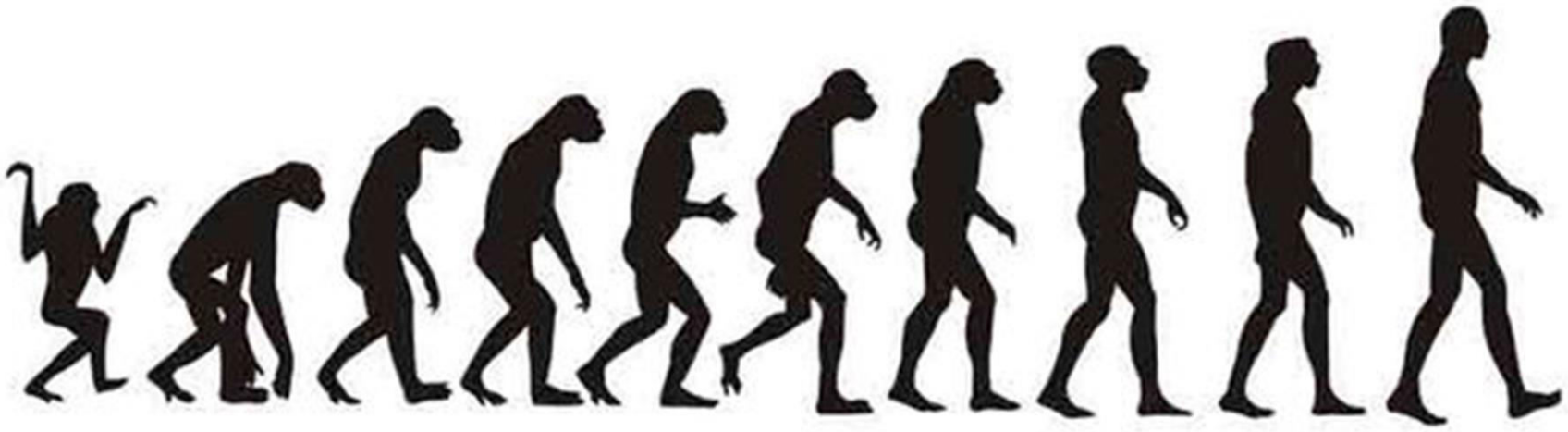
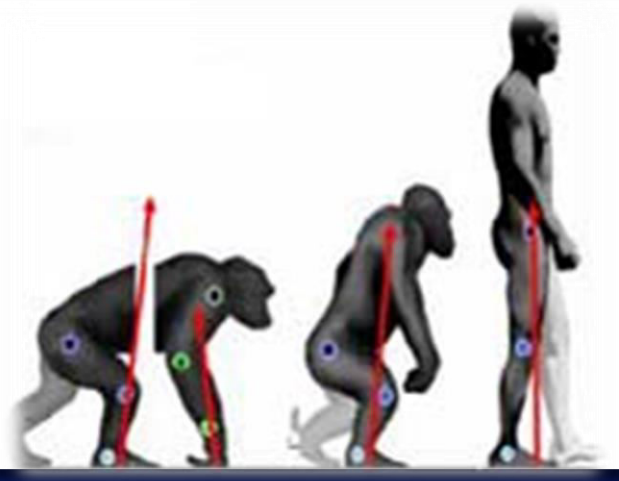
Adult Spinal deformity: A disease of the 21st century

Jwalant S. Mehta
MS (Orth); MCh (Orth); D (Orth); FRCS (Tr & Orth)
Consultant Spinal Surgeon





Life is a kyphosing event

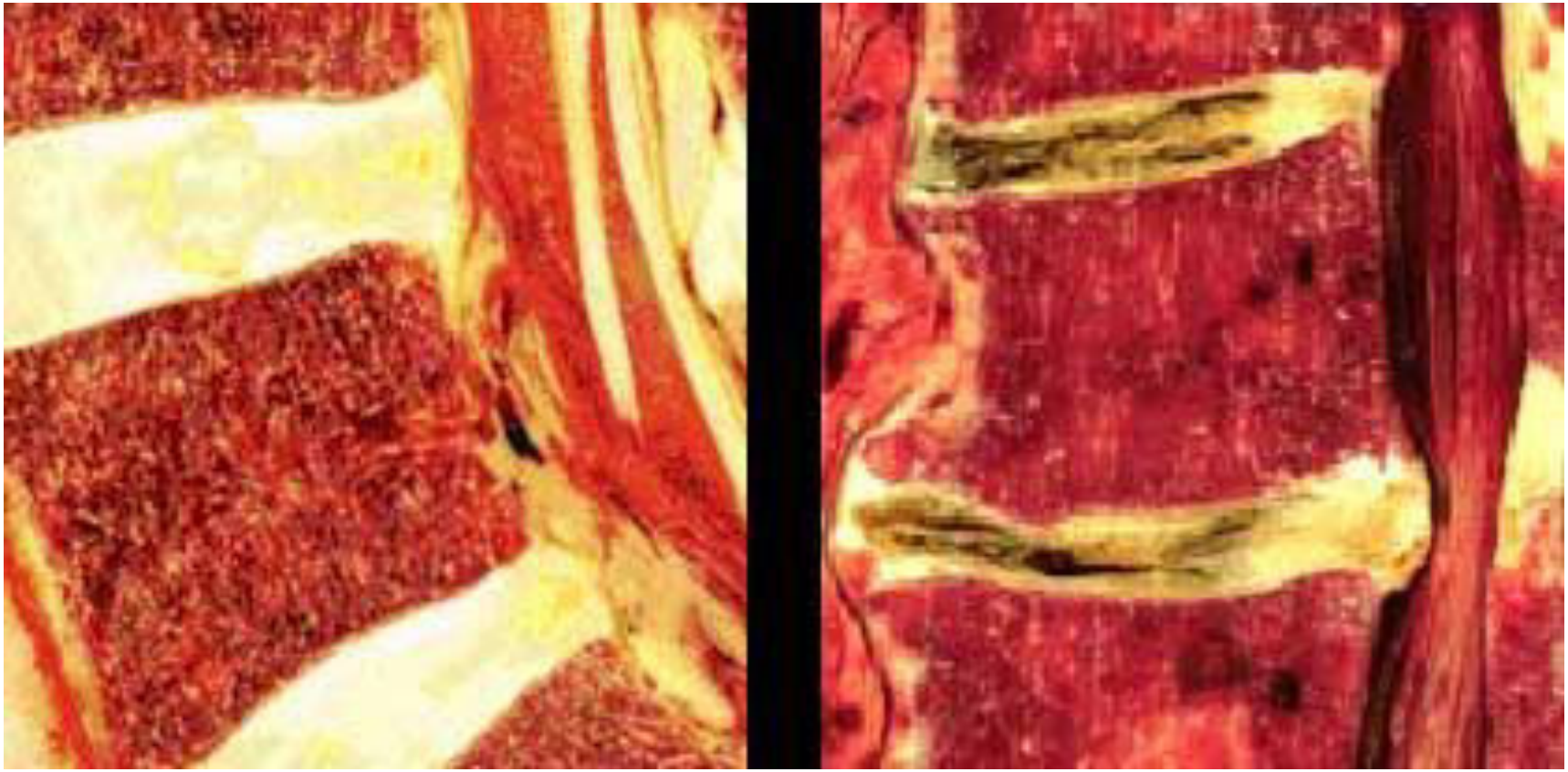
Spectrum of pathology

- Osteoporosis
- Discs and facet joints
- Failure of the spinal column

Adult Spinal Deformity

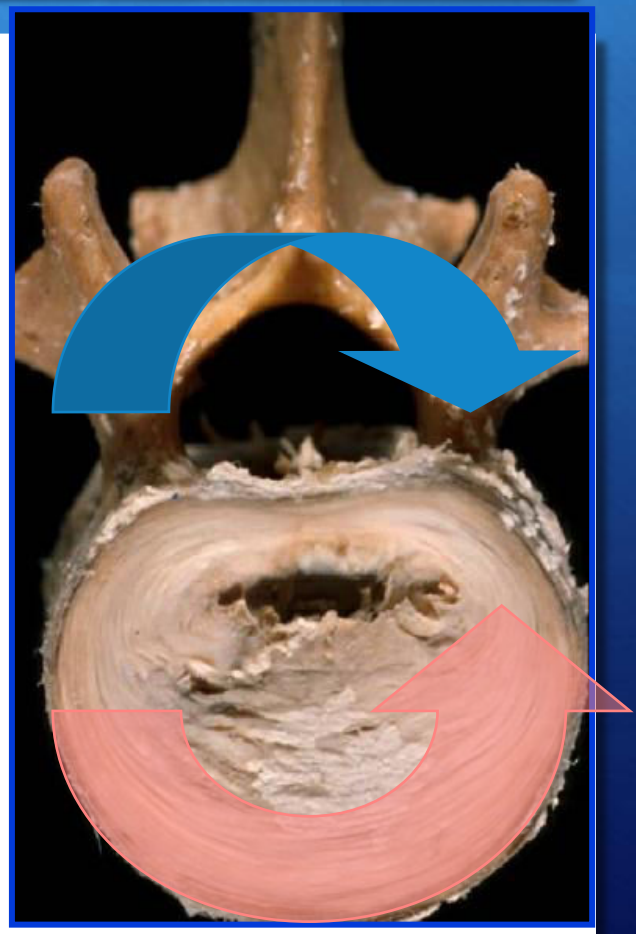
- Un-treated childhood / adolescent scoliosis
- Consequences of advanced degenerative changes

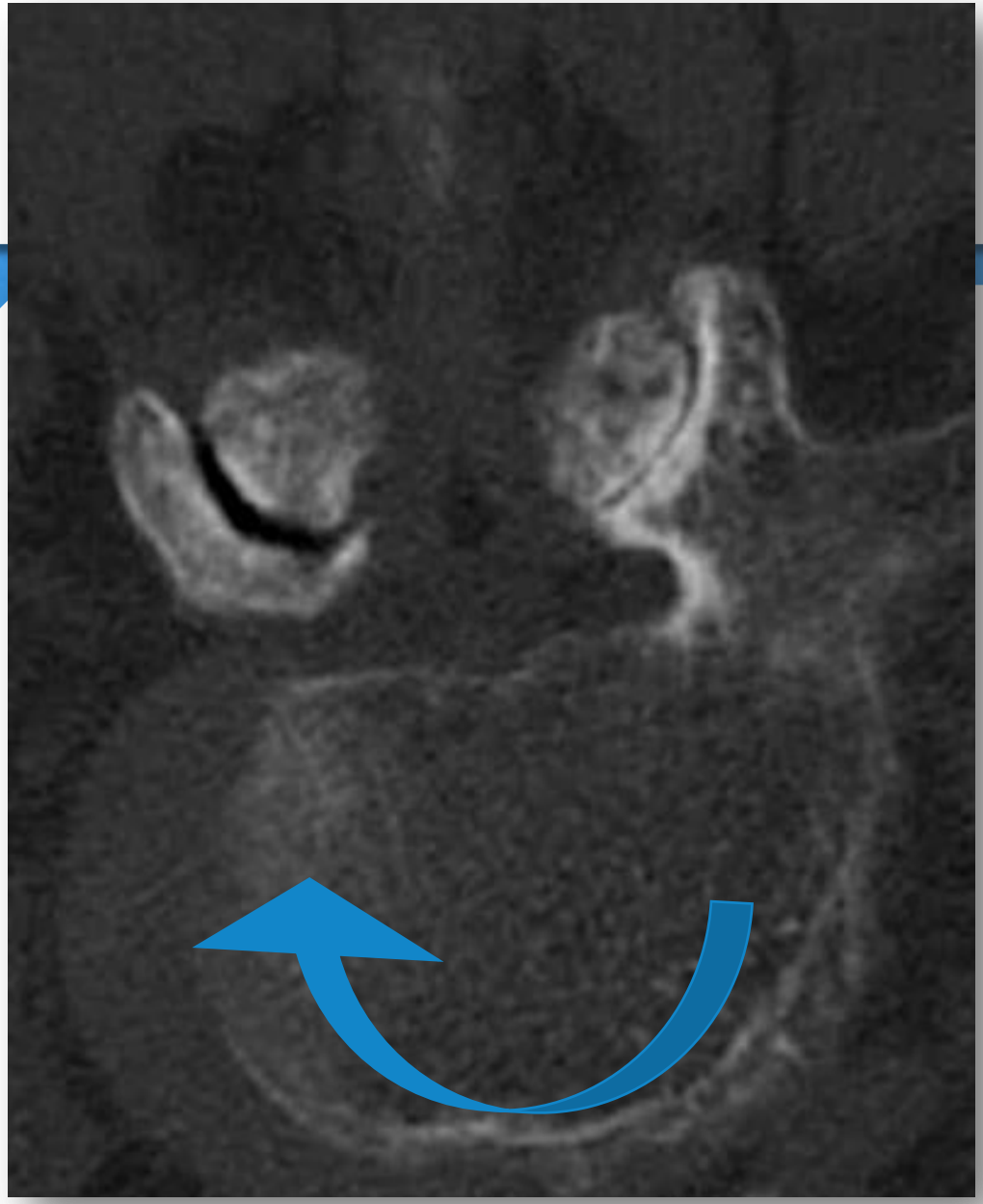
Disc degeneration

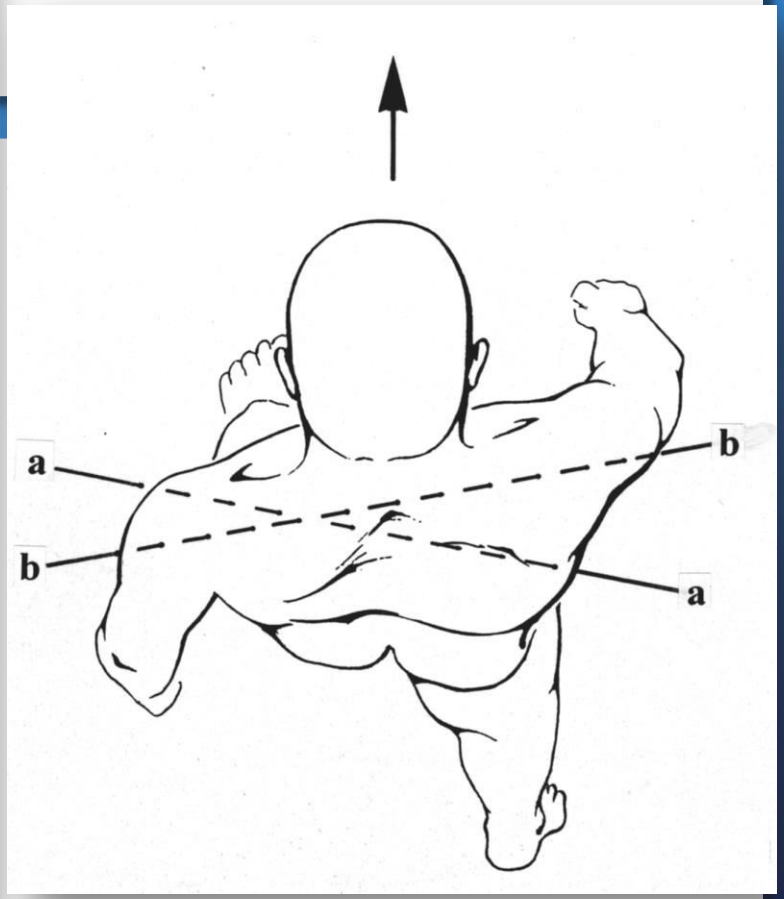


Changes in the 'motion segment'

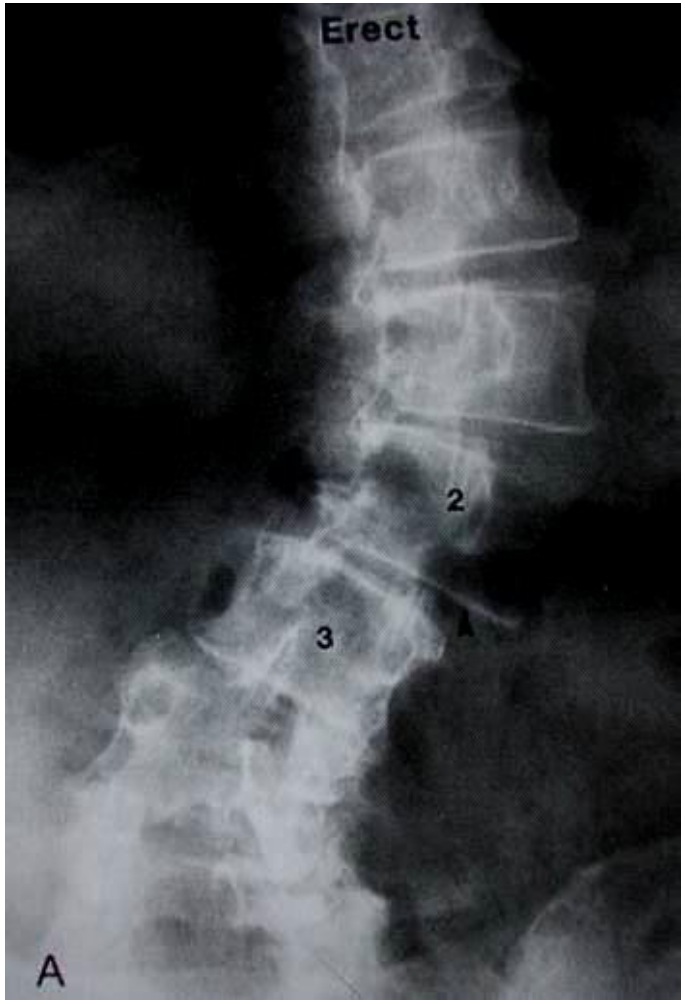
- resistance of the annulus to torque is reduced
- increased mechanical demand on posterior elements

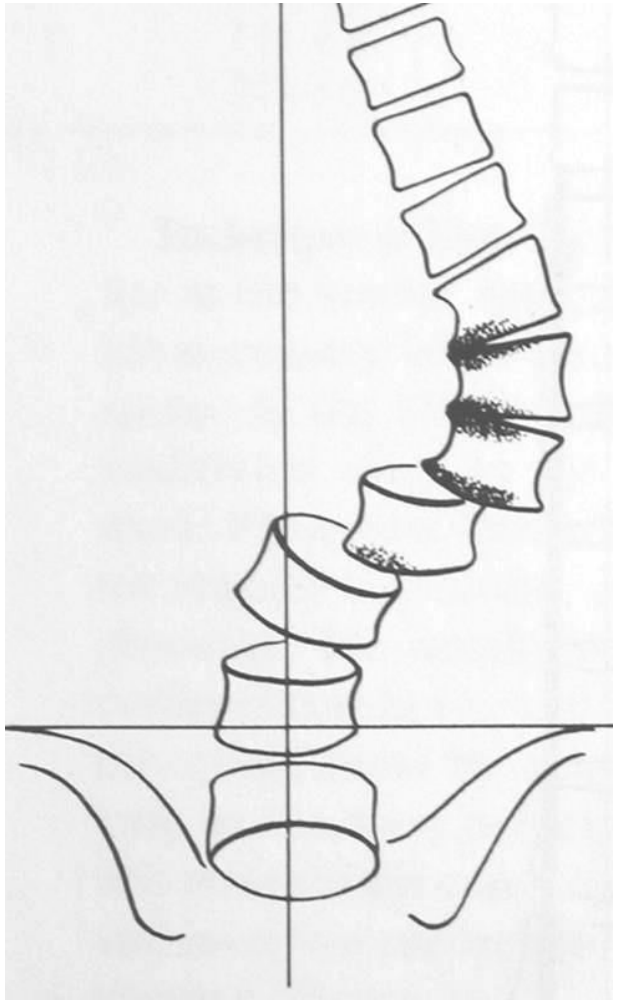




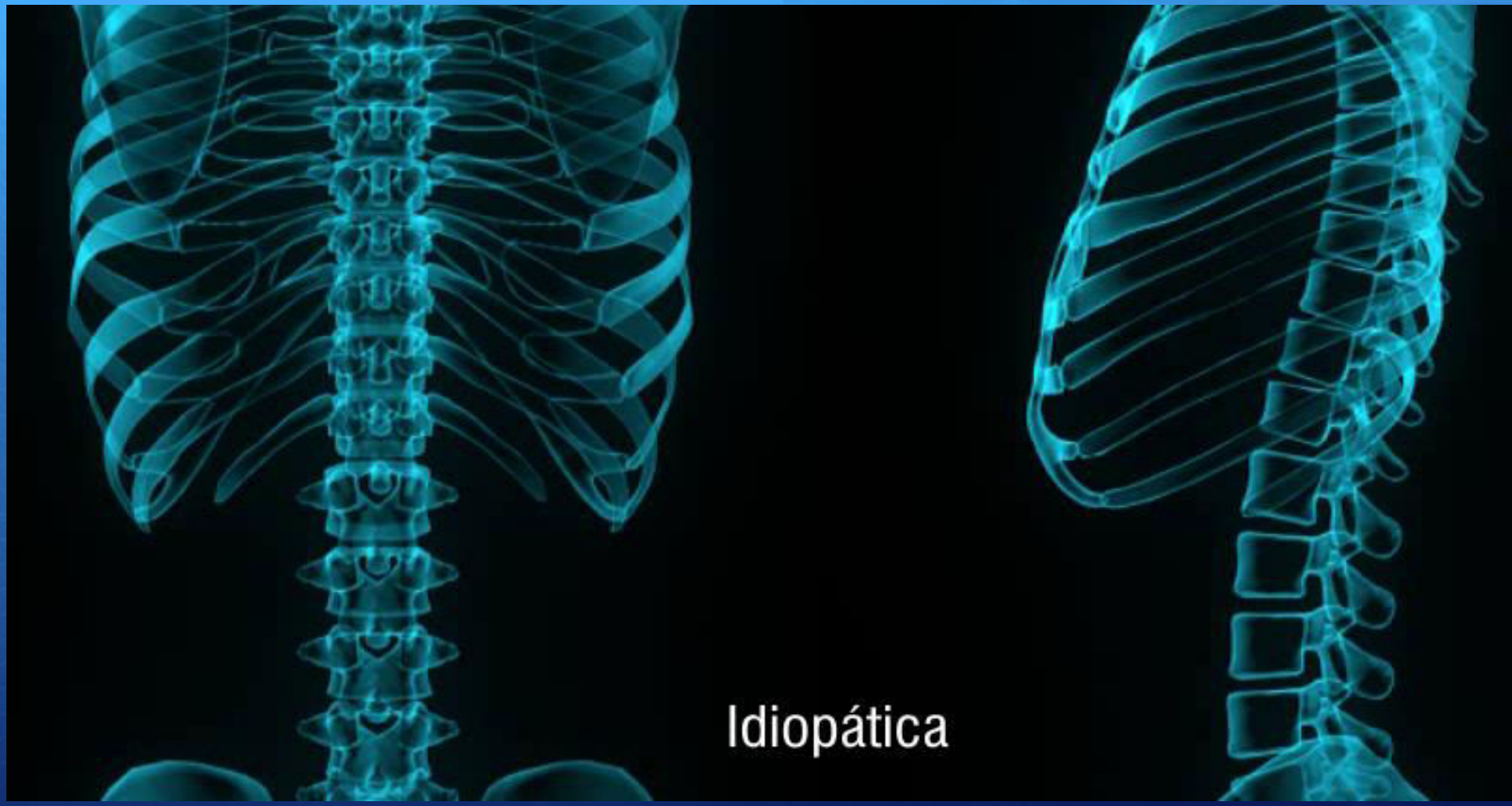

a
b
b
a

The coronal plane deformity





The sagittal plane deformity

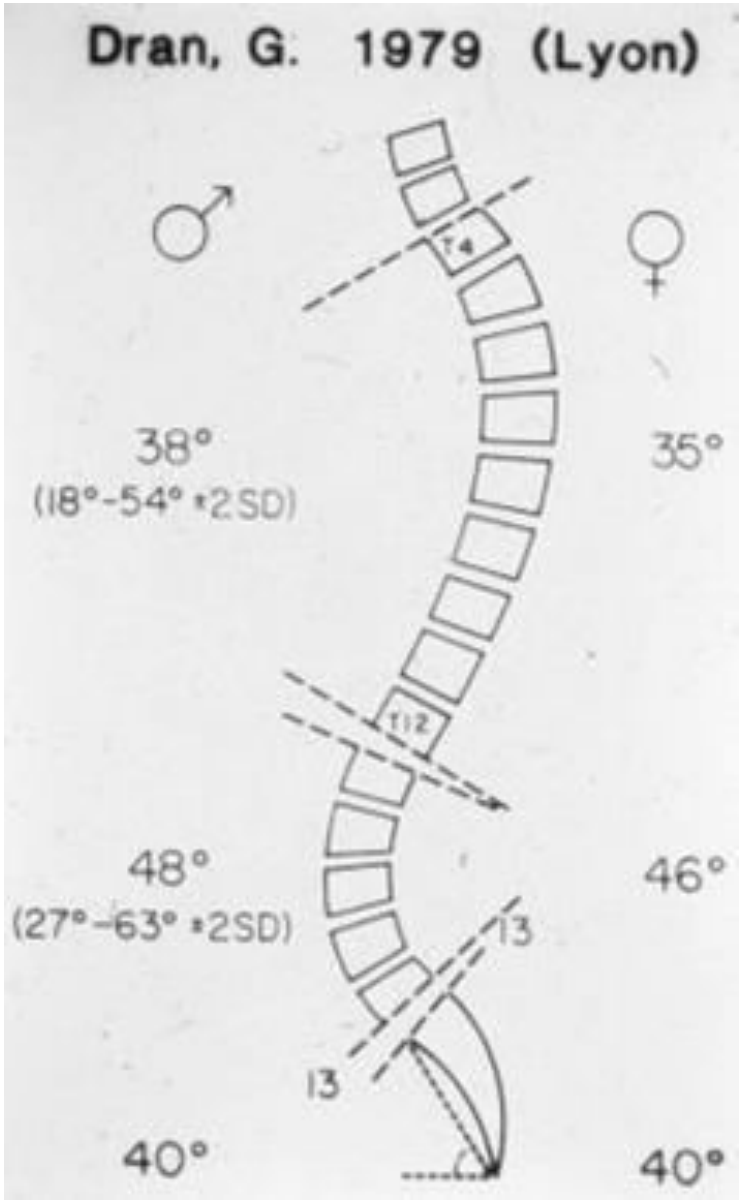

Idiopática

Thoracic kyphosis:

38° ± 18

Lumbar lordosis:

48° ± 18

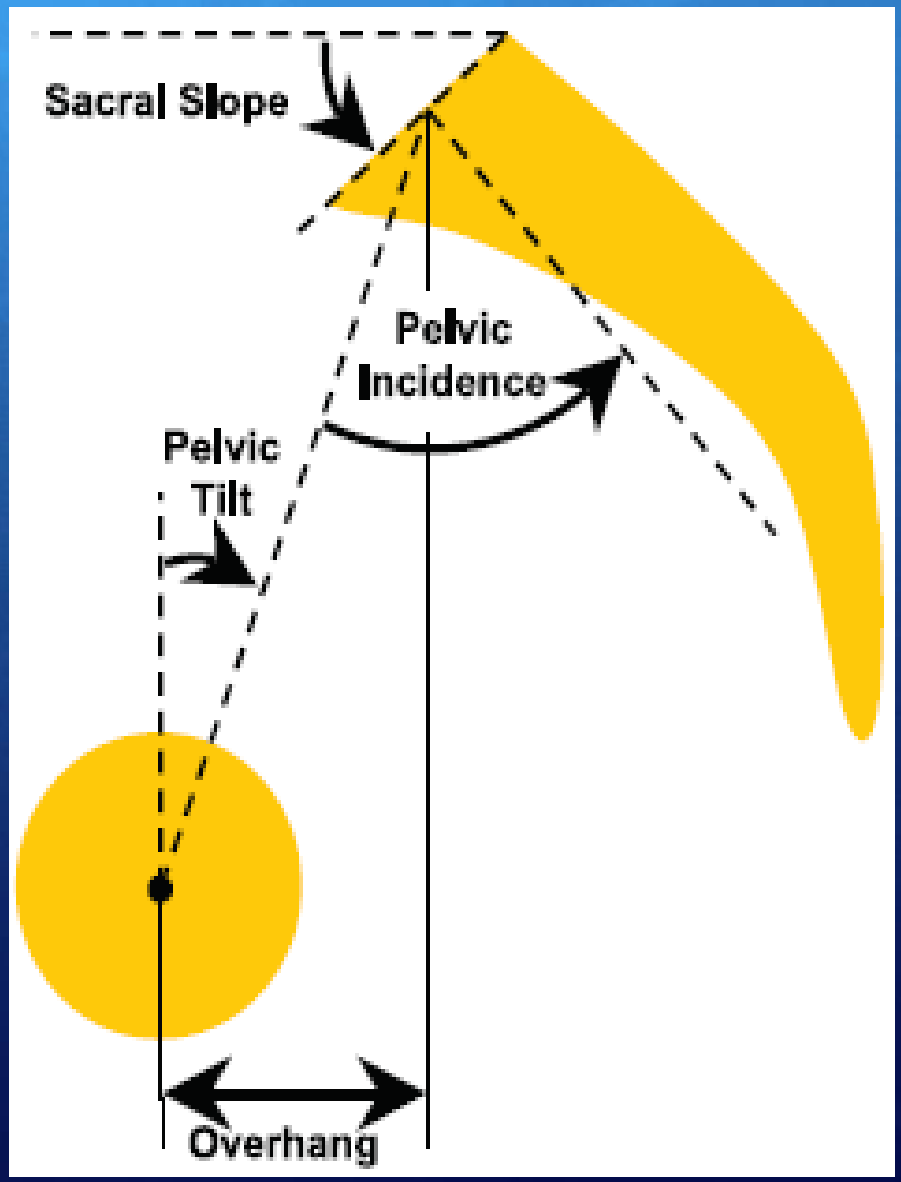



T1 offset
LT offset
SACRAL TRANSLATION
SAGITTAL VERTICAL AXIS
C7 PLUMB LINE

Pelvic measures

- Sacral slope (SS)
- Pelvic tilt (PT)
- Pelvic incidence (PI)

SS + PT = PI



Pelvic incidence

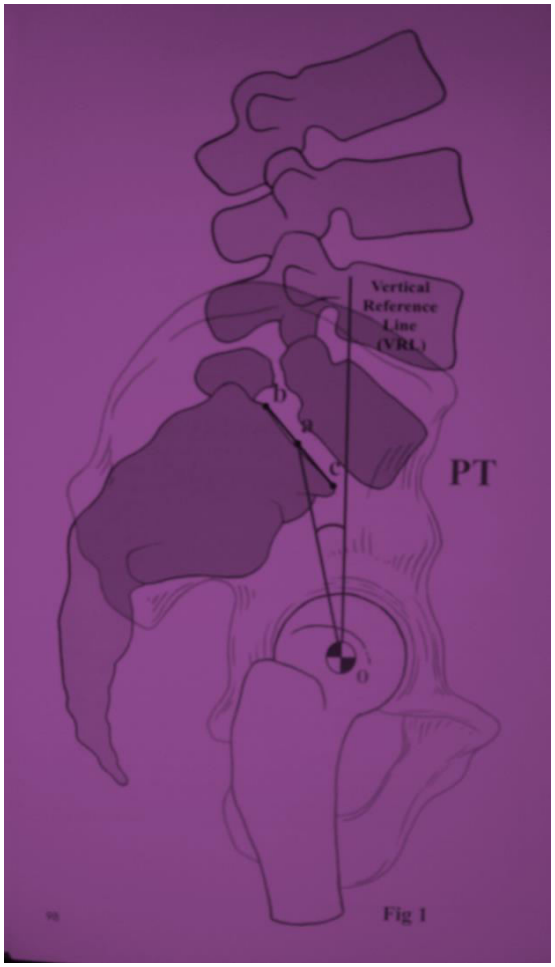
- Key parameter
- Perpendicular to:

  the middle of the sacral end plate

  mid-point of femoral heads

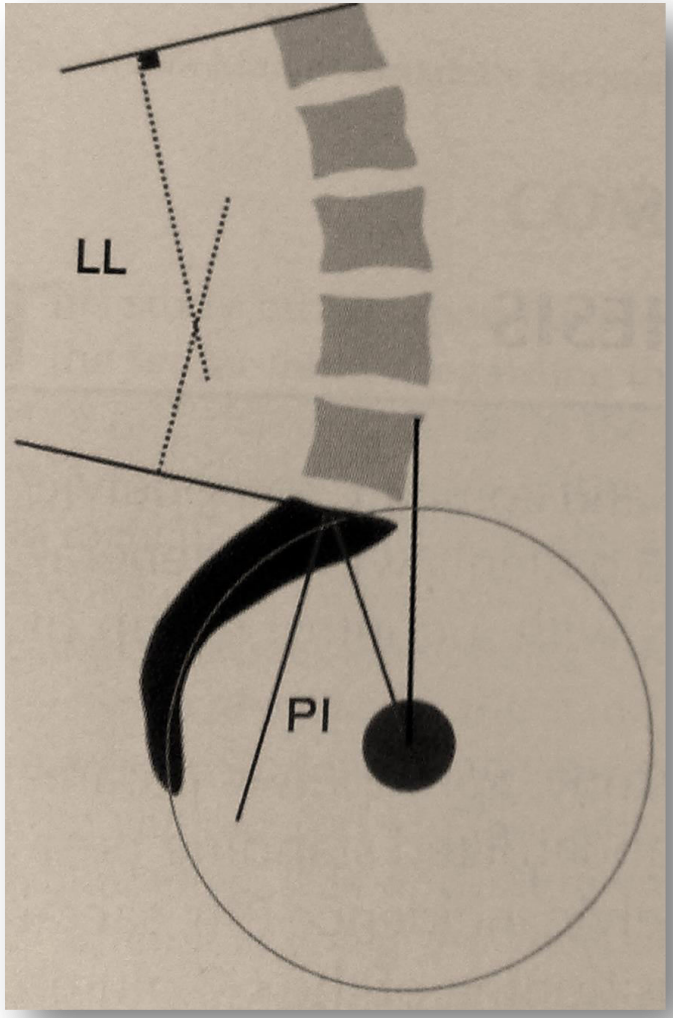
- 55° ± 10.6° (Vialle JBJS 2005)

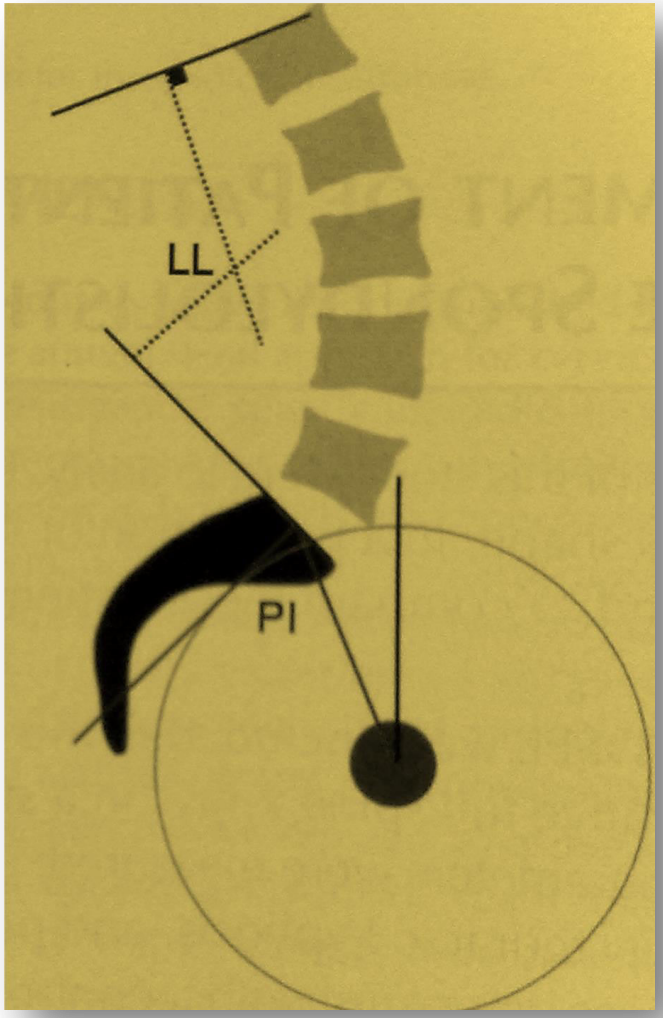
Significance of pelvic tilt



- Centre of gravity over LL
- Maintains sacral plate posterior to the hip
- Increases with age

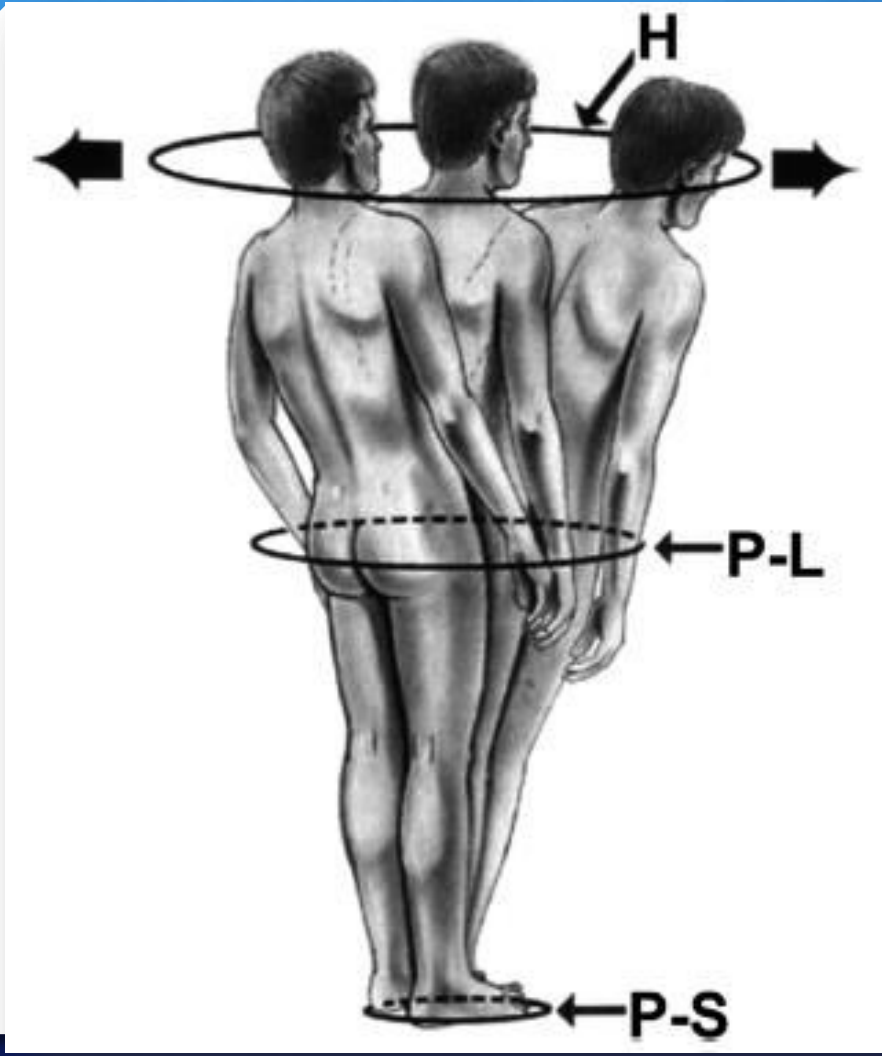
Low v High PI

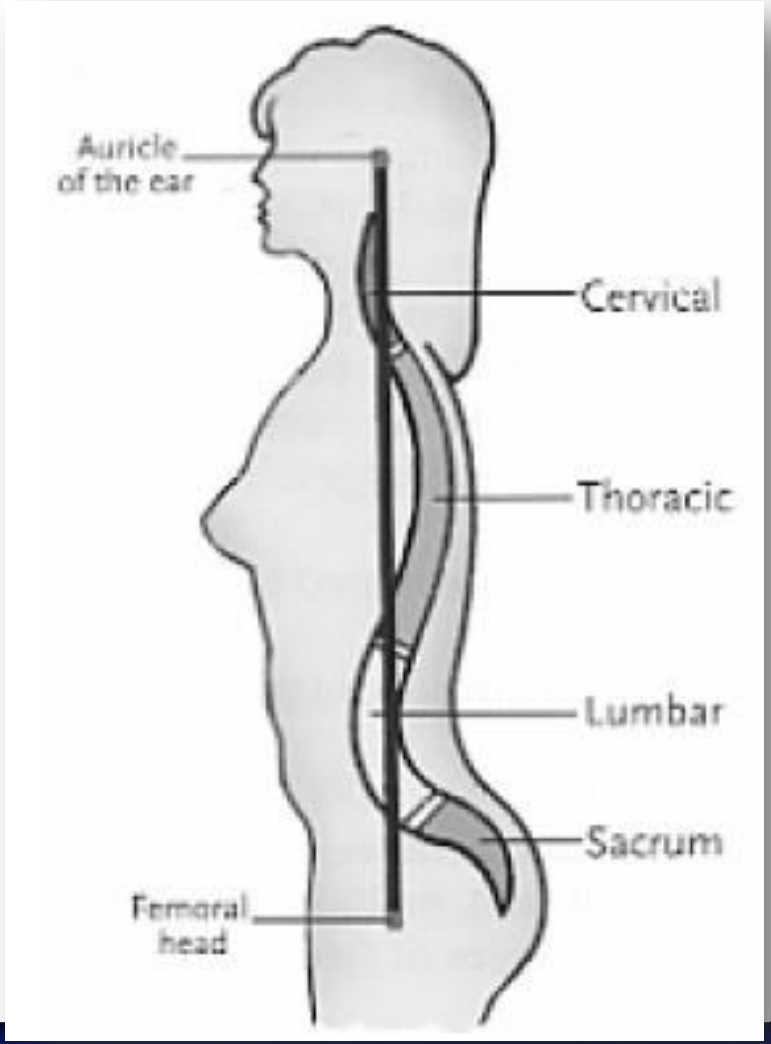




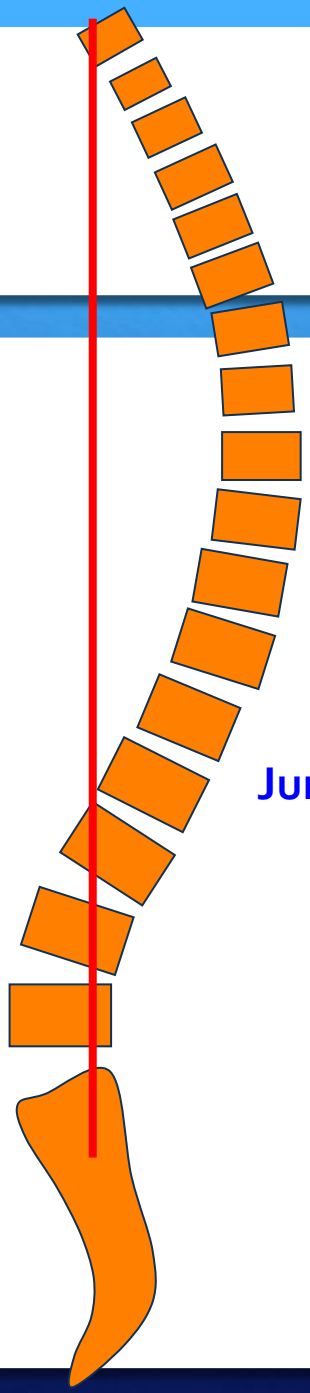
Cone of economy

J. Dubousset



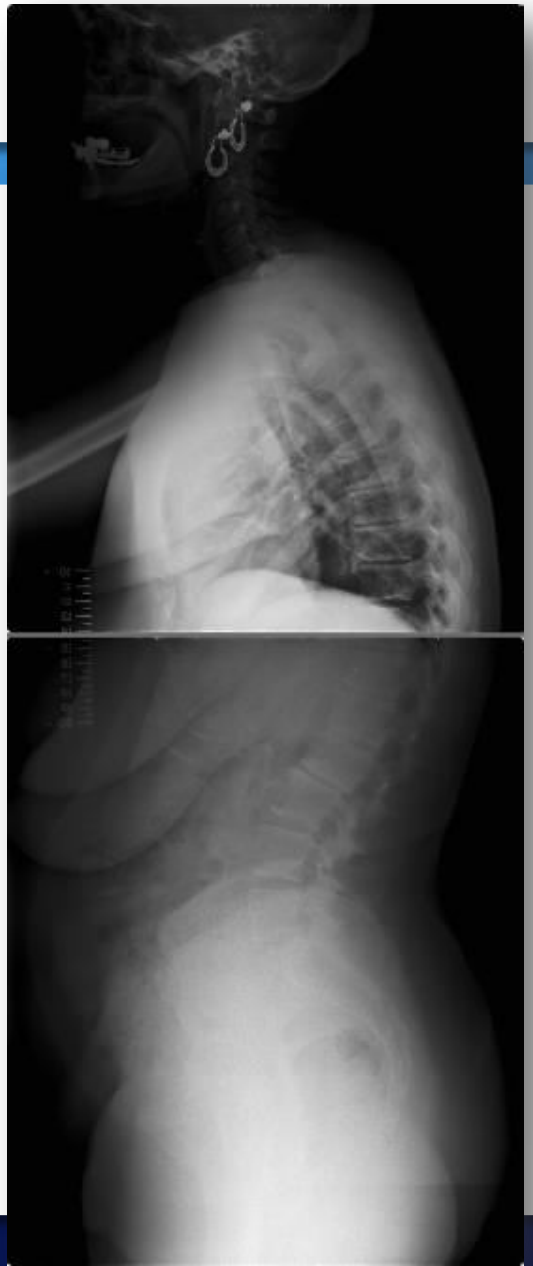


Type 1: Non-harmonious spine

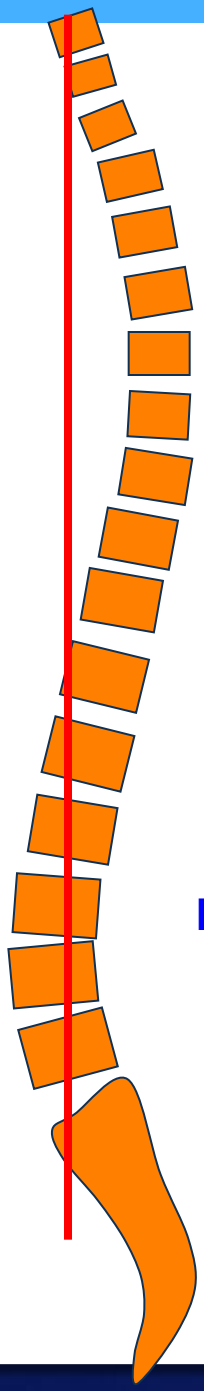


Thoraco lumbar disc

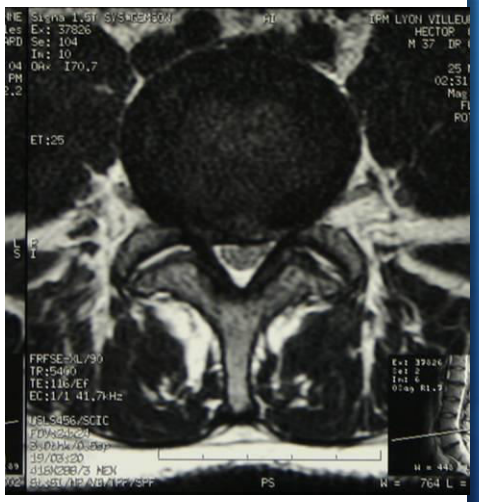
Junctional listhesis

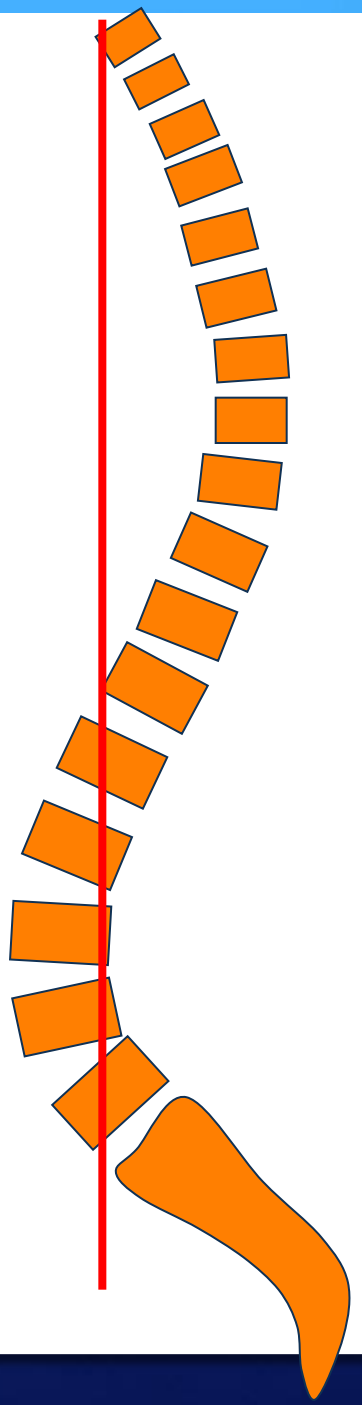


Type 2: Harmonious but Flat Back

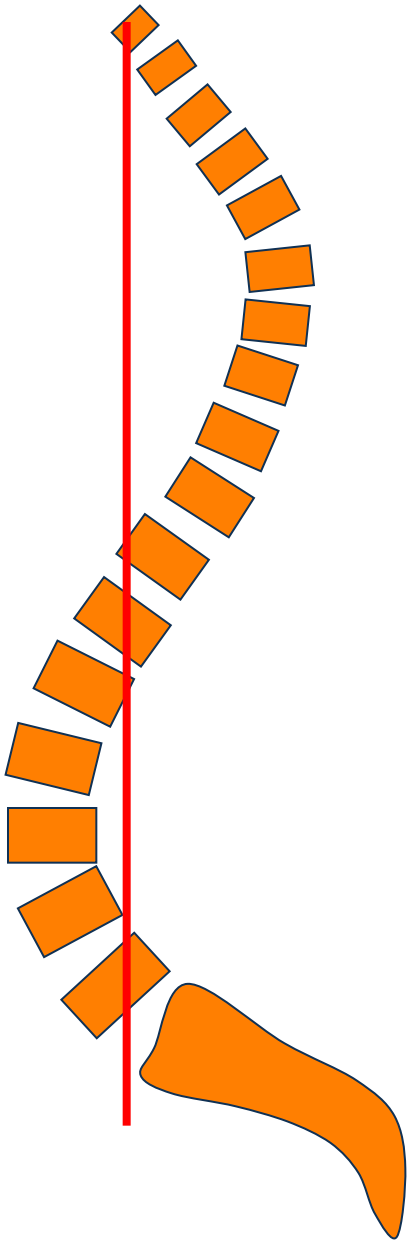


Early disc degeneration





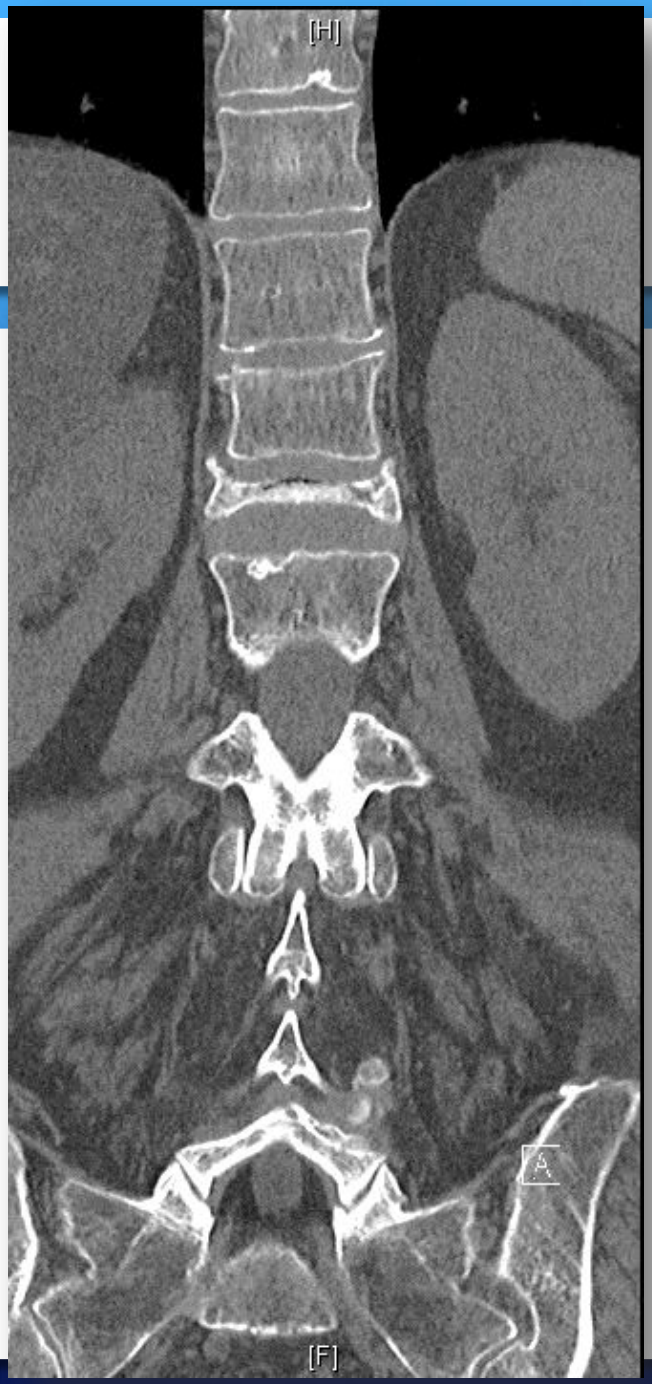
Type 3:The most harmonious ("probably a good back")



Type 4: Harmonious but hyper-curved.

- When young: very strong
  - High PI
  - Good lordosis
- With aging
  - will lose lordosis
  - pelvic tilt increases to compensate for anterior imbalance

Lumbar stenosis + spondylolisthesis

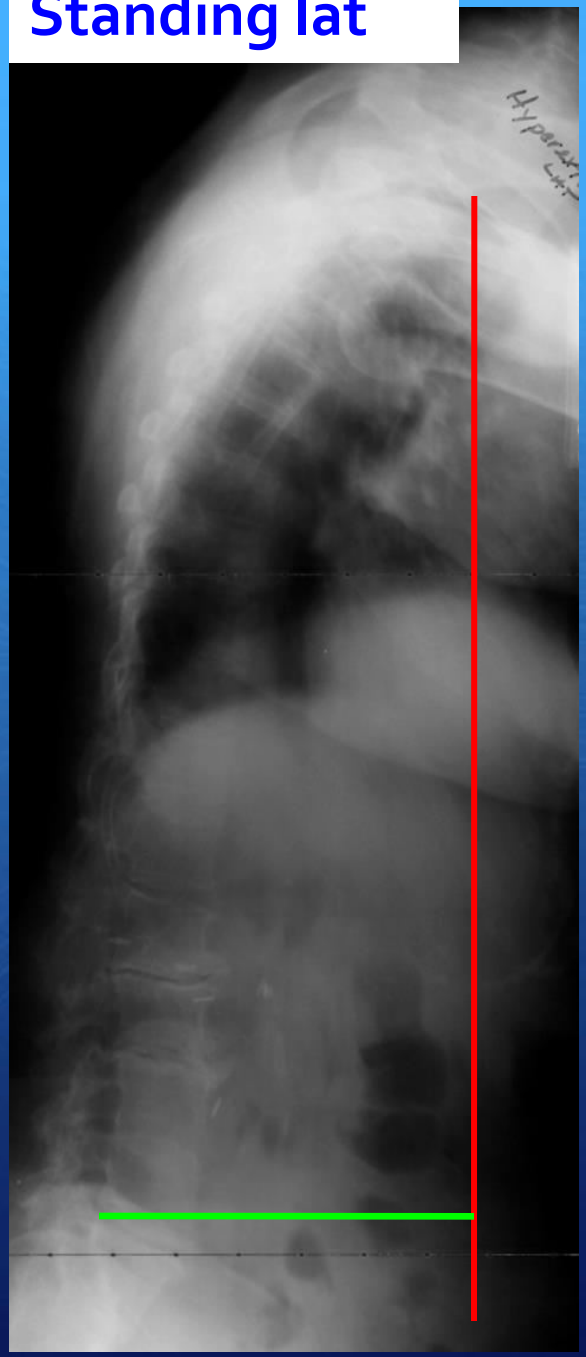

[H]
[F]


[H]
[F]

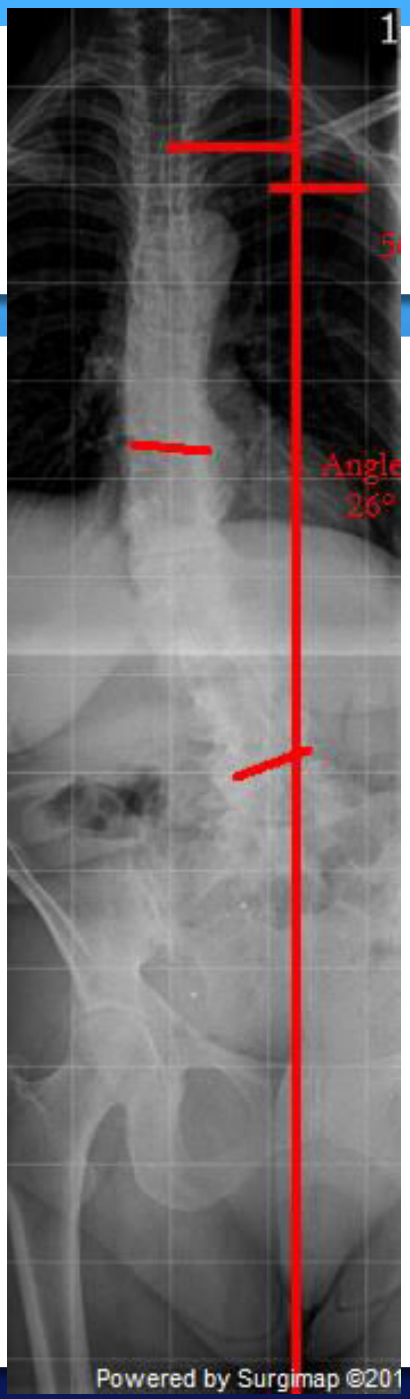
Fixed or flexible sagittal deformity

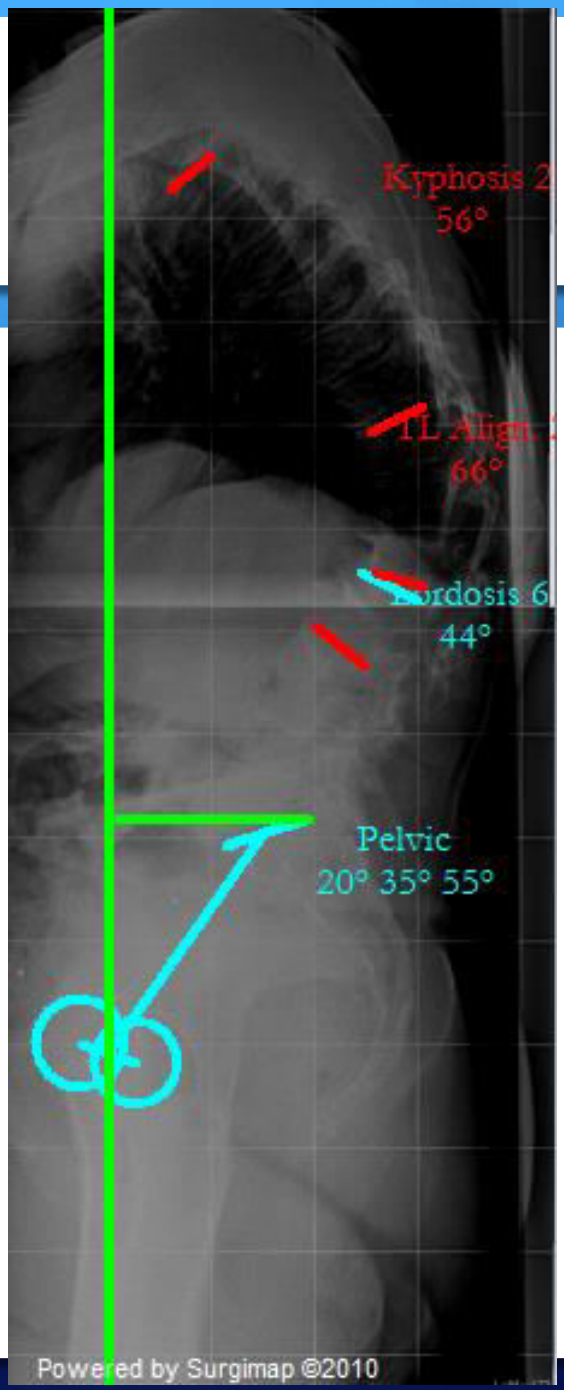

15 9:45AM

Standing lat



Hyperext lat





59 / F

AP Cobb 26°

CSL 7 cm

Pelvic:

PI 55°

SS 20°

PT 35°

LL 44°

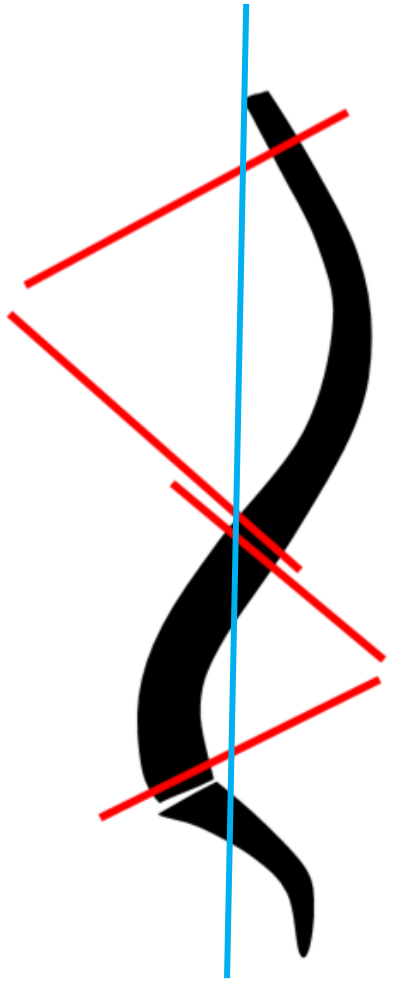
TL 66°

TK 56°

SVA 11 cm

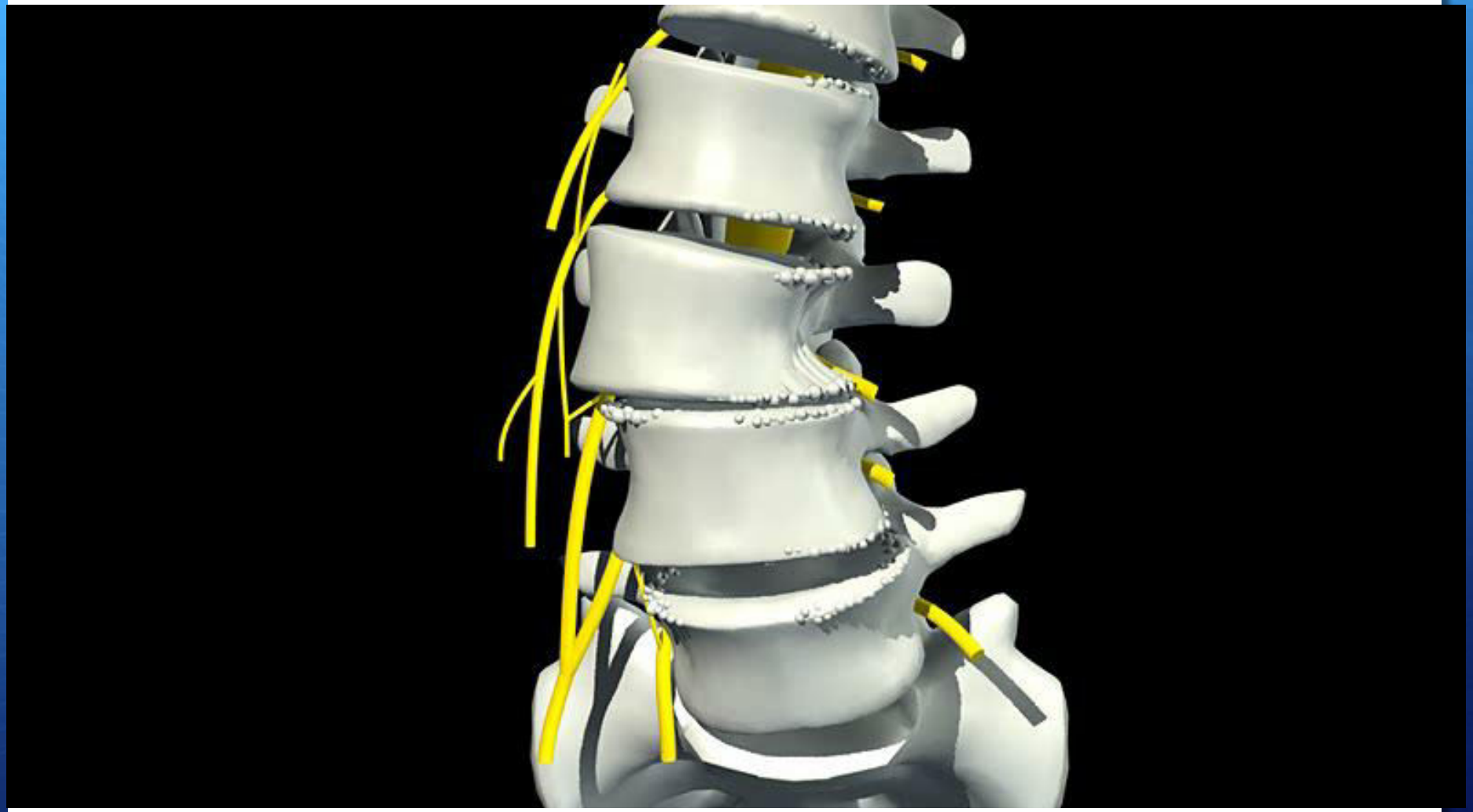
Aims of intervention

- Restore the lordosis
- Restore the plumb line
- Restore the ‘curves’



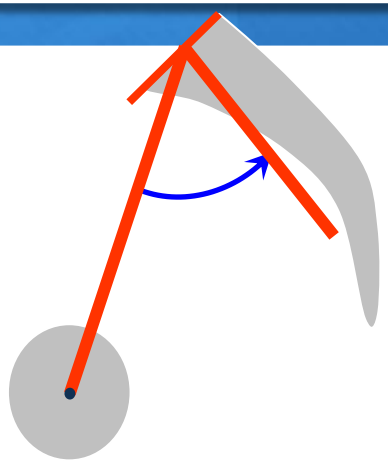
Adult Deformity: Surgical goals

- Normalize & balance contours
- Fuse the least number of segments
- Neural decompression
- Obtain solid biological fusion



Adaptation of lordosis

- Excise facet joints
- 'Open' degenerate disc spaces
- Osteotomies
- Measure the PI, and build in the lordosis



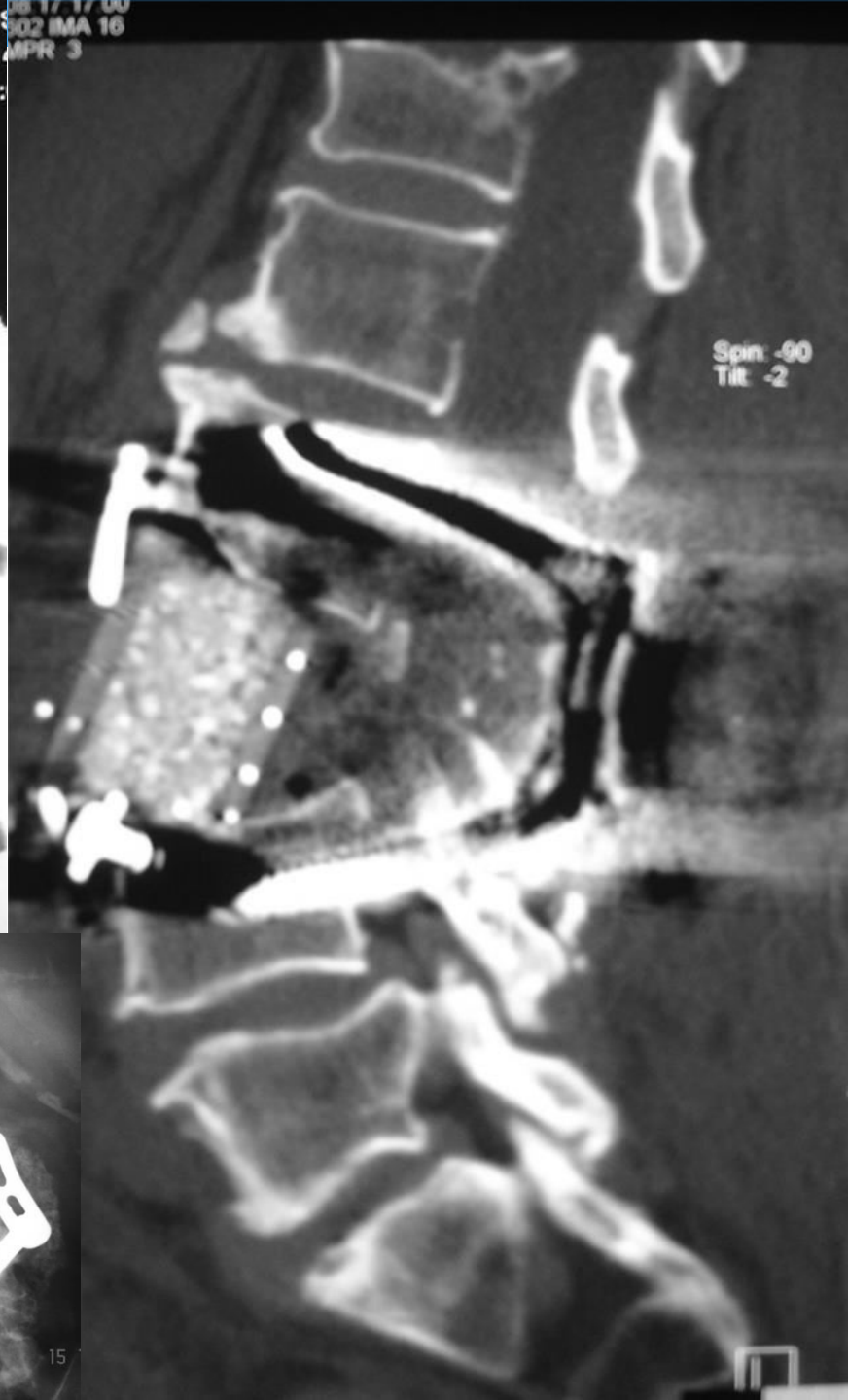
$LL = PI \pm 9^0$

Surgical reconstruction:
Adult Deformity

- Major operation
- Anaesthetic input early discuss mortality and morbidity
- 2 spinal surgeons
- Spinal cord monitoring
- ITU, Physiotherapy


EXIT
EXIT
MM
86Y

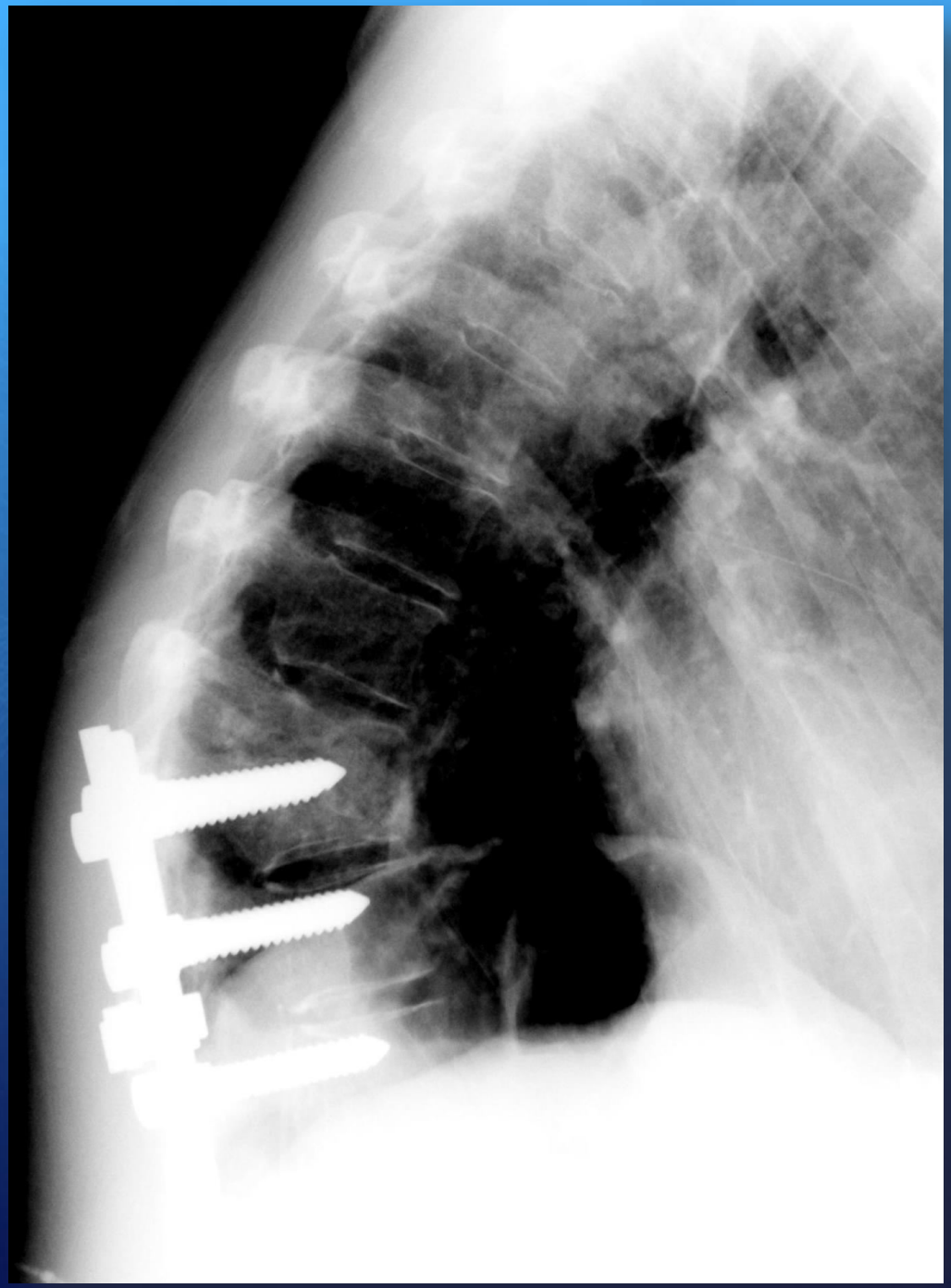

COLUMBIA REGIONAL HOS
09/1
2:48:

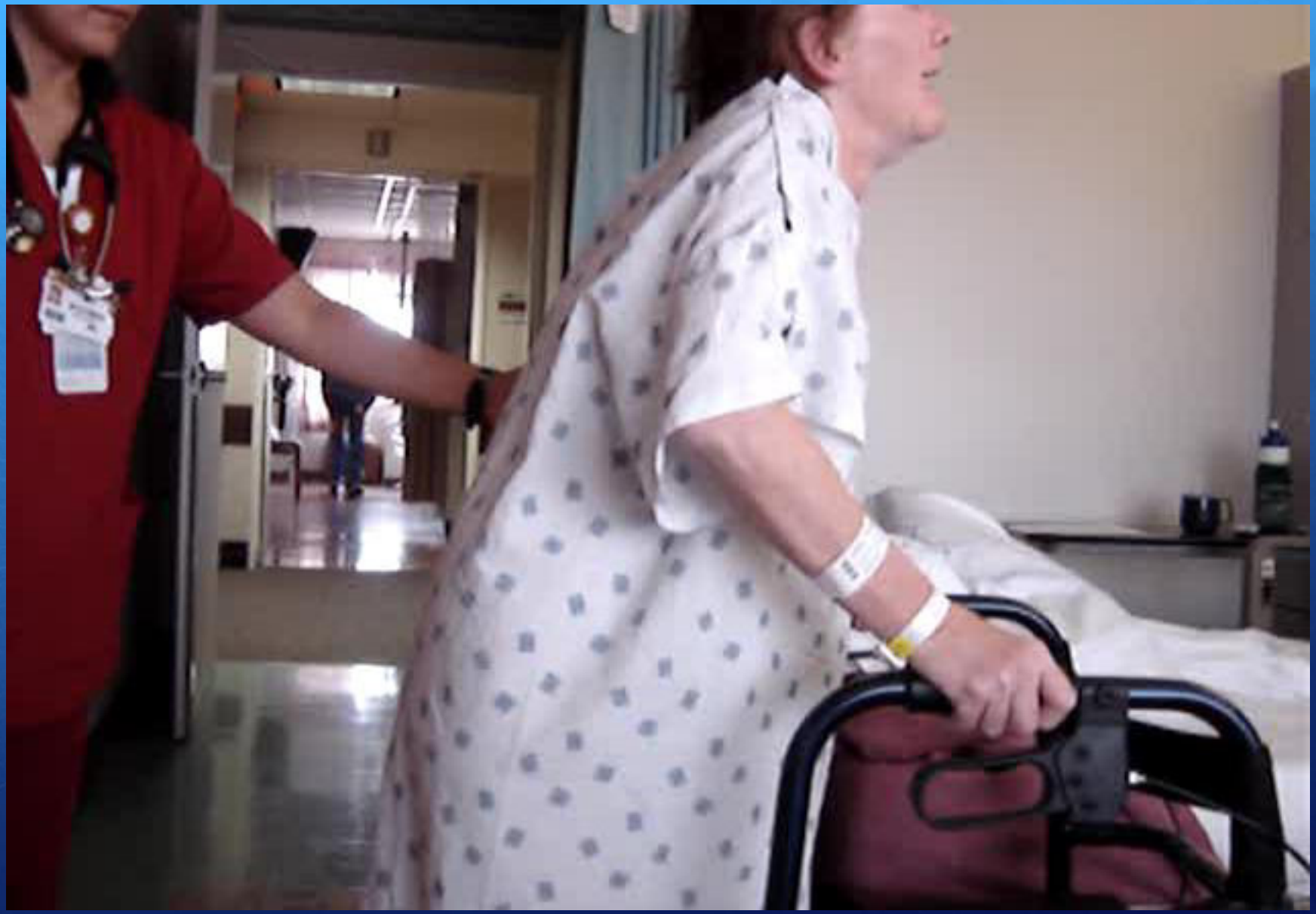

Spin -90
Tilt -2

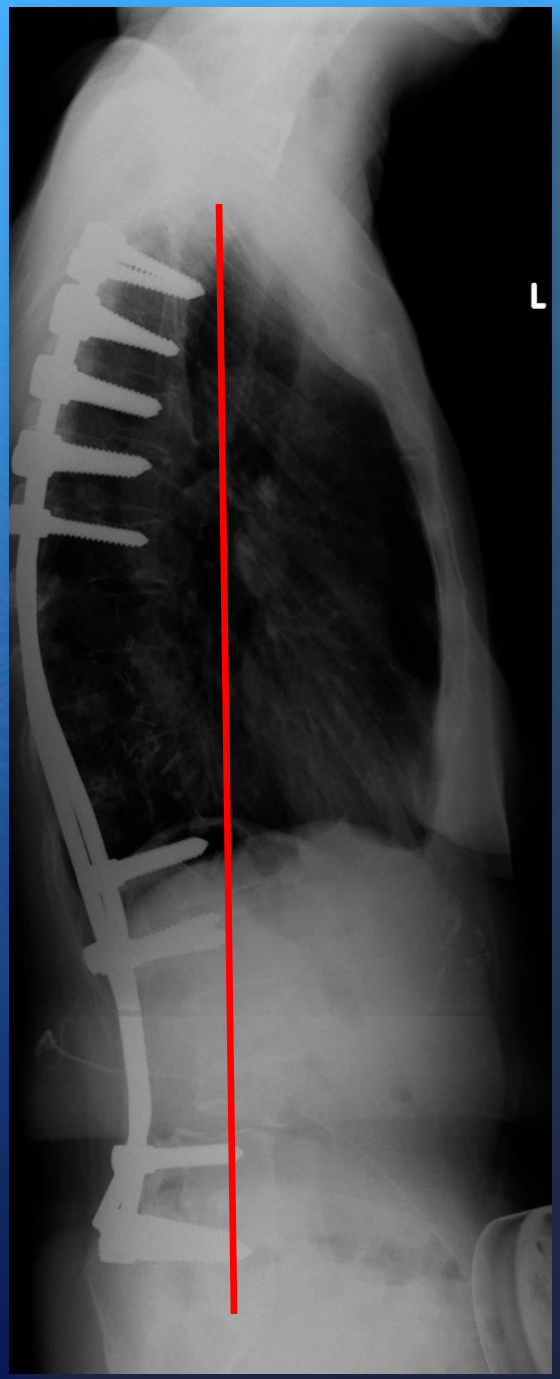

18 1:54PM

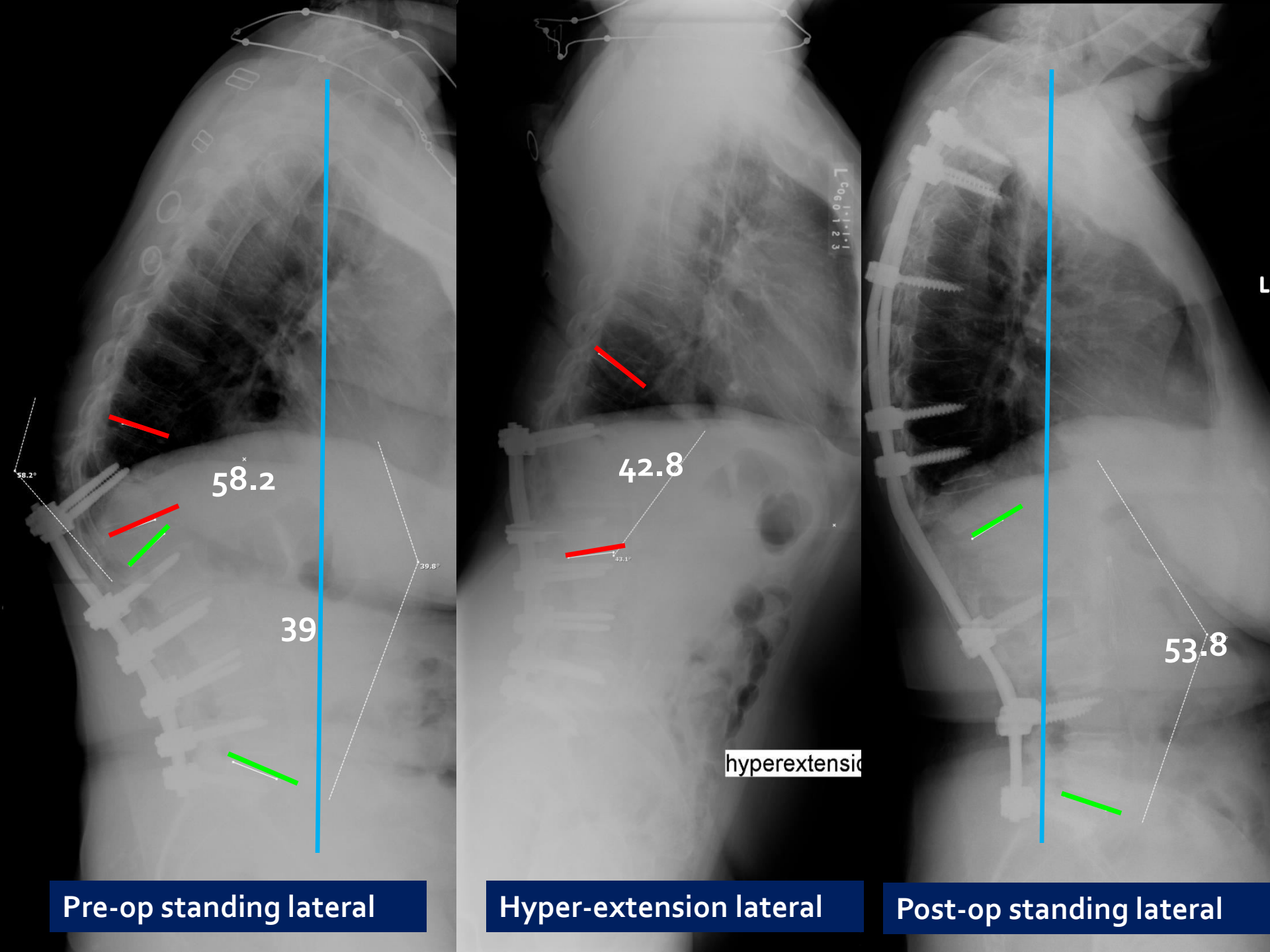

Problems

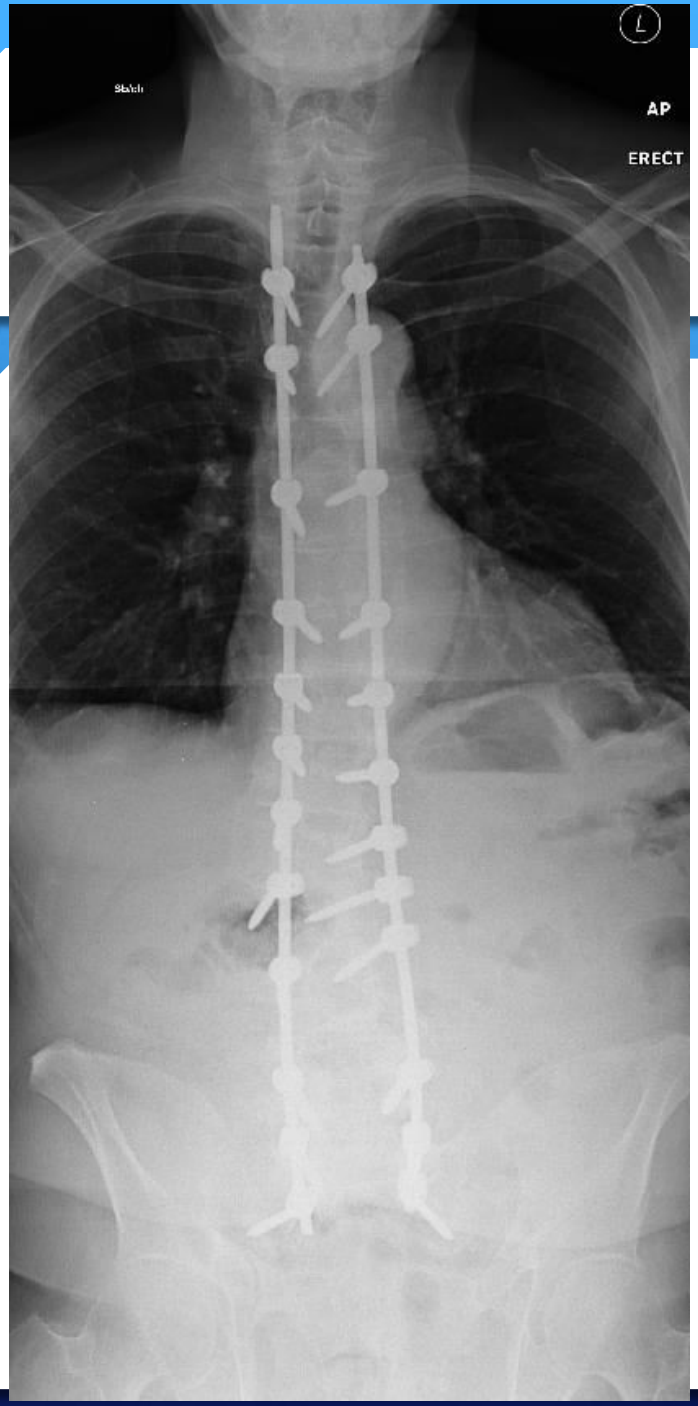
- Realistic expectations
- Medical co-morbidites
- Osteoporosis
- Junctional problems



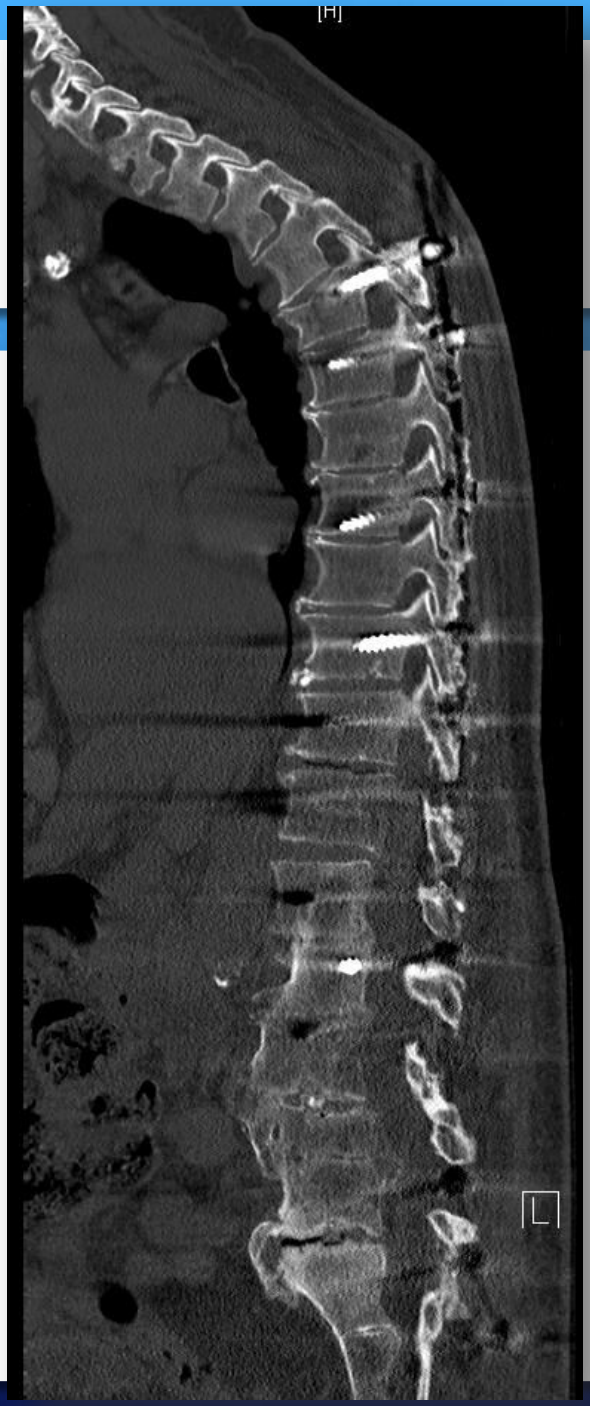


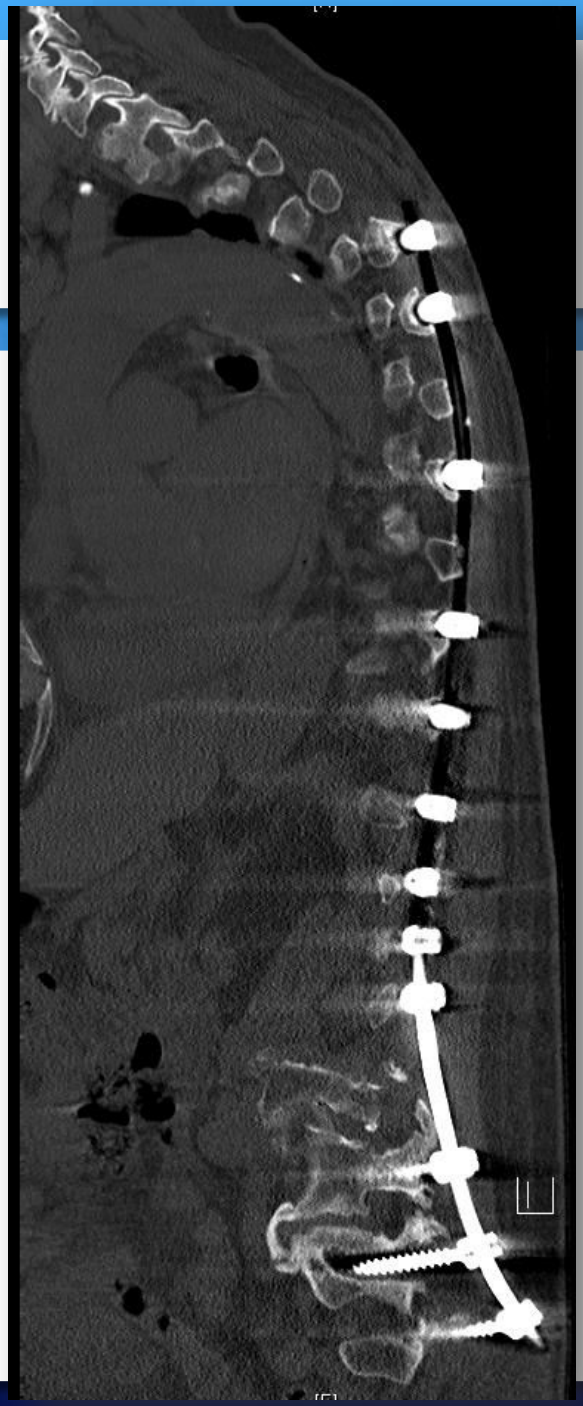

L

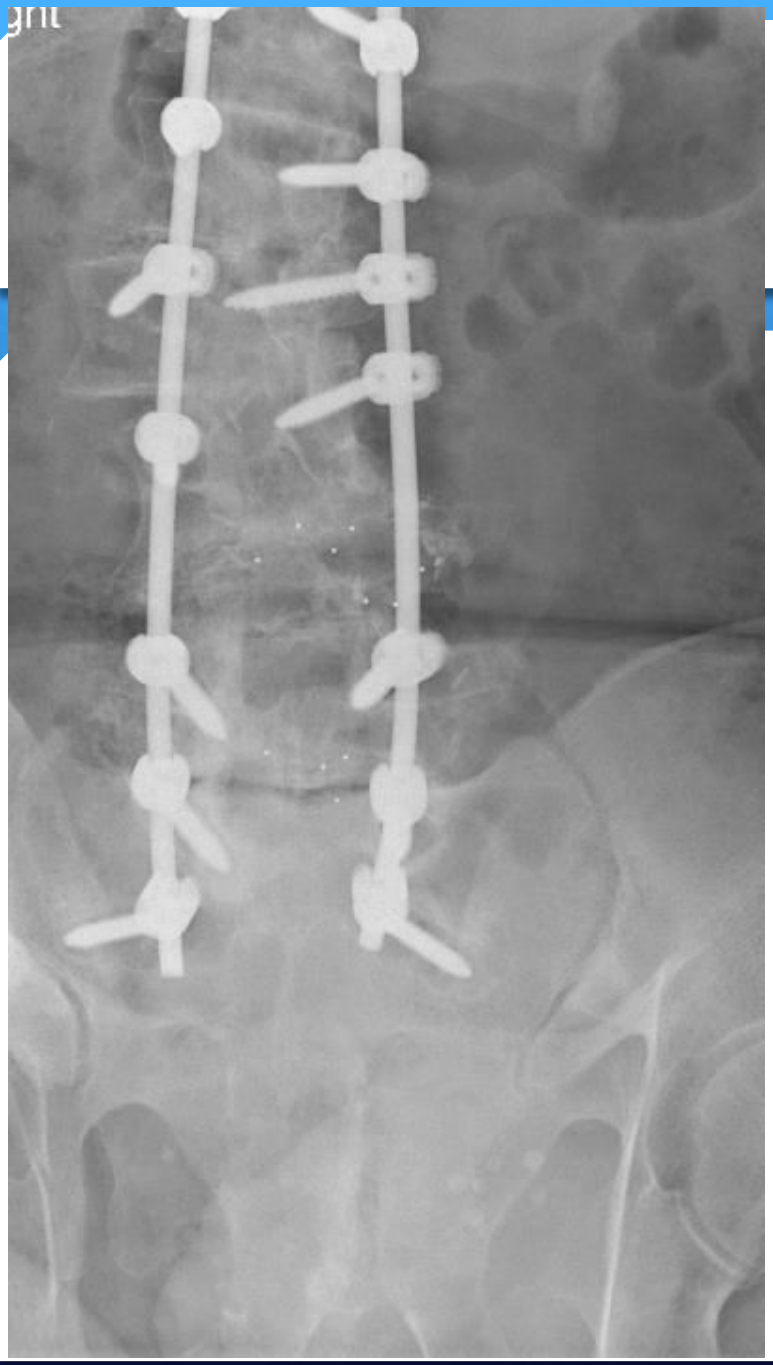

58.2
39
42.8
hyperextensi
53.8
Pre-op standing lateral
Hyper-extension lateral
Post-op standing lateral

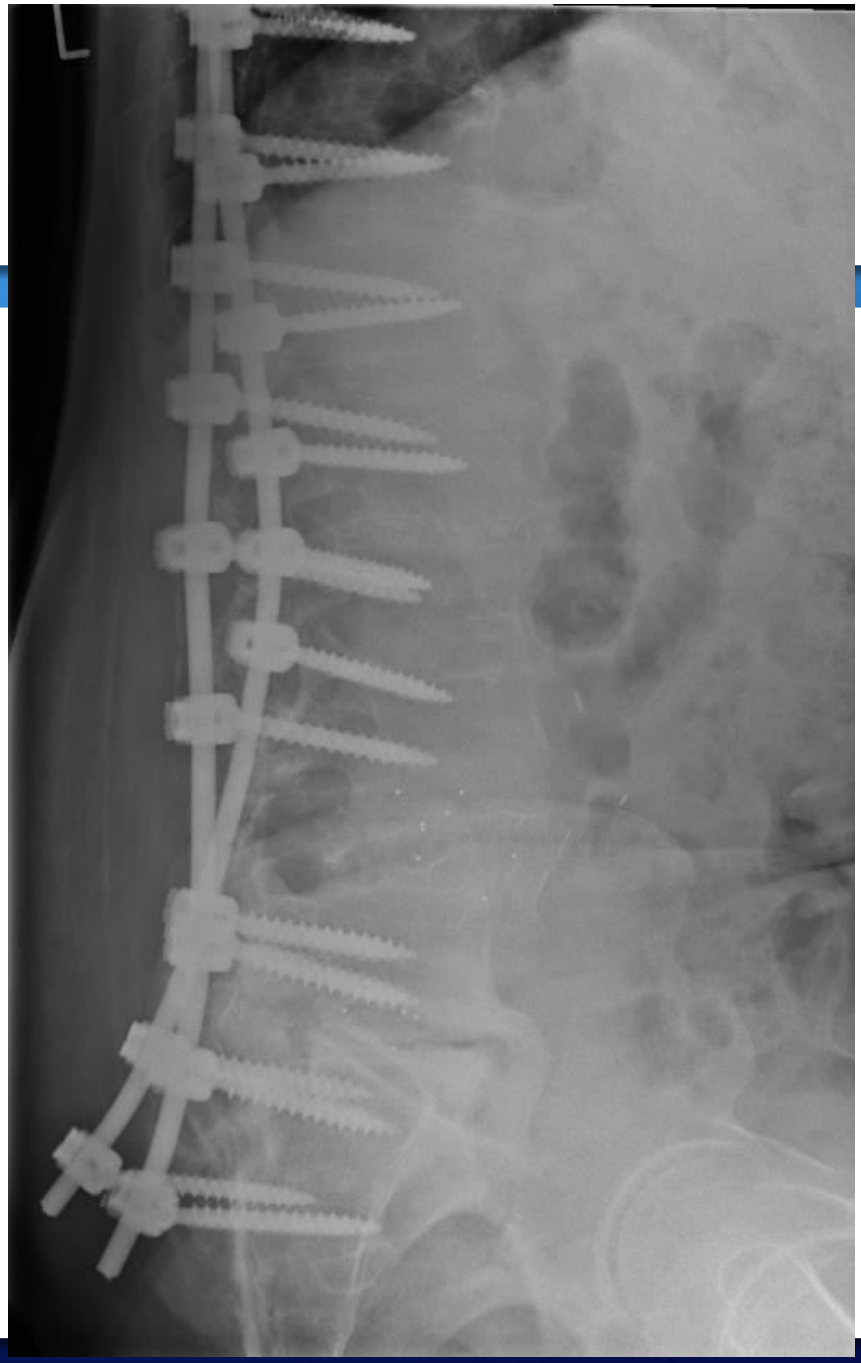

AP
ERECT


WT BEARING










<FlipH=YES><Rotate=180°>
R
PA ERECT
T


<FlipH=NO><Rotate=0°>
R
ERECT


ERECT
AP
R

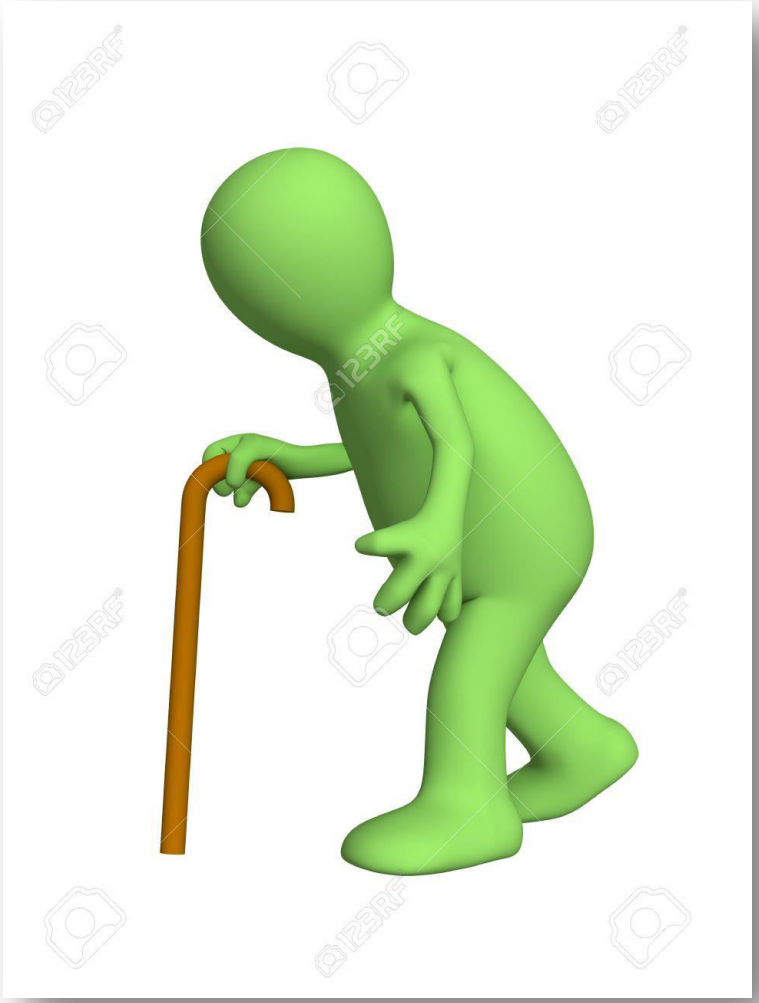

LATERAL
ERECT


R
L
PA
ERECT


R
ERECT

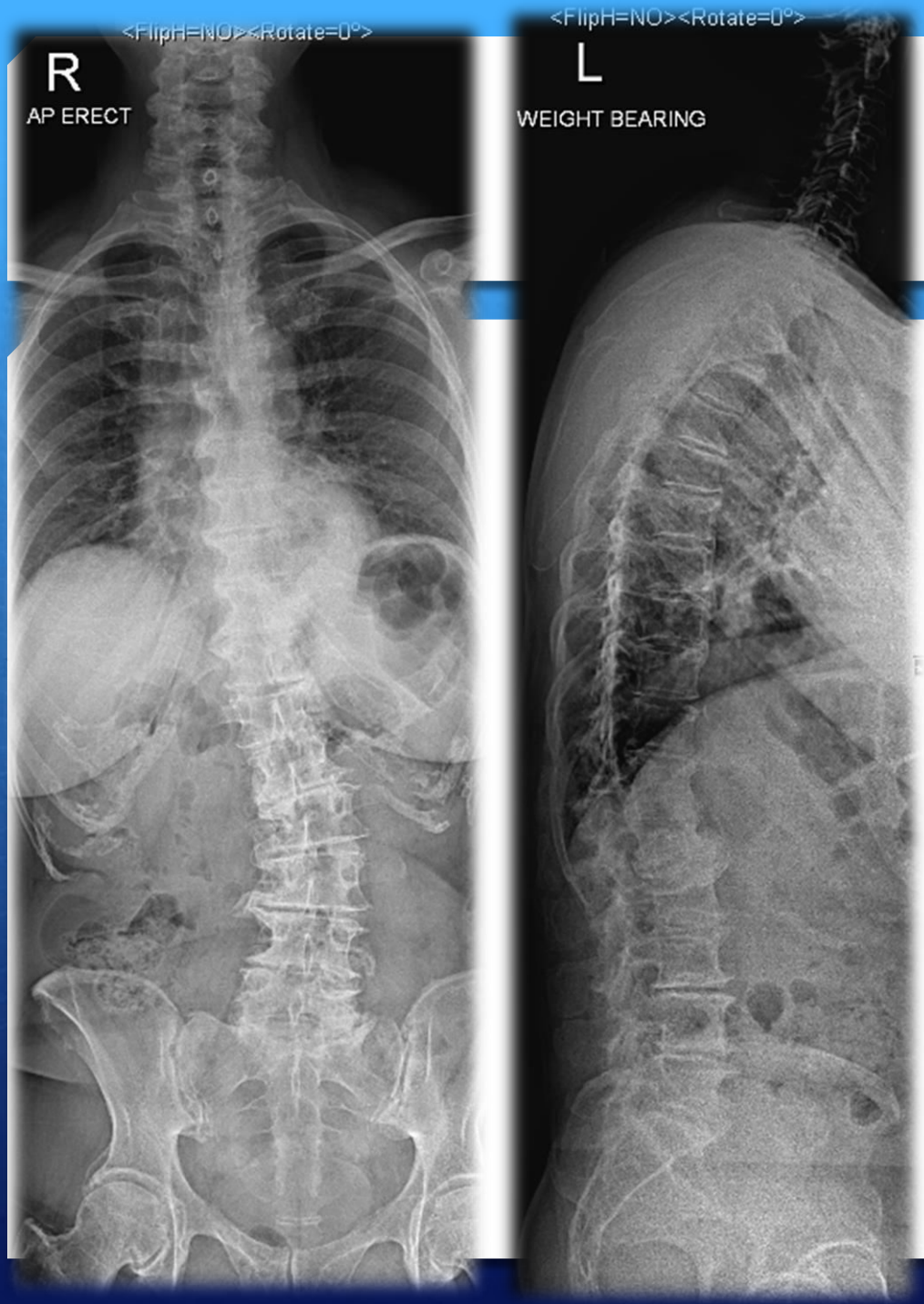
When to refer

- Unable to stand upright
- New ‘forward gaze’ issues
- Static or dynamic ‘stoop’
- Loss of ‘height’



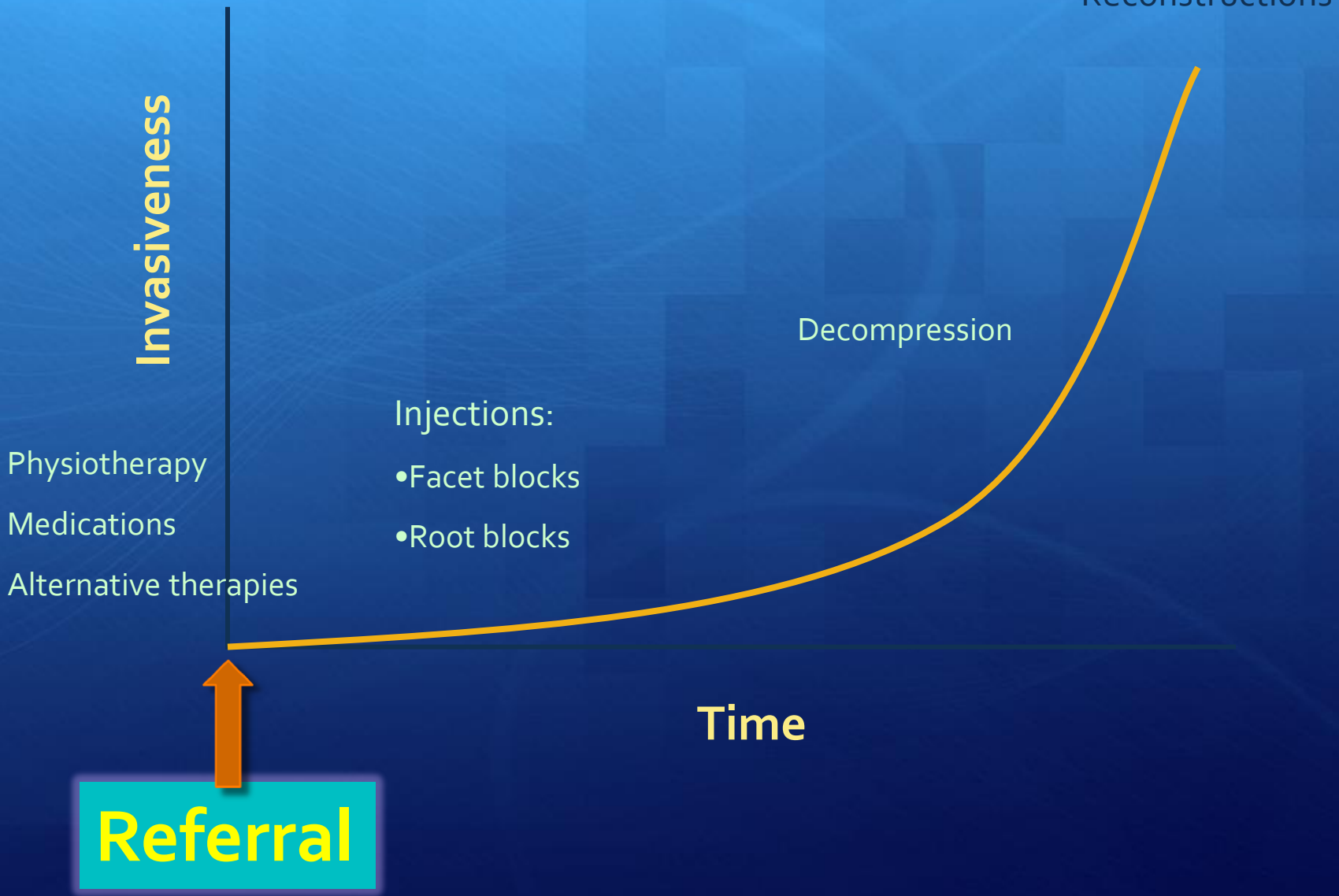
When to refer

- Axial back pain
- Radiation: thigh pain; claudication; groin pain
- Myotomal radiation
- Refer early……not all need surgery



- Active
- Back pain
- 'Leans over' after a long walk
- Difficulty in 'straightening up' when standing up from sitting

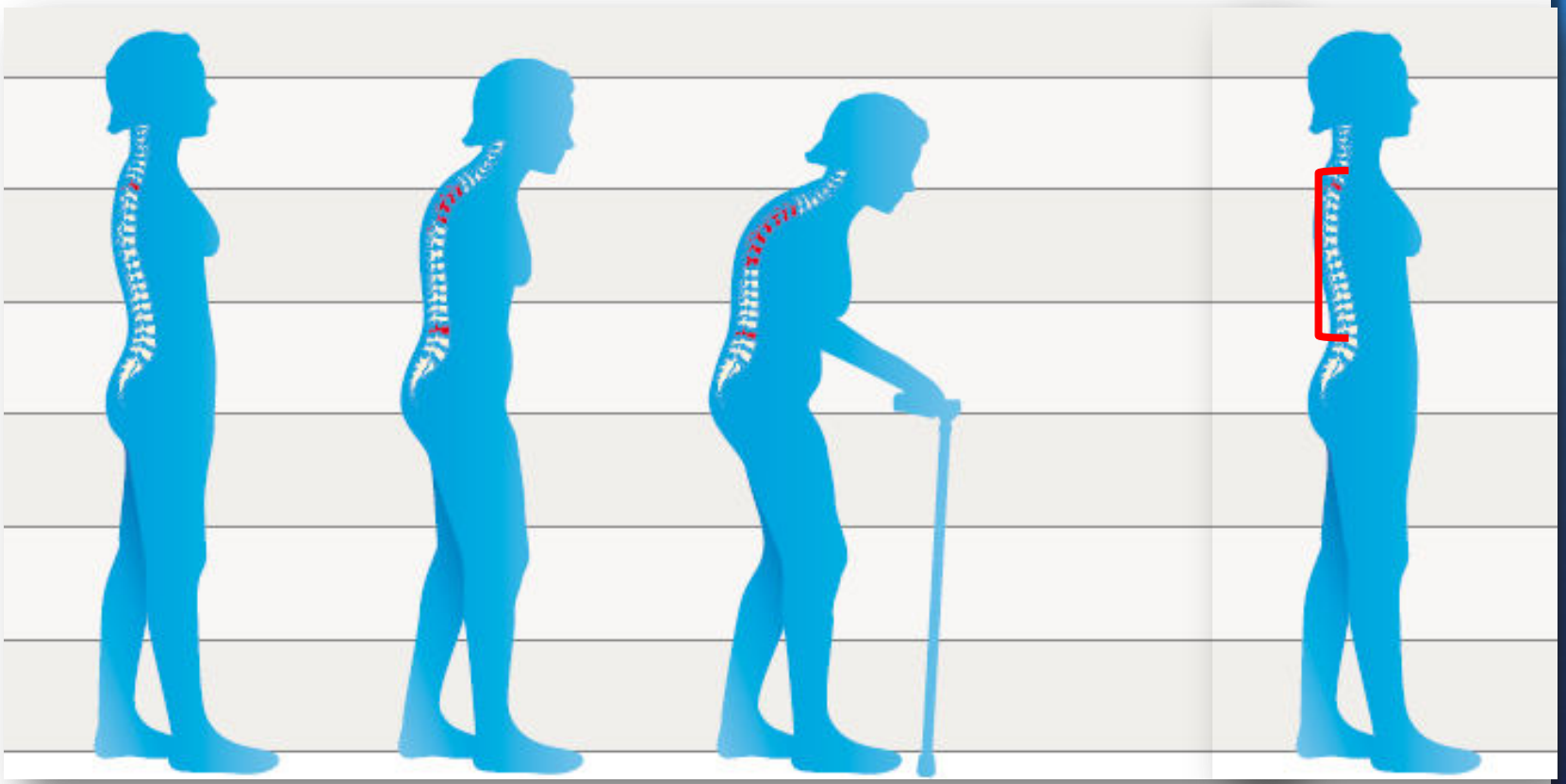
Clinical pathway



Never too early!

- Not everyone needs an operation
- Understanding expectations
- Tailor management
- Review over time

mehtaspine



BMI Healthcare

Serious about health. Passionate about care.