

# Long-term results in surgical management of congenital scoliosis (CS): A minimum 10 years follow-up study



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2<sup>nd</sup> International meeting on early onset scoliosis (ICEOS), Montreal; Nov 2008



# Long-term results in surgical management of congenital scoliosis (CS): A minimum 10 years follow-up study

|                    |                         |                         |
|--------------------|-------------------------|-------------------------|
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2<sup>nd</sup> International meeting on early onset scoliosis (ICEOS)  
Montreal, CA; Nov 2008  
Authors Disclosure Information

- a. Grants/Research Support
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- c. Stock/Shareholder
- d. Speakers' Bureau
- e. Other Financial Support



# Background

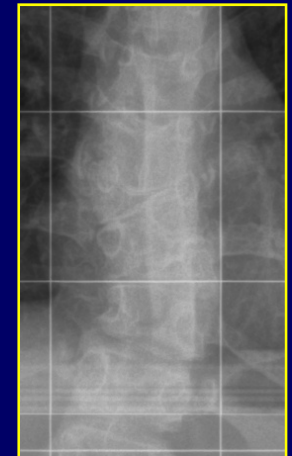
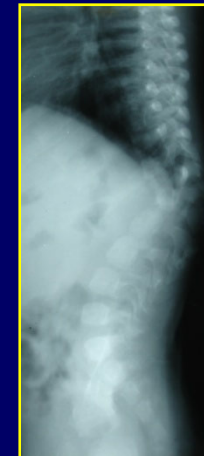
- Surgical Rx of CS: Challenging / Trial & error
- Current evidence: Levels IV / V
- Few studies: Level III evidence

# Our study cohort

- 52 children operated for CS & f/u  $\geq$ 10 yrs
- 18♂ & 34♀
- 35 Left & 17 Right sided curves
- Mean follow-up of 19.5 yrs (range: 10-52 yrs)
- Single centre: 3 surgeons (JKW / SMH / MPG)

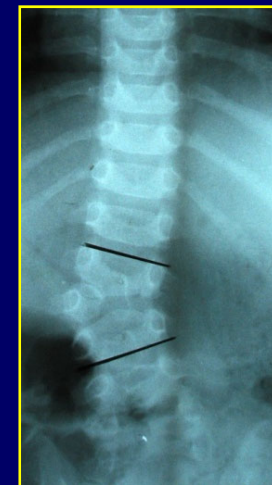
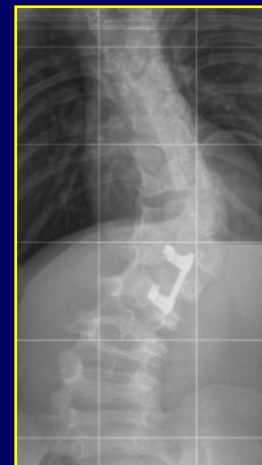
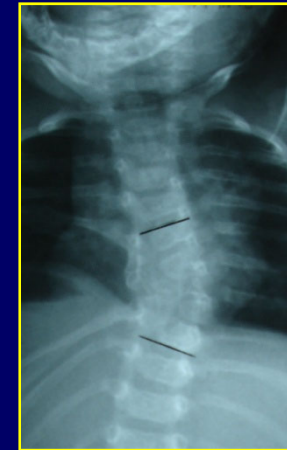
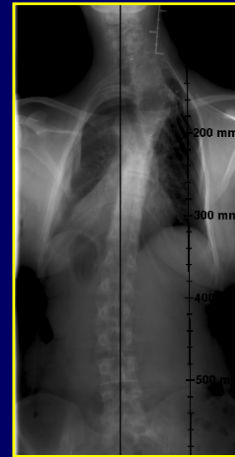
# Etiology

- Hemivertebrae – 22
- Unsegmented bar - 15
- Unsegmented bar with contra-lateral HV: 4
- Wedged vertebrae – 5
- Hemi-metameric shift – 2
- Unclassifiable - 4



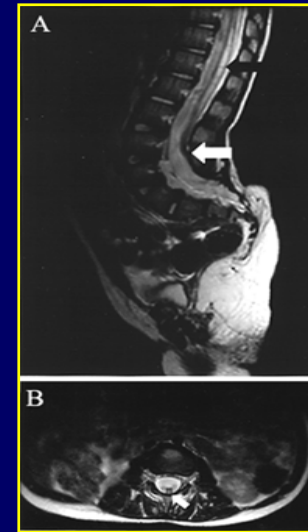
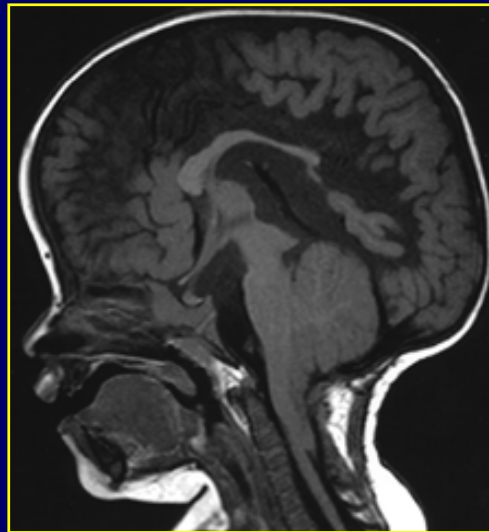
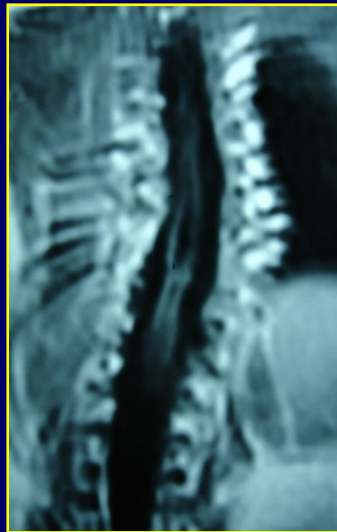
# Curve locations

- Cervical / CT – 5
- Thoracic – 33
- Th-lumbar – 9
- Lumbar / LS – 5



# Associated anomalies

- Intraspinal anomalies – 10
  - Most common anomaly – Diastematomyelia (6)

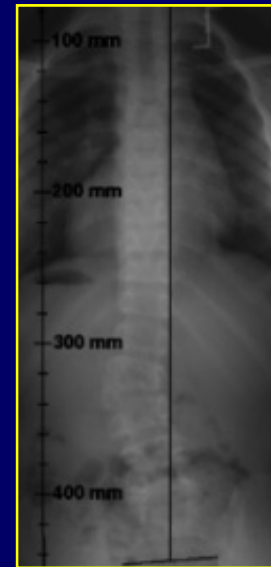
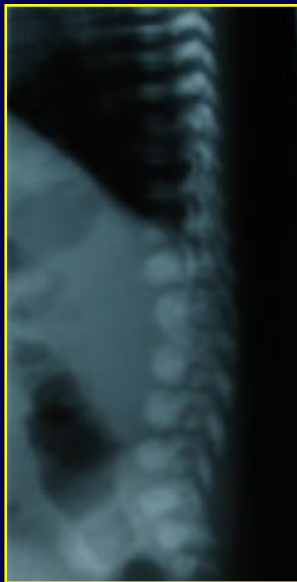


- Syndromes – 11
  - Most common syndrome – VATER Syndrome (5)

# Patient demographics

## Group I

- Posterior in-situ fusion: 16 patients





# Patient demographics

## Group II

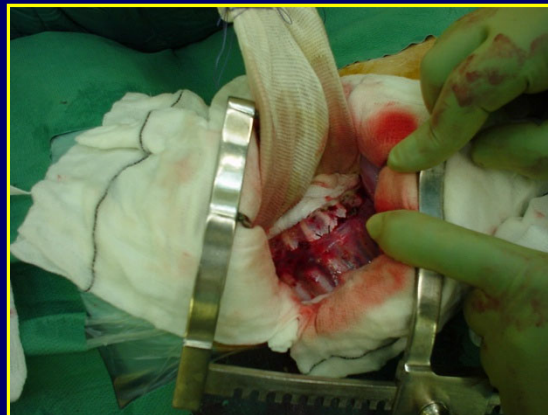
Anterior + Posterior correction & fusion: 32 pts



# Patient demographics

## Group III

Anterior HV excision + correction & fusion: 4 patients



Neurosurgery in cases of intra-spinal anomalies prior to Scoliosis correction

# Patient demographics: Summary

| Parameters                      |        | Group I           | Group II          | Group III         |
|---------------------------------|--------|-------------------|-------------------|-------------------|
| Number of patients              |        | 16                | 32                | 4                 |
| Sex                             | Male   | 4                 | 12                | 2                 |
|                                 | Female | 12                | 20                | 2                 |
| Age @1 <sup>st</sup> Sx         |        | 4.8y (1.1-11 y)   | 8.7y (6.5-14y)    | 2.3y (1.5-4.1 y)  |
| Cobb angle @ 1 <sup>st</sup> Sx |        | 63.2 <sup>o</sup> | 67.5 <sup>o</sup> | 38.5 <sup>o</sup> |
| Post-op Cobb angle              |        | 39.5 <sup>o</sup> | 37.5 <sup>o</sup> | 14.5 <sup>o</sup> |
| Cobb @ final f/u                |        | 45 <sup>o</sup>   | 42 <sup>o</sup>   | 21 <sup>o</sup>   |
| Revision Sx                     |        | 9 / 16            | 15 / 32           | 1 / 4             |
| Average no. of Sx               |        | 1.68(1-3)         | 1.72(1-4)         | 1.25 (1-4)        |

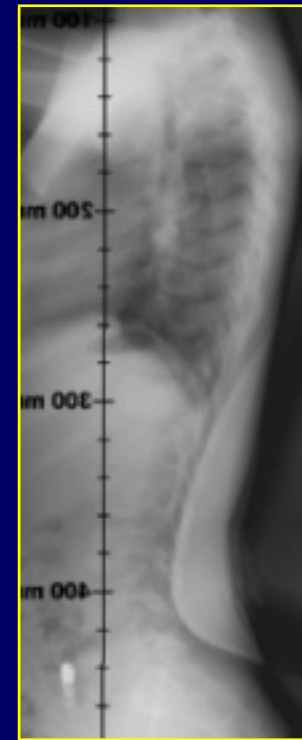
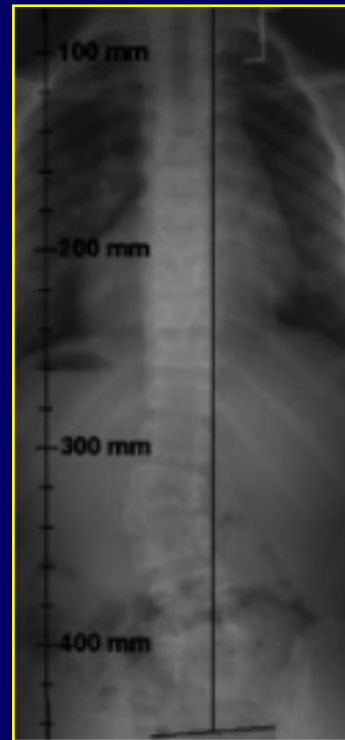


Cord monitoring

# Group I: 12 yr old Male with 10.5 yrs f/u

Diagnosed antenatally  
Posterior uninstrumented fusion  
Now 10.5 yrs post-op

L3 HV  
1.5 yrs  
latest x-rays May 2008



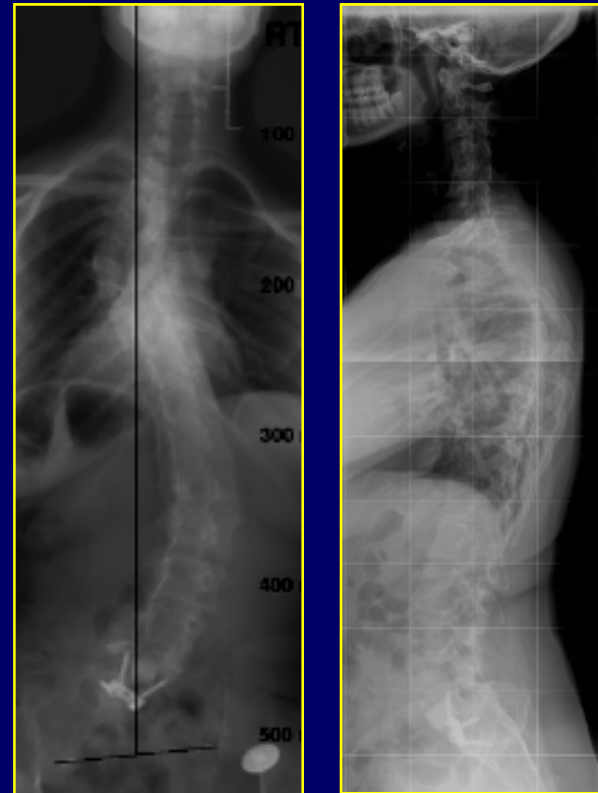
# Group I: 40yr old Female with 33 yrs f/u

Diagnosed @ 2 yrs  
Posterior uninstrumented fusion  
Definitive fusion @13yrs  
Back pain 24 yrs later

T6-7 HV  
@ 6.7 yrs  
Deep infection & implant  
removal (loss of correct 24° )  
L5-S1 Ant fusion



Immediate post-op

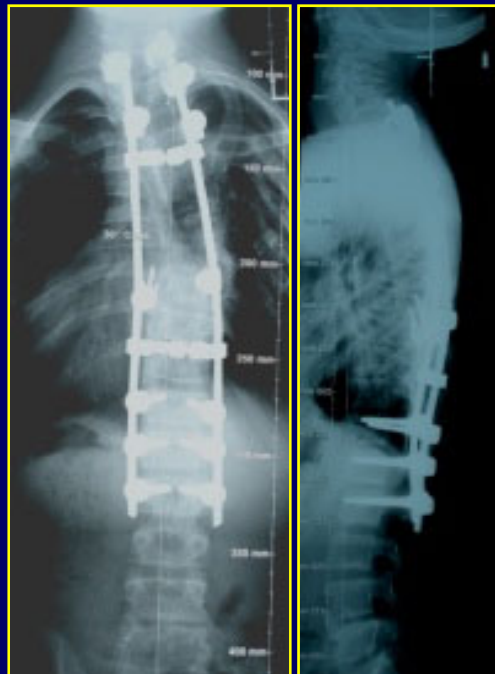
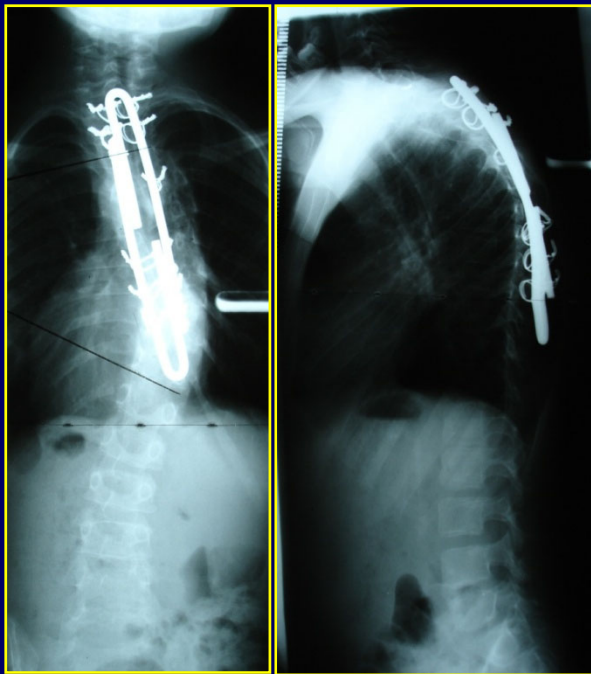


3 yrs post-op

# Group II: 24 yrs Male with 17 yrs f/u

Cervico-thoracic / thoracic multiple HV  
Sx for Coarctation of Aorta  
65° pre-op Cobb – Ant / Post LT instrumentation  
Definitive Fusion  
Most recent x-rays showing implant failure  
asymptomatic

Klippel-Feil syndrome  
@ 1 yr  
@ 7 yrs  
@ 12 yrs  
Patient is



# Group III: 22 yrs old Female with 20 yrs f/u

Diagnosed antenatally

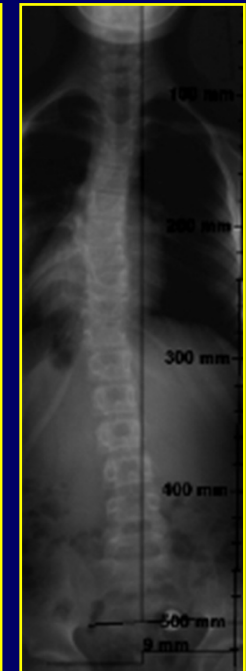
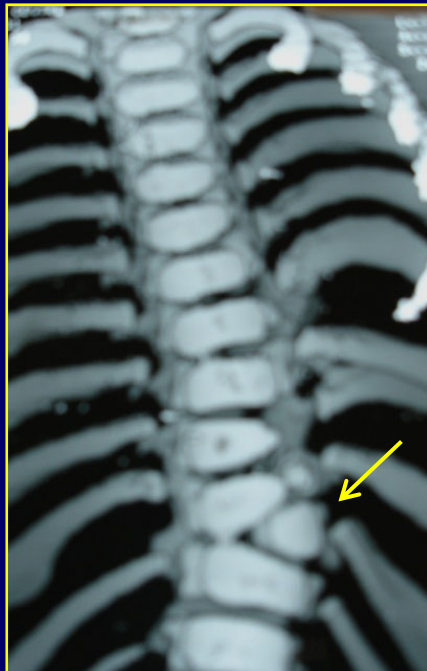
T9 HV

Anterior HV excision & fusion

at 14 mo

No surgery done after this

Latest f/u Apr 2008



# Revision surgery: Indications

- Progression of deformity
- Sagittal imbalance
- Crankshaft phenomenon
- Implant failure / pseudoarthrosis
- Junctional kyphosis



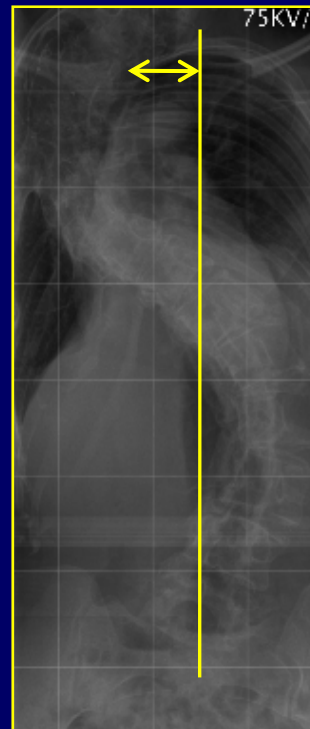
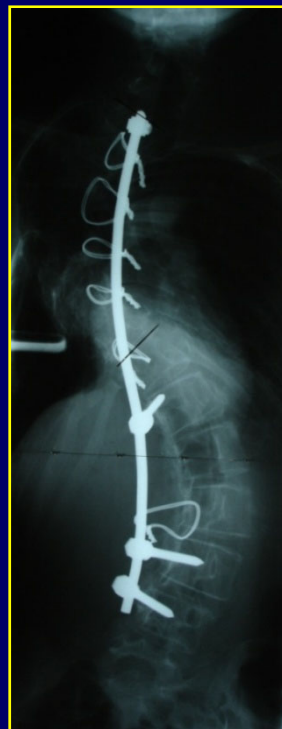
# Frontal decompression in 33 yr F with 26 yrs f/u

Diagnosed  
Circumferential convex fusion (A+P)  
Definitive fusion @ 22 yrs

Post-op Infection

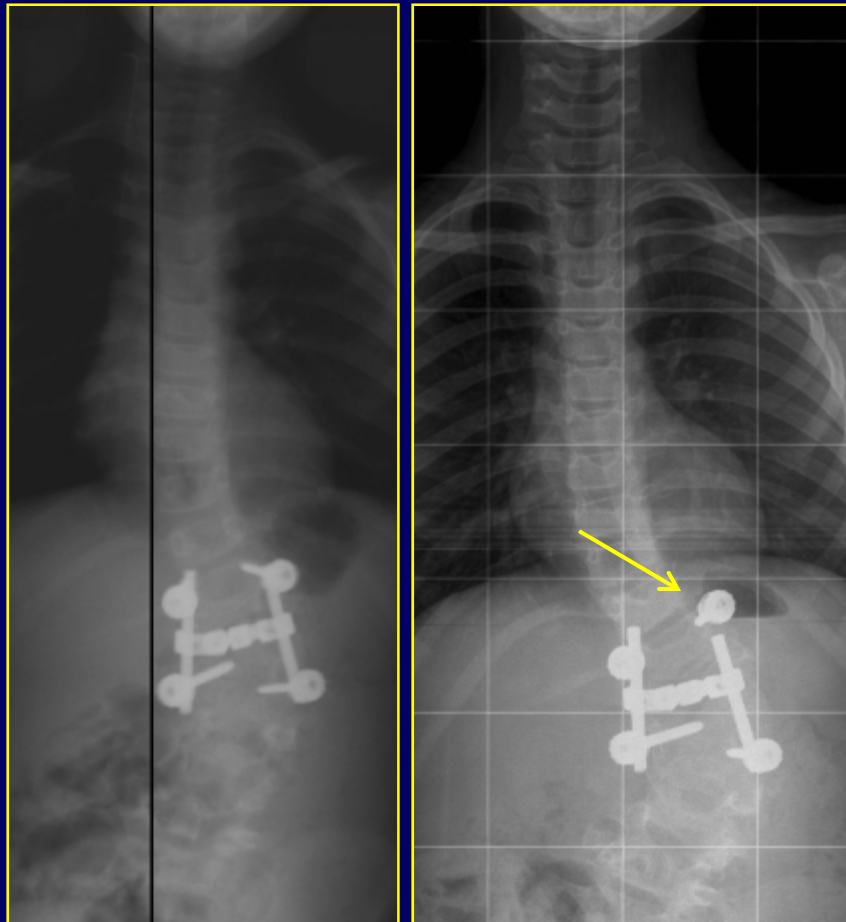
Most recent xrays – Mar 2008

@ 1.8 yrs with multiple thoracic HV  
@ 7 yrs  
Ant apical vertebrectomy & post  
fusion  
implant removal – loss of  
correction



# Implant failure & pseudoarthrosis

Listed for revision surgery

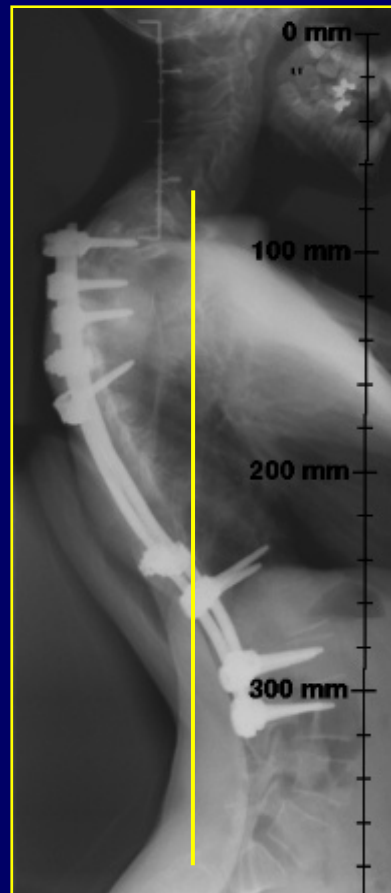
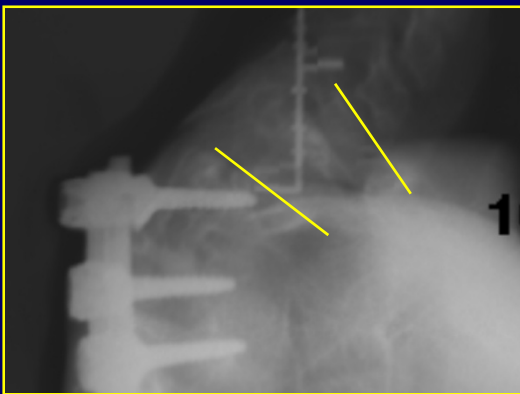
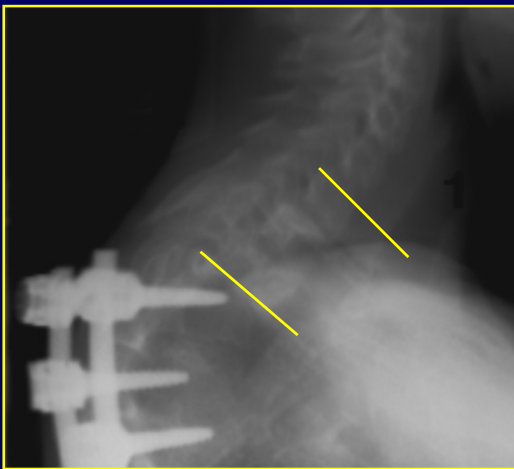


Patient is asymptomatic

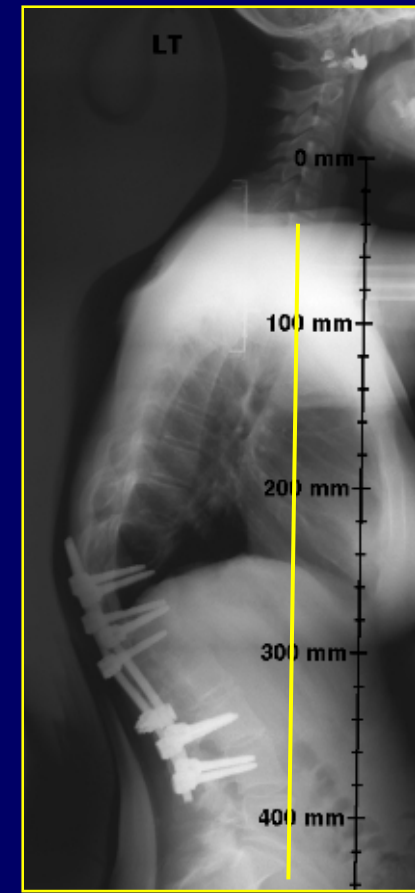


# Junctional Kyphosis

Patient 1



Patient 2



# Conclusion

- Growth arrest / fusion performed at early age may deteriorate over time
- Early definitive excision & fusion of junctional HV is recommended (cervico-thoracic / thoraco-lumbar & lumbo-sacral)
- Timing of definitive Sx influenced by
  - Type / site & no. of HV
  - Presence of unsegmented bar

# Conclusion

- Follow-up beyond adulthood is required
- Group I – maximum proportion of patients who underwent definitive revision Sx  
[56.25% vs. 47% (Gr II) & 25% (Gr III)]
- Multiple surgeries may be needed
- Combined neuro & orthopaedic spinal input to optimise outcome @ long-term