

Déformations Rachidiennes

Scoliose idiopathique

Dante G. Marchesi MD

HIRSLANDEN 

Clinique Bois-Cerf
Lausanne / Switzerland

Pathologies Rachidiennes

très variées et complexes



Spinal pathologies

deformities

- idiopathic
- congenital
- neuromuscular
- degenerative
- secondary

- cervical
- thoracic
- lumbar

fractures

- traumatic
- pathologic

- frontal plane
- sagittal plane

degenerative

- disc diseases
- osteoarthritis
- instability
- deformities

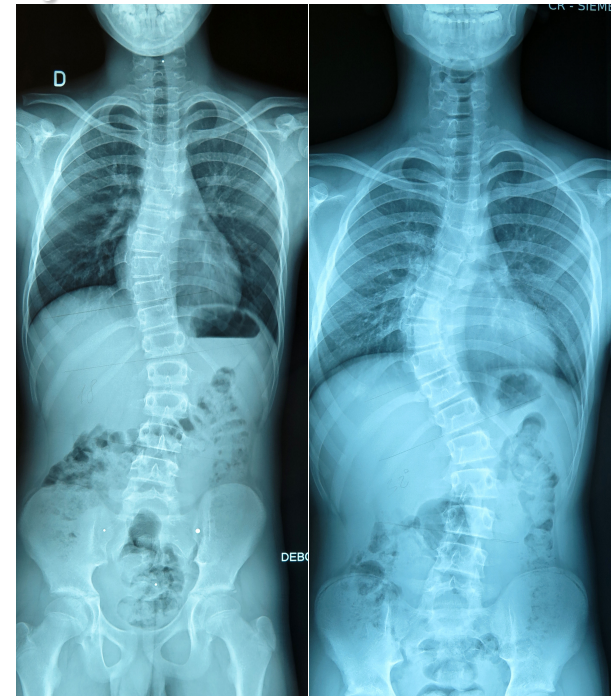
- LBP

Spinal deformities

frontal plane

scoliosis

- idiopathic
 - early onset
 - adolescent
 - adult
- congenital
- neuromuscular
- degenerative
- secondary
 - post-traumatic
 - pathol. fracture
 - tumor
 - infection
 - other



PM, male 13y

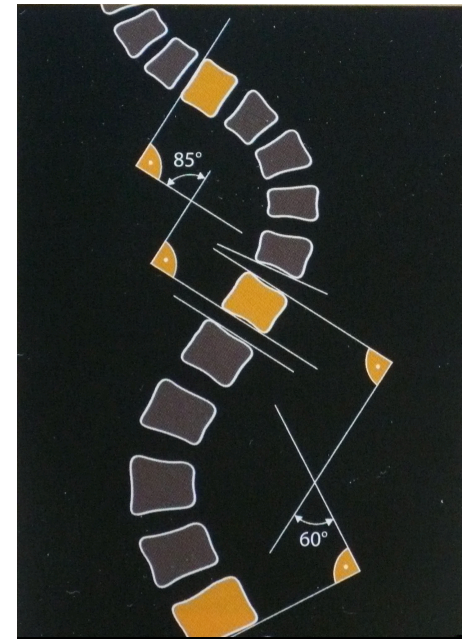
14.5y

Spinal deformities

frontal plane

scoliosis

- idiopathic
 - early onset
 - adolescent
 - adult
- congenital
- neuromuscular
- degenerative
- secondary
 - post-traumatic
 - pathol. fracture
 - tumor
 - infection
 - other

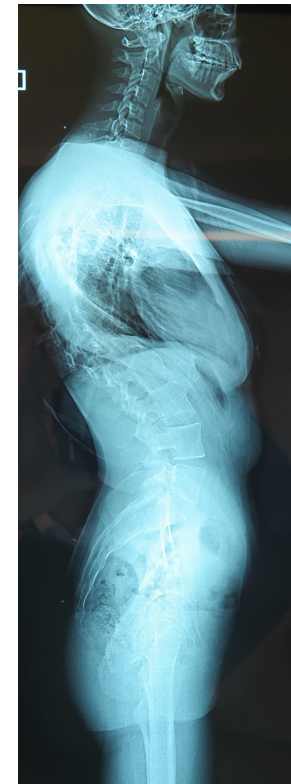
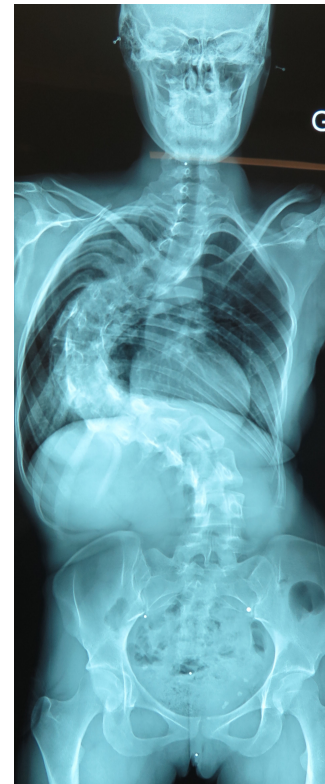


Spinal deformities

frontal plane

scoliosis

- idiopathic
 - early onset
 - adolescent
 - adult
- congenital
- neuromuscular
- degenerative
- secondary
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 - pathol. fracture
 - tumor
 - infection
 - other



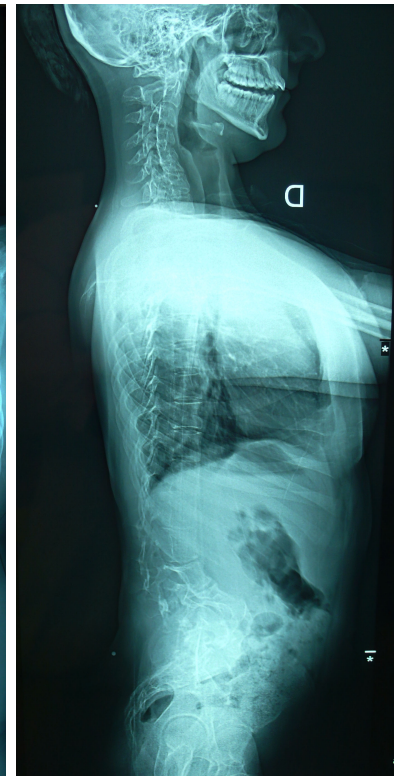
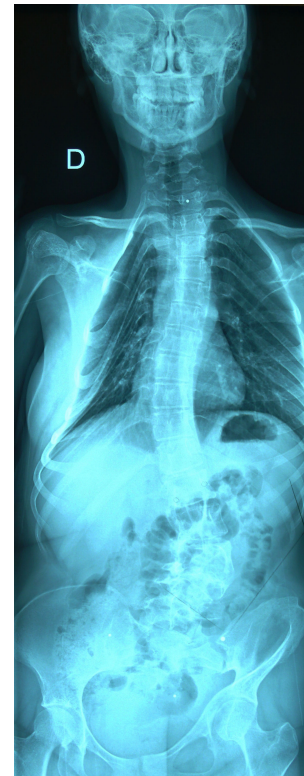
BM, female 34y

Spinal deformities

frontal plane

scoliosis

- idiopathic
 - early onset
 - adolescent
 - adult
- congenital
- neuromuscular
- degenerative
- secondary
 - post-traumatic
 - tumor
 - infection
 - other

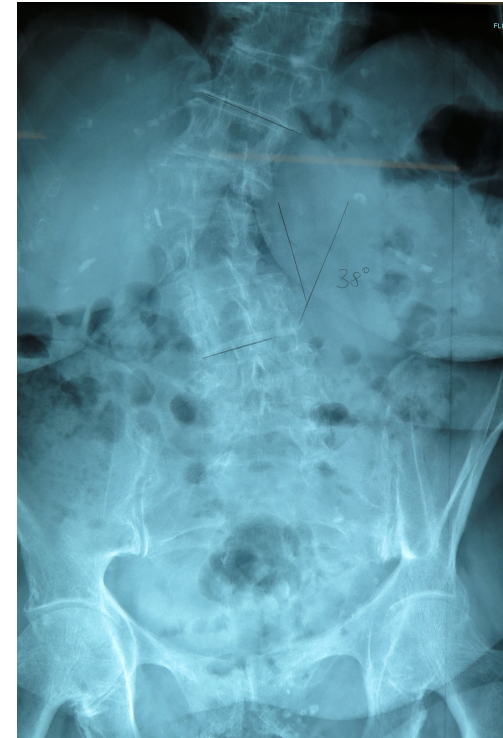


Spinal deformities

frontal plane

scoliosis

- idiopathic
 - early onset
 - adolescent
 - adult
- congenital
- neuromuscular
- degenerative
- secondary
 - post-traumatic
 - tumor
 - infection
 - other



NJ, female, 85 y

Spinal deformities

sagittal plane

kyphosis

- Scheuermann
- degenerative
- osteoporosis
- angular

spondylolisthesis

- low-grade
- high-grade



PM, f 35y



CT, f 81y

Spinal deformities

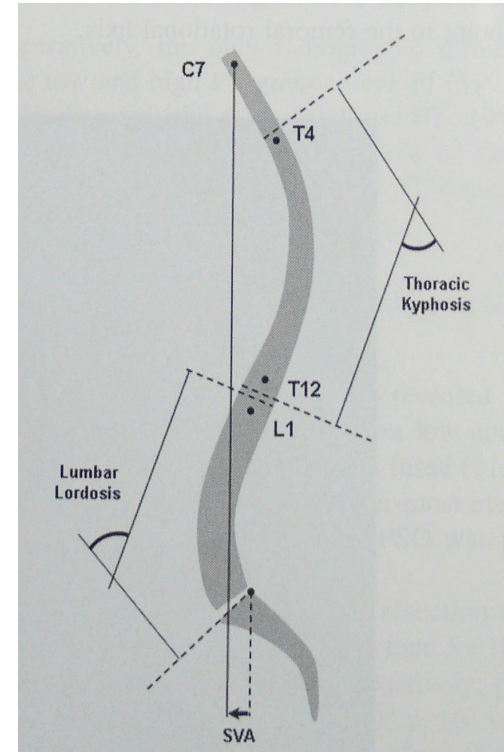
sagittal plane

kyphosis

- Scheuermann
- degenerative
- osteoporosis
- angular

spondylolisthesis

- low-grade
- high-grade



Spinal deformities

sagittal plane

kyphosis

- Scheuermann
- degenerative
- osteoporosis
- angular

spondylolisthesis

- low-grade
- high-grade
- degenerative



IM, m 27y



DJ, f 55y

Spinal deformities

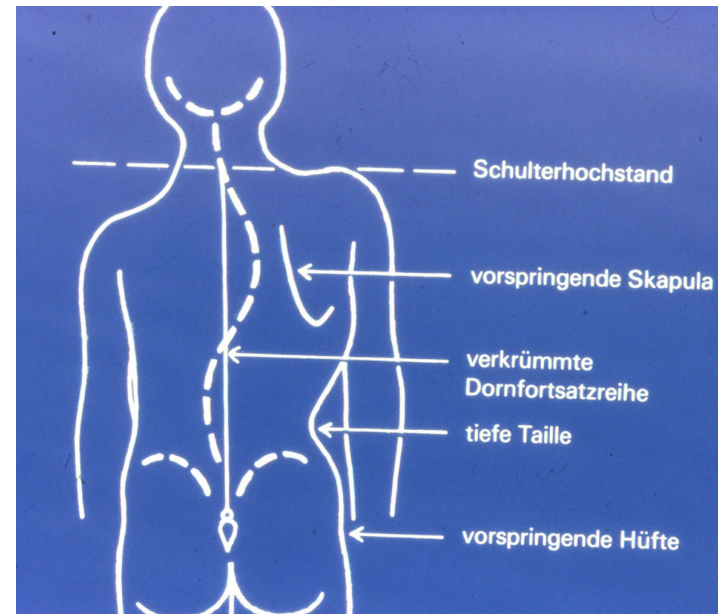
Adolescent idiopathic scoliosis (AIS)



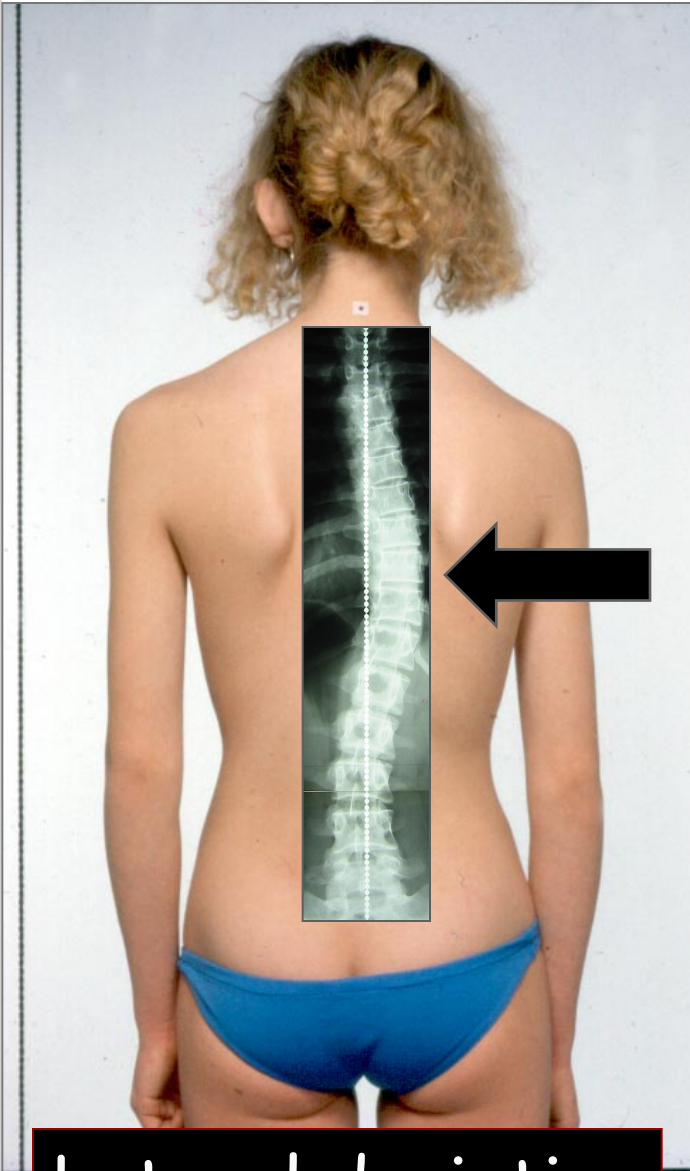
- structural deformity 2-3%,
0.1- 0.3% >
30°
- females > males
- aetiology unknown
- benign natural history

Spinal deformities

Adolescent idiopathic scoliosis (AIS)



Frontal



Lateral deviation

Frontal



Horizontal



Lateral deviation

Rotation

Frontal



Lateral deviation

Horizontal



Rotation

Sagittal
MEDICAL

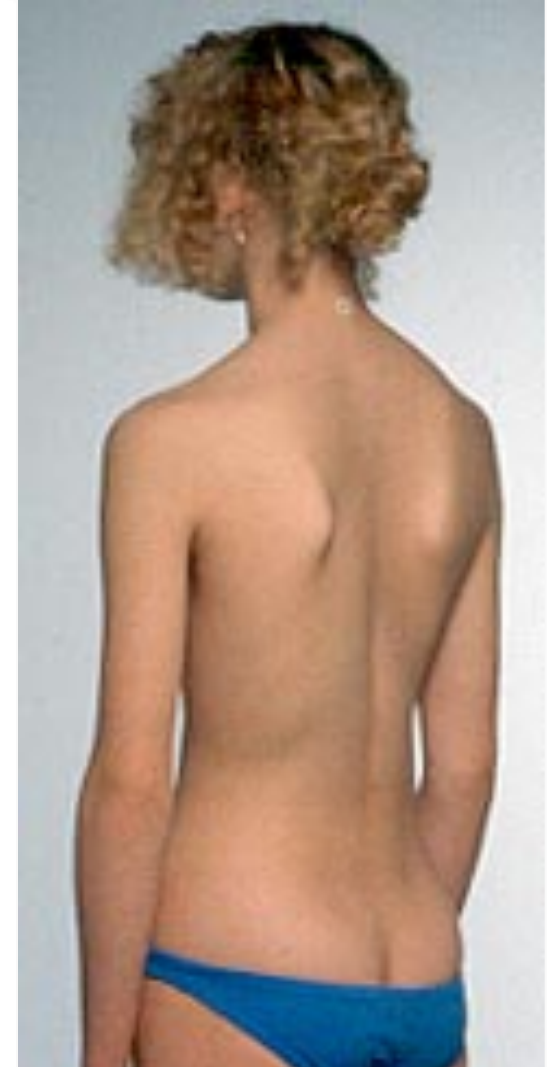


Hypokyphosis

Frontal



Sagittal



Horizontal



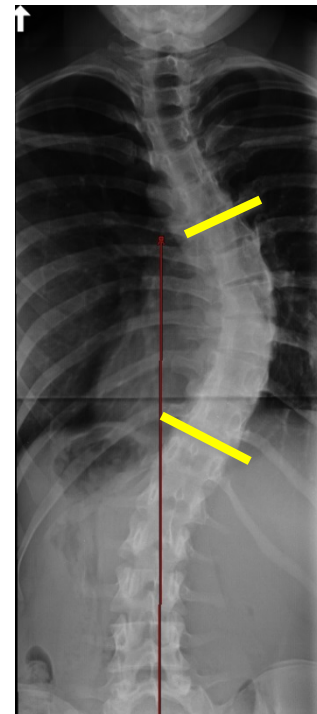
Three-Dimensional Deformity

Adolescent idiopathic scoliosis (AIS)

Treatment Principles

Factors

- * Curve magnitude (Cobb angle)
- * State of growth (Risser)
- * Cosmesis
- * Patient's desire

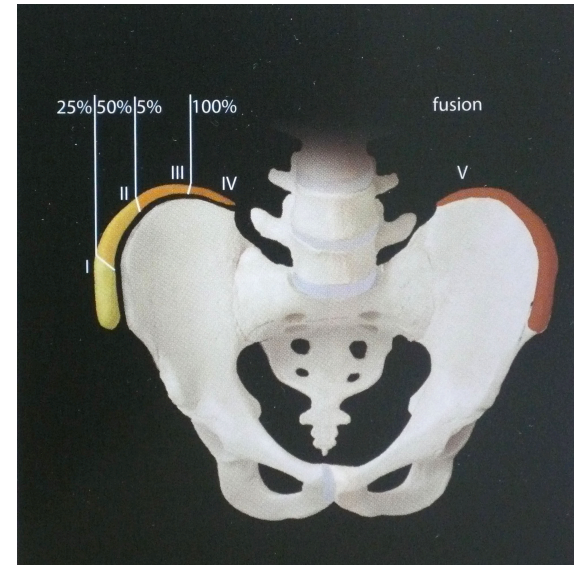


Adolescent idiopathic scoliosis (AIS)

Treatment Principles

Factors

- * Curve magnitude (Cobb angle)
- * State of growth (Risser)
- * Cosmesis
- * Patient's desire



Adolescent idiopathic scoliosis (AIS)

Treatment Principles

During Growth

< 25°	▮	Observation
25 - 40°	▮	Bracing
> 50°	▮	Operation

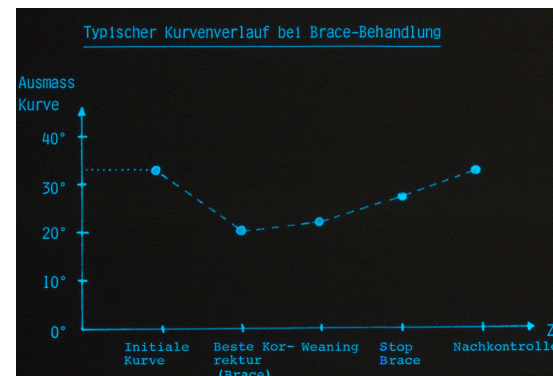
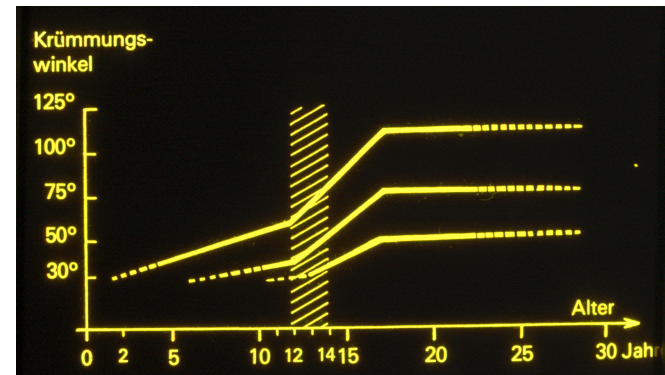


Adolescent idiopathic scoliosis (AIS)

Decision Making

Factors

- * Curve magnitude (COBB)
- * State of growth
- * Cosmesis
- * Patient's desire

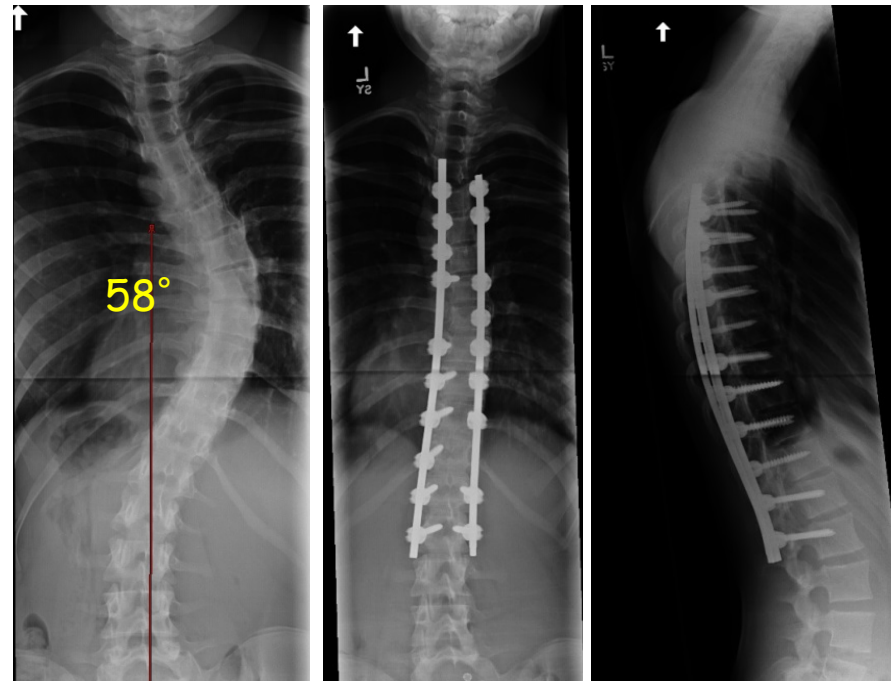


Adolescent idiopathic scoliosis (AIS)

Decision Making

Factors

- * Curve magnitude (Cobb)
- * State of growth
- * Cosmesis
- * Patient's desire



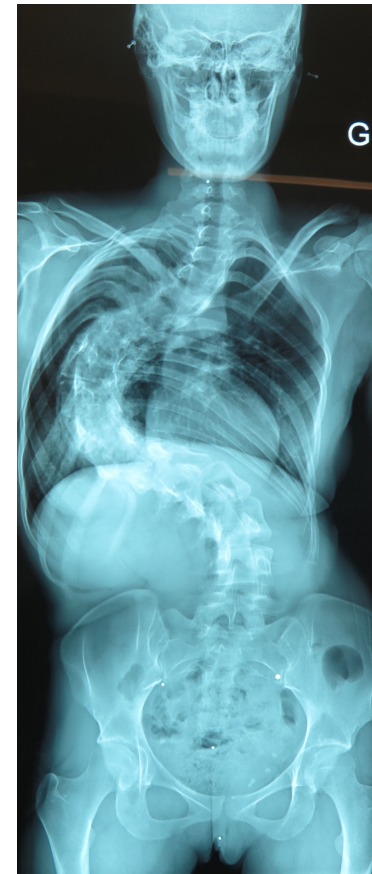
FE, 13 y / fem

Keep in mind:
the natural history is benign

Adolescent idiopathic scoliosis (AIS)

Aims of Scoliosis Surgery

- * Prevent curve progression
- * Stabilise the spine (spinal fusion)
- * 3D-Correction (coronal, axial, sagittal)
- * Maintain or correct balance
- * Maintain mobility (save segments)
- * Avoid complications





50°

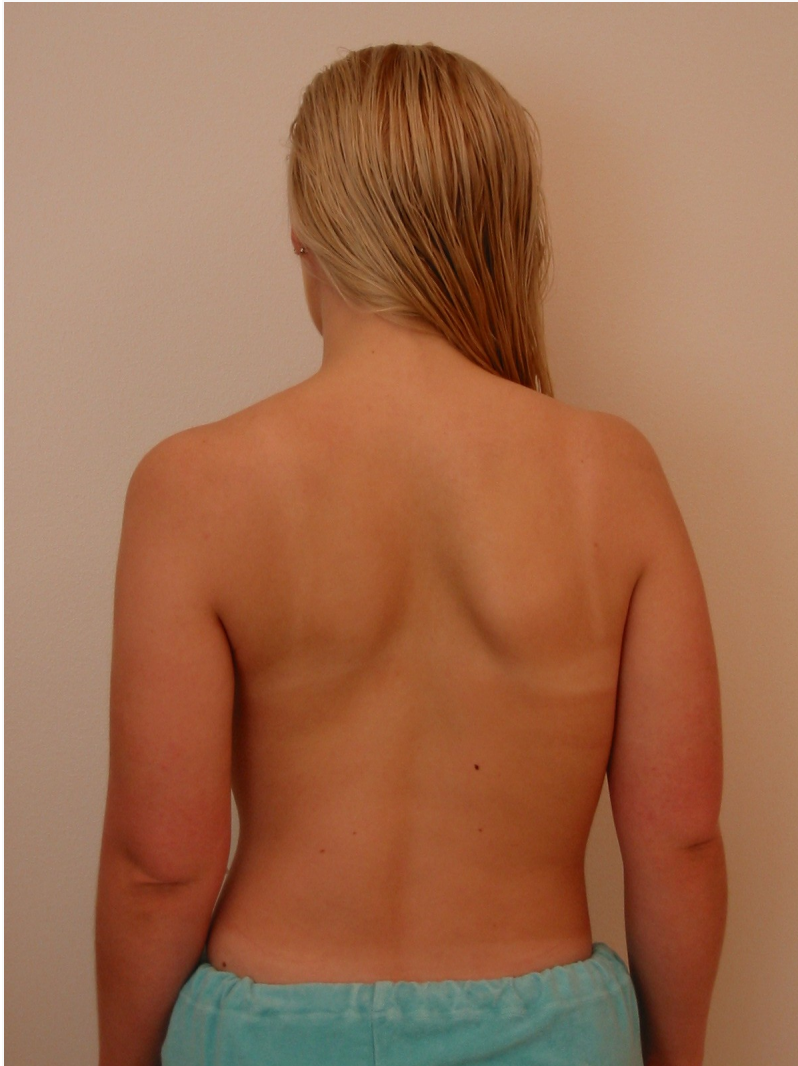
Result ?

26 y / fem

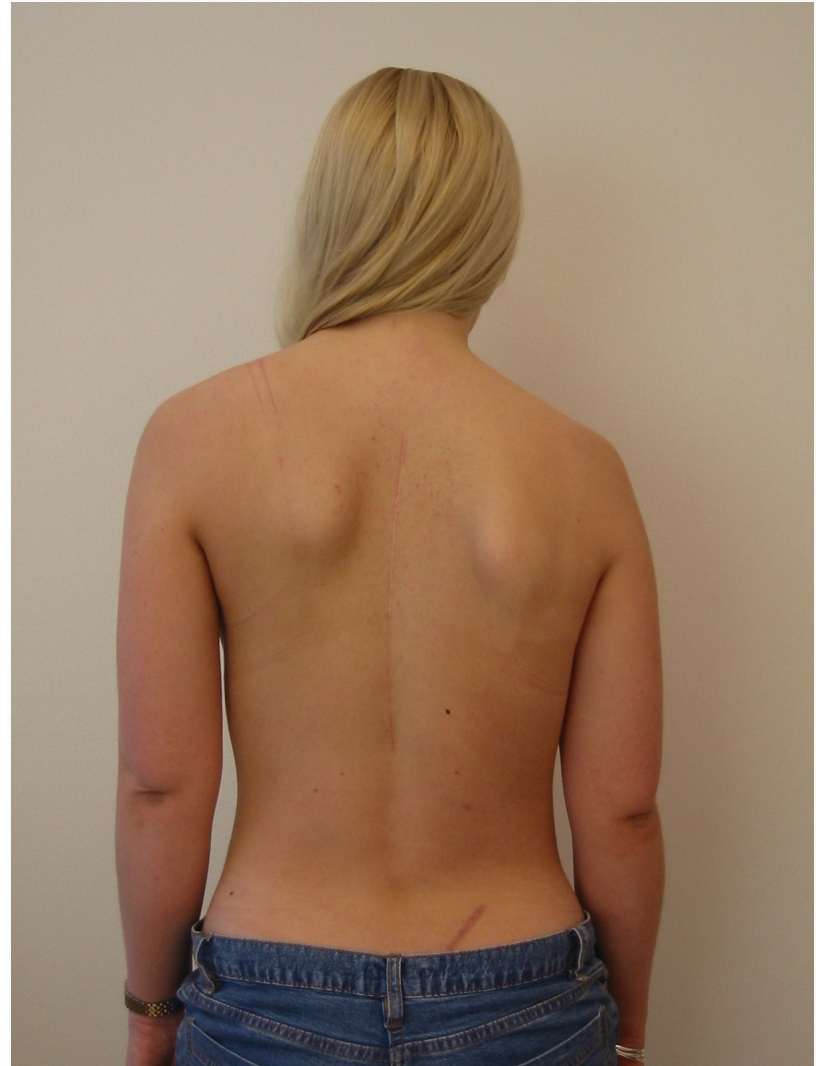


22°

2 y p.op

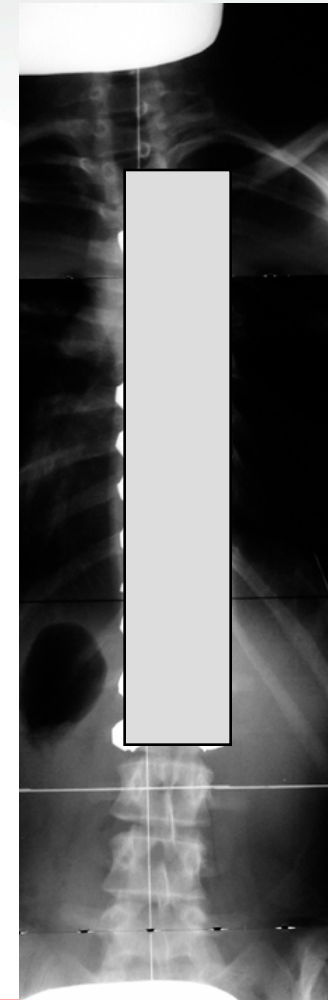


26 y / fem



2 y p.op

Goals of surgery



Balance (AP and sagittal)
Preservation of a maximum of vertebrae level
Stable over time (no adding-on)

Adolescent idiopathic scoliosis (AIS)

How much correction ?

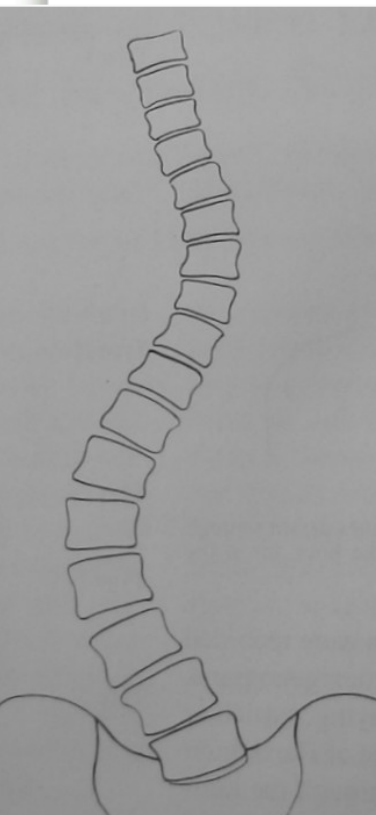
*”The straighter is **NOT** the better”*

Goal ?

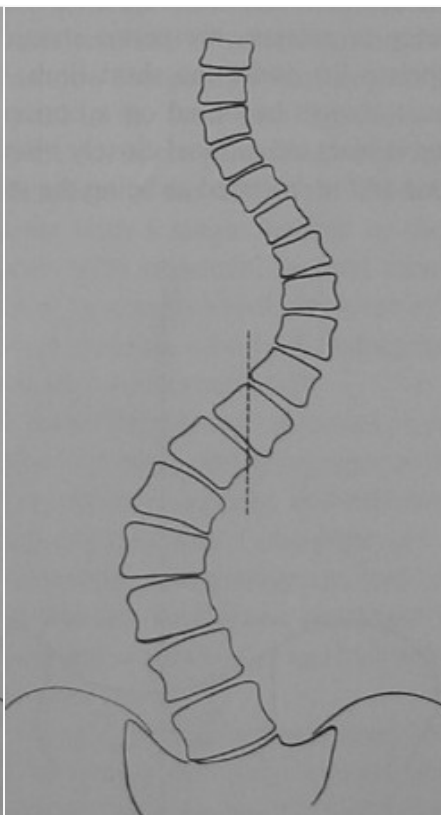
Balanced spine with levelled shoulders

Classification (King-Moe)

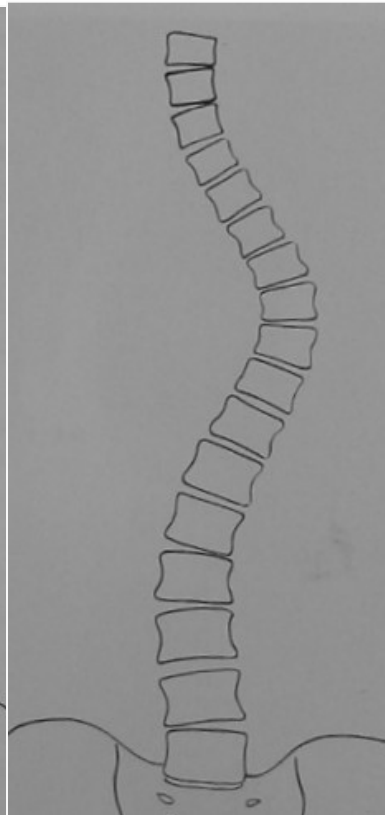
primary and secondary curve



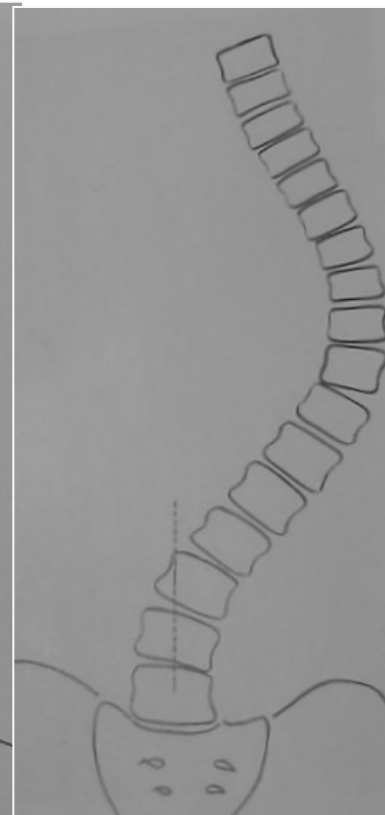
Type 1



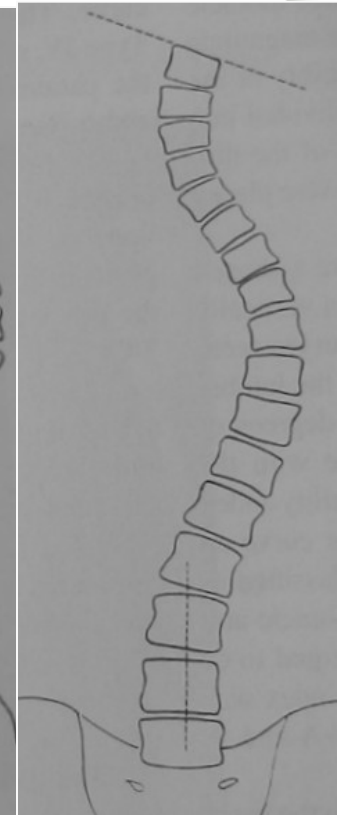
Type 2



Type 3



Type 4



Type 5














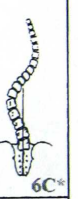
Classification

(King-Moe extended)

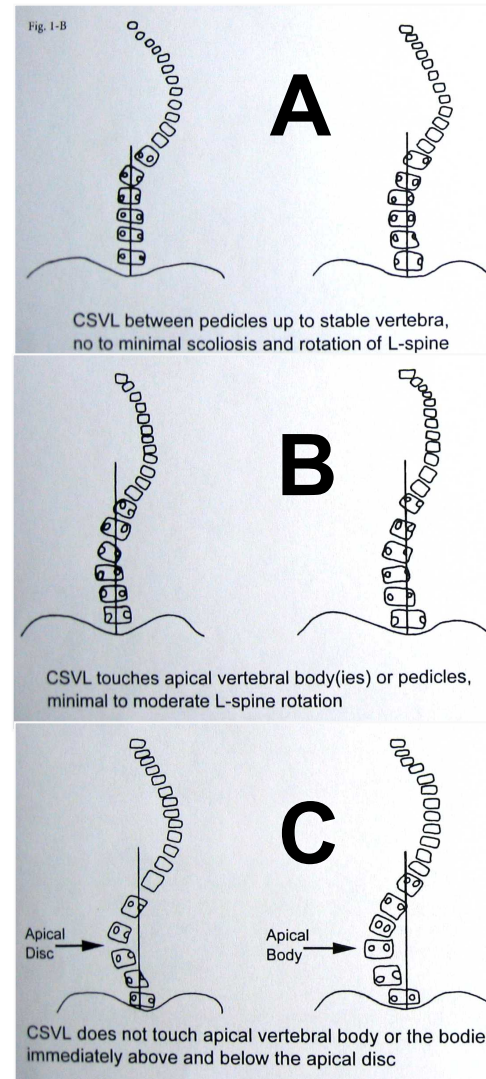
Steps

- * Curve type (King 1-5)
- * Sec. lumbar curve (K2)
 - magnitude, rotation
- * Sagittal profile (junct.kyph.)
- * Skeletal age
- * Balance (overall, shoulders)

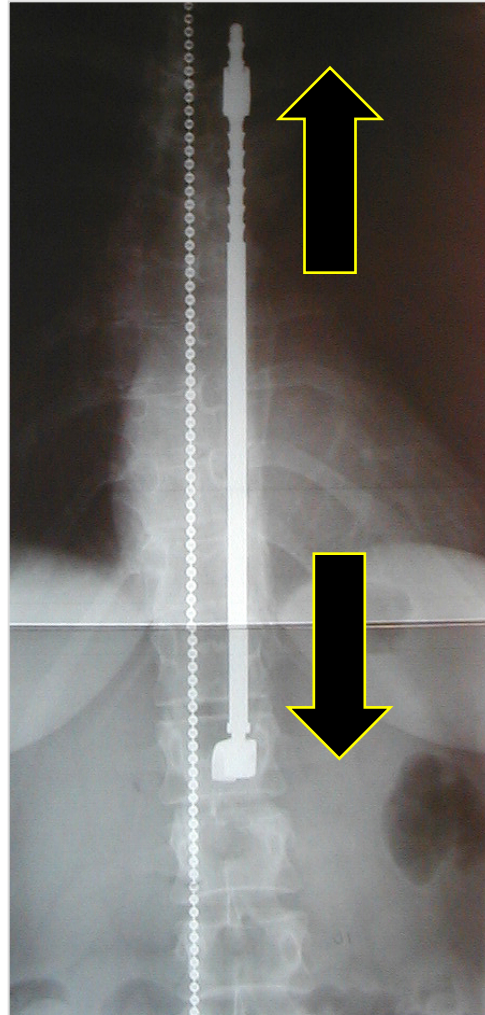
Classification (Lenke)

Lumbar Spine Modifier	Curve Type (1 - 6)					
	Type 1 (Main Thoracic)	Type 2 (Double Thoracic)	Type 3 (Double Major)	Type 4 (Triple Major)	Type 5 (TL/L)	Type 6 (TL/L - MT)
A (No to Minimal Curve)	 1A*	 2A*	 3A*	 4A*		
B (Moderate Curve)	 1B*	 2B*	 3B*	 4B*		
C (Large Curve)	 1C*	 2C*	 3C*	 4C*	 5C*	 6C*
Possible Sagittal structural criteria (To determine specific curve type)	Normal	PT Kyphosis $\geq +20^\circ$	TL Kyphosis $\geq +20^\circ$	PT + TL Kyphosis $\geq +20^\circ$		

* T5-12 sagittal alignment modifier: -, N, or +
 - : $<10^\circ$
 N : $10-40^\circ$
 + : $>40^\circ$

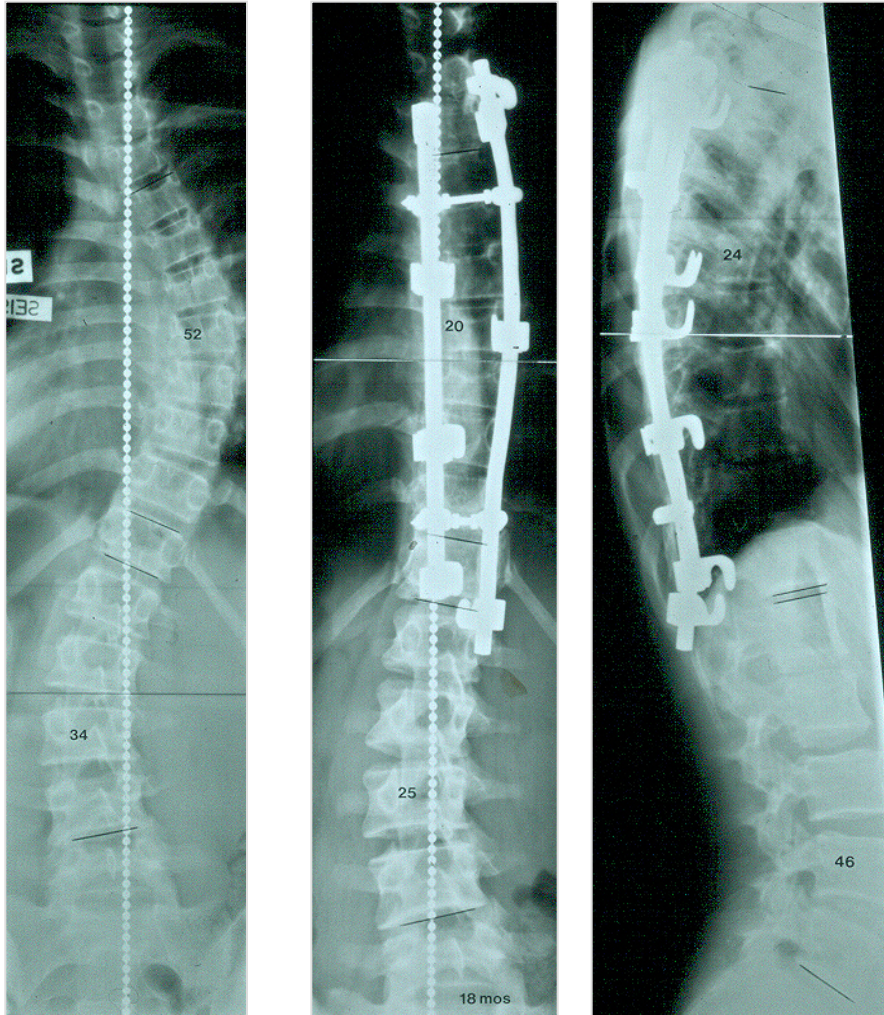


Harrington Instrumentation



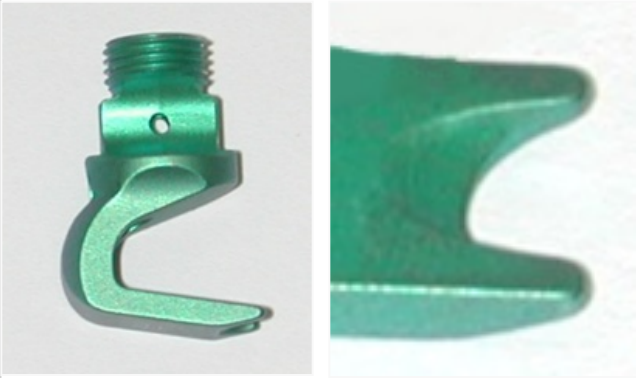
Distraction

Cotrel-Dubousset Instrumentation

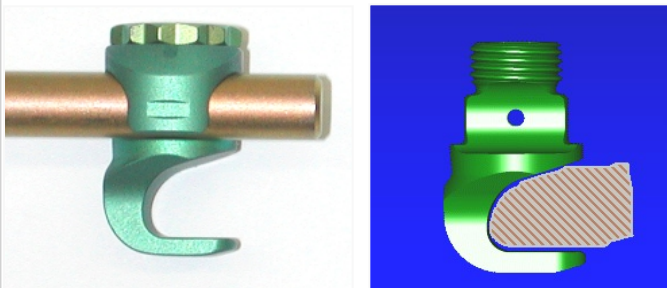


Rod Rotation
Translation

Instrumentation (USS II)



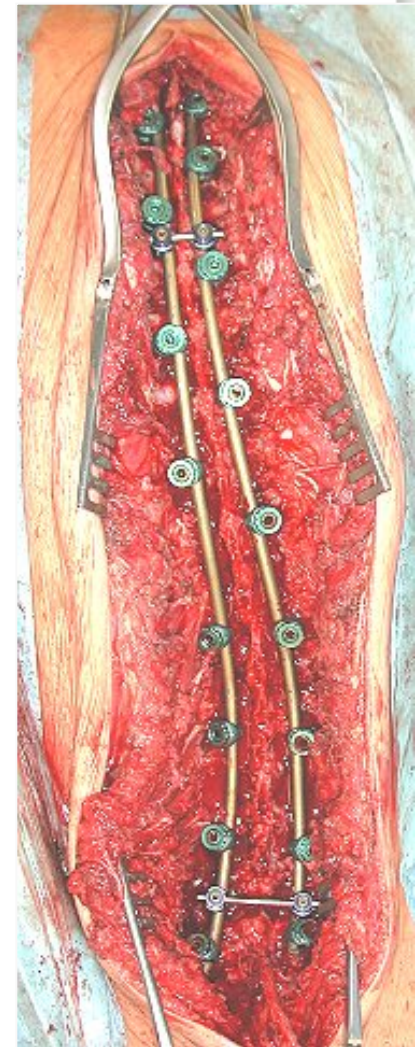
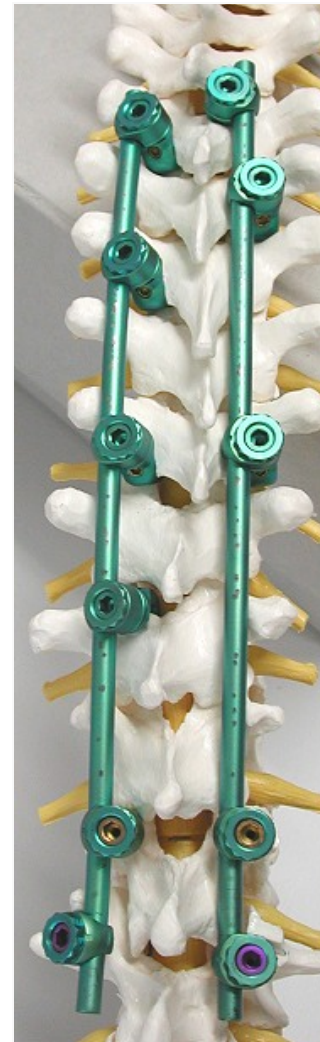
Pedicle Hook



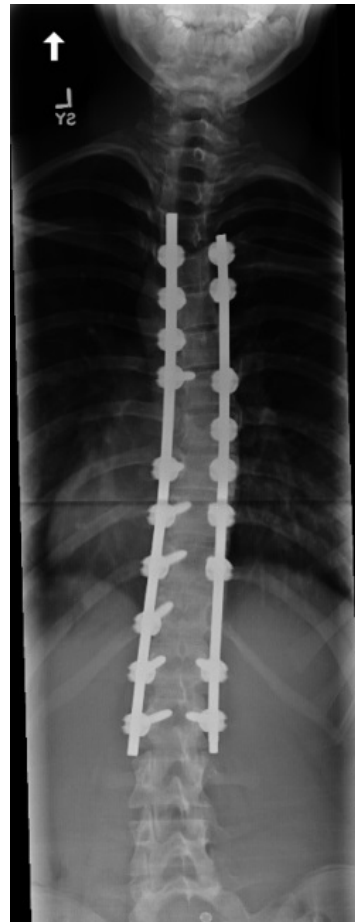
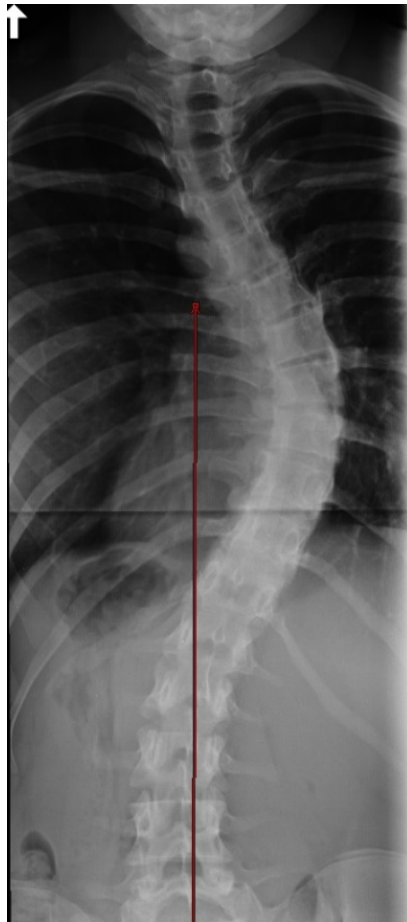
Lamina Hook



Pedicle
Screw



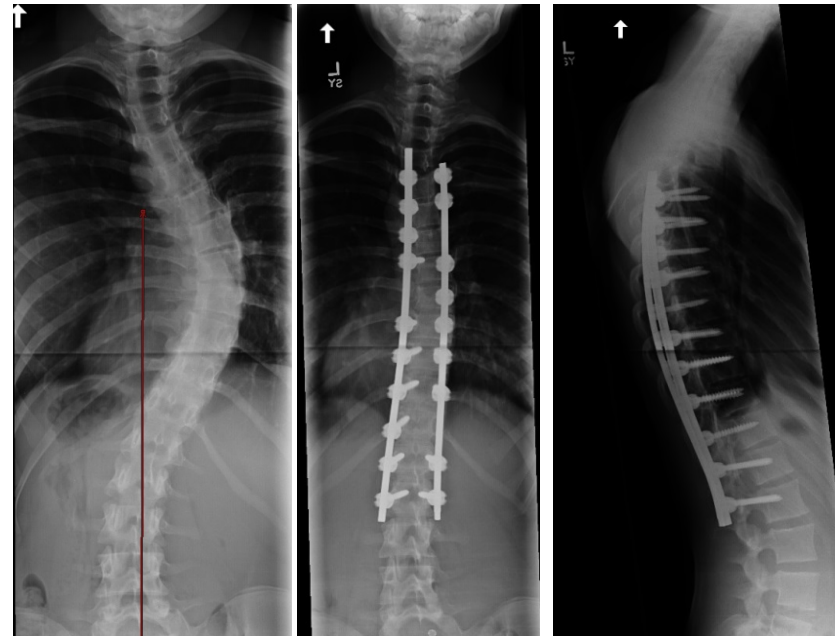
Last generation instrumentation



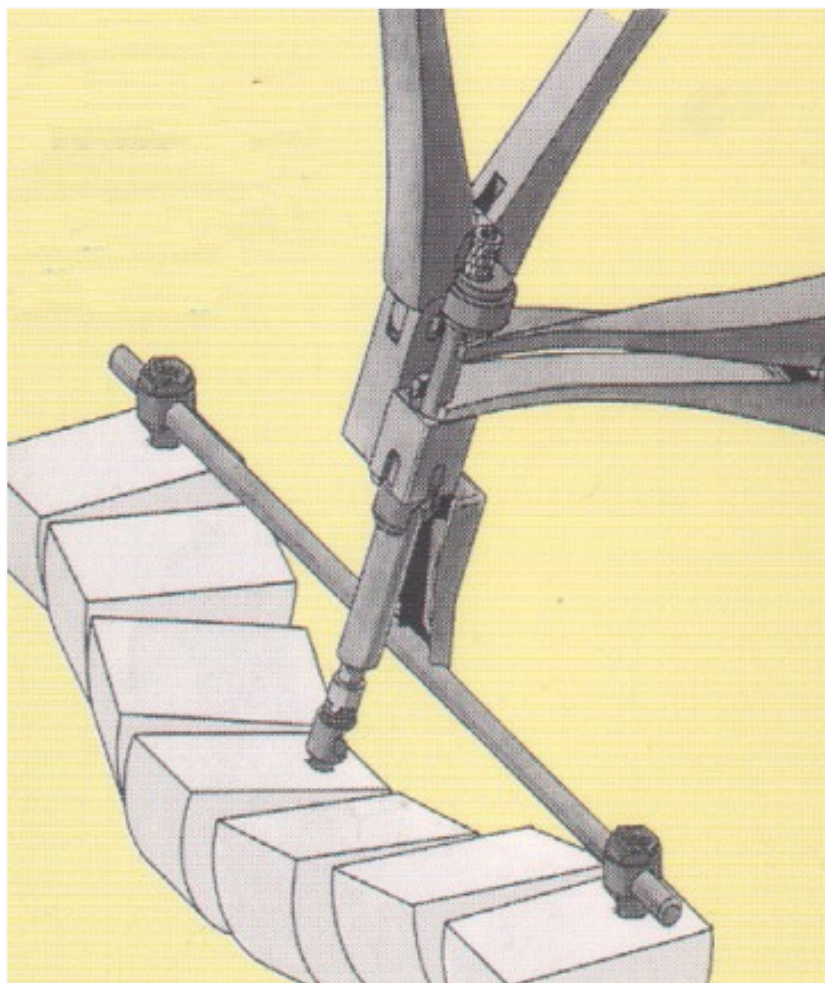
Spinal deformities

surgical strategies

- low / high density instrumentation
- correction manoeuvres
- instrumentation extension
- sacro-pelvic fixation
- osteotomies



Correction Principle



Translation
Vertebral derotation

Questions to answer.....

Approach

- * *Anterior versus posterior*

Which curve(s)

- * *Primary versus primary + secondary*

Amount of correction

- * *full versus partial*

Length of instrumentation

- * *Whole curve versus short*

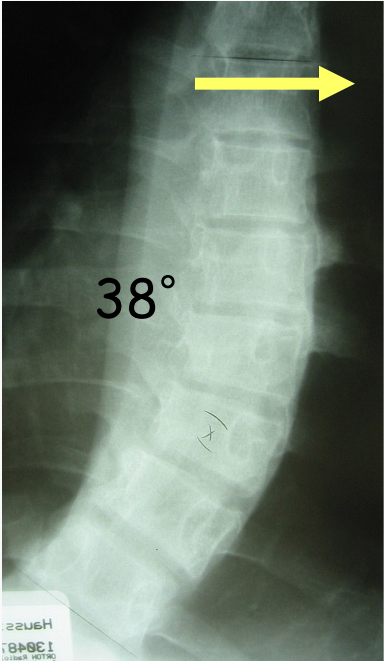
Anterior release

- * *Yes versus No*

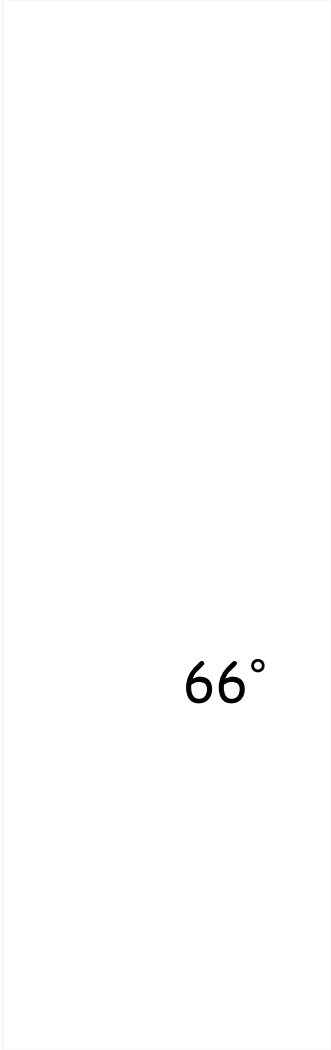


Preop. Radiographs

Bending



Thoracic

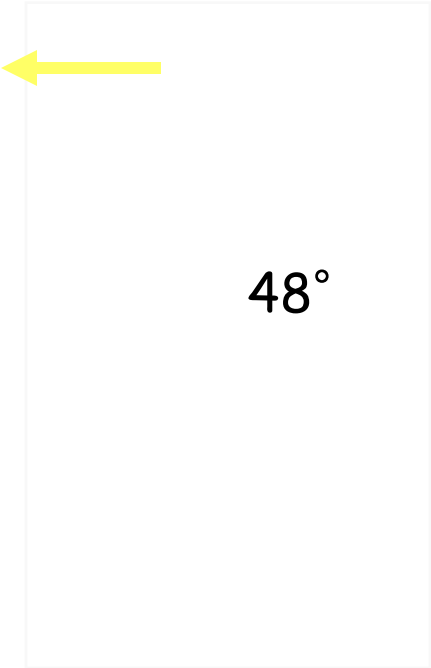


66°

Standing p.a.



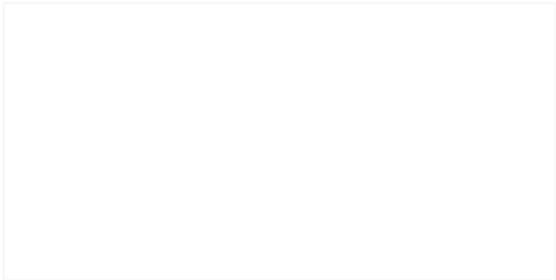
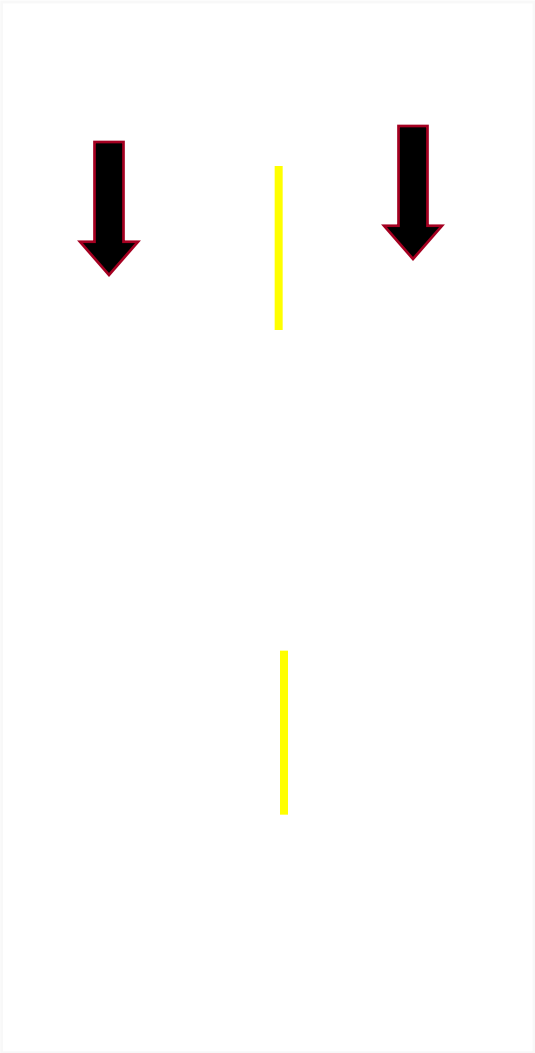
lateral



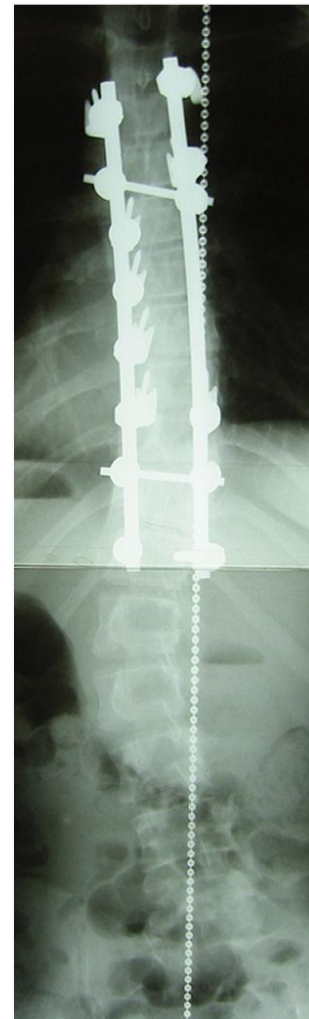
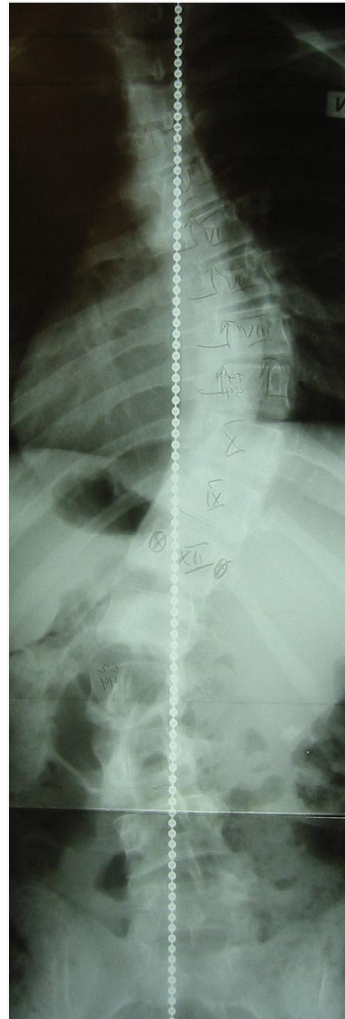
48°

Lumbar

Photographs

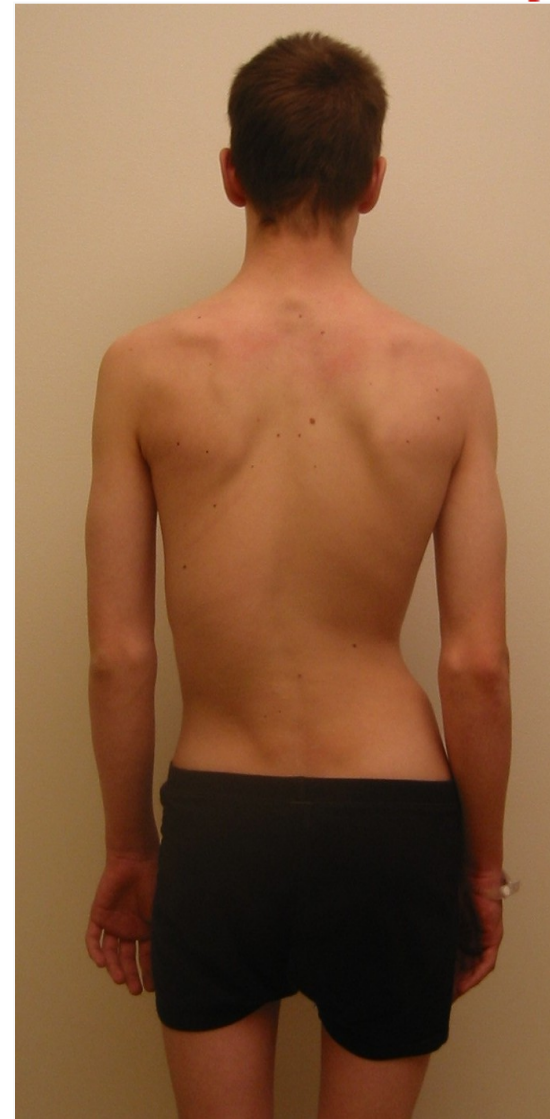
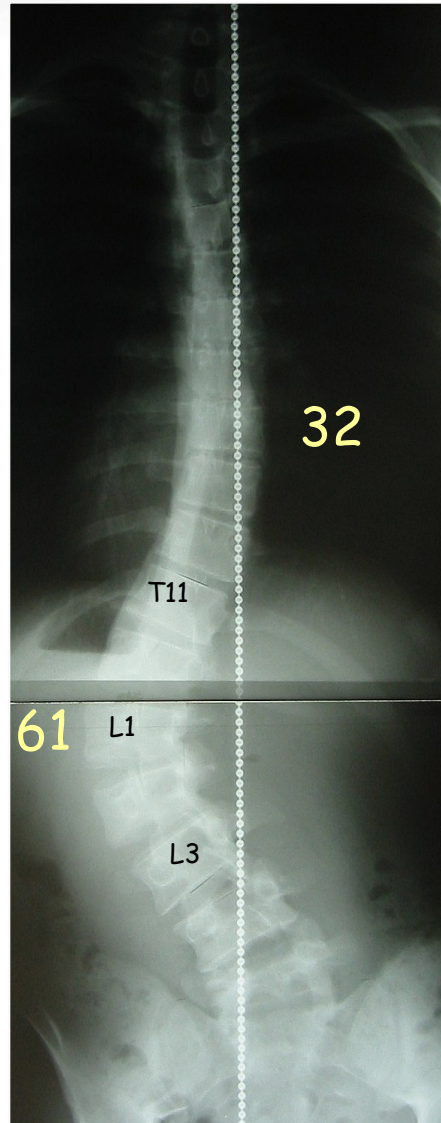


14y/fem; King 2

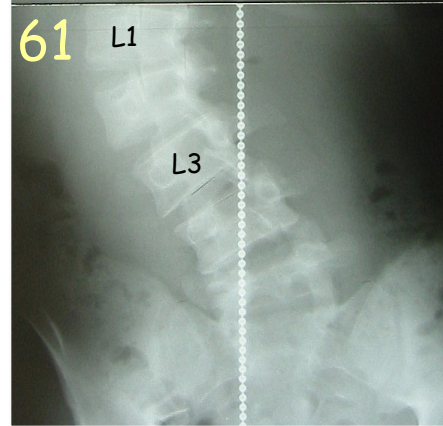
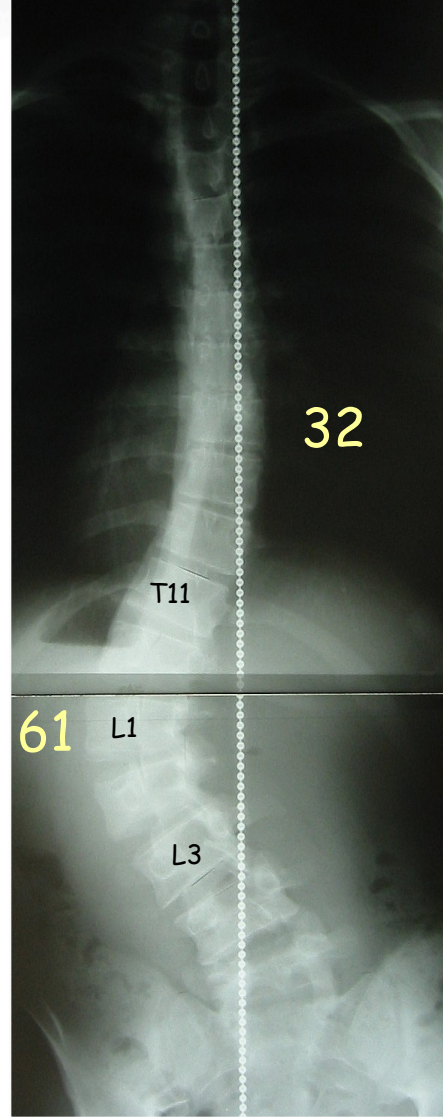




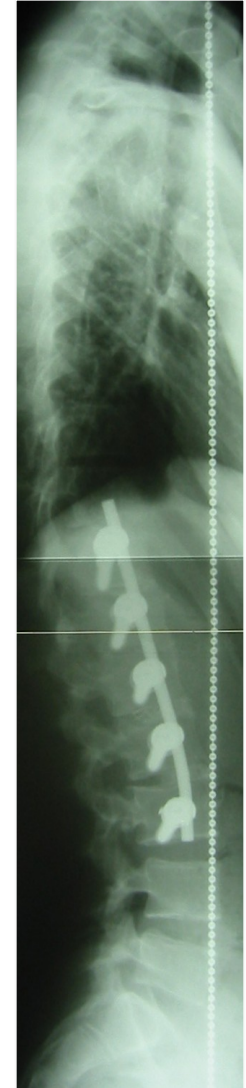
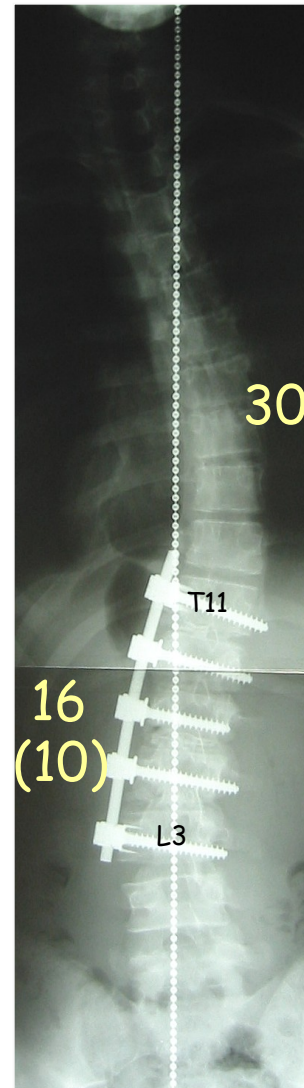
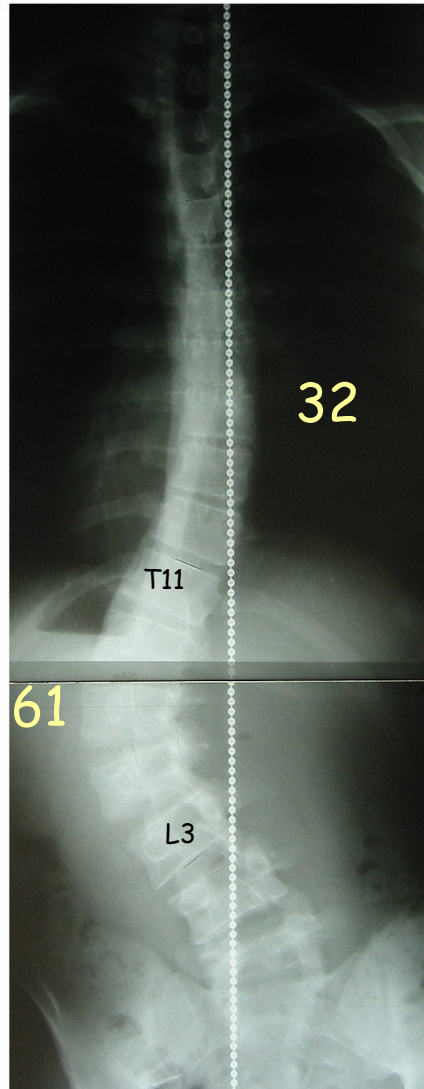
17y/m, King 1



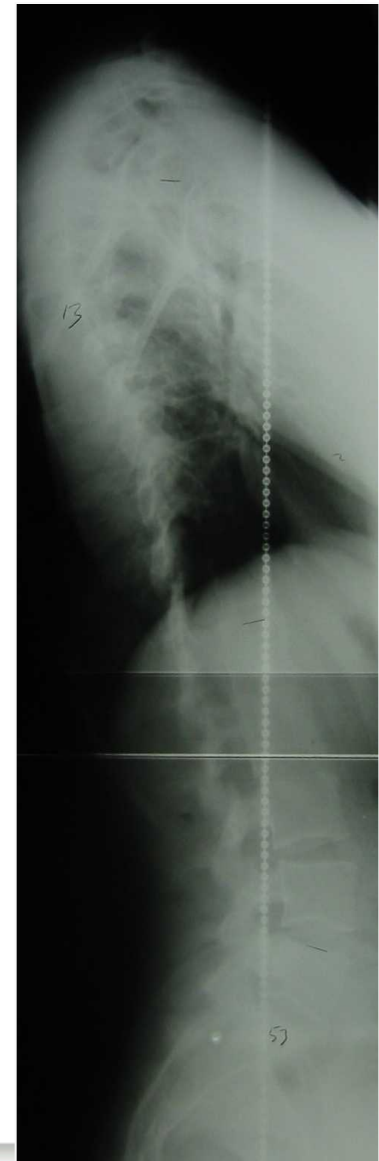
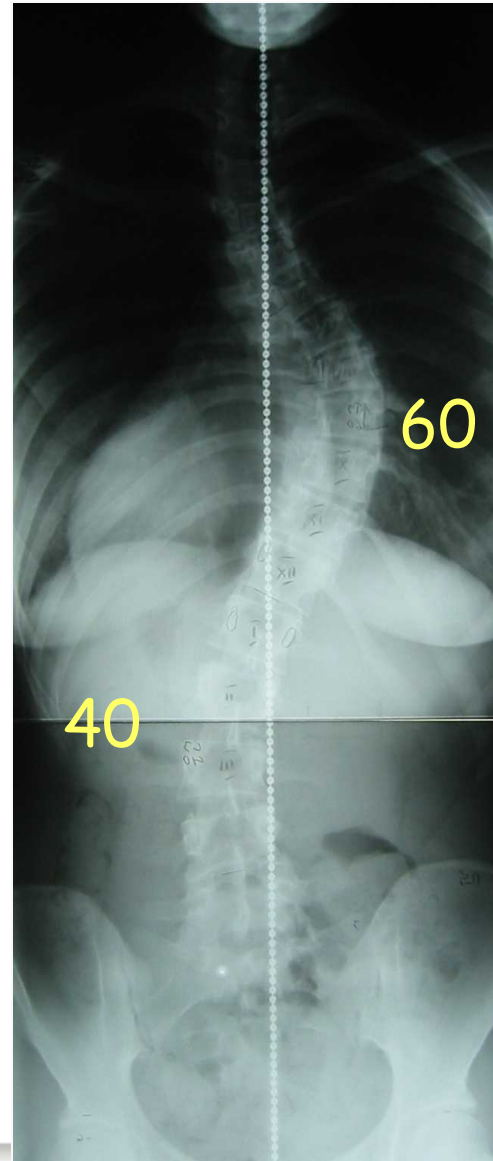
17y/m, King 1



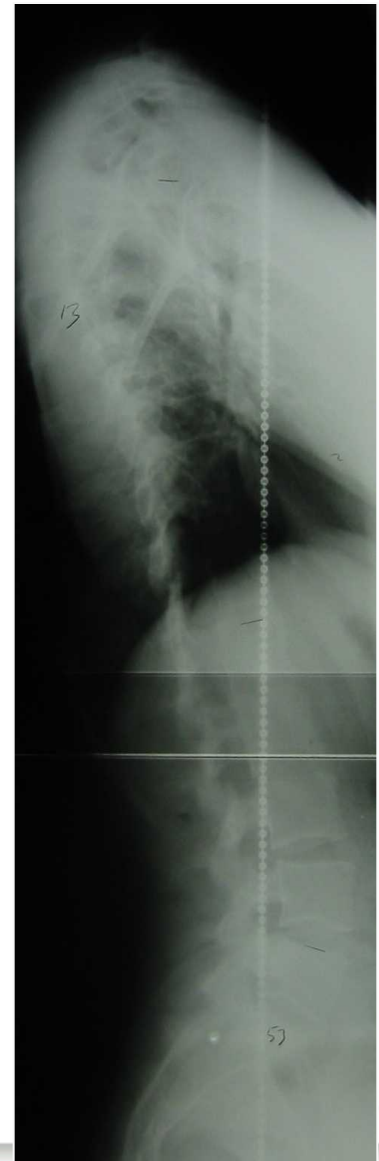
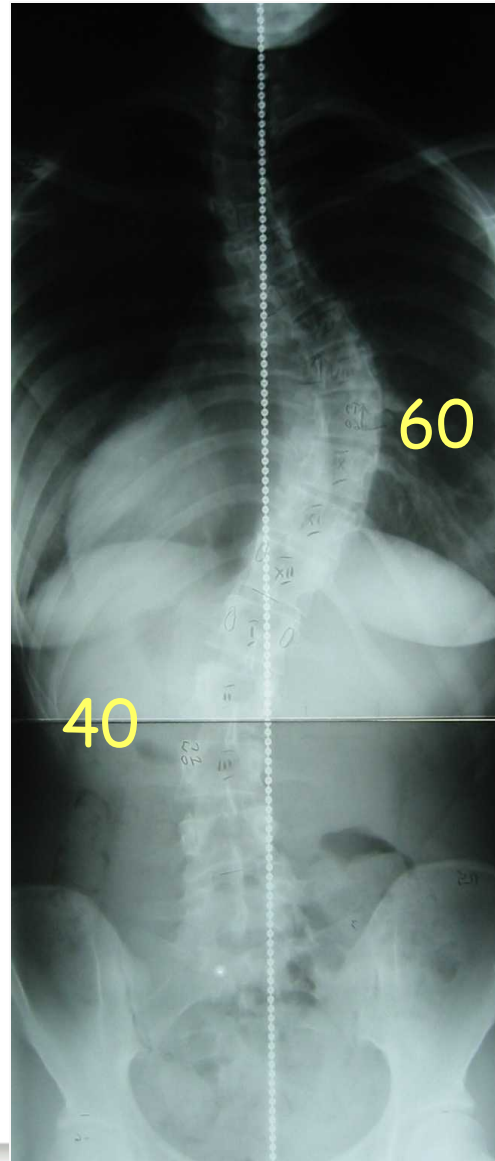
17y/m; King 1



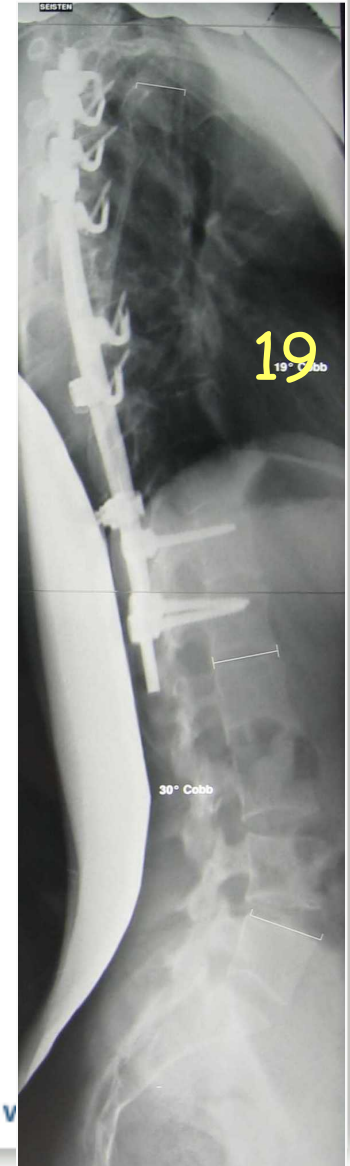
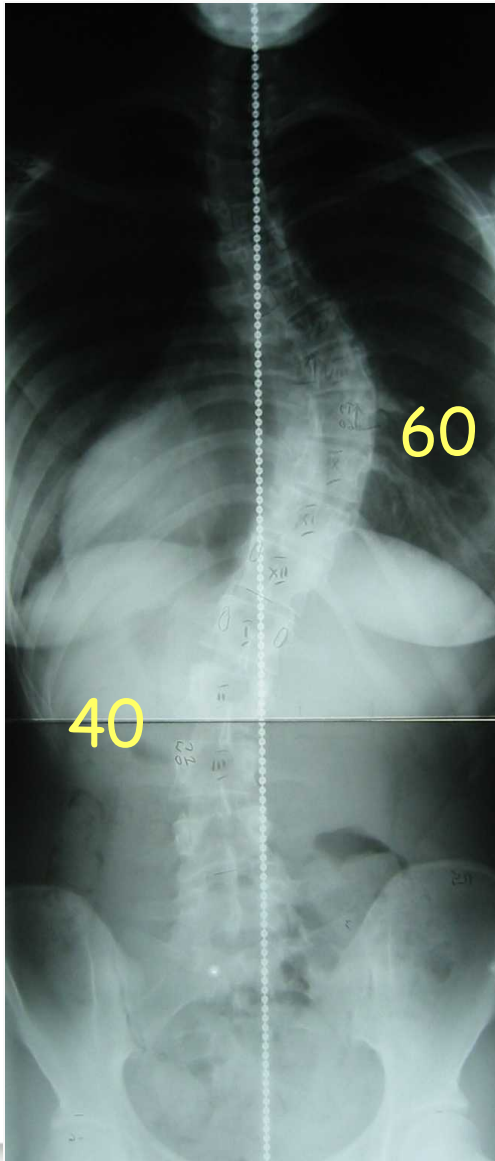
20y/female; King 3



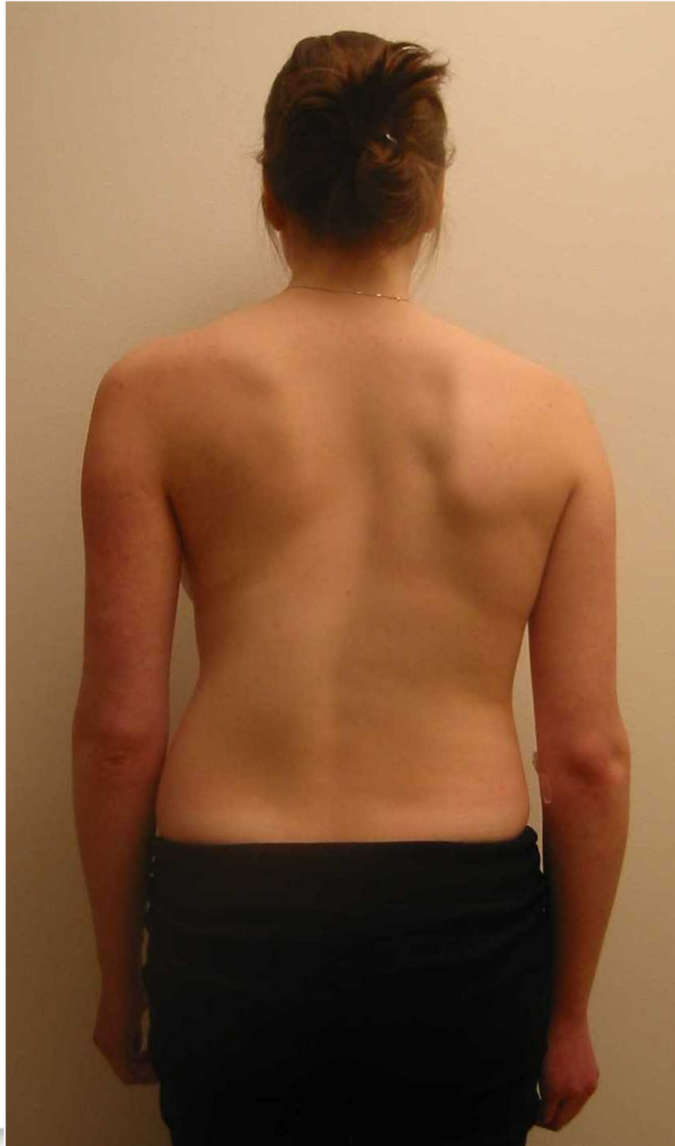
20y/female; King 3



20y/female; King 3



20y/female; King 3



Risk factors

- Too important correction of the thoracic curve
- Extreme rigidity of the instrumentation that can not allow a secondary adaptation
- Too distal extension of the fusion in the lumbar area



Revision Surgery After Primary Spine Fusion for Idiopathic Scoliosis

Scott J. Luhmann, MD, Lawrence G. Lenke, MD, Keith H. Bridwell, MD,
and Mario Schootman, PhD



Revision rate: 4%
Distal adding-on : 17%

