SEGMENTAL SELF GROWING ROD CONSTRUCTS IN THE MANAGEMENT OF EARLY ONSET NEUROMUSCULAR SCOLIOSIS

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b. Consultant
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d. Speakers' Bureau
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EARLY ONSET NEUROMUSCULAR SCOLIOSIS

- Children with neuromuscular disease frequently develop a progressive scoliosis and respiratory compromise
- Constriction of the chest cavity as a result of a spinal deformity restricts lung growth and will contribute to further pulmonary complications.

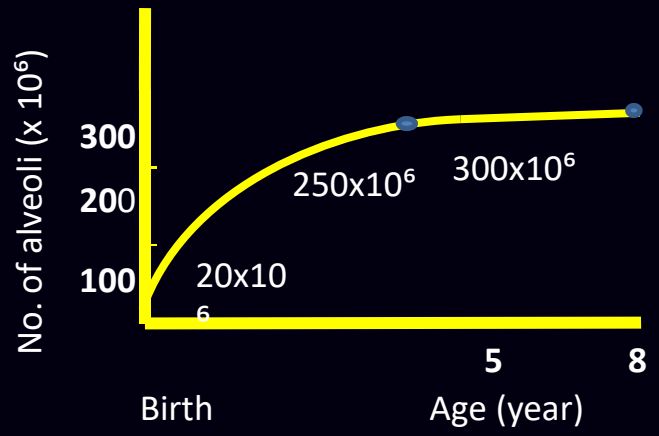
Lung development

Lung development up to the age 5 is important because:

- **20 million alveoli at birth**

but

- **300 million alveoli at the age of 5**



Early growth disturbance compromises thoracic volume

EARLY ONSET NEUROMUSCULAR SCOLIOSIS

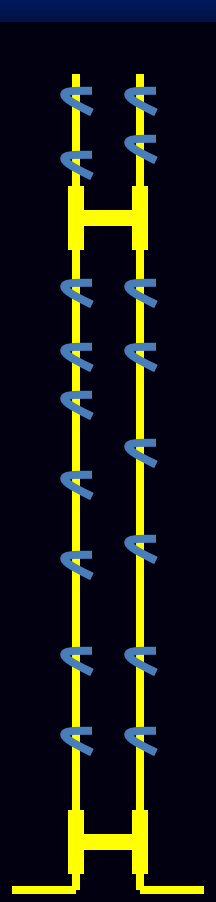
Various surgical techniques have been employed to correct EONMS

Limitations :

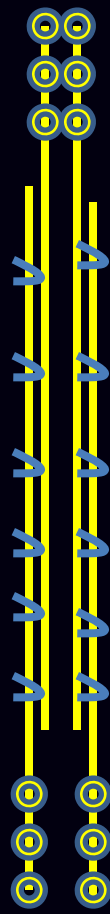
- Lack of segmental control
- Loss of sagittal balance
- Multiple surgeries
- High rate of complications

Definitive Self Growing Rod Constructs

- We have been using two different definitive growing rod constructs based on the Luque trolley.
- These constructs have enabled us to achieve and maintain the correction during spinal growth.



Sliding H Bar Construct



Screw + Wire Construct

Early Onset Neuromuscular Scoliosis
Self Growing Constructs

- This retrospective analysis involves 16 patients with EONMS treated between 1998-2010 with self growing constructs.

Objective:

- To evaluate the structural effectiveness, degree of correction, spinal growth and complications with these Constructs.

Self Growing Constructs in Early Onset Neuromuscular Scoliosis 1998-2010

- Sex 16 pts (9 M, 7 F)
- Age 7.1 yrs (5-8 yrs)
- Instrumentation T2-S1 (pelvic fixation)

Self Growing Constructs in Early Onset Neuromuscular Scoliosis

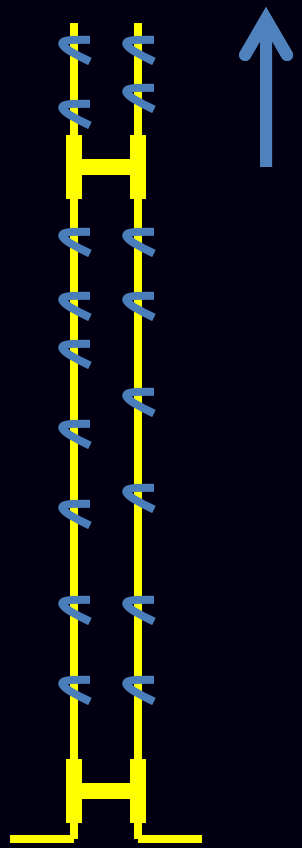
- Hospital Stay 7.6 days (6-10 days)
- PICU Stay 1.3 days (1-3 days)
- Follow up 3.2 yrs (24 mon-13 yrs)

Self Growing Rod Constructs in Early Onset Neuromuscular Scoliosis

Diagnosis

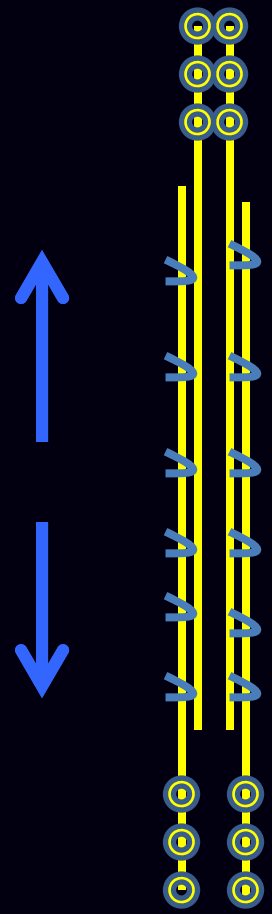
- SMA Type 2 — 6 pts
- SMA Type 3 — 4 pts
- Hypotonia — 2 pts
- Cong M Dystrophy — 3 pt
- CP — 1 pt

Self Growing Rod Constructs



9 pts

Sliding H Bar Construct

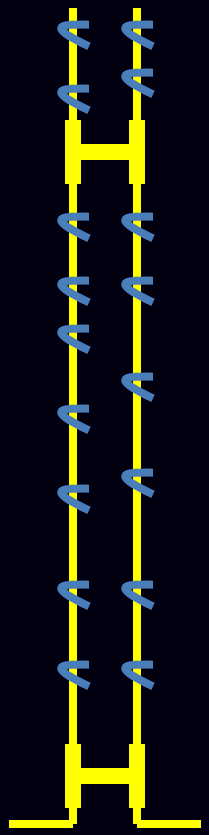


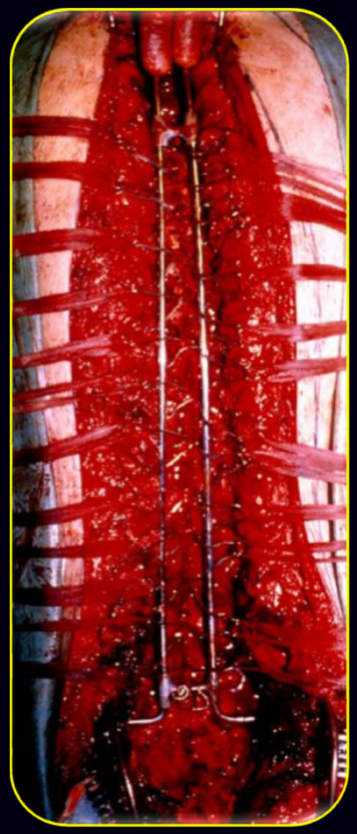
7 pts

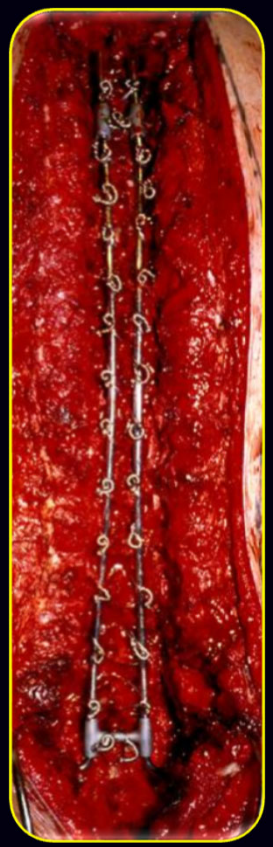
Screw + Wire Construct

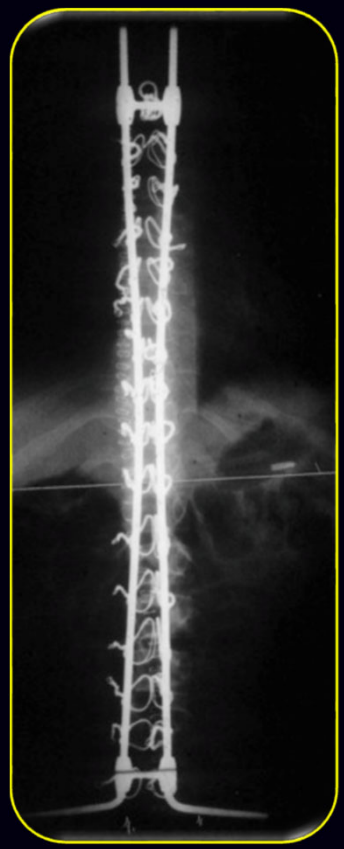
Self Growing Rod Constructs (SMA)

Sliding H-Bar Construct

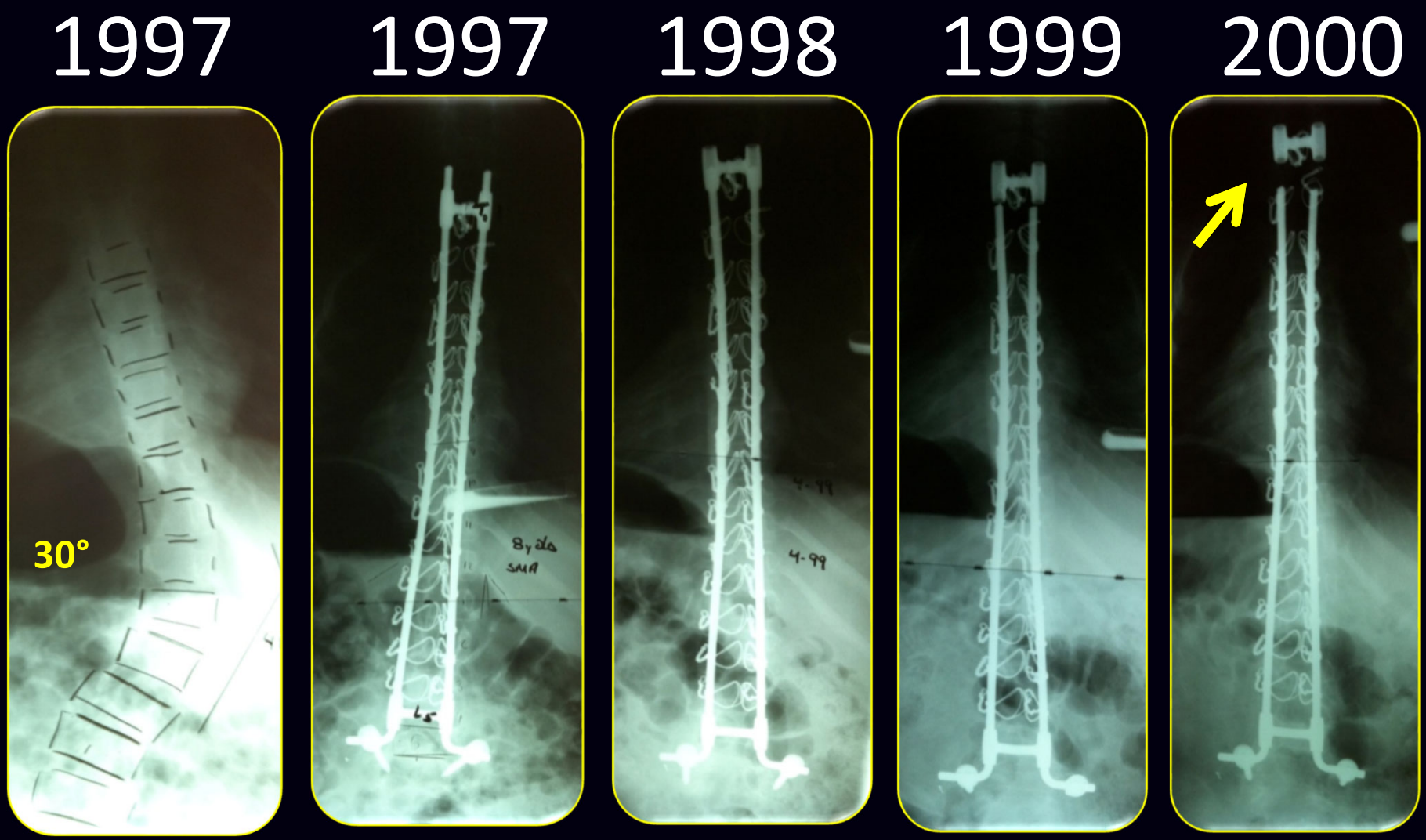








Spinal Muscular Atrophy



Spinal Muscular Atrophy

2001 2002 2010 2010

Age 11

Age 12

Age 20

Age 20

13 yrs: Post- op

12 cm: Spinal G

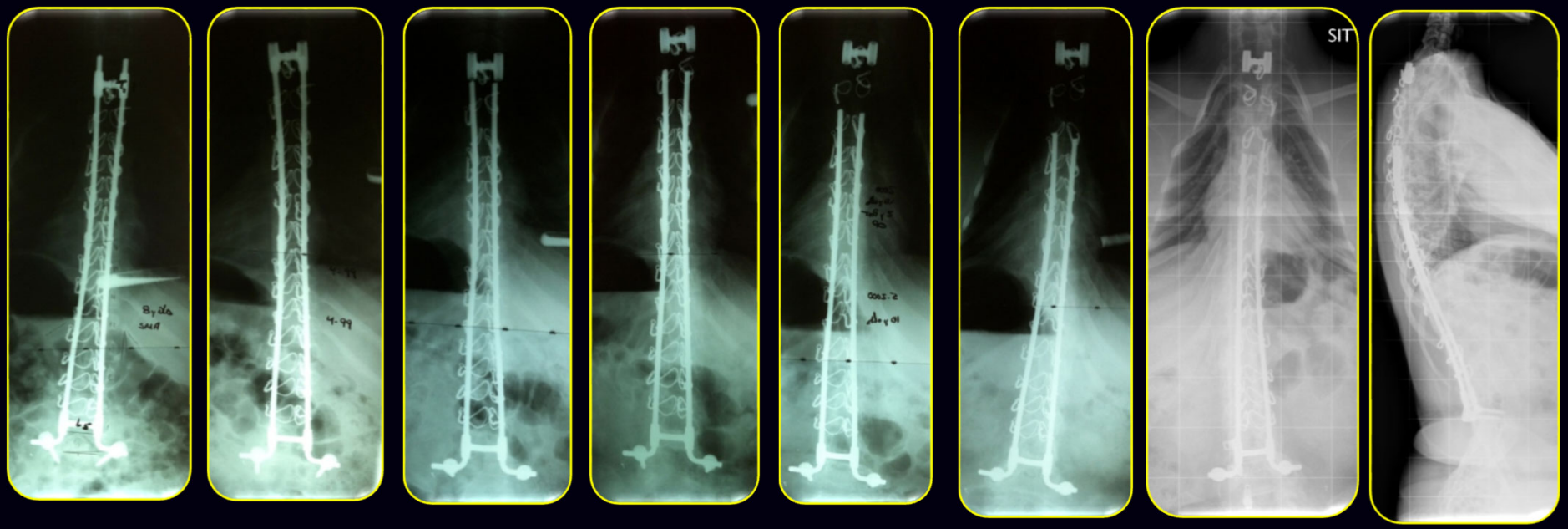
PJK: None

TK,LL:Preserved

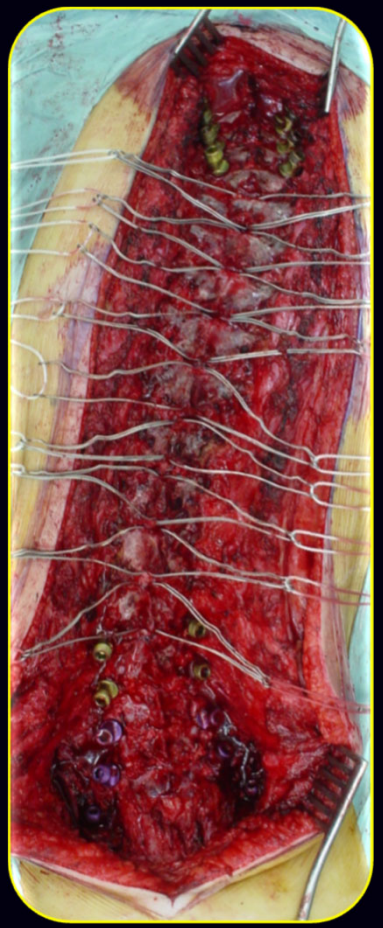
operation: 1

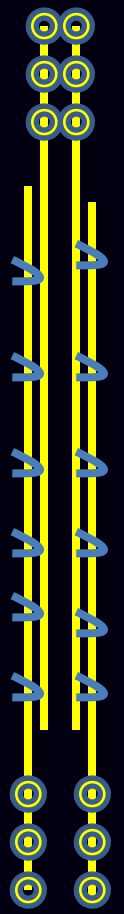
Spinal Muscular Atrophy

Spinal growth (12cm)



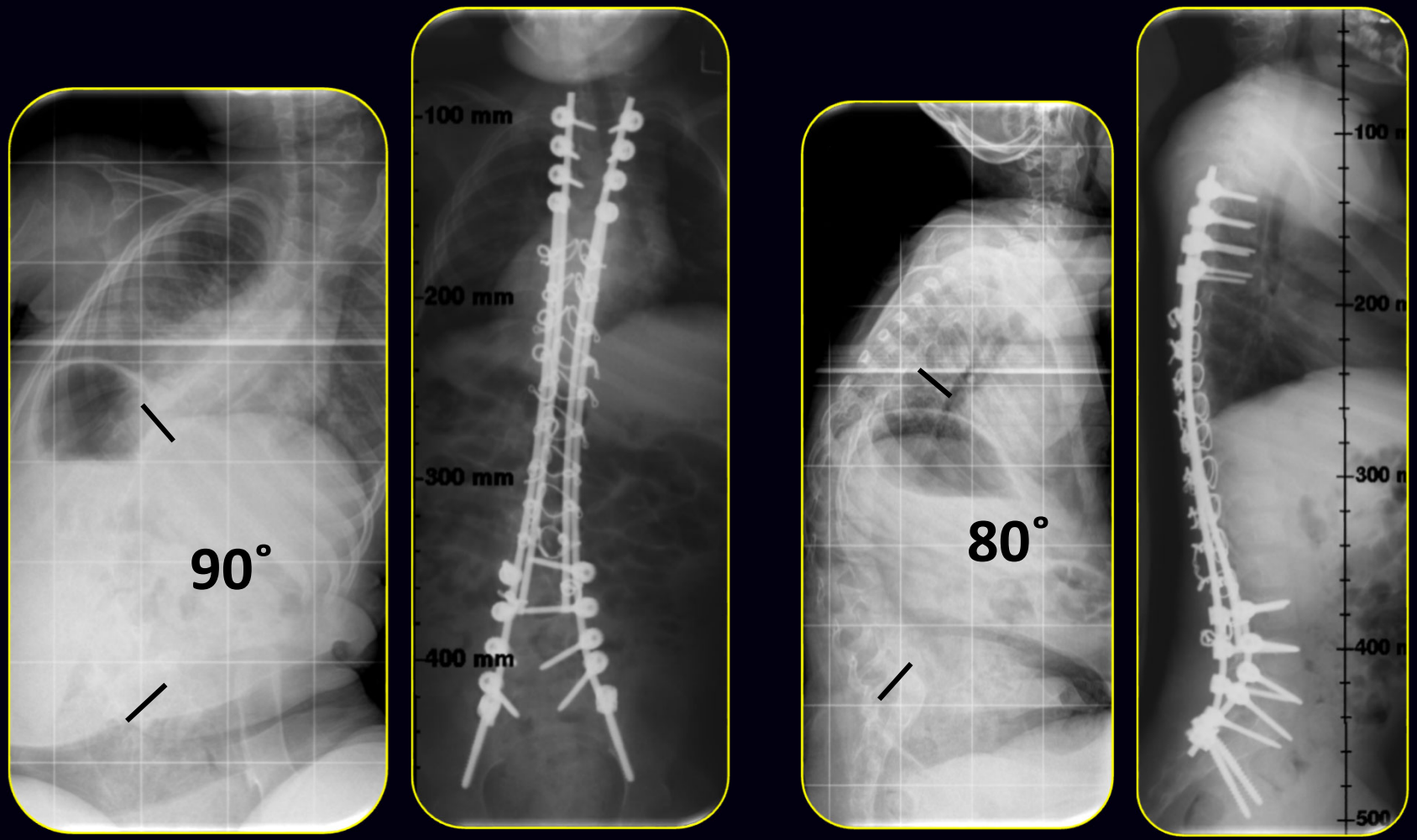
Spinal Muscular Atrophy





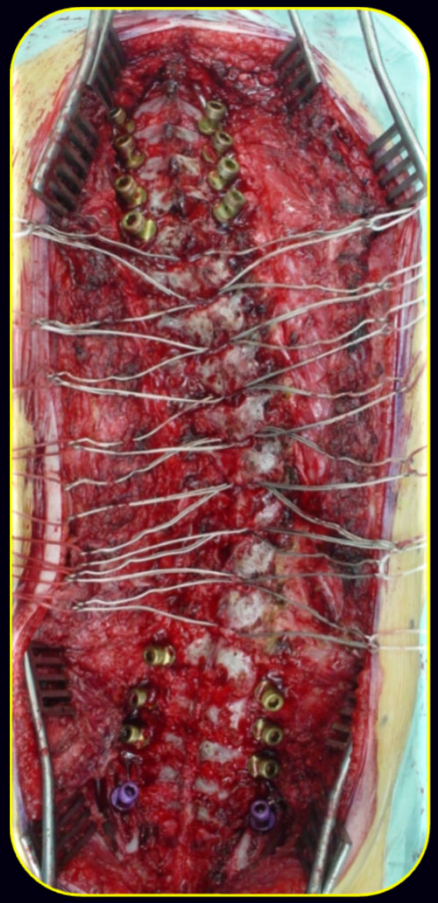
Screw + Wire Construct

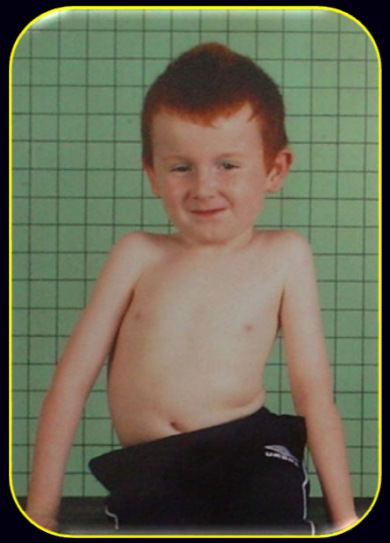
Spinal Muscular Atrophy



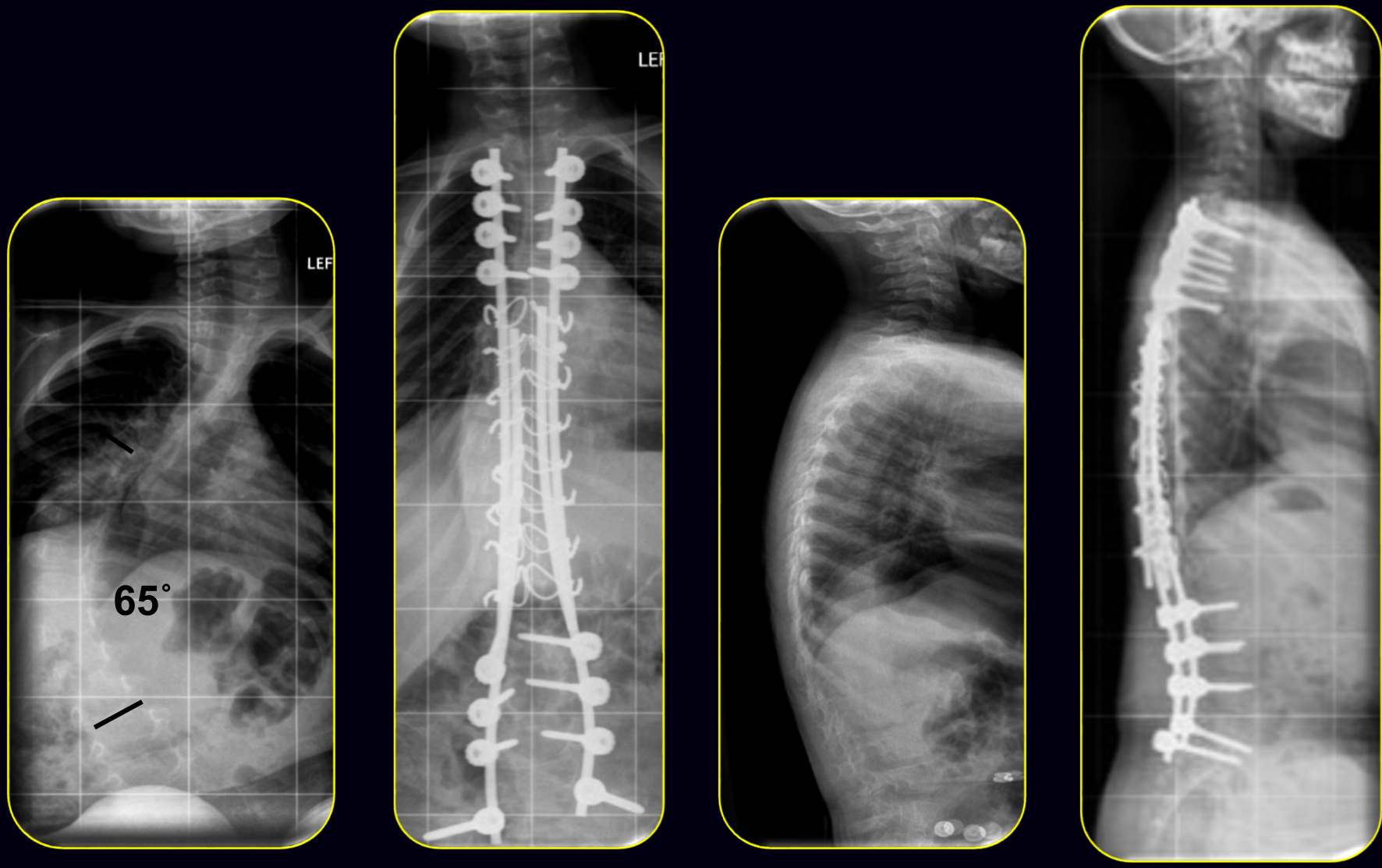
A D

Spinal Muscular Atrophy





Spinal Muscular Atrophy

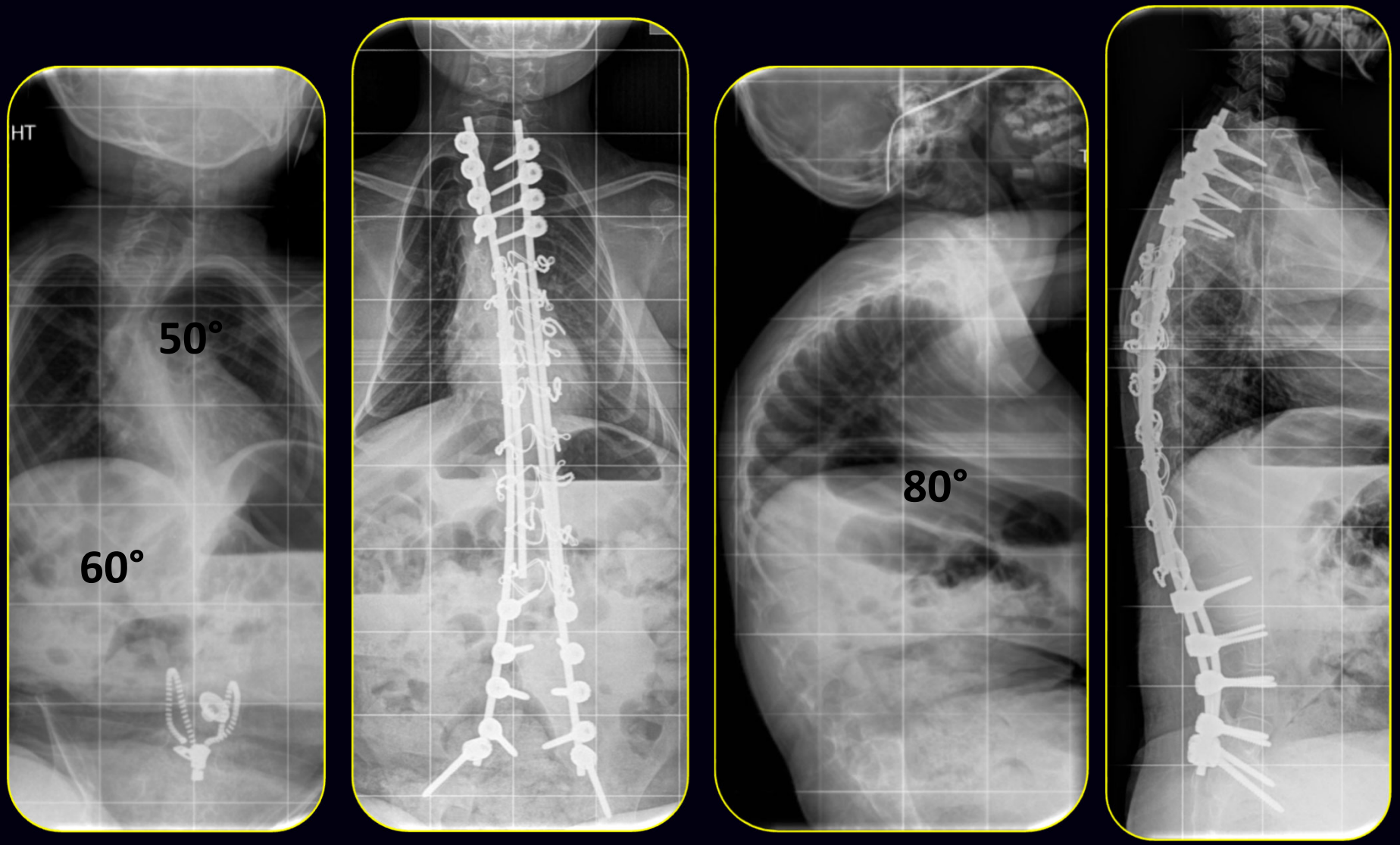


Congenital muscular dystrophy

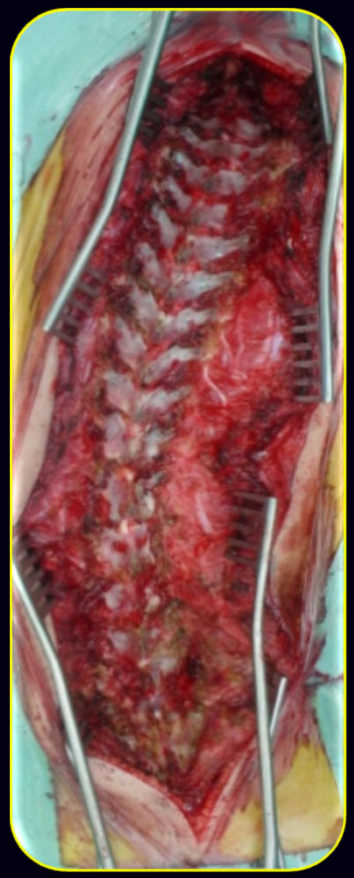


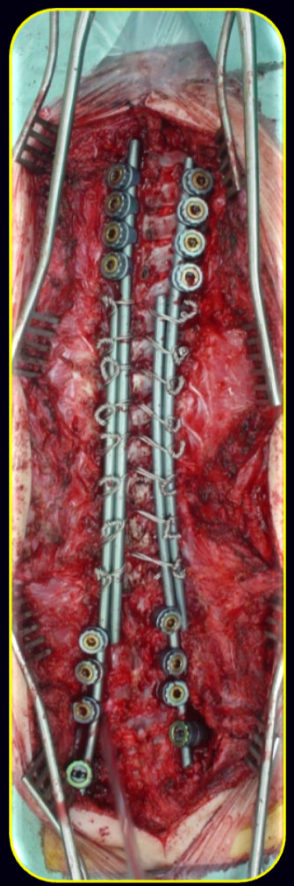


Congenital muscular dystrophy

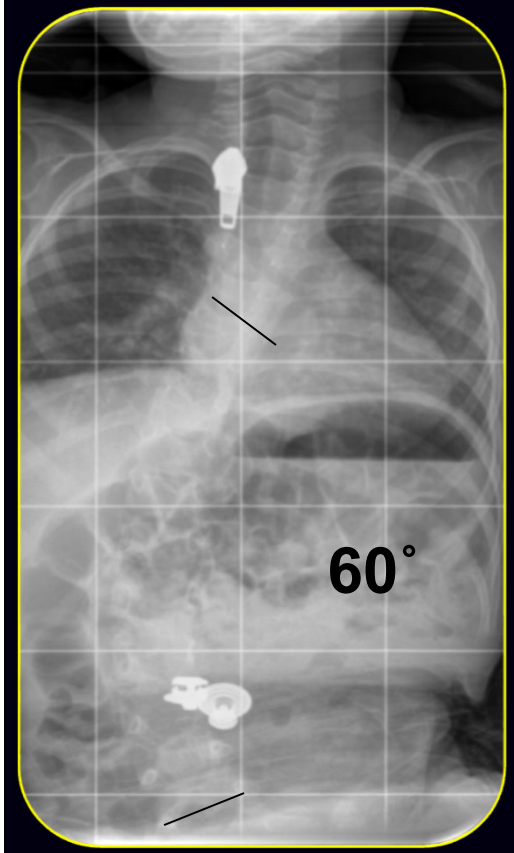


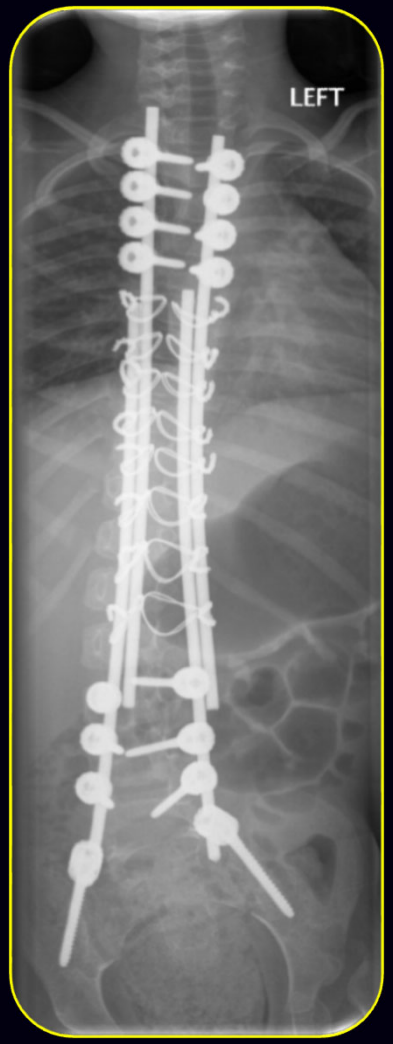
Spinal Muscular Atrophy

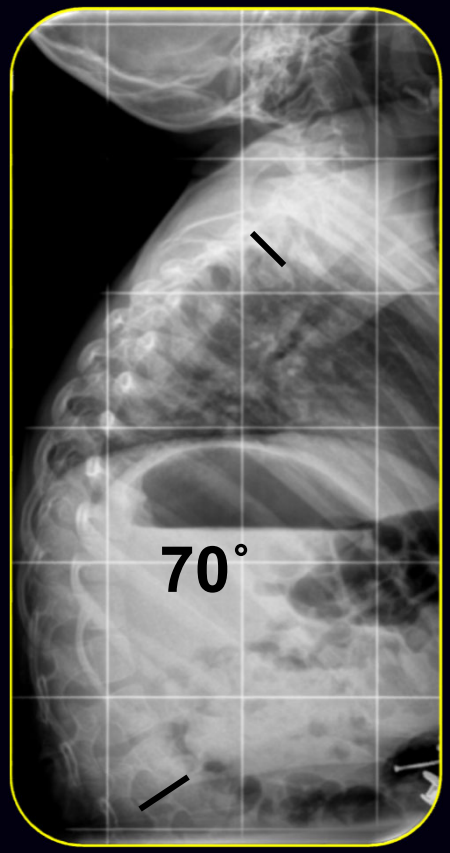


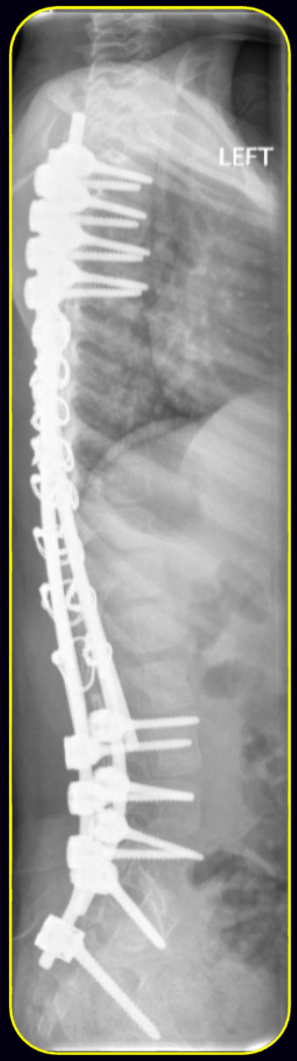


Spinal Muscular Atrophy









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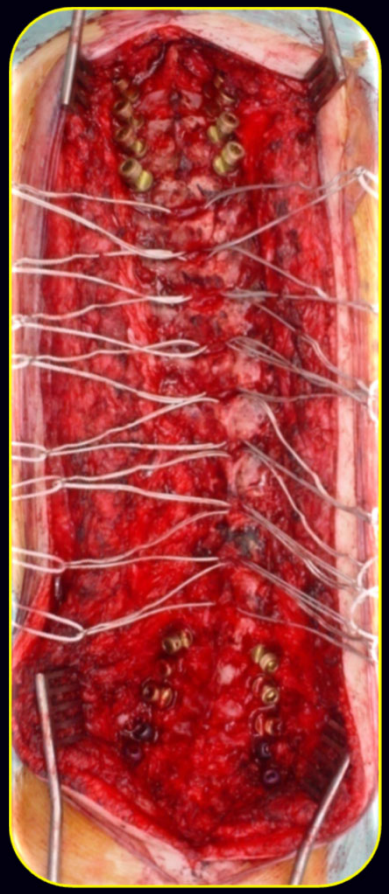
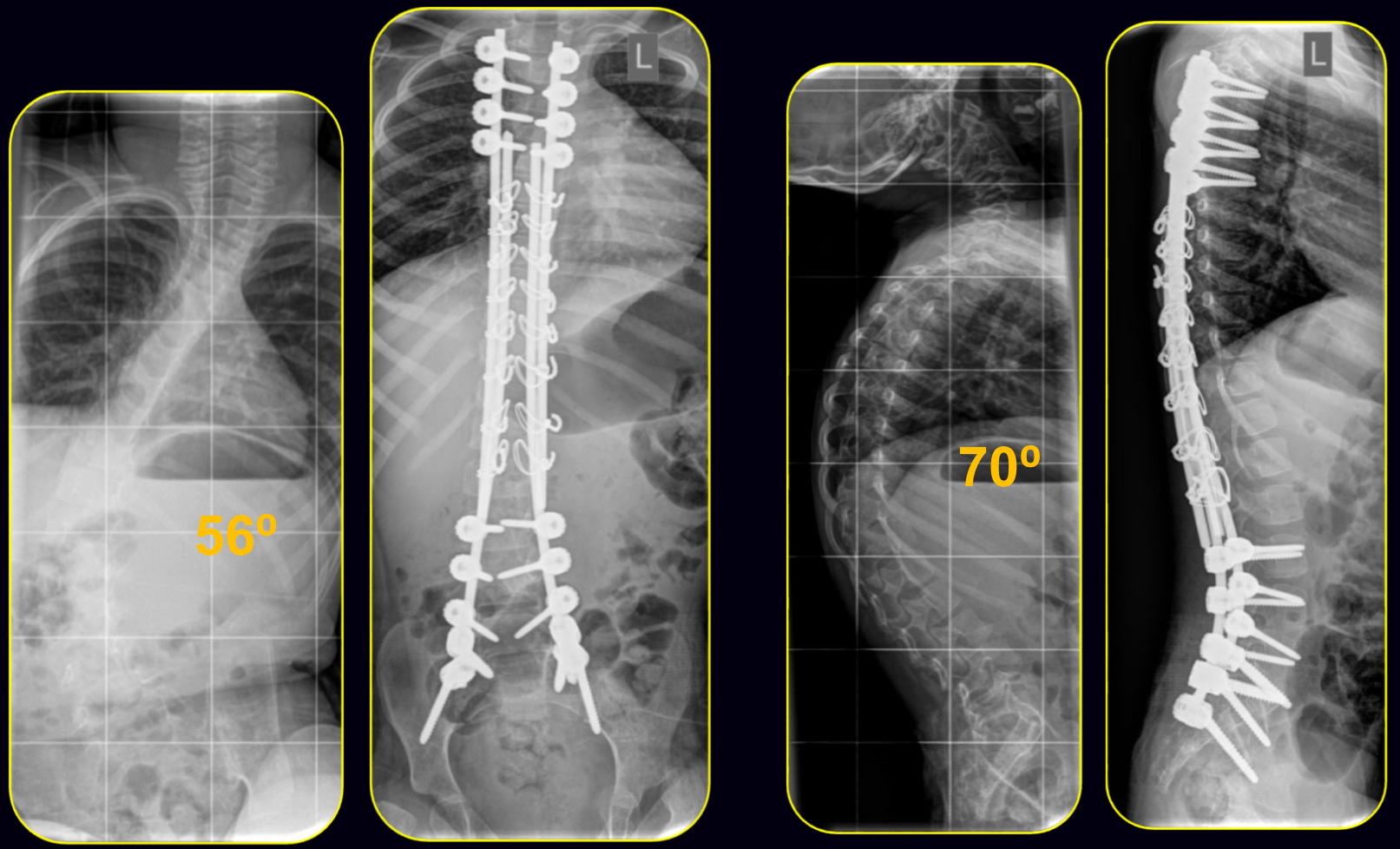
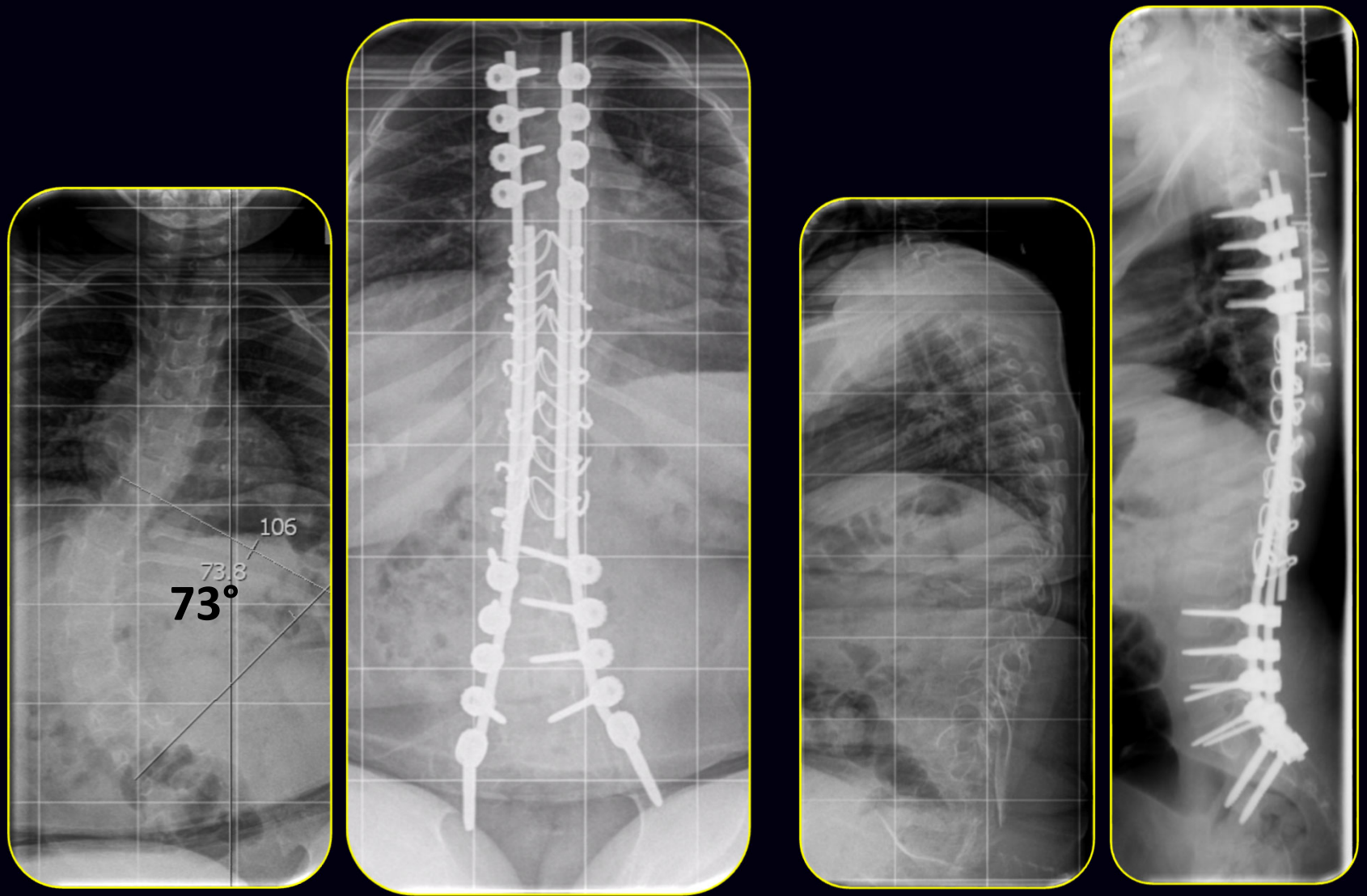


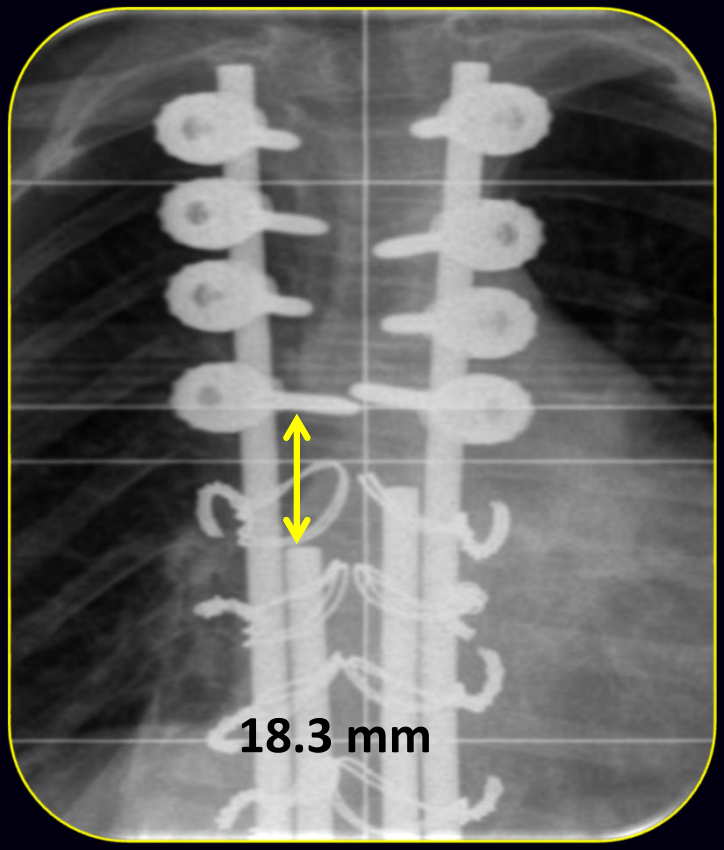

Spinal Muscular Atrophy

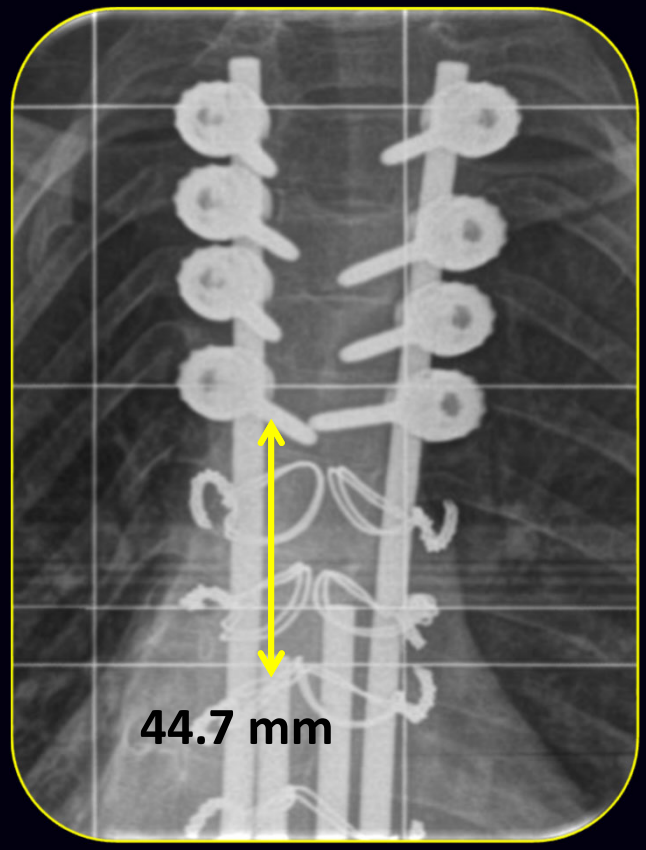


Hypotonia



Spinal Growth





07.10.2009

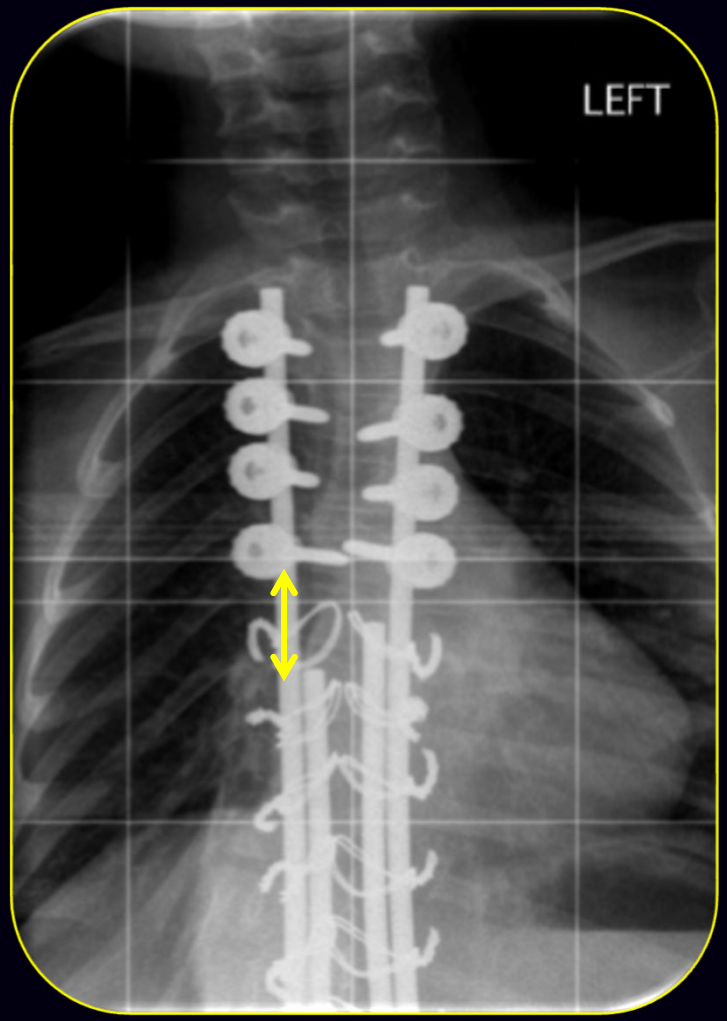
19.03.2012

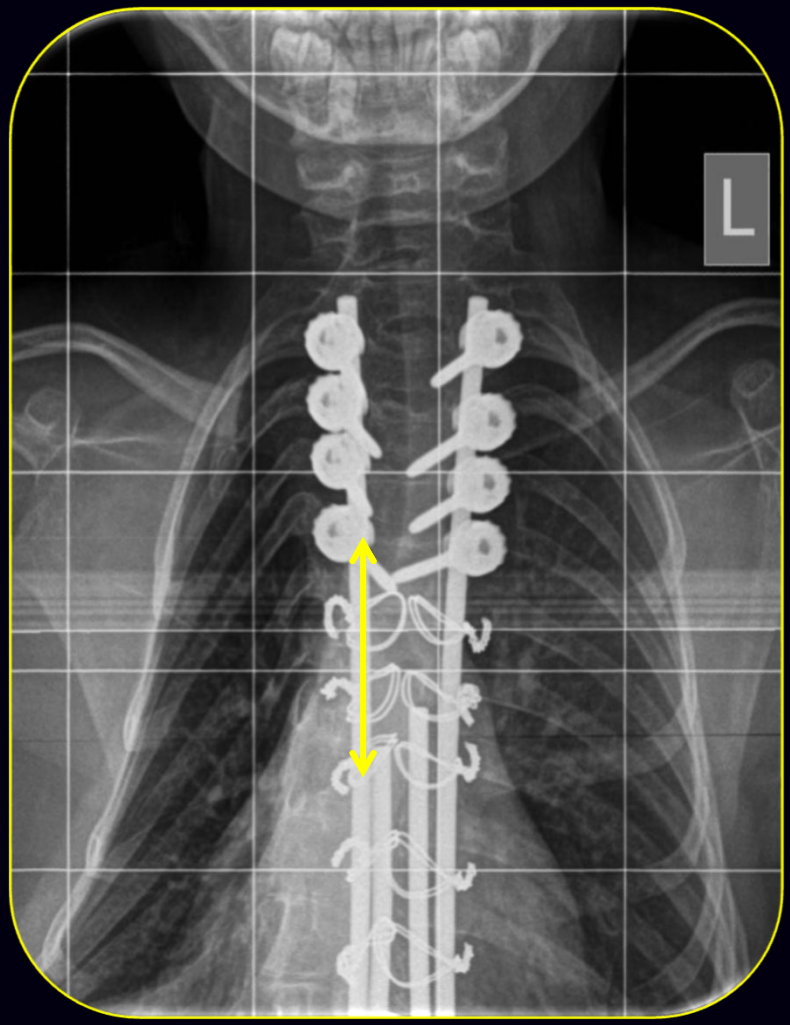
2½ years → 26.4 mm

Spinal Growth

22mm

52mm





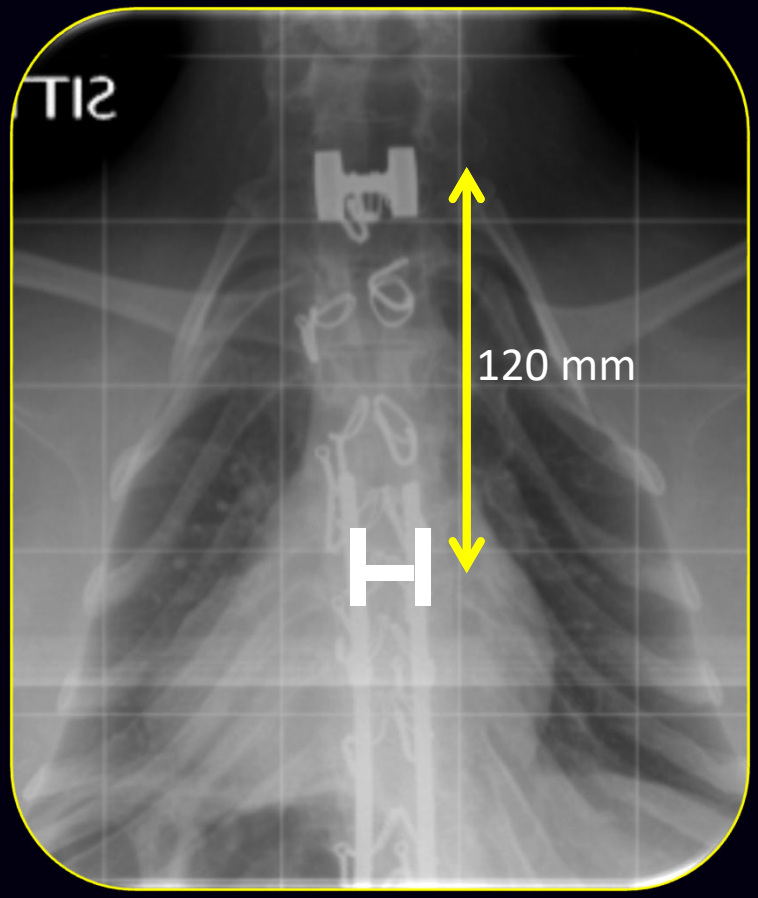
07.10.2009

15.09.2012

3 years → 30 mm

Spinal Growth

1997



2010

13 years → 120 mm

Early Onset Neuromuscular Scoliosis Results

- Scoliosis (pre-op) 68° (40°-92°)
- Scoliosis (Post-op) 9° (0-35°)
- Kyphosis (Pre-op) 62° (37°-90°)
- Post-op Kyphosis 28° (20°-40°)

Early Onset Neuromuscular Scoliosis Results

- Averaged vertebrae 13 levels (9-17)
- Follow up 3.2 yrs (2-13 yrs)
- Spinal Growth 40 mm (20 -120 mm)

Results

	Pre-op	Post-op	1 year F-up	2yrs F-up
FVC	64.6 %	83%	69%	63.2%
T1-S1 HEIGHT	25.07 cm	32.67 cm	34.92 cm	37.30 cm
Chest Width	21.32 cm	22.12 cm	22.47 cm	24.50 cm
Chest Cavity Space	98.66 cm2	116.68 cm2	154.33 cm2	172.40 cm2

Complications

- Superficial Infection 1 patient
- Loss of distal fixation 1 patient
- Neurological complication -

Conclusion

- The Segmental Self Growing Rod Construct is a powerful, definitive technique for the management of EONMS
- Excellent correction is achieved and maintained
- PJK is prevented
- Sagittal contour of the spine is preserved
- Maximum spinal growth and thoracic development is achieved with single surgery

Thank you

Centre for Spinal Studies and Surgery Nottingham

EARLY ONSET NEUROMUSCULAR SCOLIOSIS

Various surgical techniques have been employed to correct EONMS

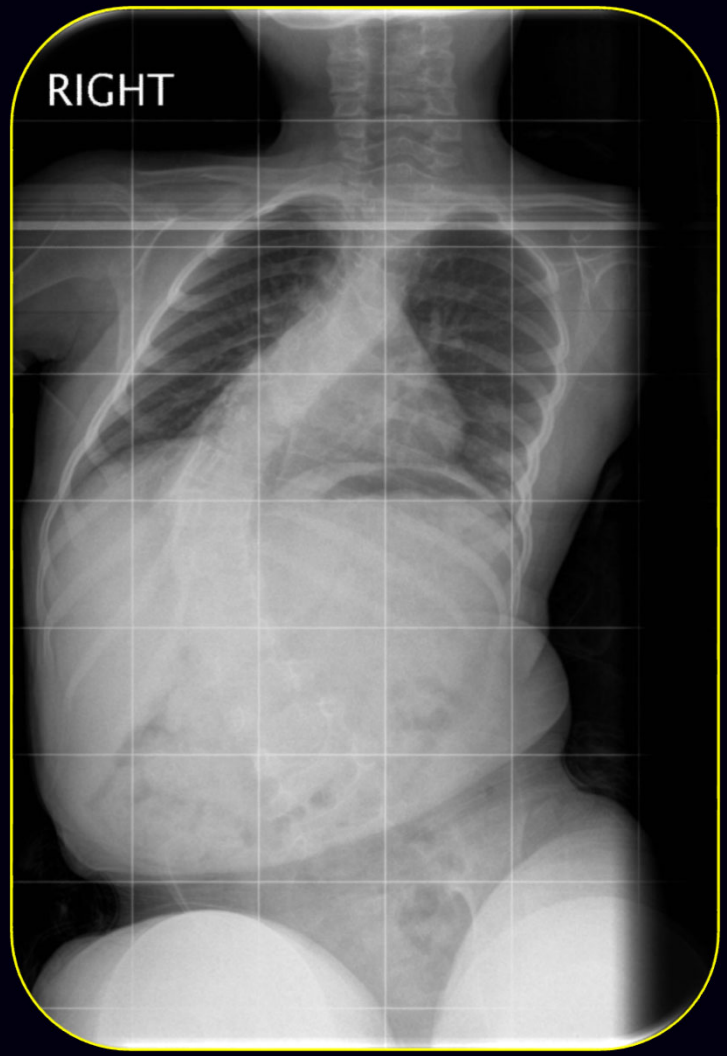
Limitations :

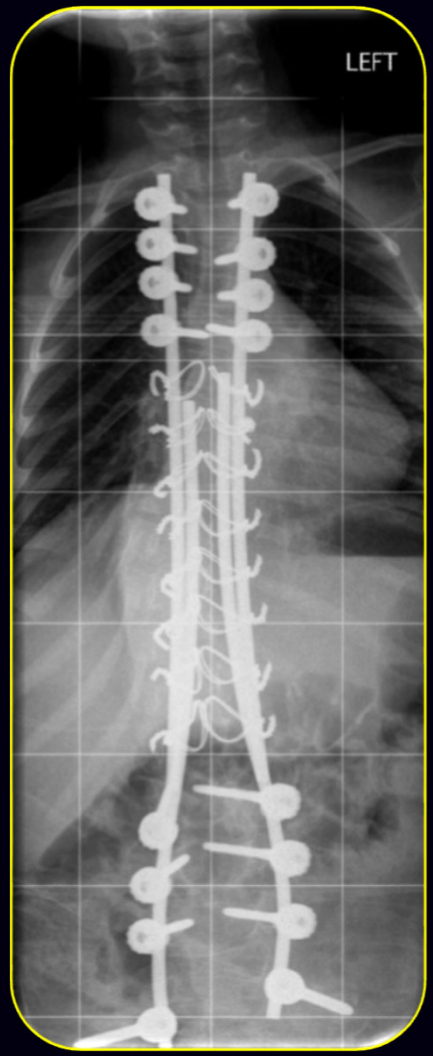
- Lack of segmental control
- Loss of sagittal balance
- Multiple surgeries
- High rate of complications

Spinal Growth

07.10.2009

19.03.2012





3 years → 30 mm