropathic**
  - **1. upper motor neuron**
    - **a. Cerebral palsy**
    - **b. Spinocerebellar deg.**
      - **i. Friedreich´s atax.**
      - **ii. Charcot- M- T**
      - **iii. Roussy-Levy**
    - **c. Syringomyelia**
    - **d. Spinal cord tumor**
    - **e. Trauma**
  - **2. Lower motor neuron**
    - **a. Poliomyelitis and other v.**
    - **b. Traumatic**
    - **c. Spinal muscular atrophy**
      - **i. Werdnig Hoffmannn**
      - **ii. Kugelberg Welander**
      - **iii. Dysautonomia**

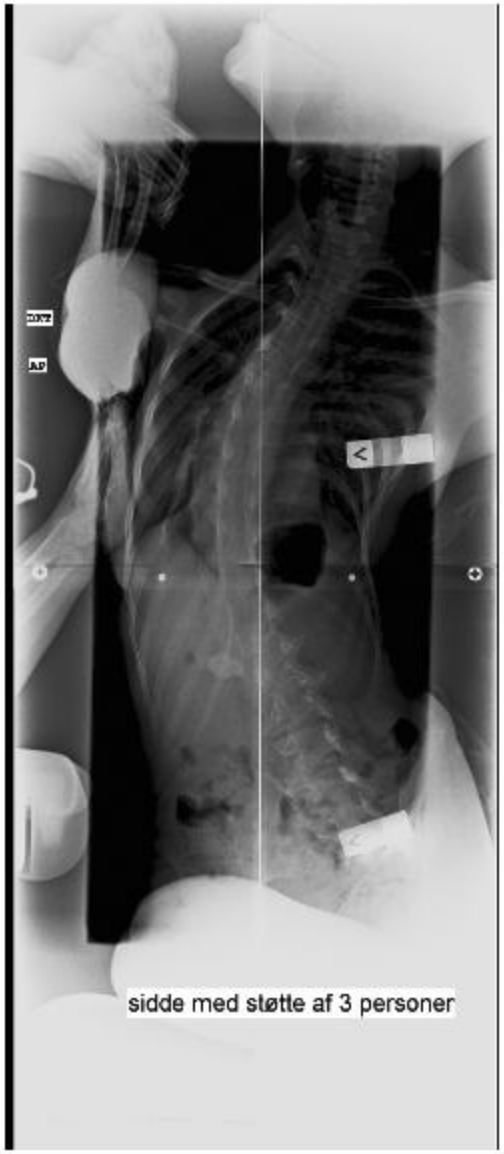
- **Myopathic**
  - **1. Arthogryphosis**
  - **2. Muscular dystrophy**
    - **a. Duchenne**
    - **b. Limb-girdle**
    - **c. fascioscapulo-hu**
  - **3. Fiber type disprop.**
  - **4.Congenital hypotonia**
  - **5. Myotonica dystrophica**

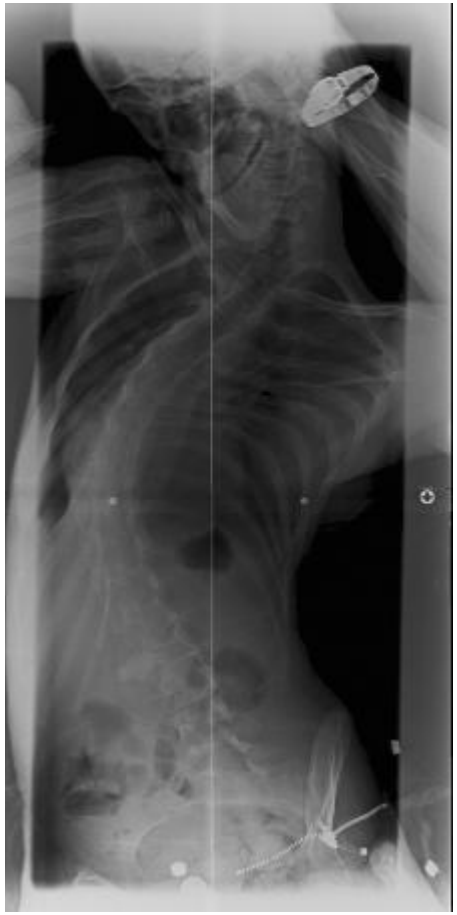


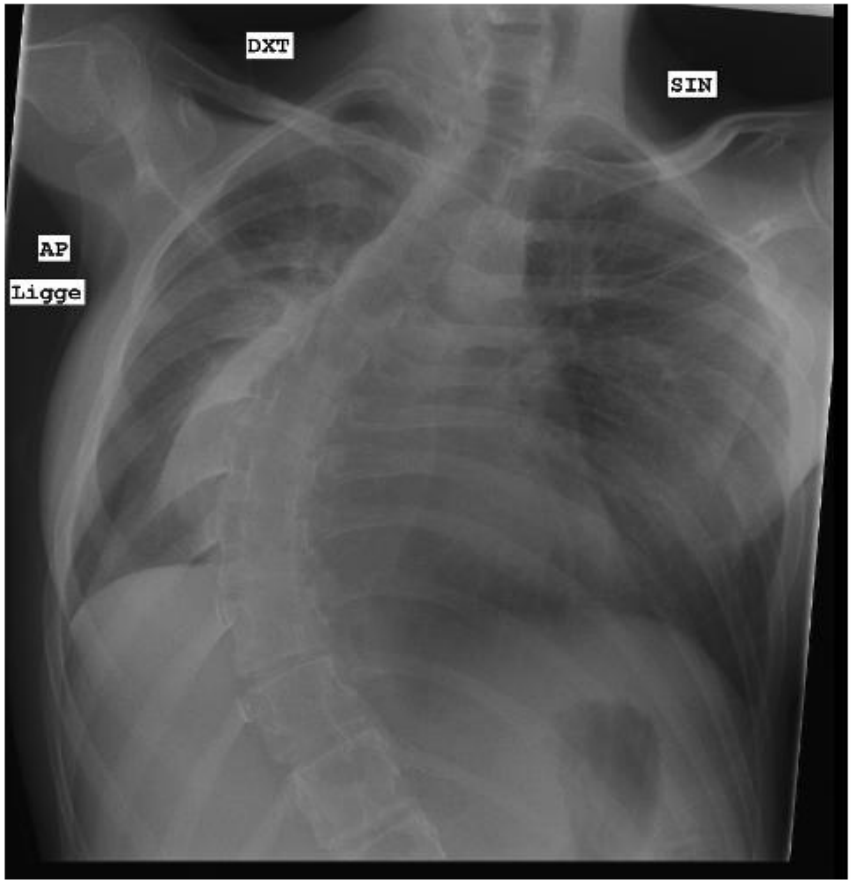
Dystonia

Cerebral palsy

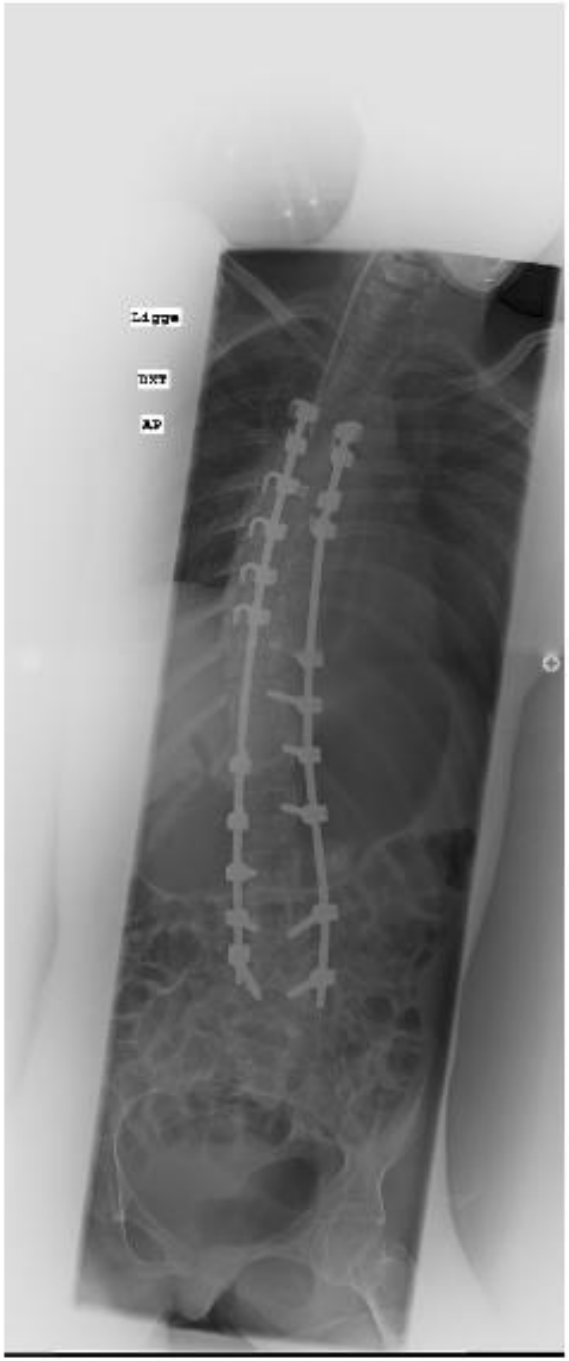




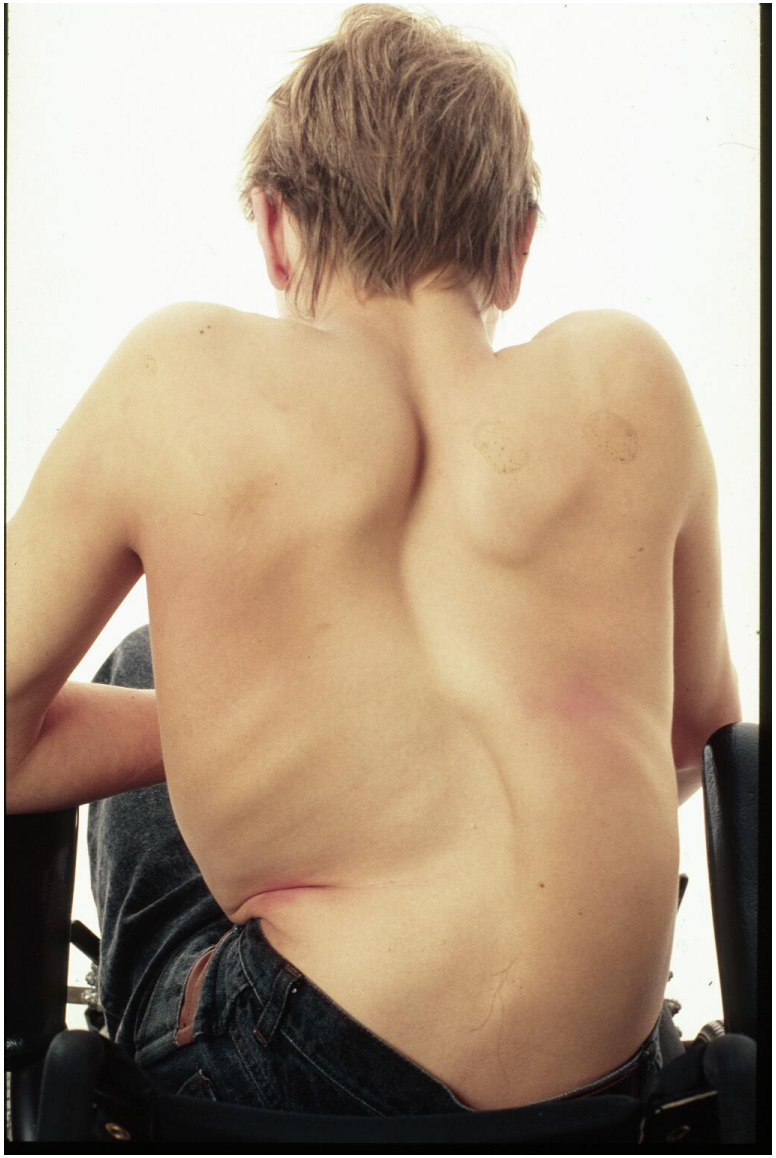




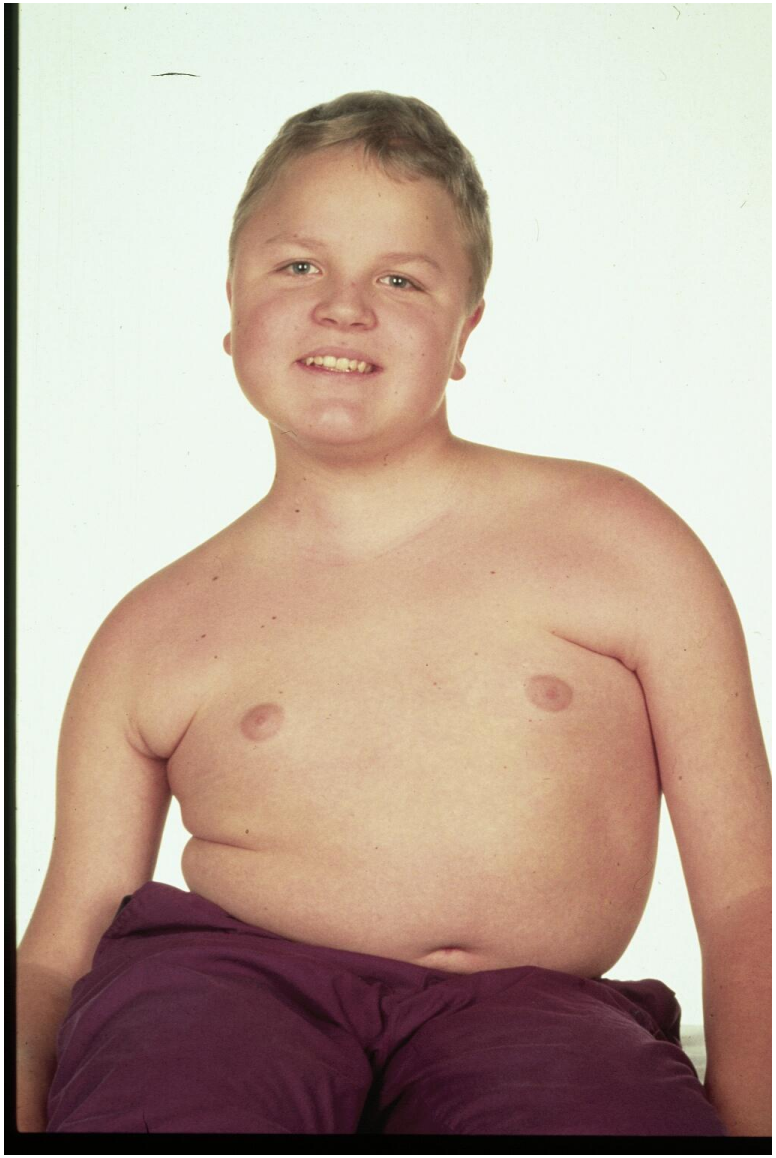
Neuromuscular –cerebral palsy


Liggs
DXT
AP

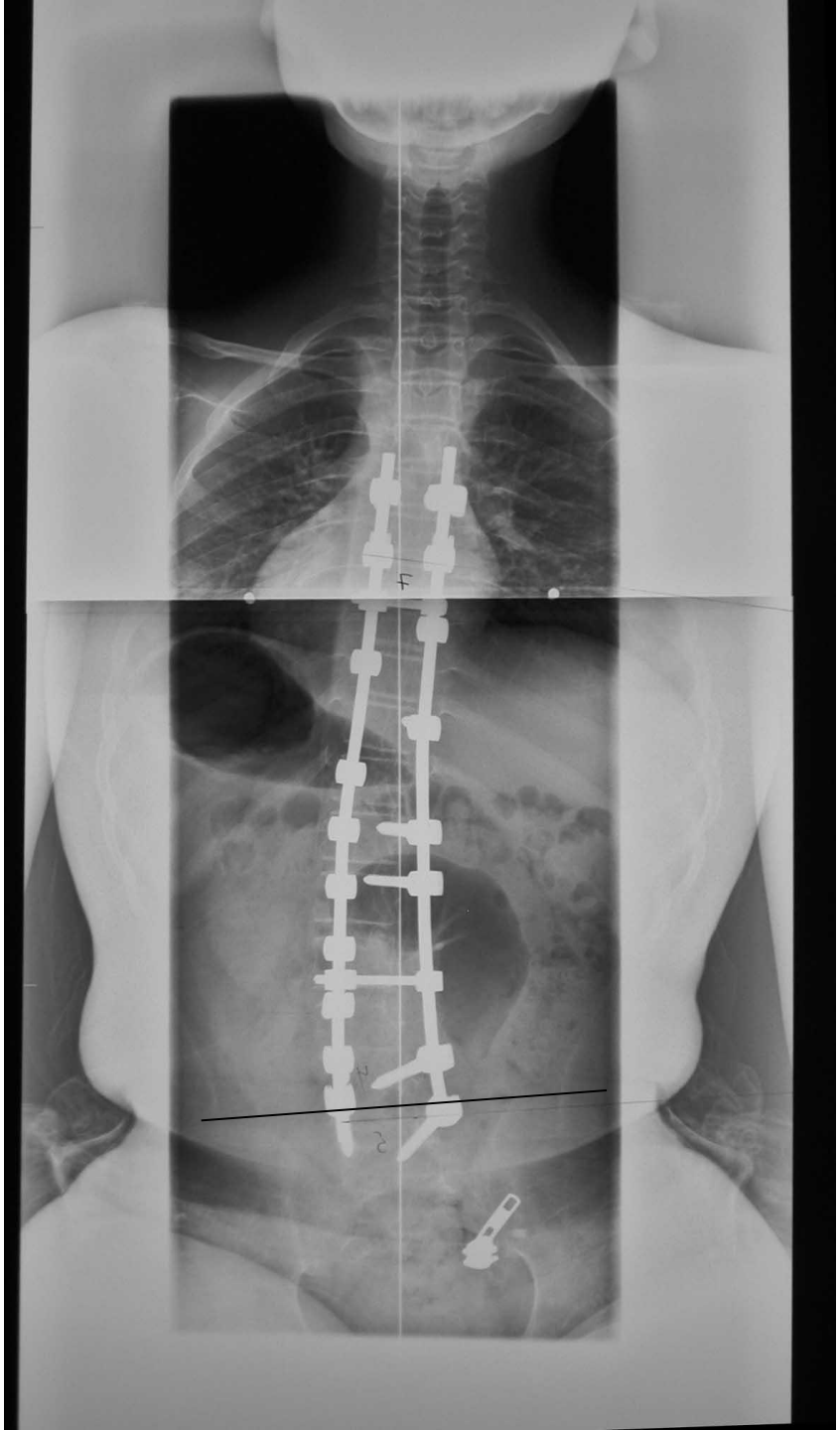
Limb Girdle

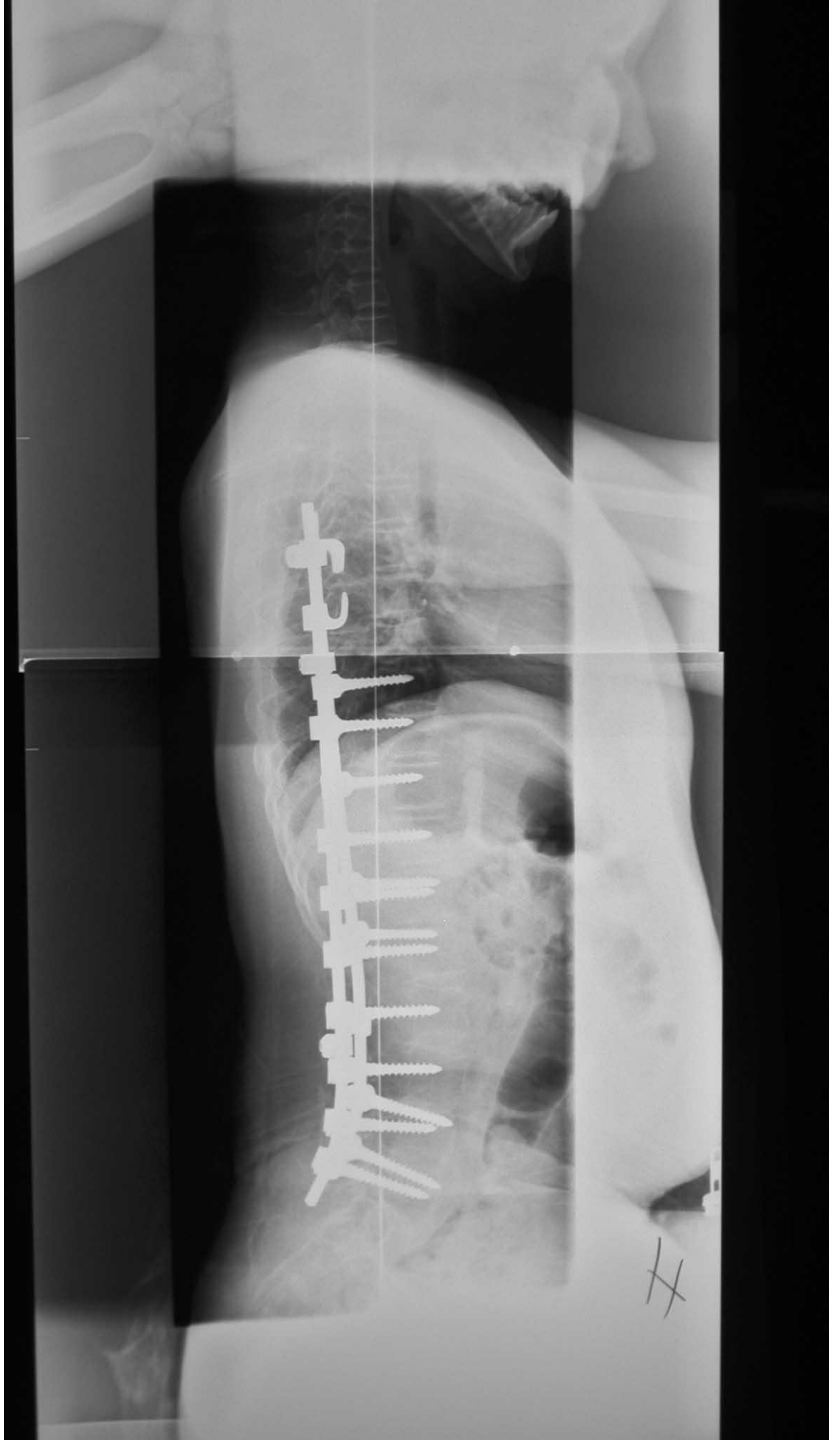


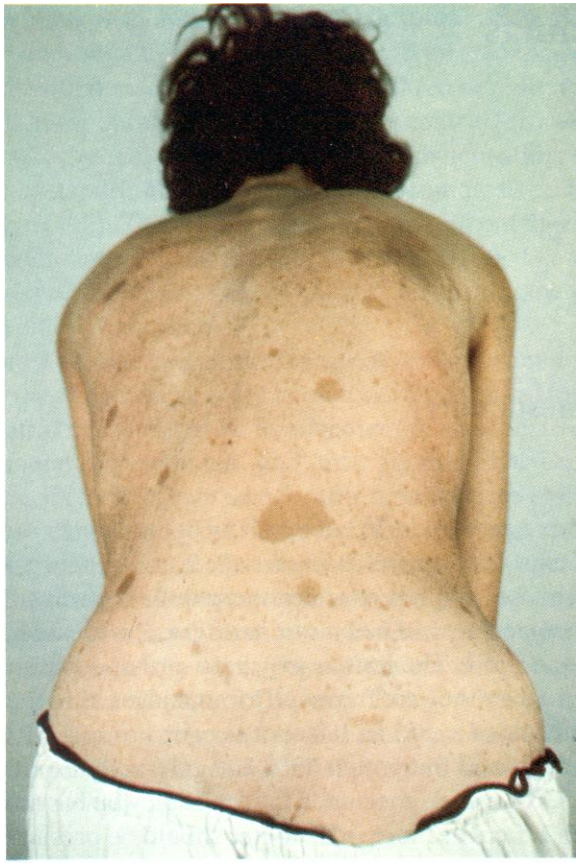
Friedrich Ataxia

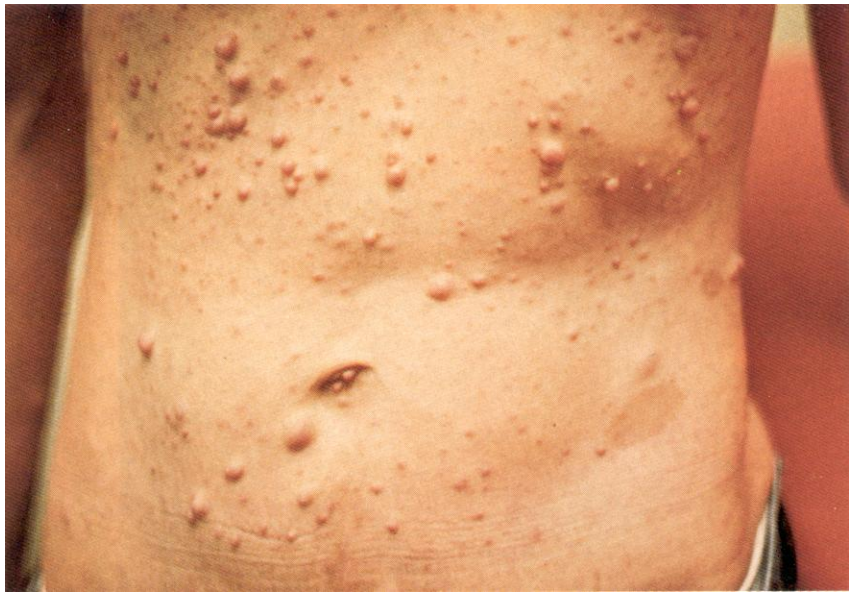


Duchenne MD

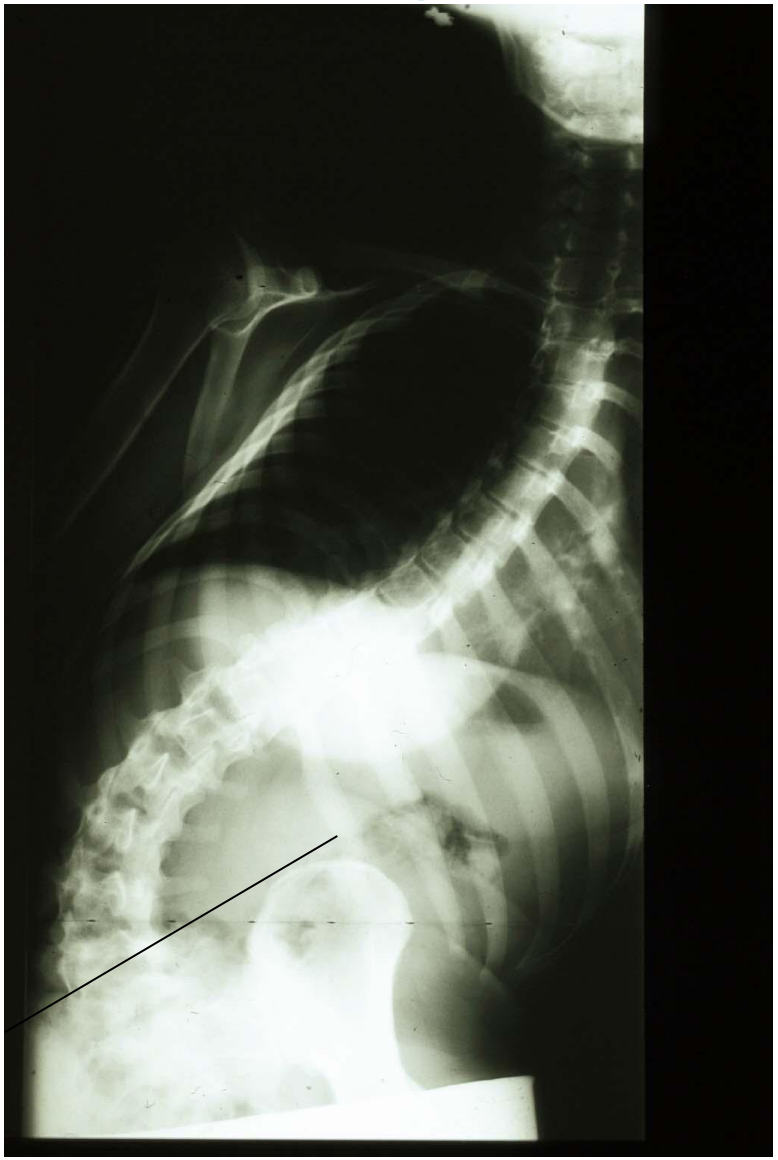


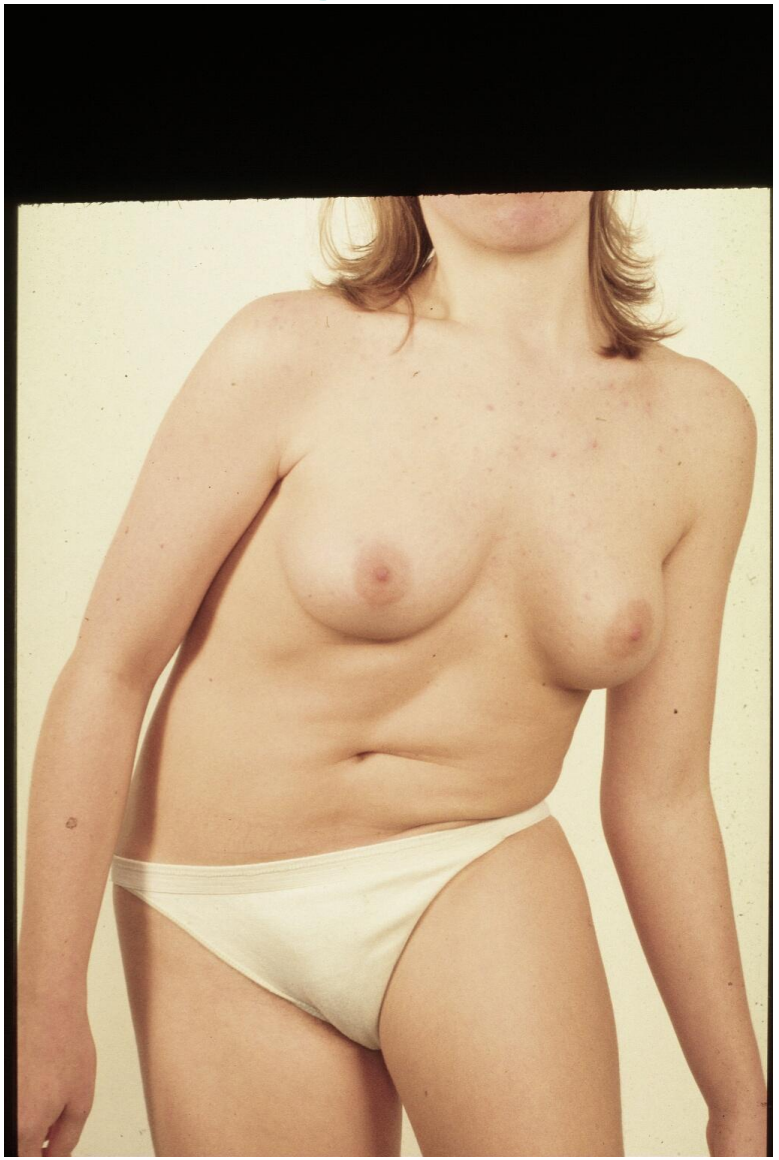


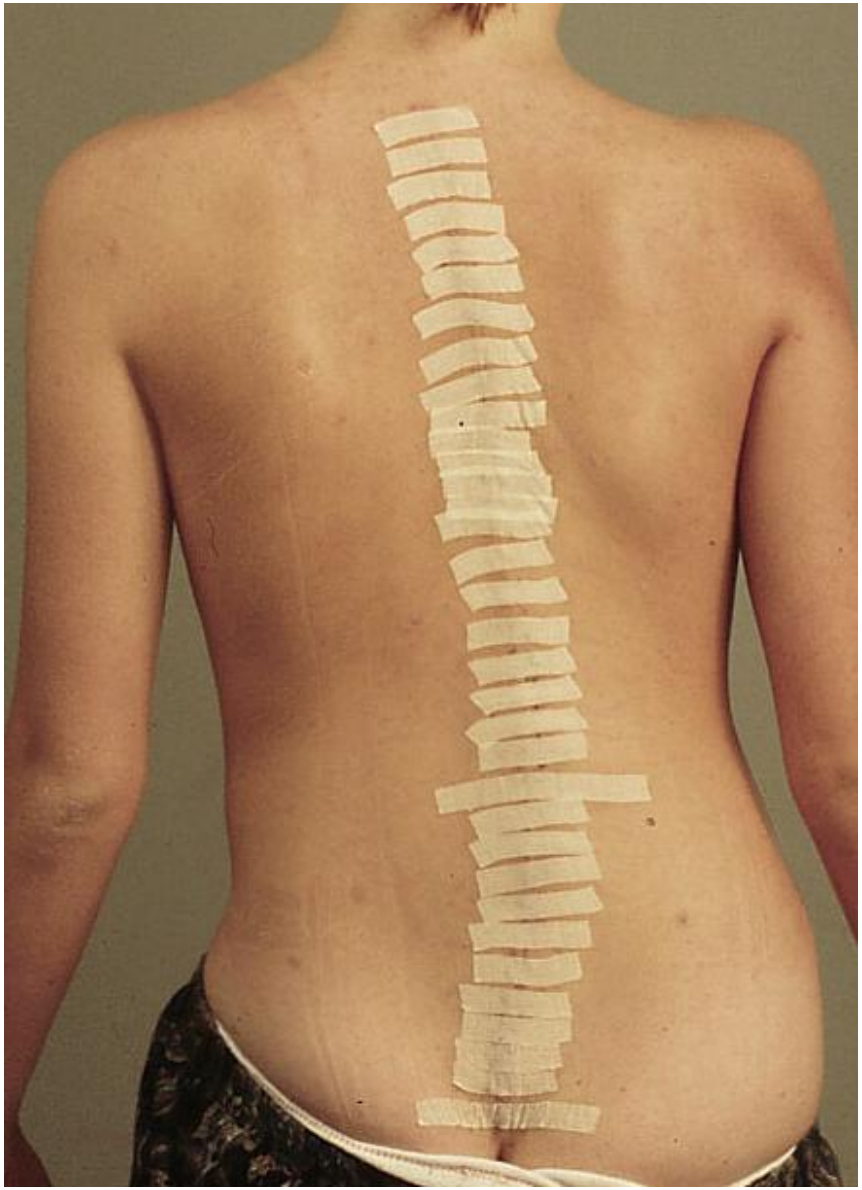


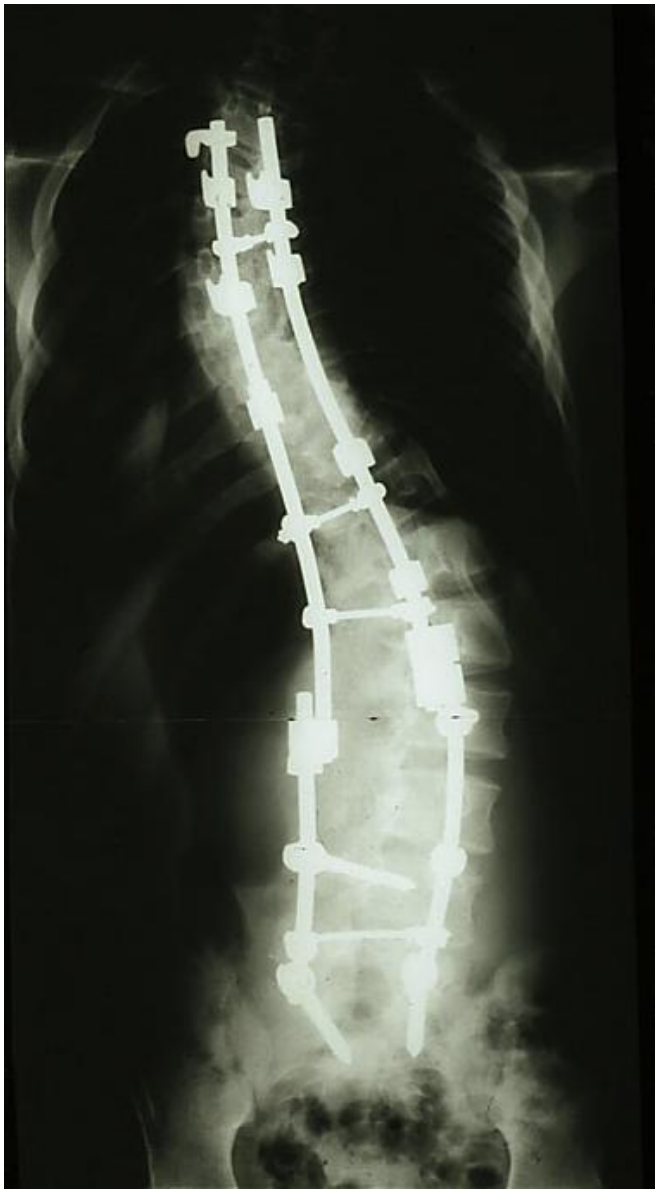


Congenital dystonia 18 yrs old girl









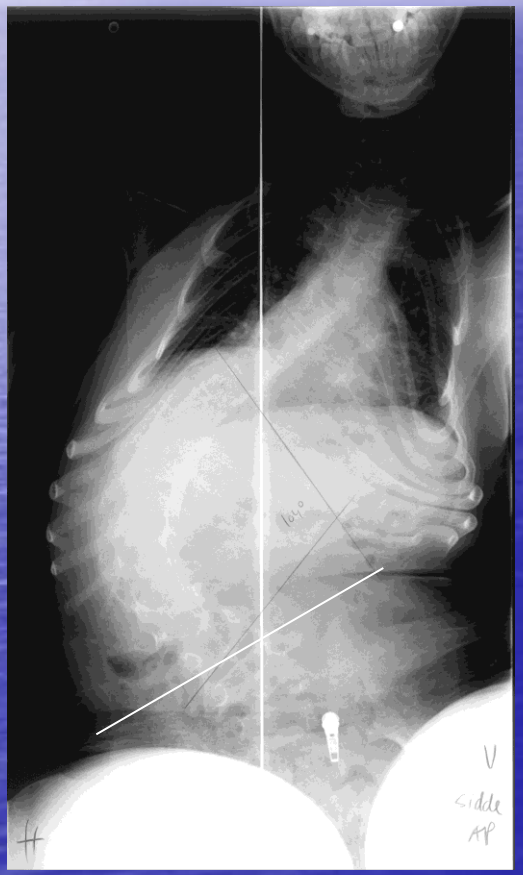
DMD

- 22 patients, all boys
- Average age at time of diagnosis 4.75 years
- 11 (50 %) had been braced
- Median age at surgery 14.5 yrs.
- Average hospital stay:
  17 days

- **Type of curve:**
  80 % C-formed
  20% S-formed

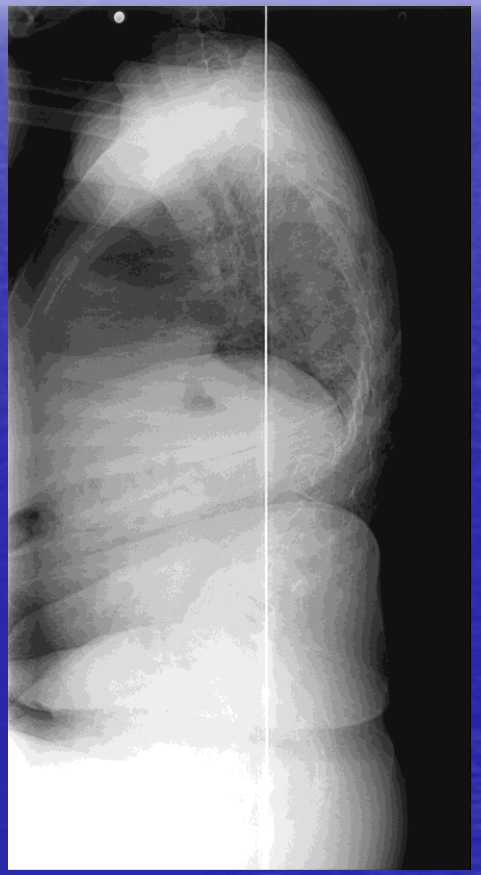
- Type of surgery:
  90% CD-Horizon
  10% Synergy
- Average blood loss 2264 ml.
- Average duration of surgery 256 min.
- No surgical complications
- No reoperations

Girl age 7, Spinal muscular atrophy



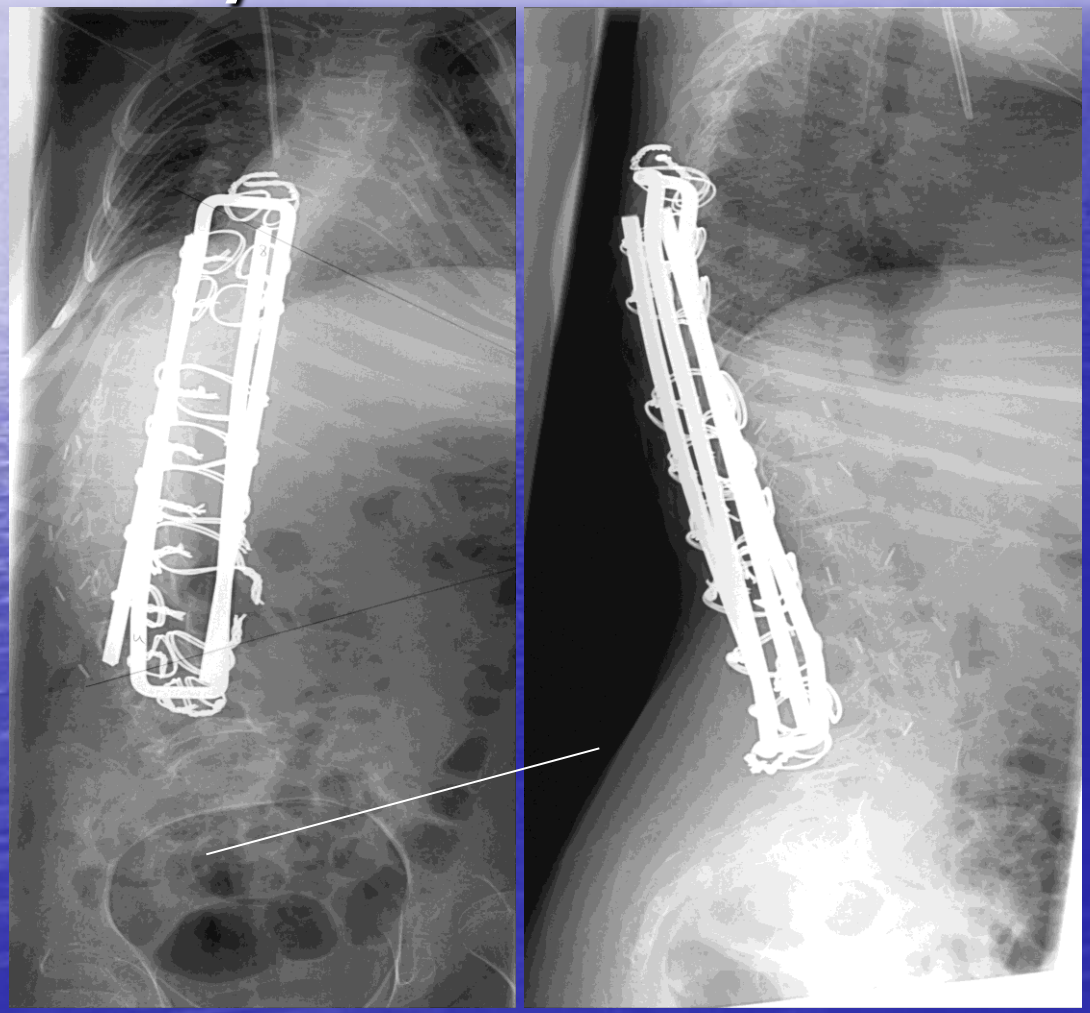
Collapsing spine

Major growth Potential



NM

Postop. Girl 7 yrs, SMA. Convex epiphysiodesis + Luque Trolley.



NM

Problems:

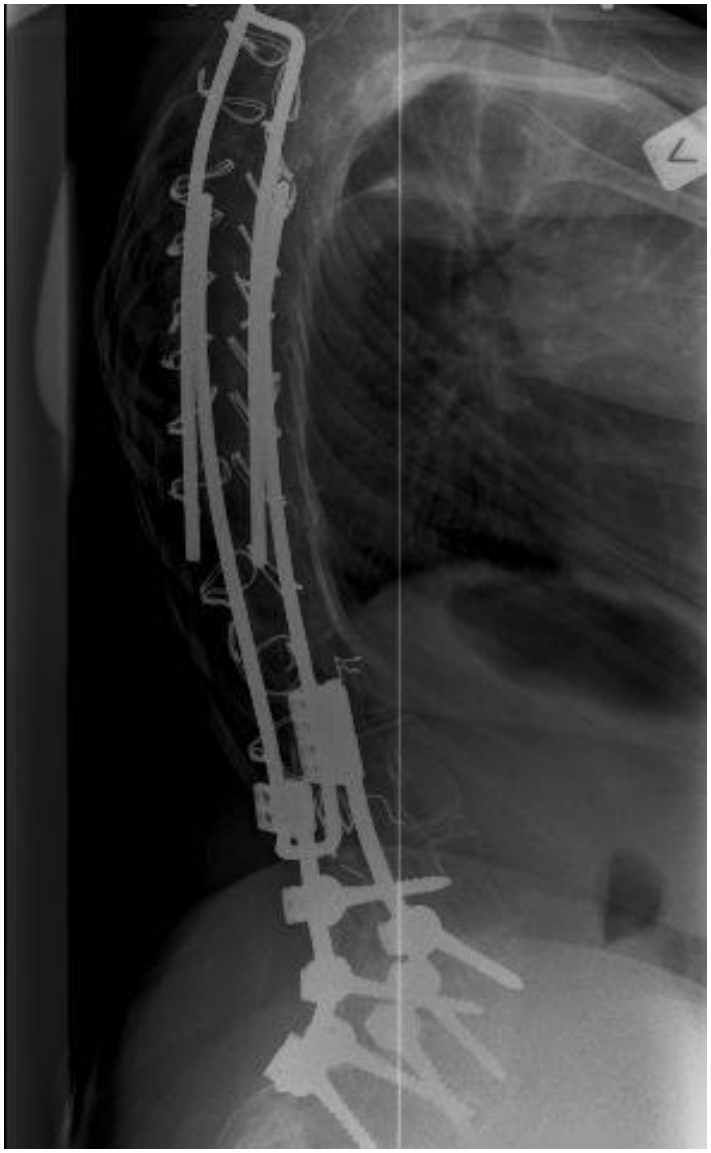
Lumbopelvic tilt ?

Cephalic curve ?

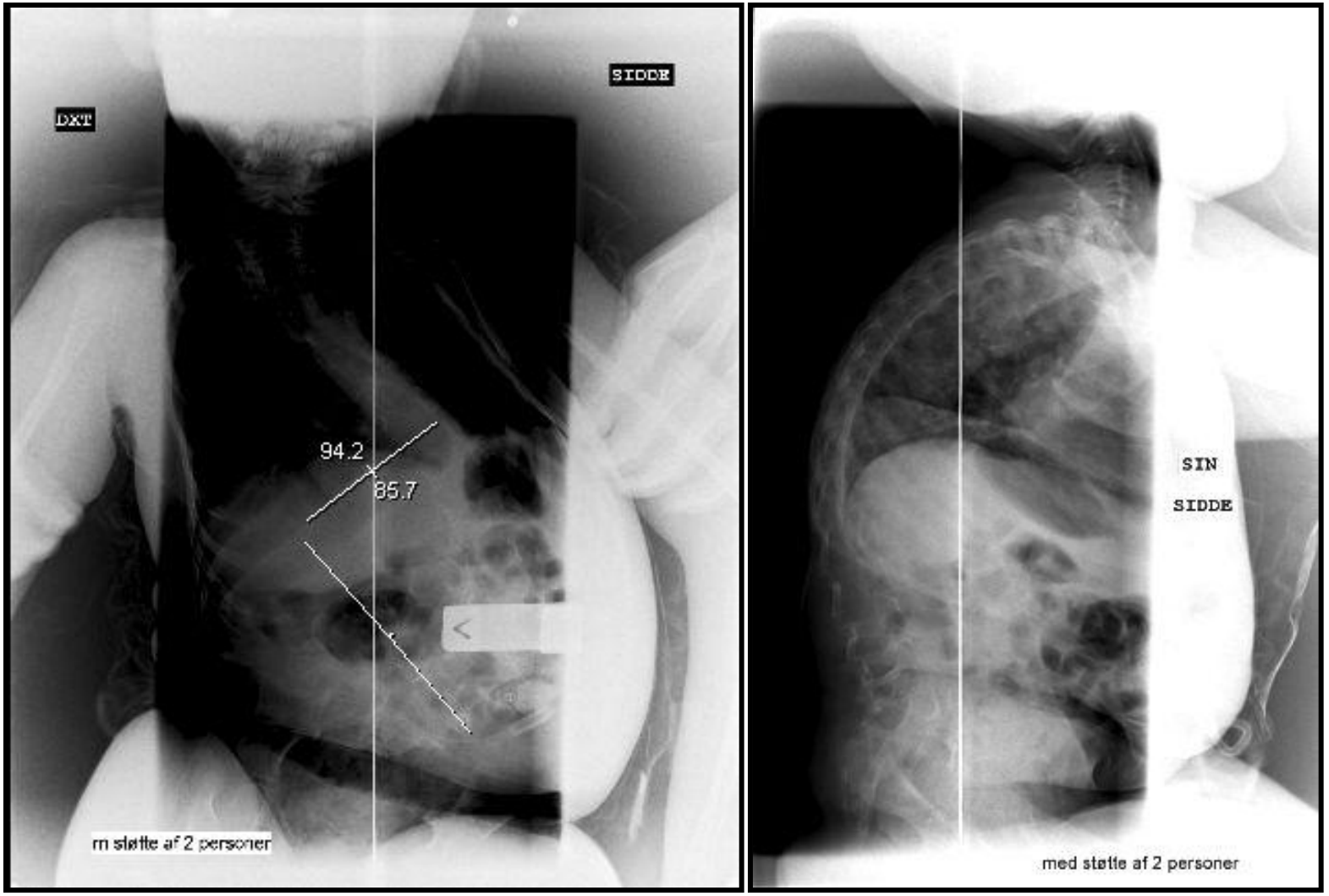
Posterior tethering ?

Krank-shaft ?

7 yrs girl SMA, 12 yrs follow up

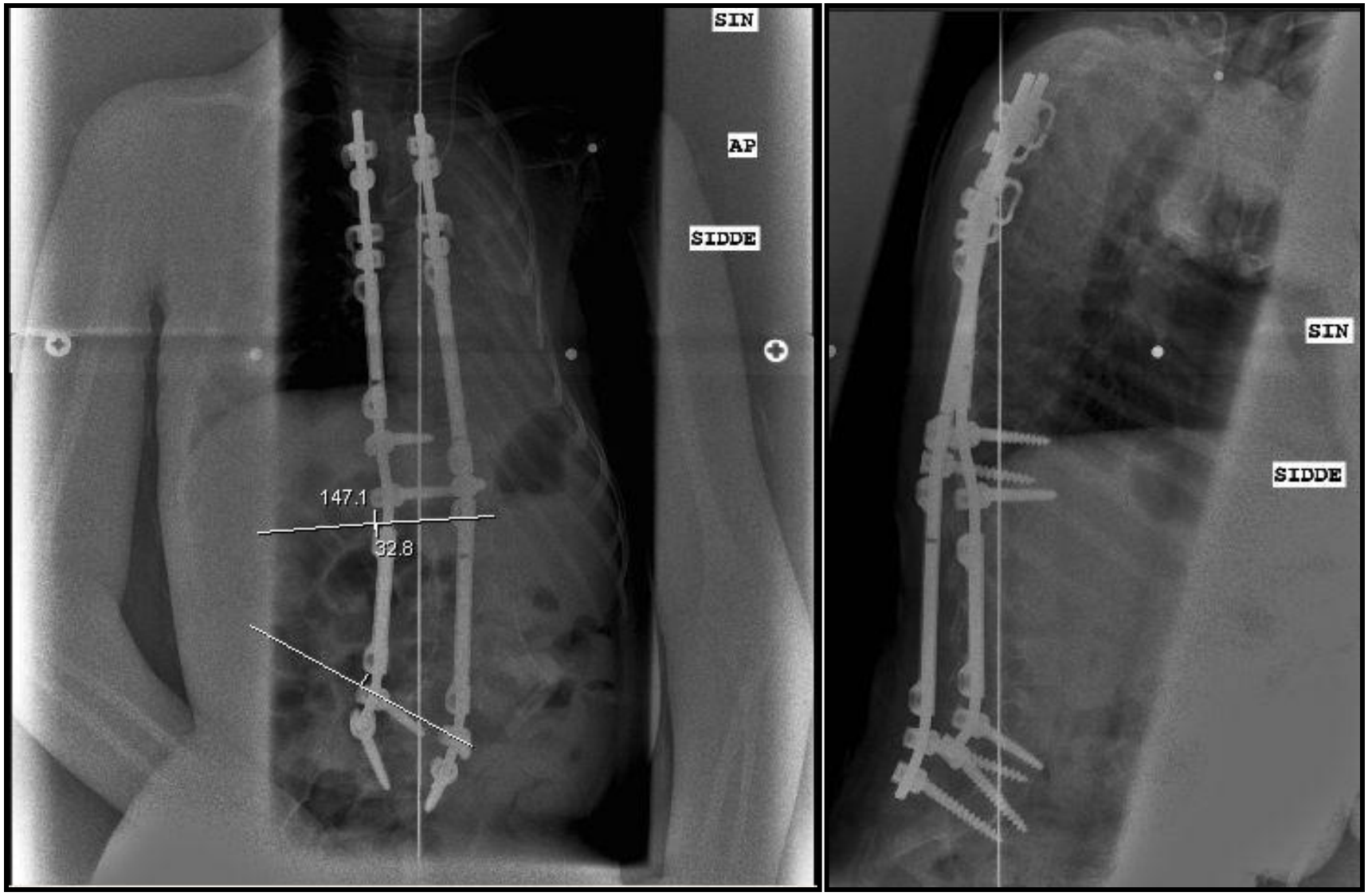


Pre-op Radiographs 09, March, 2009

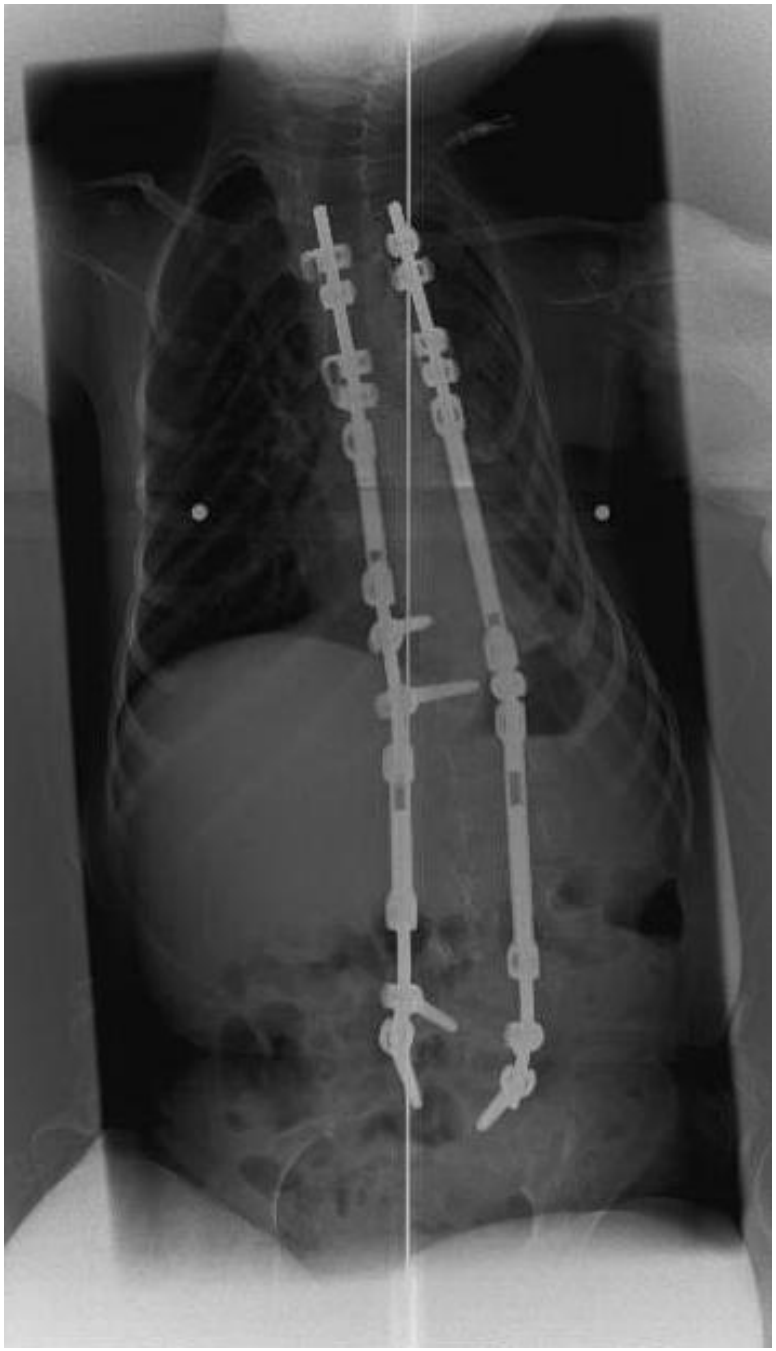


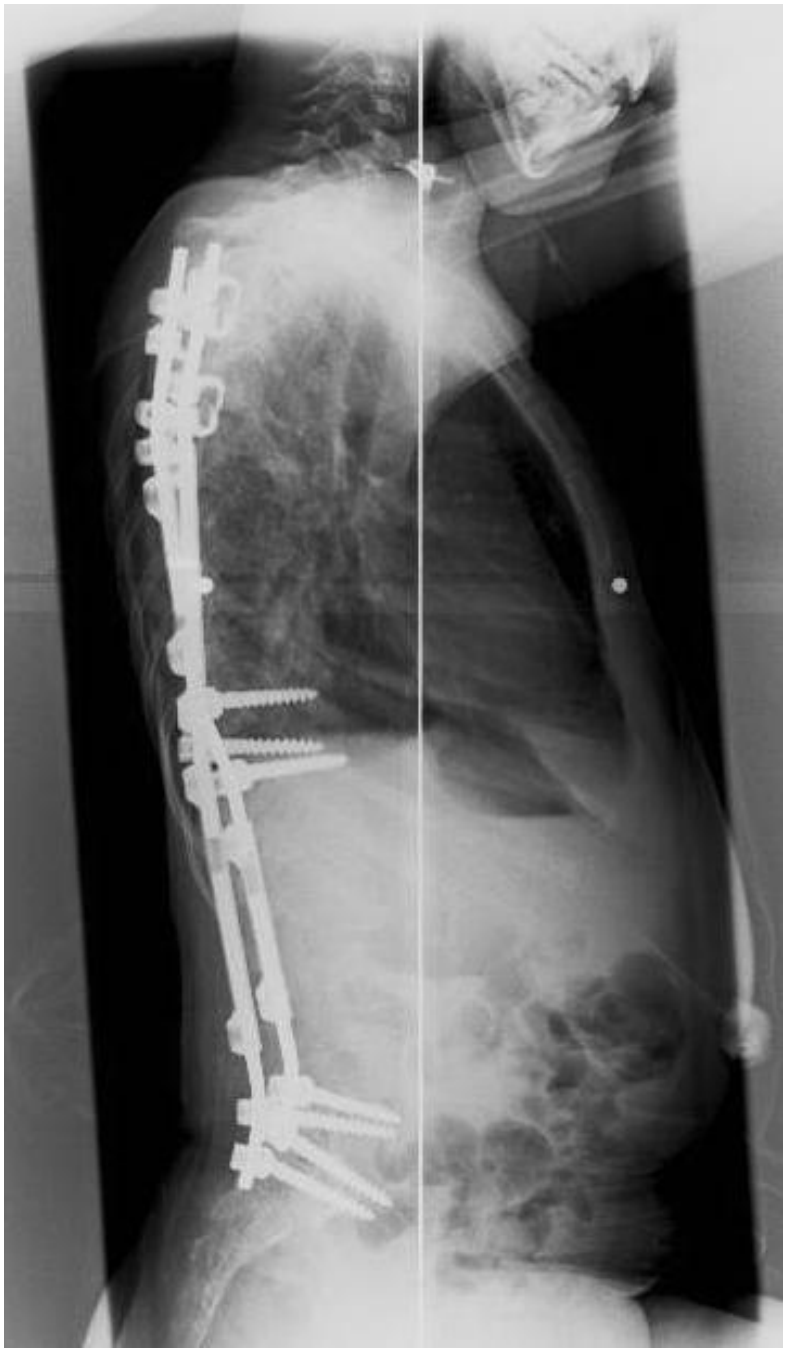
Neuromuscular scoliosis (SMA)
6 year old, 85.7° curve

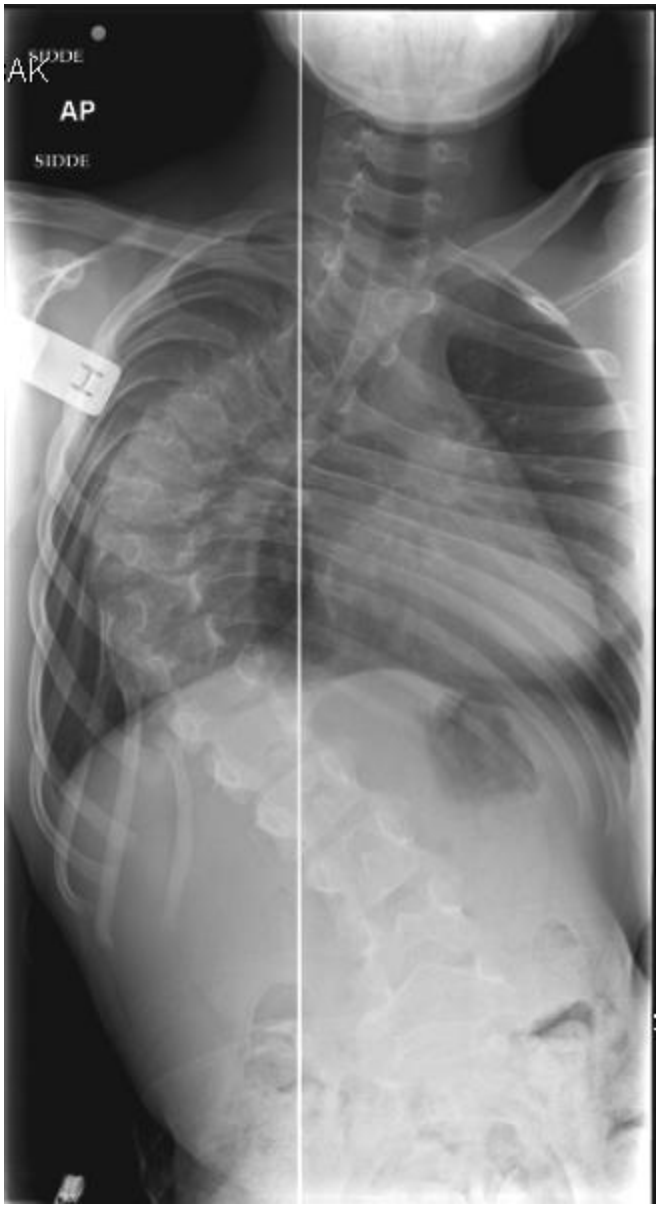
Initial growing rod procedure, March, 2009



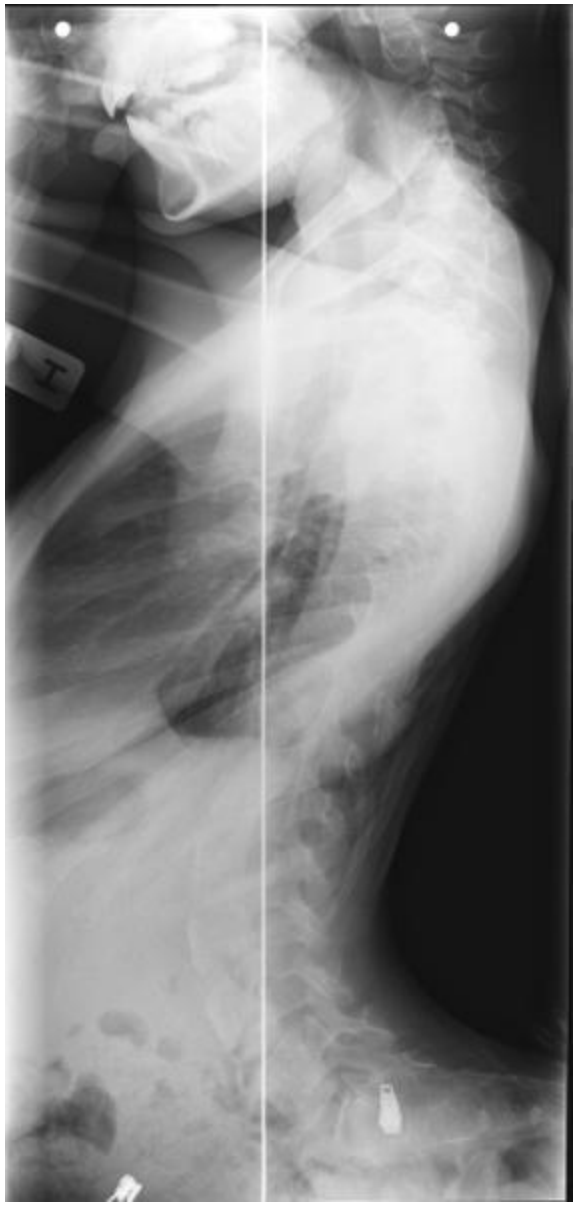
Growing rod procedure, four tandem connectors
The curve decreased from 85.7° to 32.8° after operation.

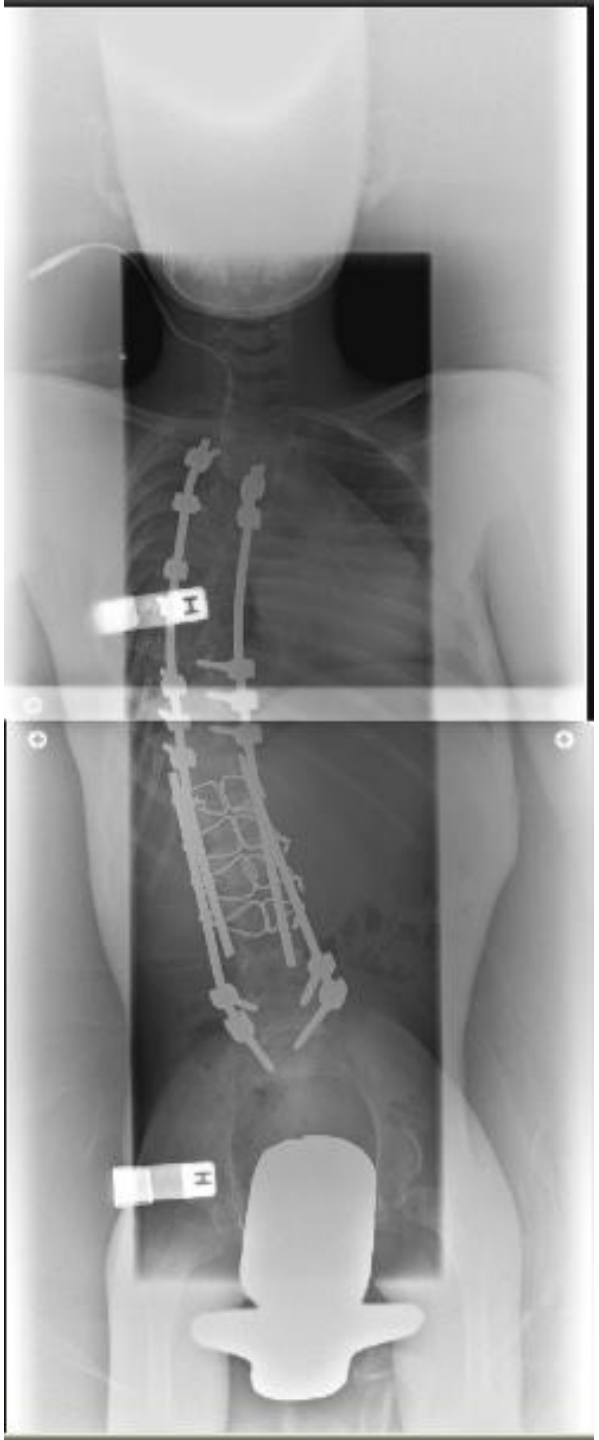




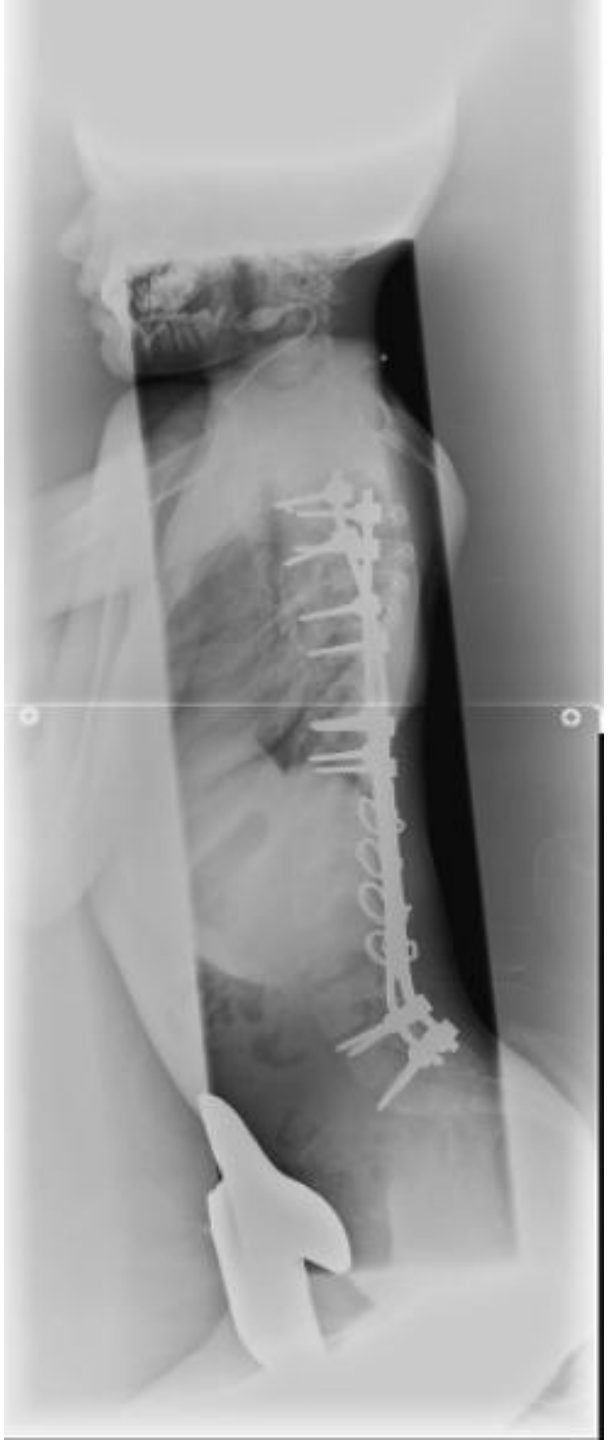


13/03/2003
10 yr boy with quadriphlegia, congenital medullary atrophy C6





Post op
14/04/2003



Konklusion

Kongenit og Neuromuskulær skoliose

- Tidlig tværfaglig udredning i højt specialiseret afdeling
- Betydelig co-morbiditet
- Sygdomsspecifik operativ behandling