

Déformations rachidiennes

Scoliose idiopathique I

Evaluation clinique et radiologique

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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

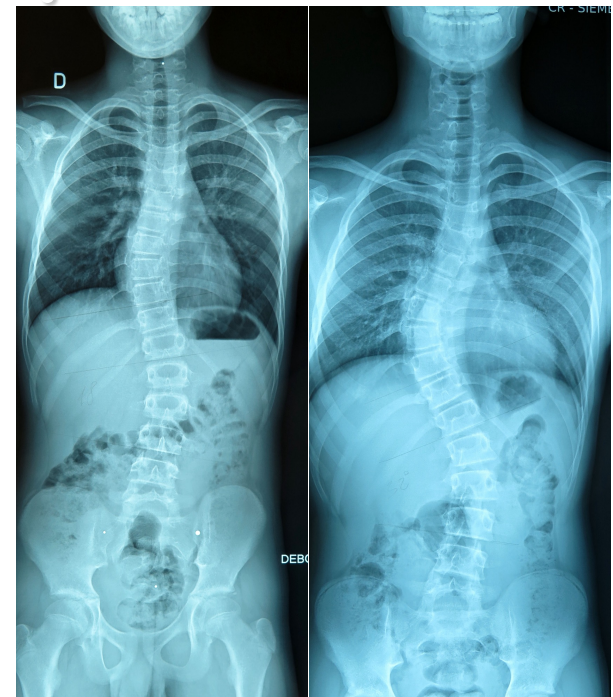
- LBP

Spinal deformities

frontal plane

scoliosis

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



PM, male 13y

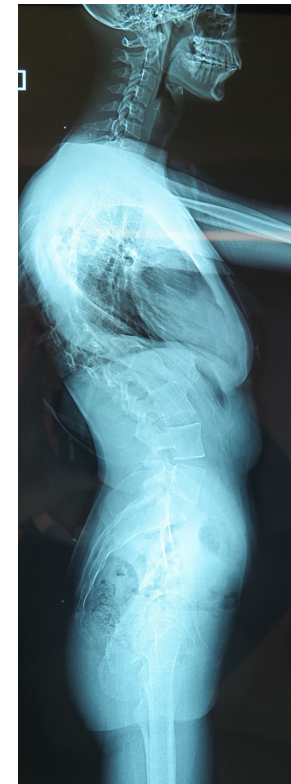
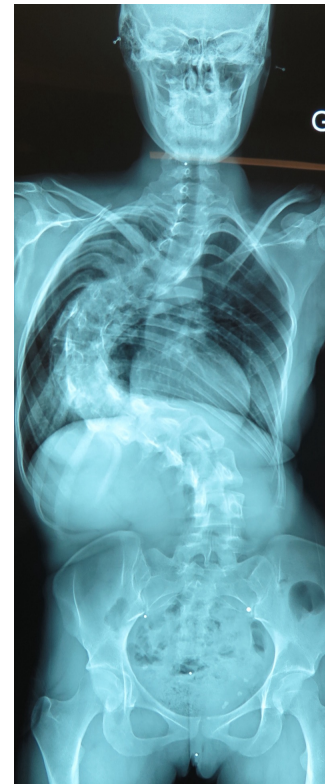
14.5y

Spinal deformities

frontal plane

scoliosis

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



BM, female 34y

Spinal deformities

frontal plane

scoliosis

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

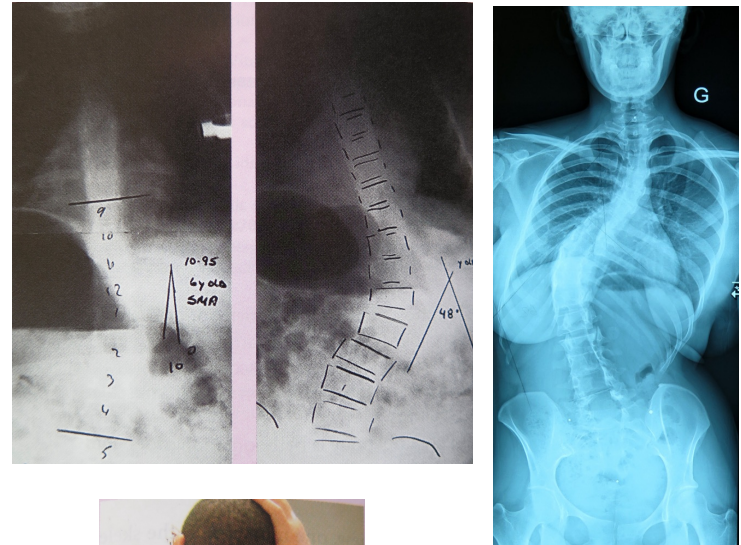


Spinal deformities

frontal plane

scoliosis

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



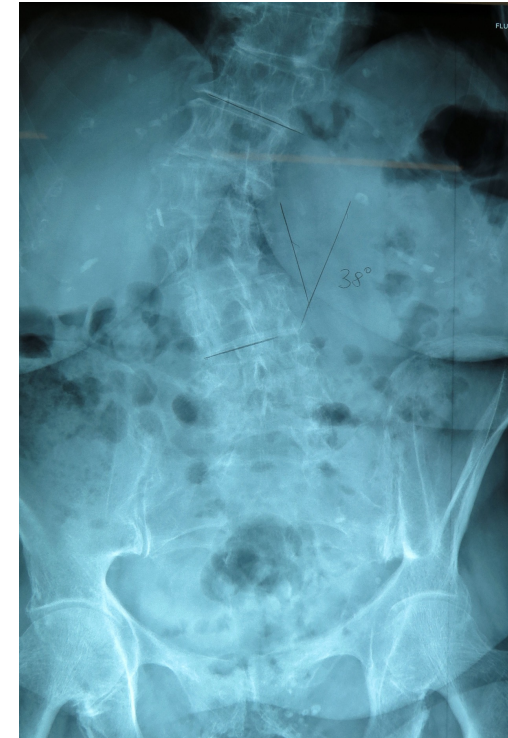
- Duchenne dystrophy
- Friedreich ataxia
- Neurofibromatosis
- Polio
- Myelodysplasia
- Cerebral palsy
- MMC (spina bifida)

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

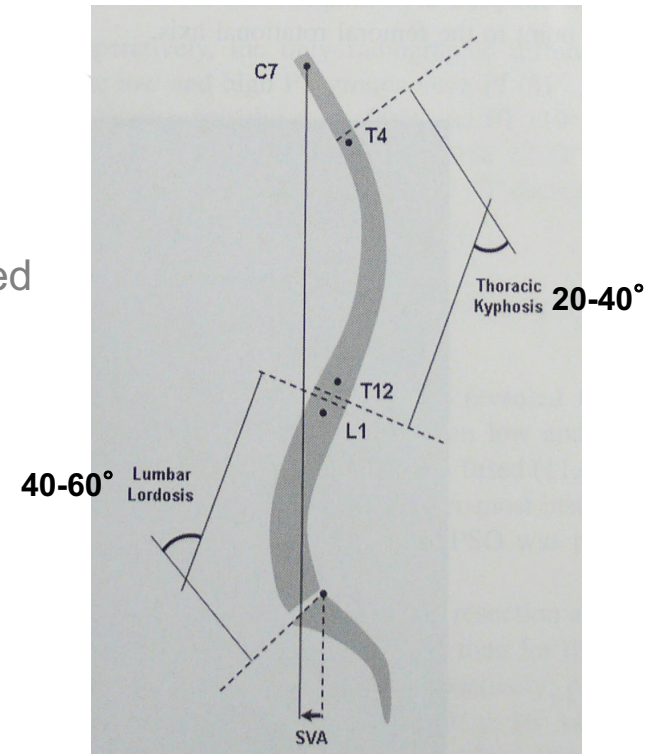
- Scheuermann

- $> 45^\circ$ kyphosis
- 3 or more contiguous deformed vertebrae ($>5^\circ$)

- 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)



scoliosis: coronal curve $> 10^\circ$
with vertebral rotation (SRS)

- structural deformity 2-3% adol. popul.
 0.1- 0.3% $> 30^\circ$
- females $>>$ males
- aetiology unknown
 multifactorial
 imbalance ant/post spinal growth (?)
 hormonal (?)
 familiar
- benign natural history

Spinal deformities

Adolescent idiopathic scoliosis (AIS)



Physical examination:

- inspection (skin,..)
- curve location/side
- flexibility
- rib hump
- shoulder level
- pelvic obliquity
- sagittal profile
- balance (frontal, sagittal)
- physical maturity
- neurological examination

Spinal deformities

Adolescent idiopathic scoliosis (AIS)



Physical examination:

- inspection (skin,..)
- curve location/side
- flexibility
- rib hump (scoliometer, $7^\circ = 20^\circ$ curve)
- shoulder level
- pelvic obliquity
- sagittal profile
- balance (frontal, sagittal) plumb line
- physical maturity
- neurological examination

Scoliosis is a **3-dimensional deformity**

frontal



Lateral deviation

horizontal



Axial rotation

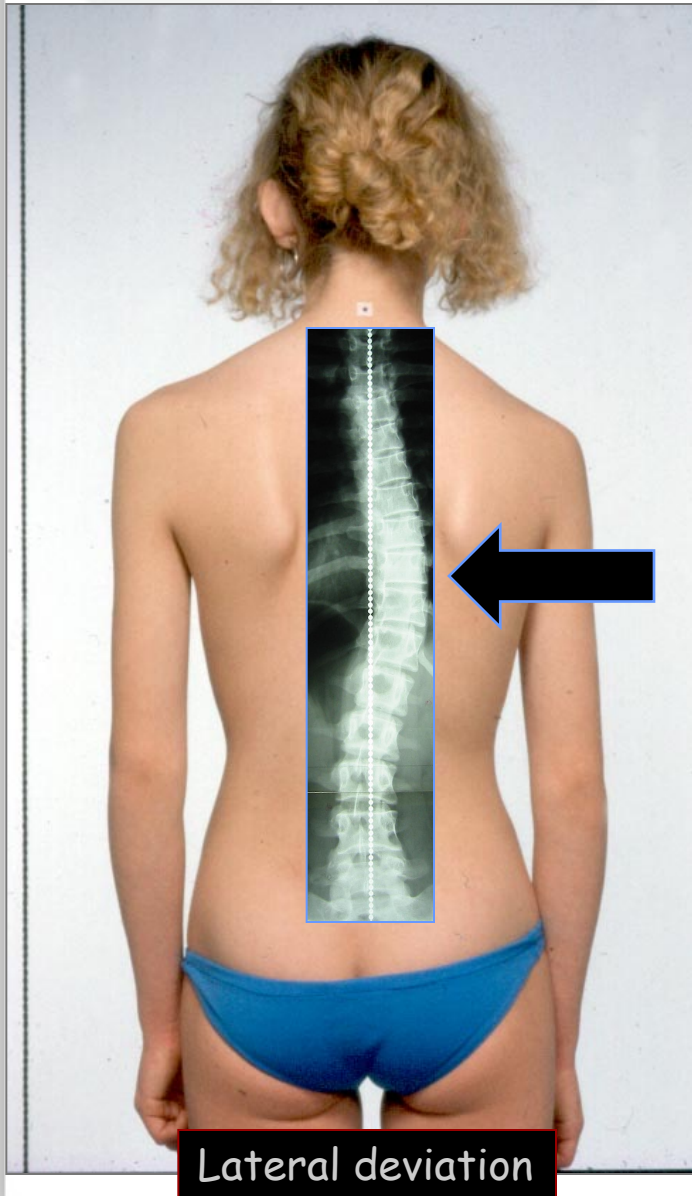
MEDICOL
+

sagittal



Hypokyphosis

Frontal



Classification

Age onset

- infantile (0-3y)
- juvenile (3-10y)
- adolescent (10-18y)
- adult (>18y)
- “de novo” (degen.)

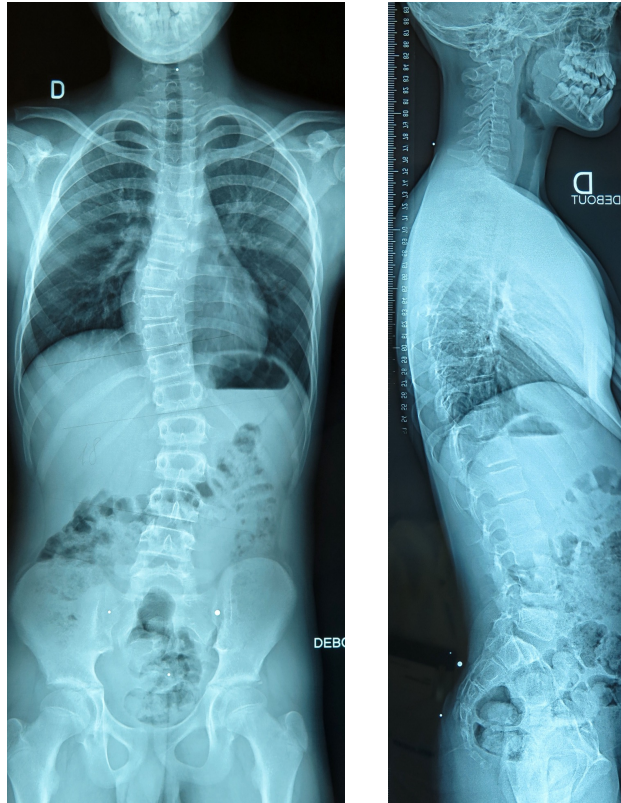
Localization

- thoracic
- thoraco-lumbar
- lumbar

Convex to the right

Spinal deformities

Adolescent idiopathic scoliosis (AIS)



PM, male 13y

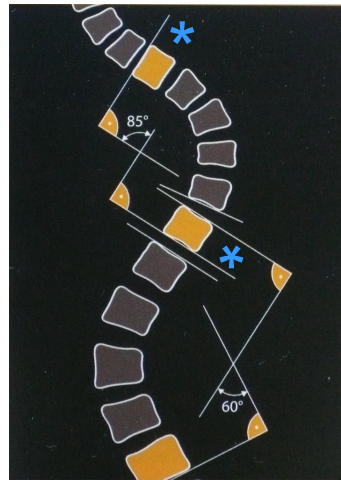
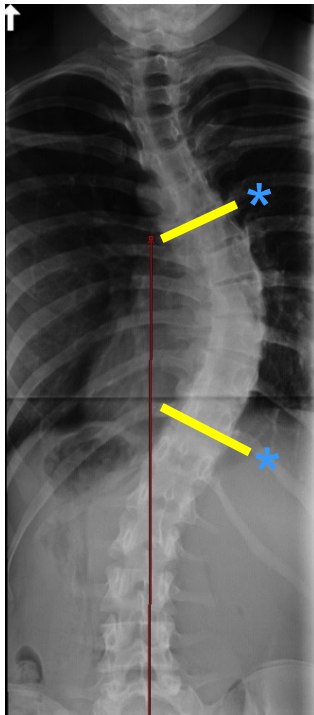
Radiographic assessment:

(whole spine standing ap and lat. RX)

- localization
- magnitude (Cobb angle)
- major/compensatory
- side convexity
- end vertebrae (upper/lower)
- apical vertebra
- balance (frontal/sagittal)
- pelvic obliquity
- skeletal maturity (Risser)
- vertebral rotation

Spinal deformities

Adolescent idiopathic scoliosis (AIS)



Radiographic assessment:

(whole spine standing ap and lat. RX)

- localization
- magnitude (**Cobb angle**)
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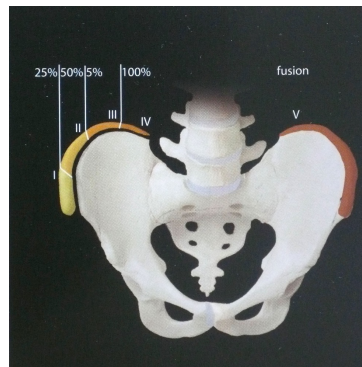
* end vertebrae: the most tilted vertebrae
used to measure **Cobb angle**

Spinal deformities

Adolescent idiopathic scoliosis (AIS)



HE, female 15y



Risser sign

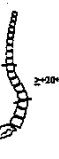
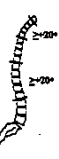
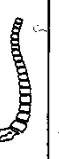
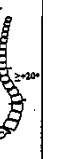
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- balance (frontal/sagittal)
- pelvic obliquity
- skeletal maturity (**Risser sign**)
- vertebral rotation

Spinal deformities

Adolescent idiopathic scoliosis (AIS)

<u>Lumbar Spine Modifier</u>	<u>Curve Type (1 - 6)</u>					
	Type 1 (Mild 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	 TL Kyphosis	 PT + TL Kyphosis	 Normal	 TL Kyphosis

* T5-T12 sagittal alignment modifier: -, N, or +
- : <10°
N : 10-40°
+ : >40°

Lenke scoliosis classification

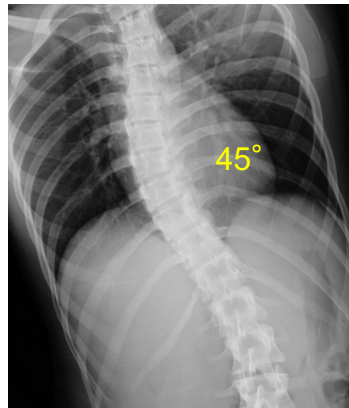
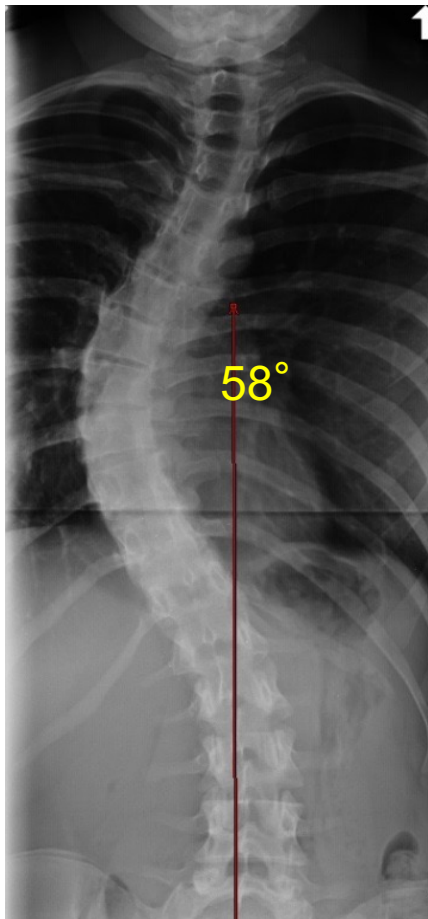
Radiographic assessment:

(whole spine standing ap and lat RX)

- localization
- magnitude
- major/compensatory
- side convexity
- end vertebrae (upper/lower)
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Spinal deformities

Adolescent idiopathic scoliosis (AIS)

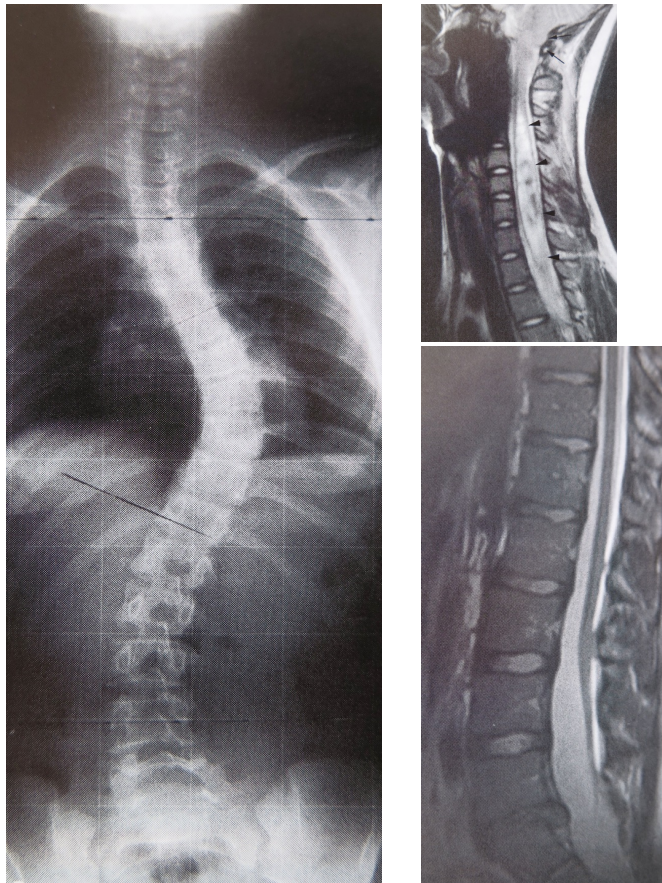


Radiographic assessment:

- **side bending views**
(flexibility in %)

Spinal deformities

Adolescent idiopathic scoliosis (AIS)



Radiographic assessment:

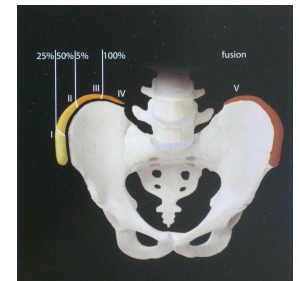
- **MRI** atypical scoliosis
 - infantile or juvenile onset ($< 10y$)
 - painful scoliosis
 - **left** convex thoracic curves
 - rapid curve progression
 - neurol. abnormalities
 - associated syndroms
 - syringomyelia
 - Arnold-Chiari
 - tethered cord
 - tumors

Adolescent idiopathic scoliosis (AIS)

Treatment Principles

Factors

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



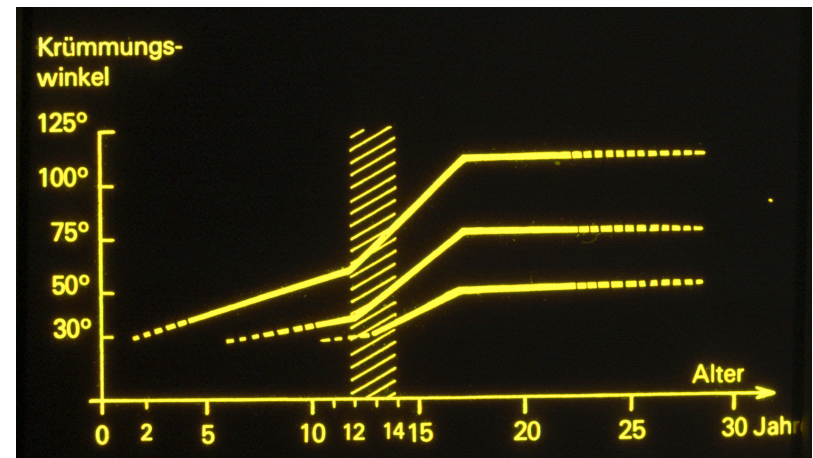
HE, female 15Y

Adolescent idiopathic scoliosis (AIS)

Decision Making

Factors

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

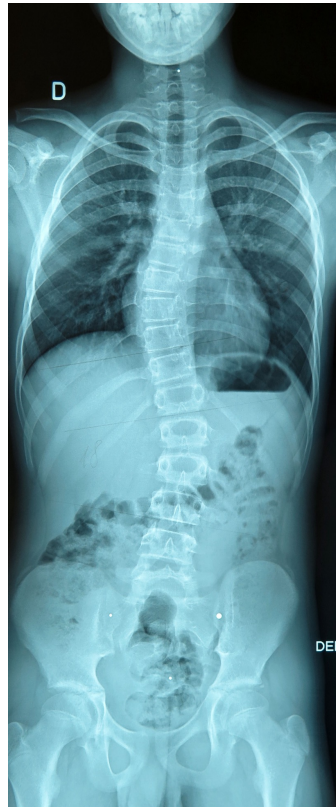


Adolescent idiopathic scoliosis (AIS)

Decision Making

Risk factors for progression:

- young age at onset (<12y)
- Risser 0-1
- premenarchal status
- physical immaturity
- large curves (>50°)
- thoracic > lumbar
- double curve > single curve



PM, male 13y

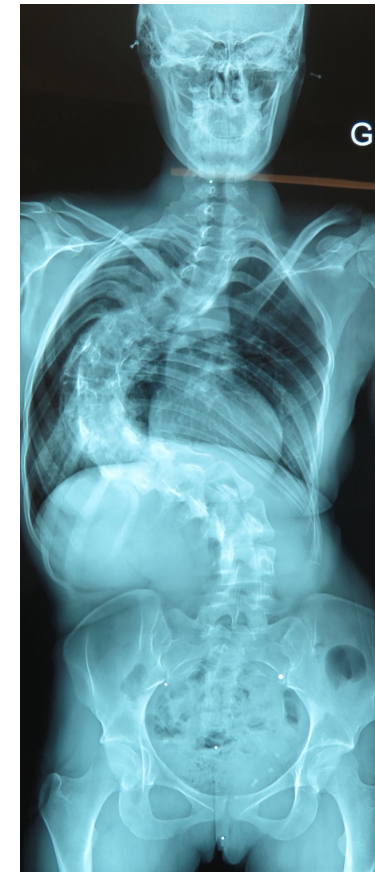


14.5y

Adolescent idiopathic scoliosis (AIS)

Aims of Scoliosis Treatment

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



Keep in mind: the natural history is benign

Adolescent idiopathic scoliosis (AIS)

Treatment Principles

During Growth

< 25°

▮ Observation

25 - 40°

Physiotherapy
Bracing

> 50°

Physiotherapy
▮ Electrostimulation
Surgery

40 - 50° “gray zone”



