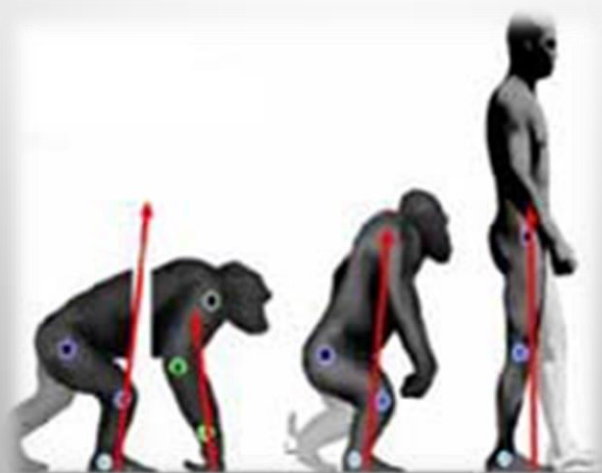
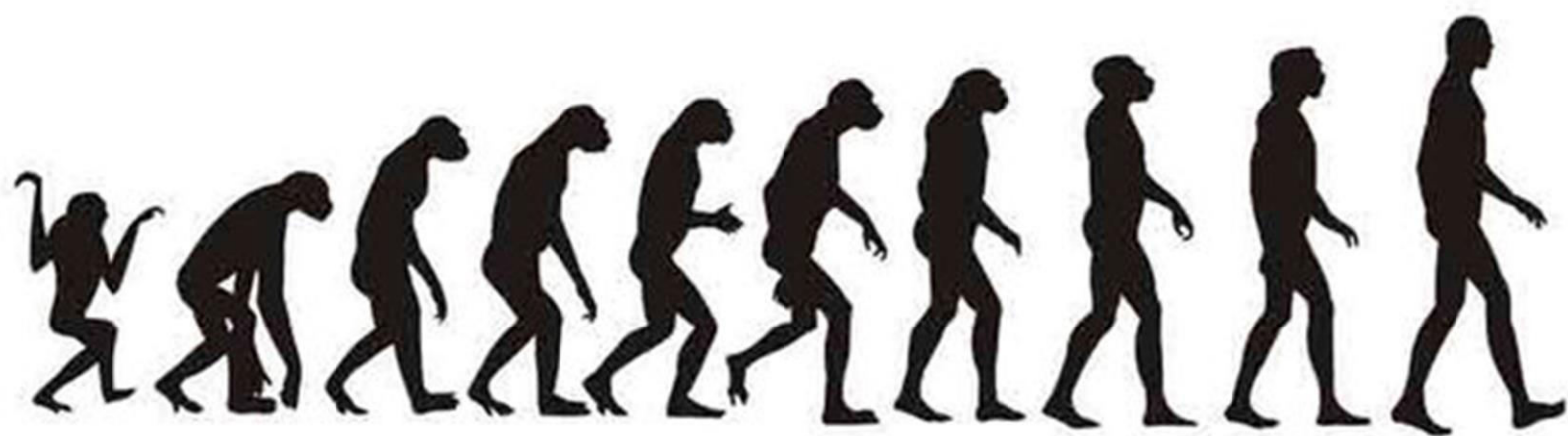




Standing tall: Spinal alignment in adult spinal deformities

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Consultant Spinal Surgeon
Royal Orthopaedic Hospital
BMI Healthcare



Life is a kyphosing event



Spectrum of pathology



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

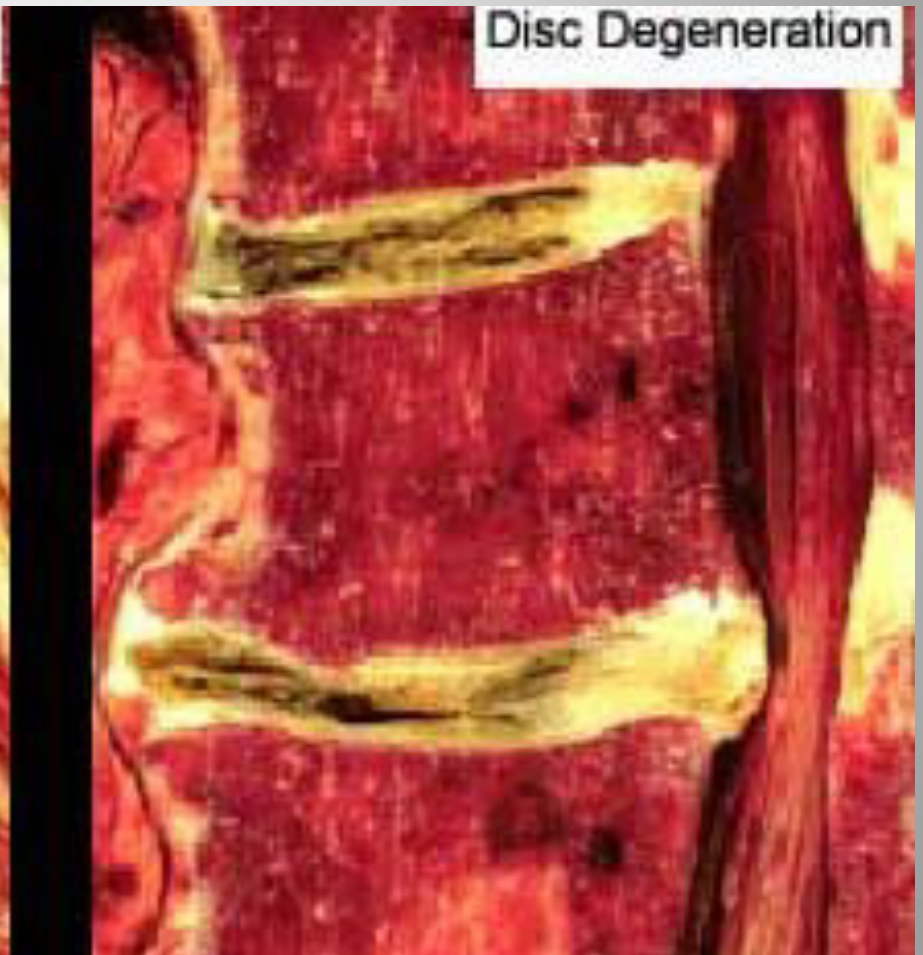


Outline

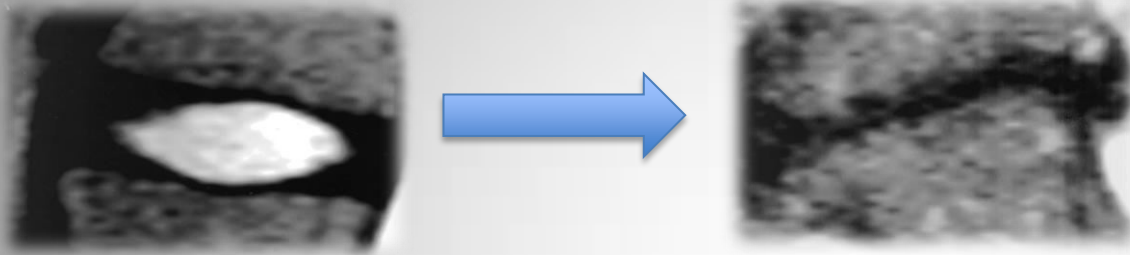
Standing tall by re-aligning the spine

- Consequences of advanced degenerative changes
- How do we measure the effects
- Case examples
- When to refer

Disc degeneration

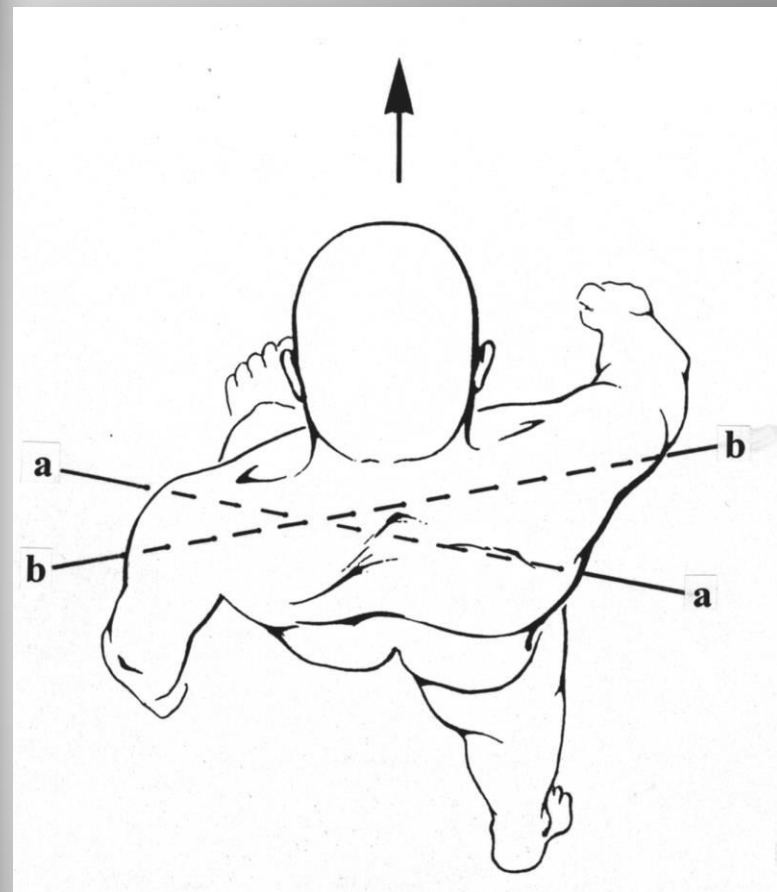
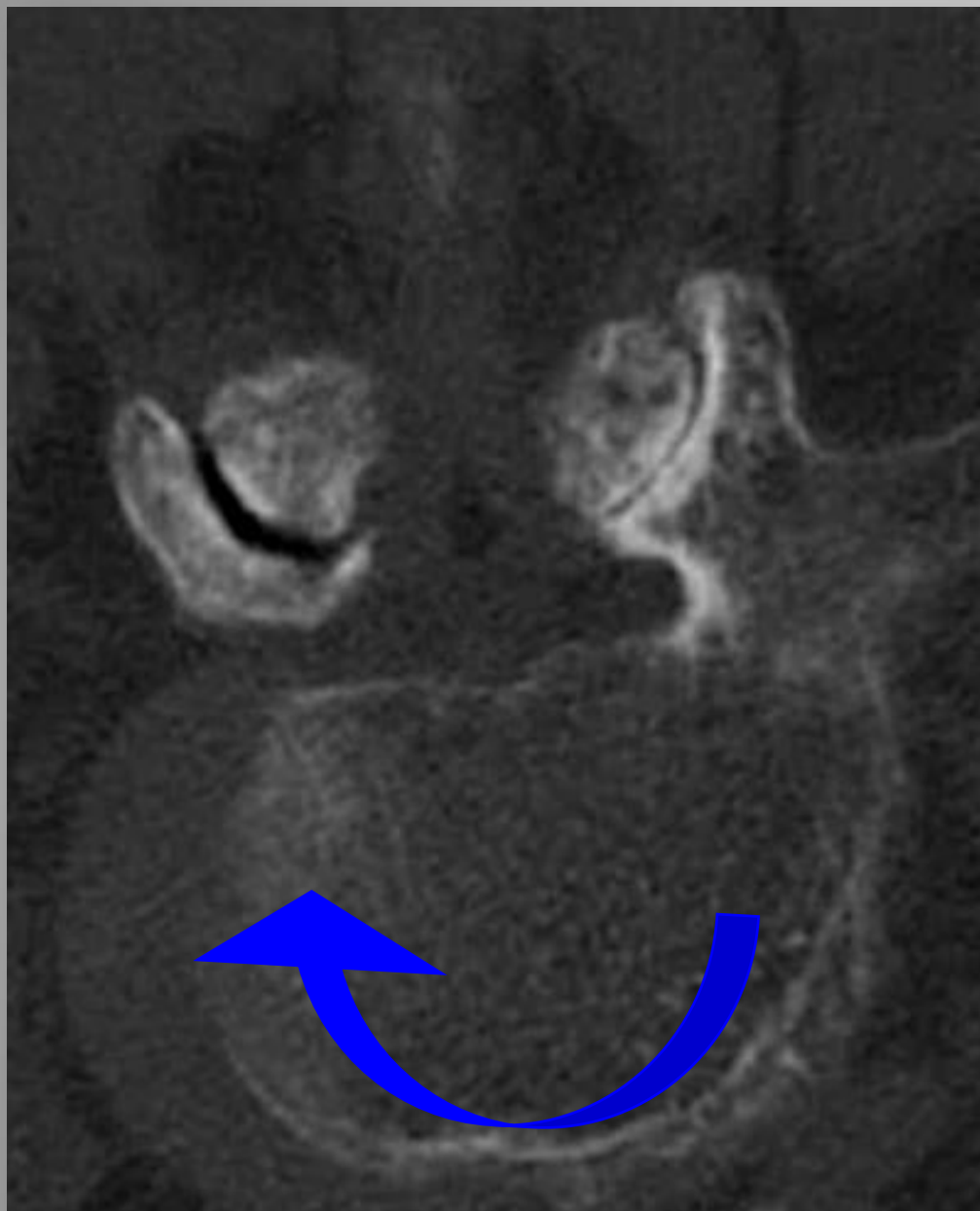


Changes in the 'motion segment'

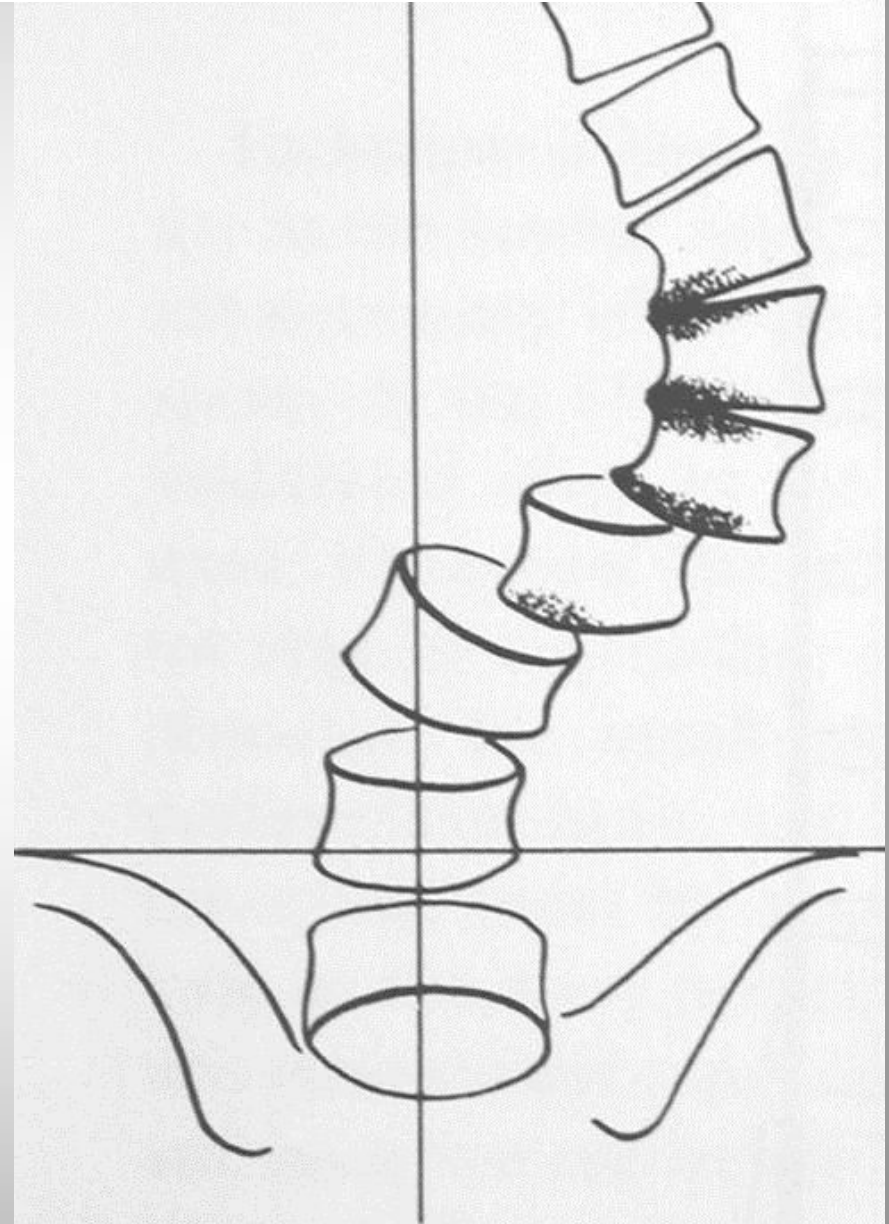


- resistance of the annulus to torque is reduced
- increased mechanical demand on posterior elements





The coronal plane deformity



The sagittal plane deformity



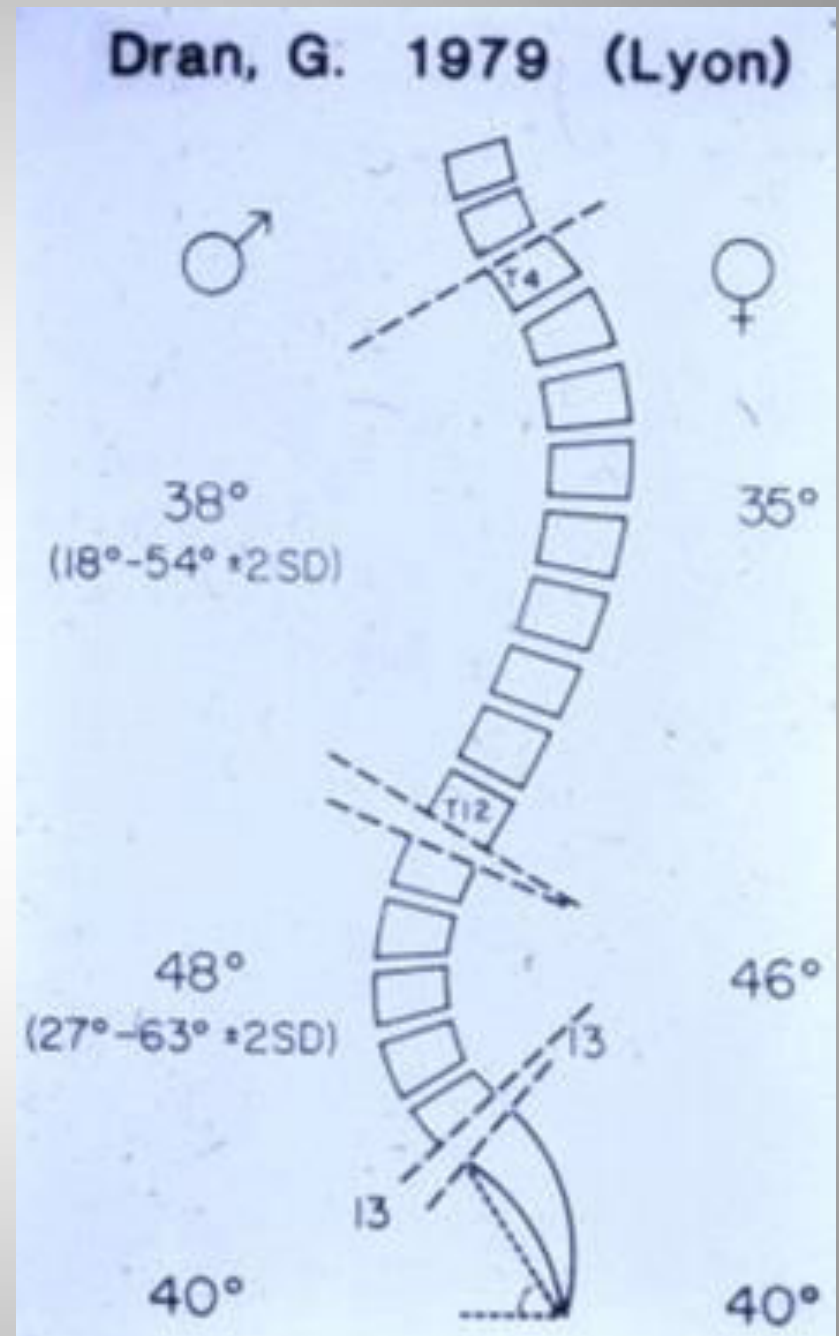


Thoracic kyphosis:

$$38^{\circ} \pm 18$$

Lumbar lordosis:

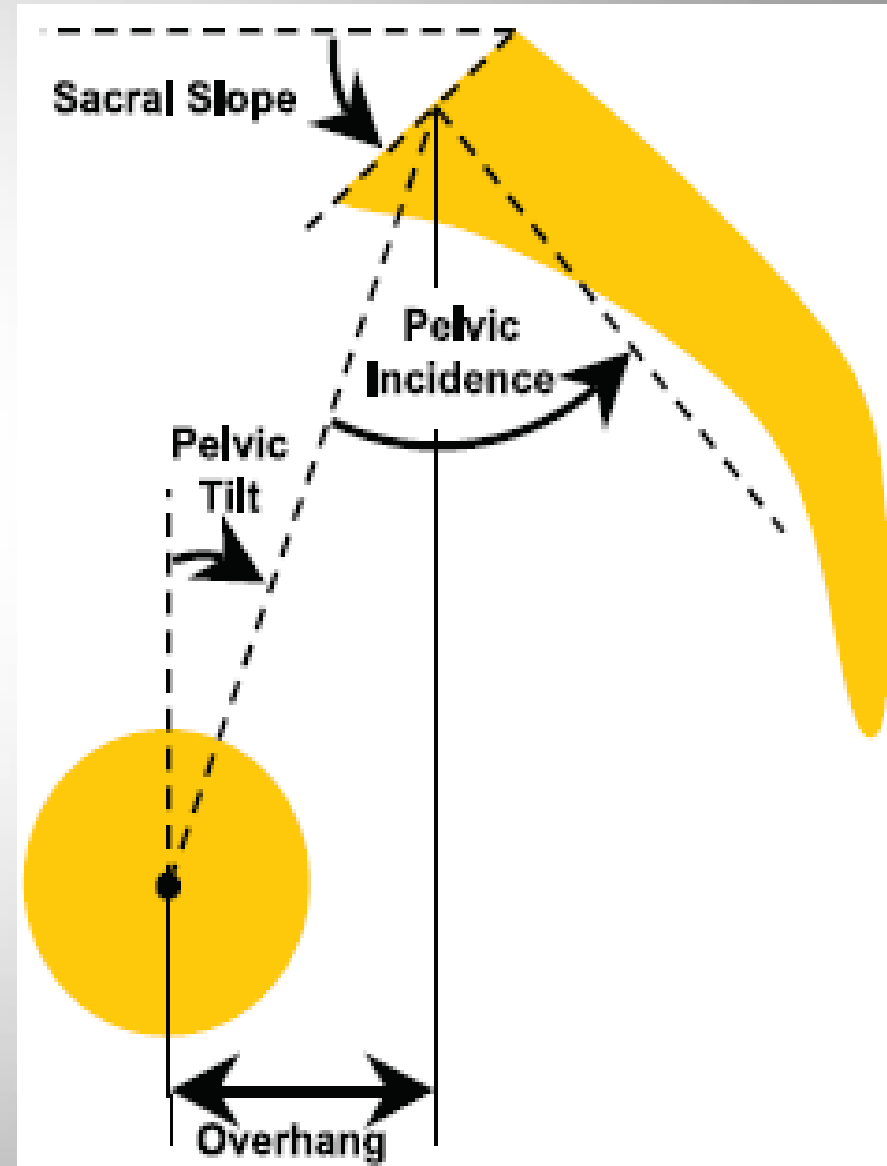
$$48^{\circ} \pm 18$$



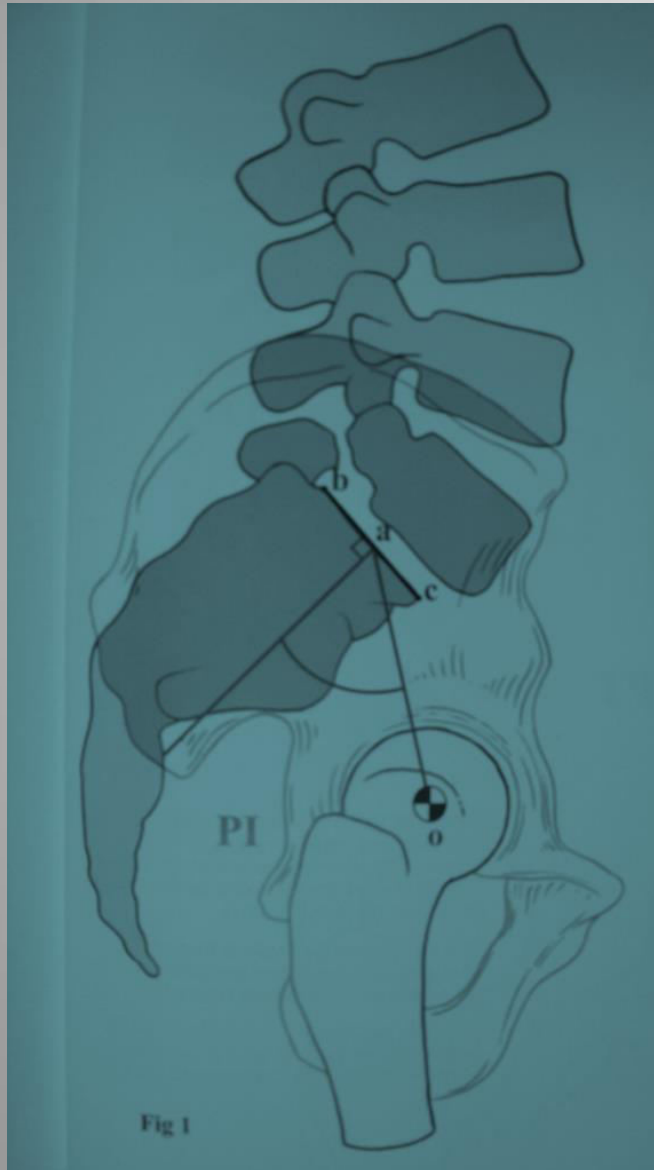


Pelvic measures

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

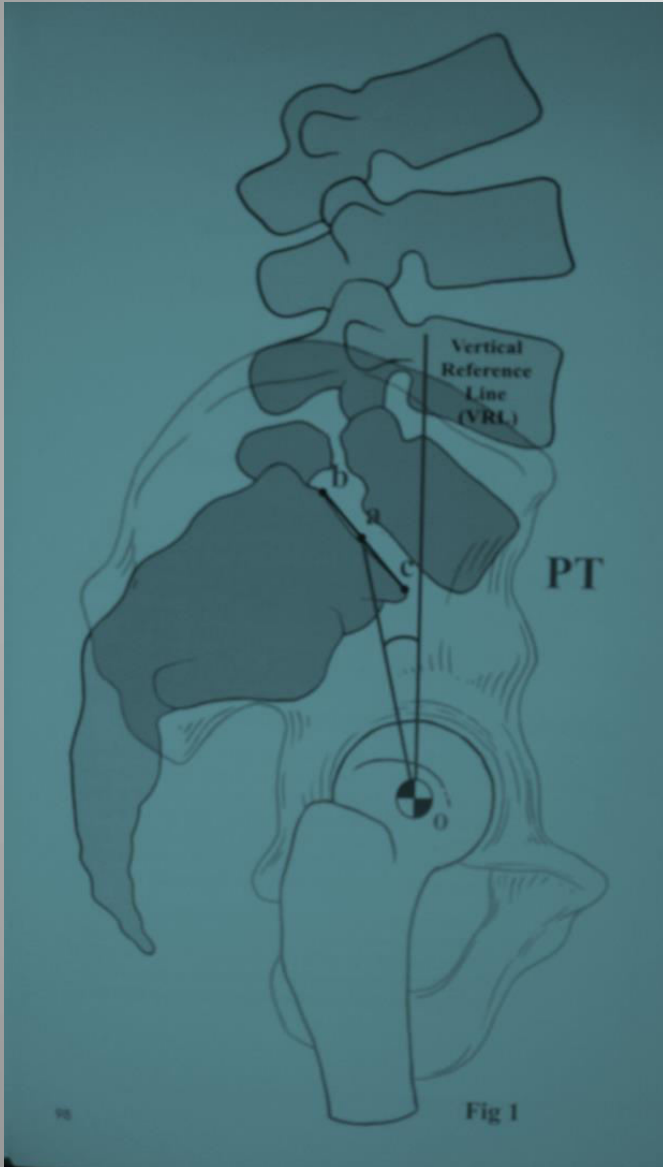


Pelvic incidence

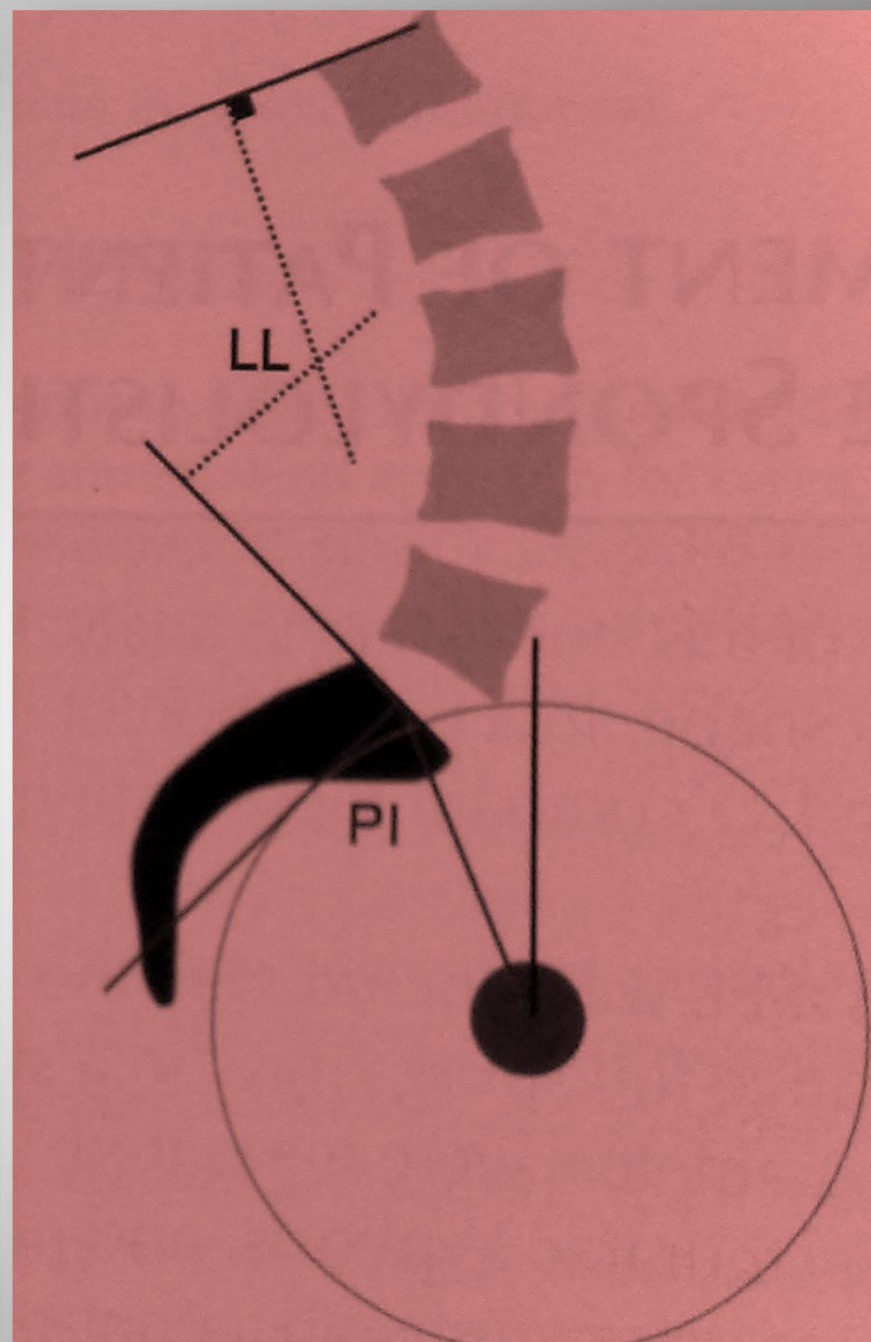
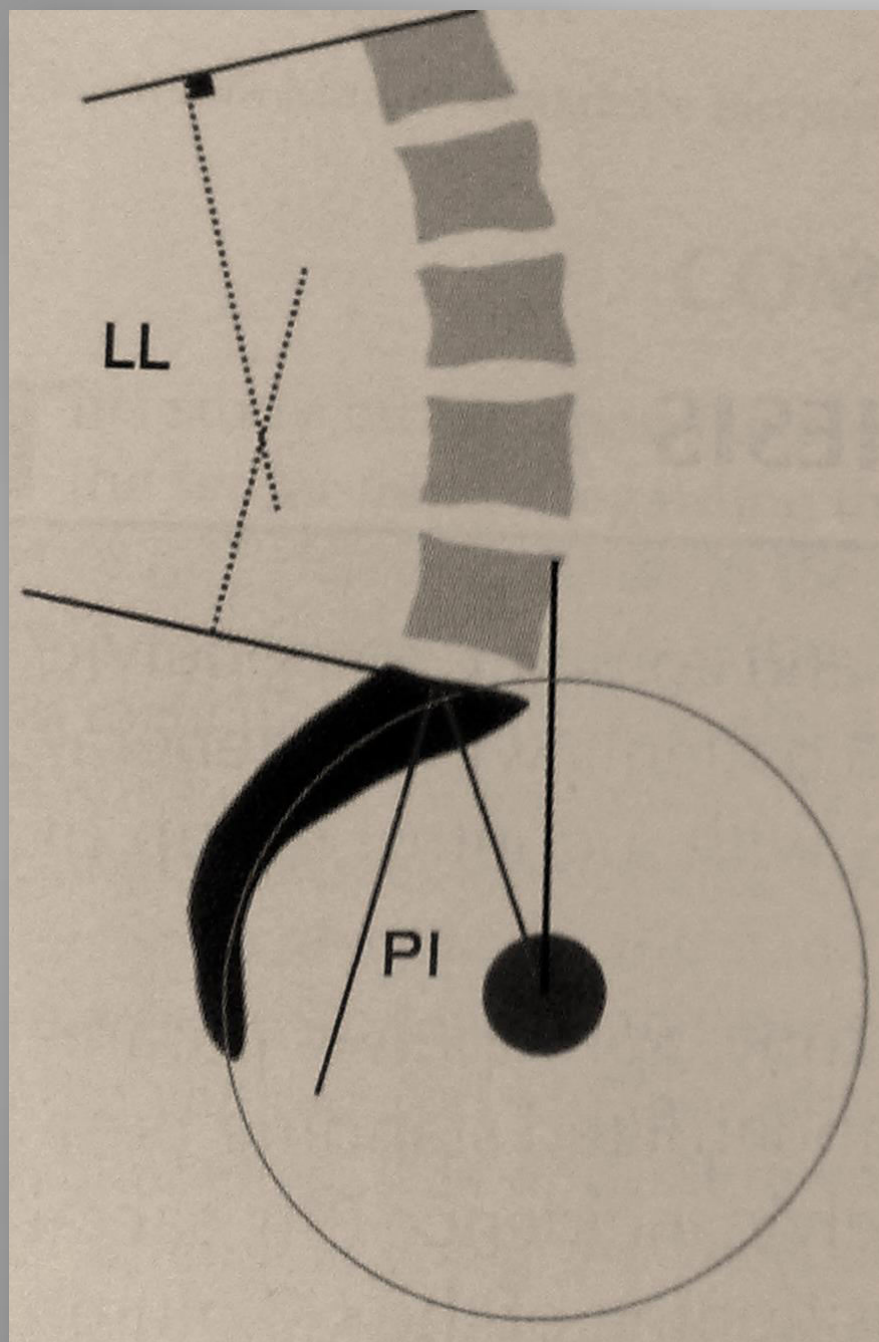


- Key parameter
- Perpendicular to:
the middle of the sacral end plate
mid-point of femoral heads
- $55^{\circ} \pm 10.6^{\circ}$ (Vialle JBJS 2005)

Significance of pelvic tilt

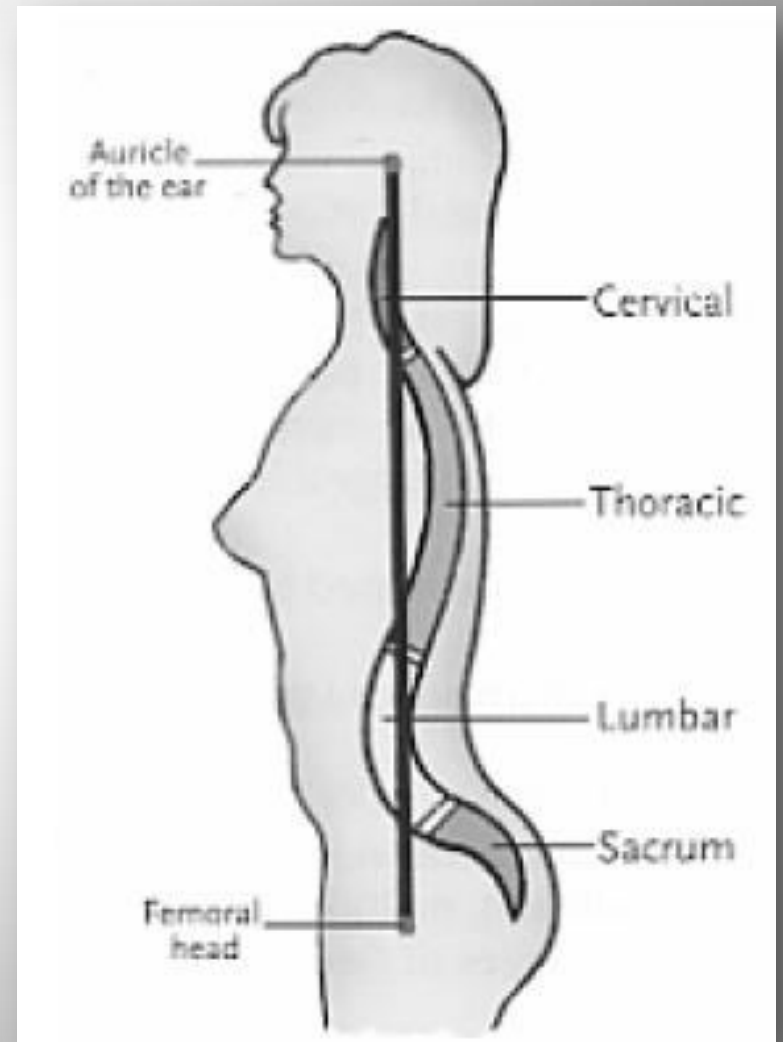
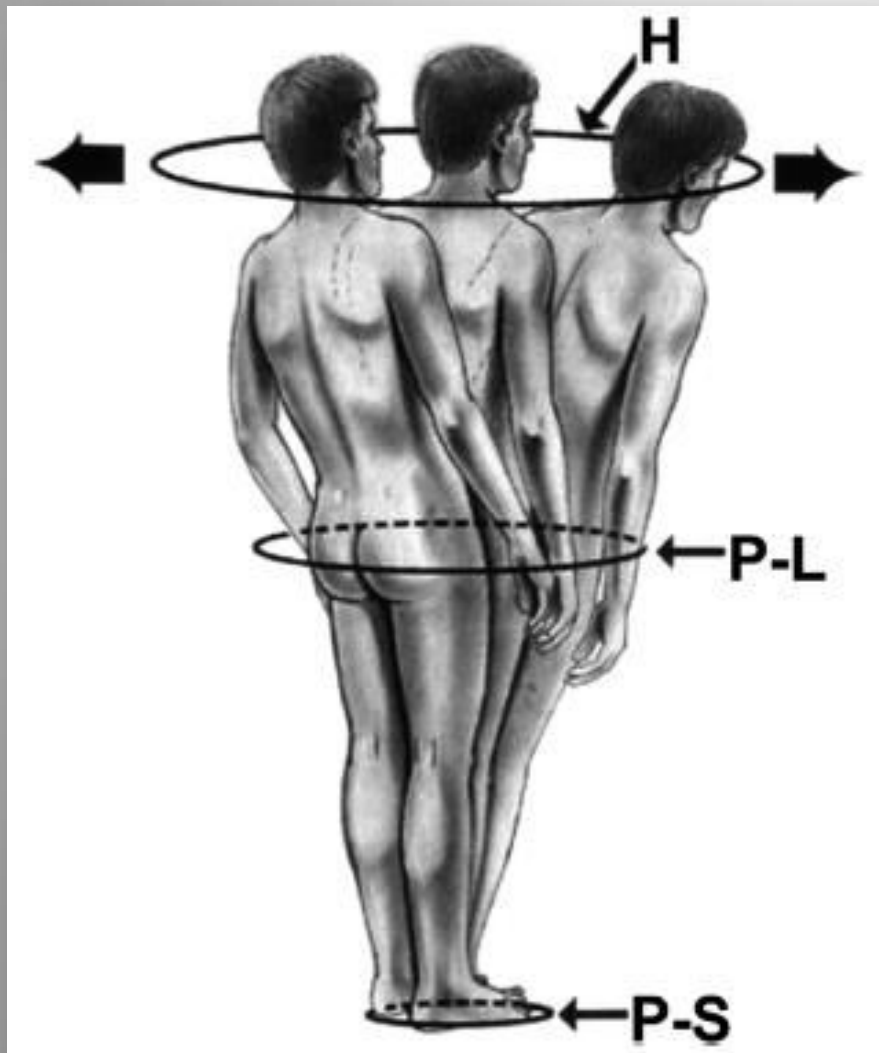


- Centre of gravity over LL
- Maintains sacral plate posterior to the hip
- Increases with age

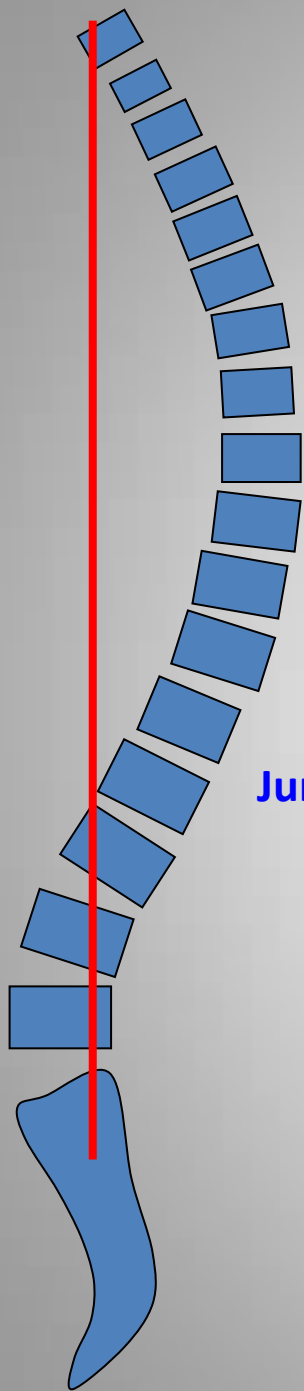


Cone of economy

J. Dubousset

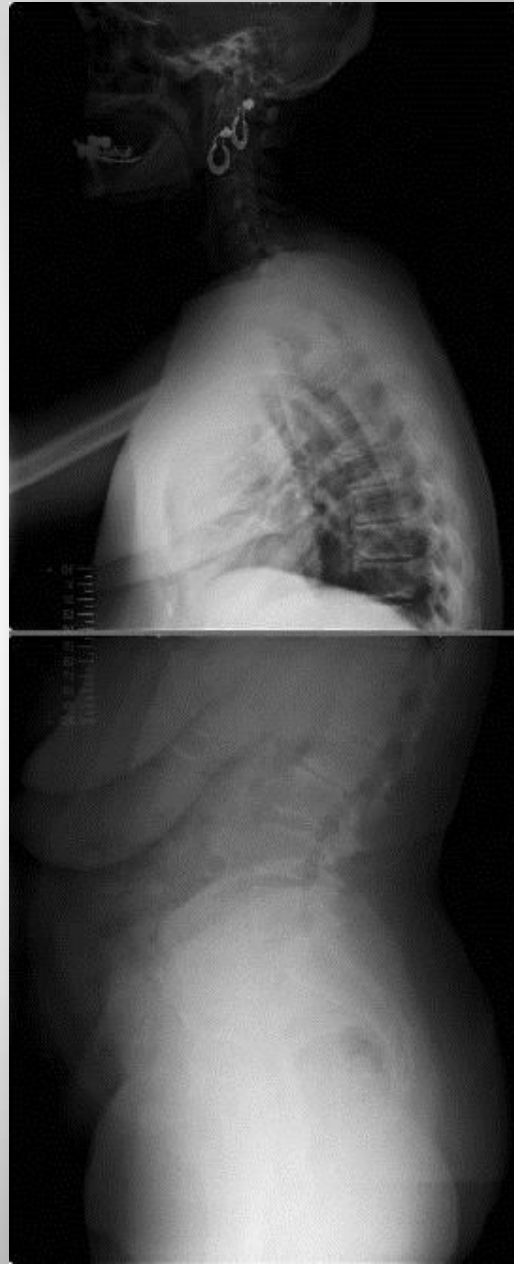


Type 1: Non-harmonious spine

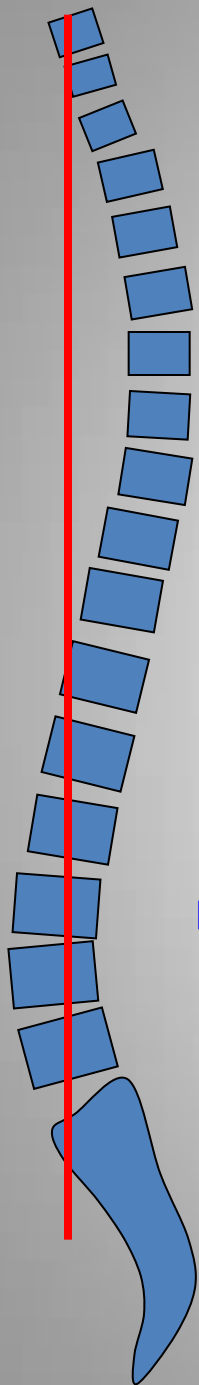


Thoraco lumbar disc

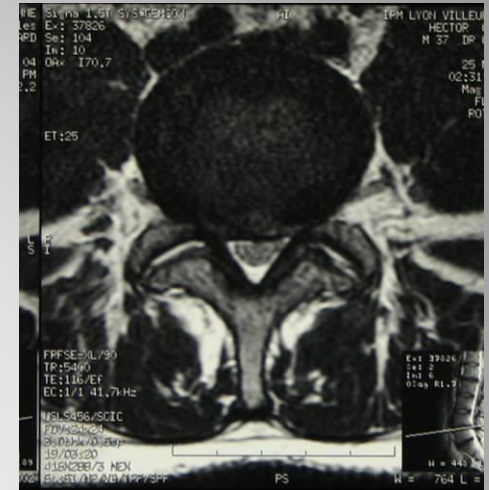
Junctional listhesis

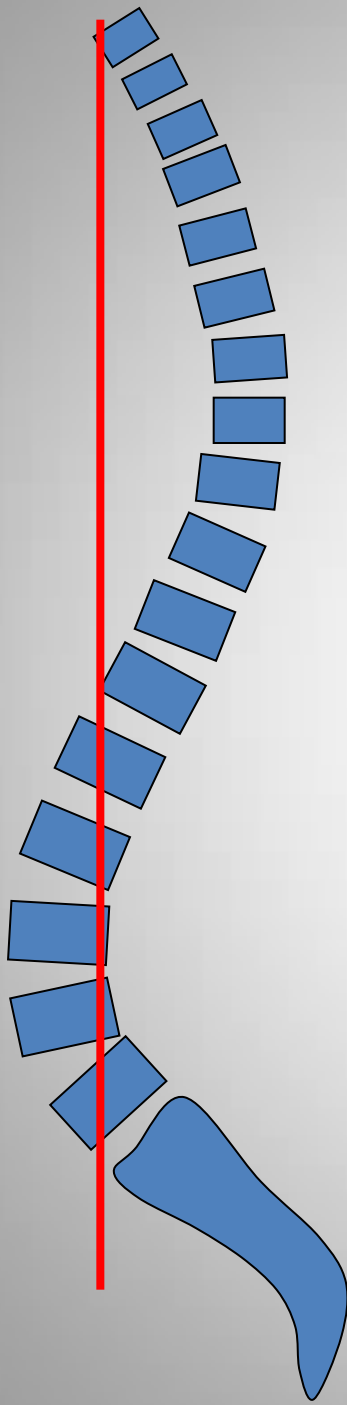


Type 2: Harmonious but Flat Back



Early disc degeneration

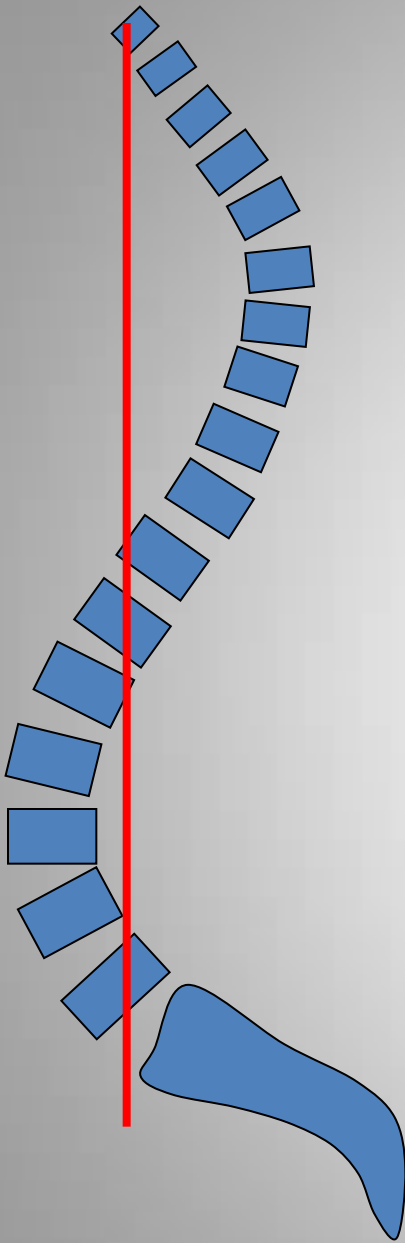




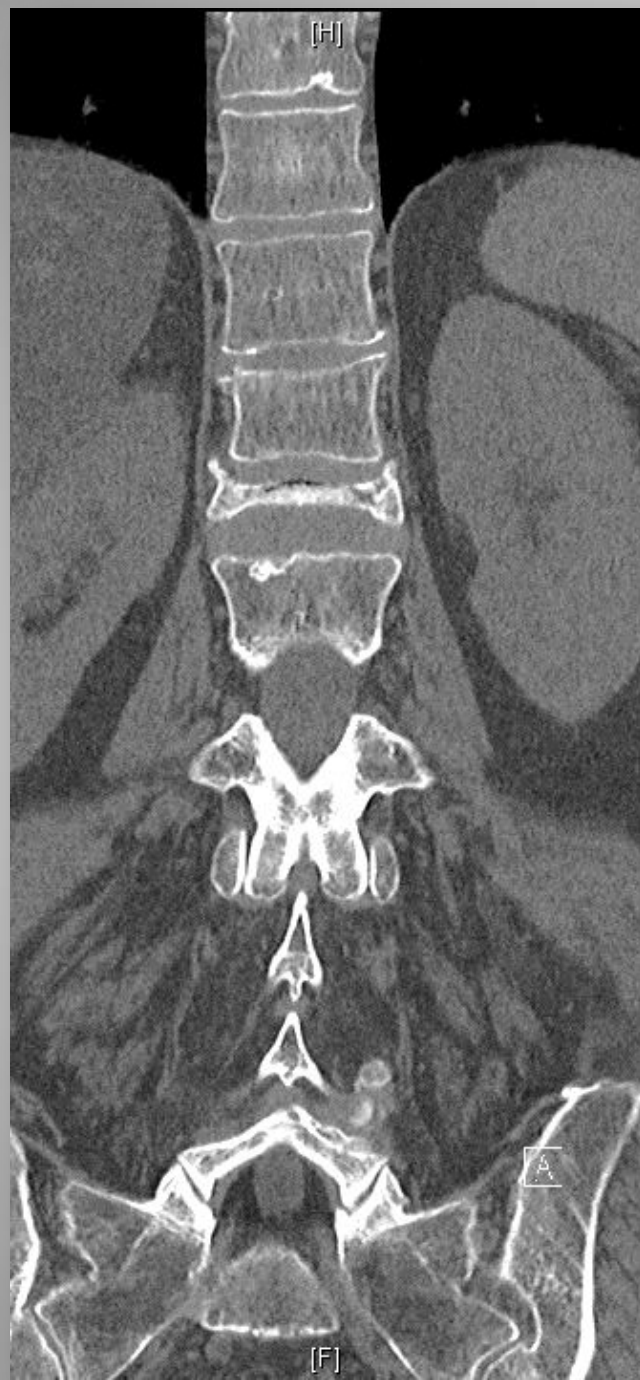
**Type 3: The most harmonious
("probably a good back")**

Type 4: Harmonious but hyper-curved.

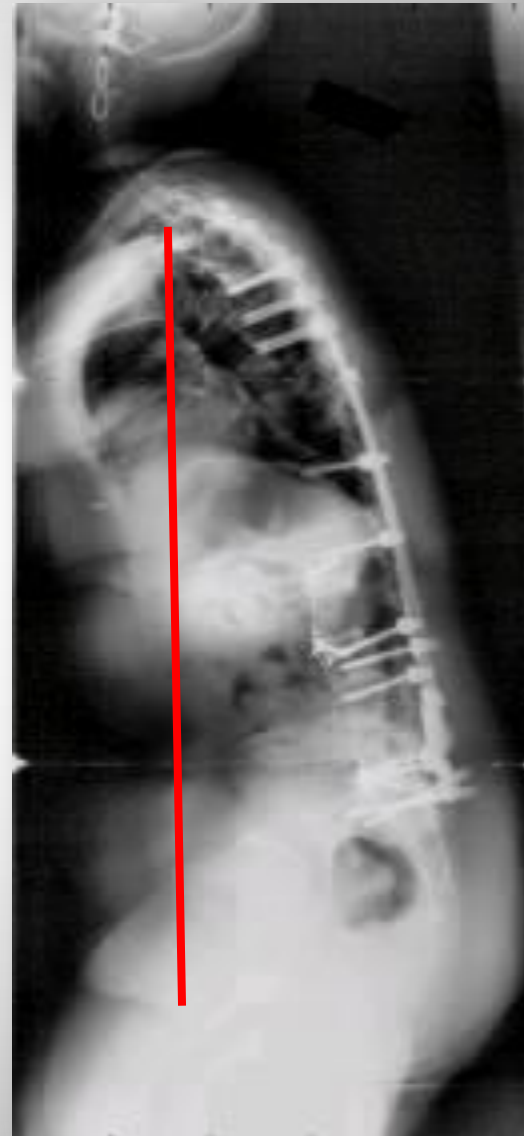
- When young: very strong
 - High PI
 - Good lordosis
- With aging
 - will lose lordosis
 - pelvic tilt increases to compensate for anterior imbalance



Lumbar stenosis + spondylolisthesis

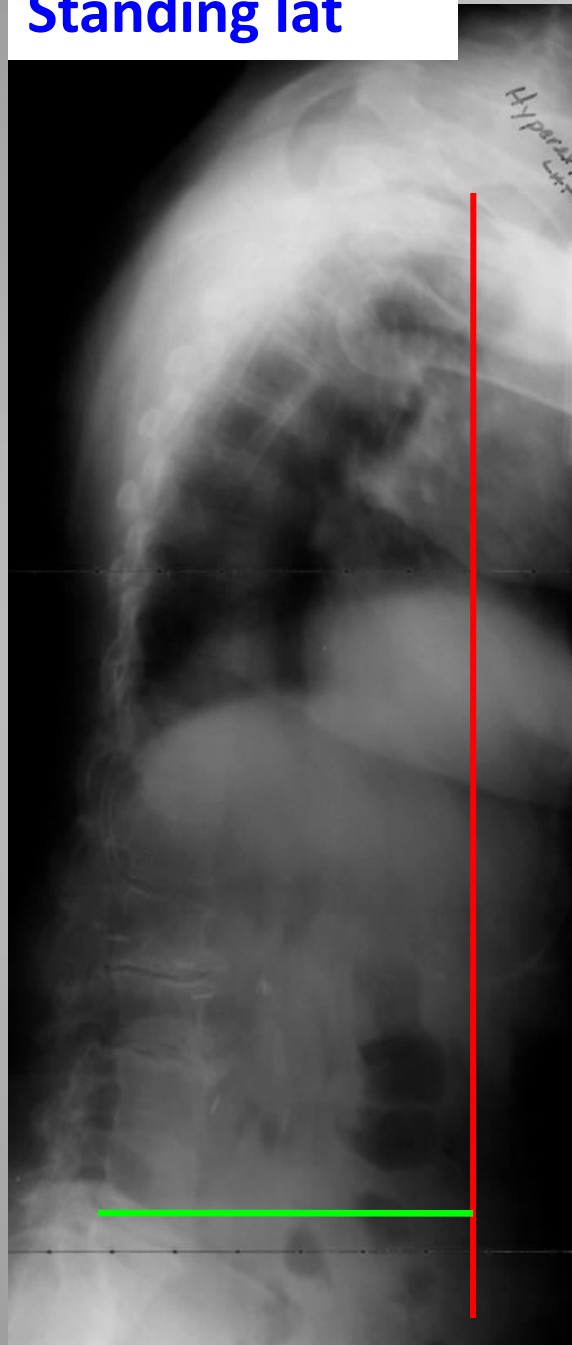


Fixed or flexible sagittal deformity



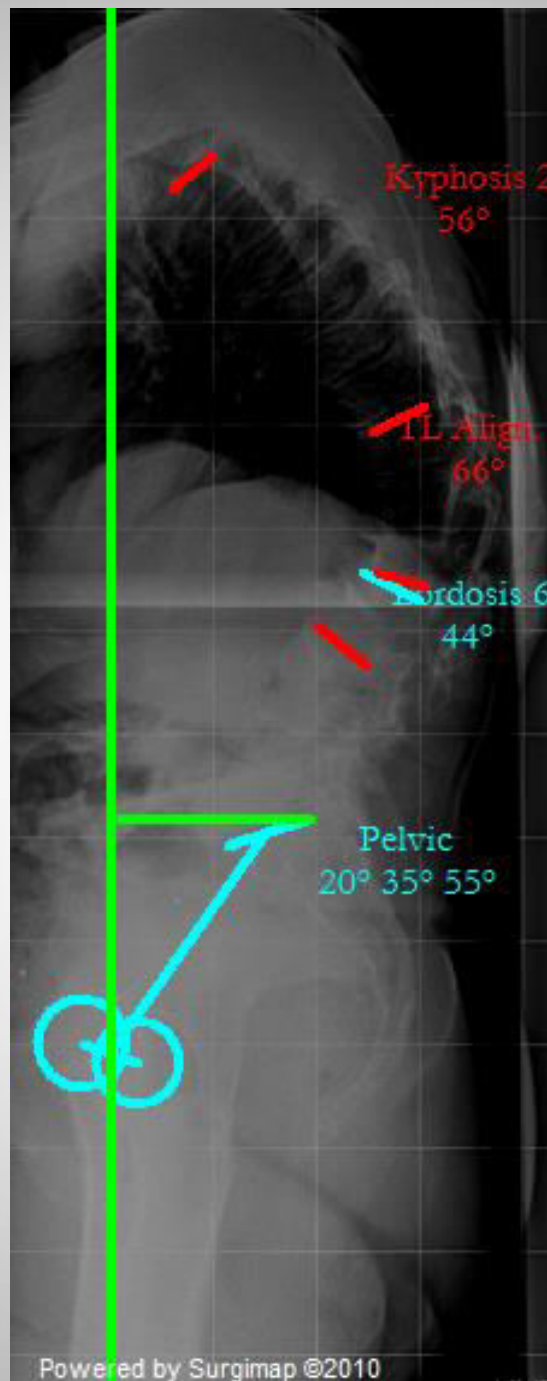


Standing lat



Hyperext lat





59 / F

AP Cobb 26°

CSL 7 cm

Pelvic:

PI 55°

SS 20°

PT 35°

LL 44°

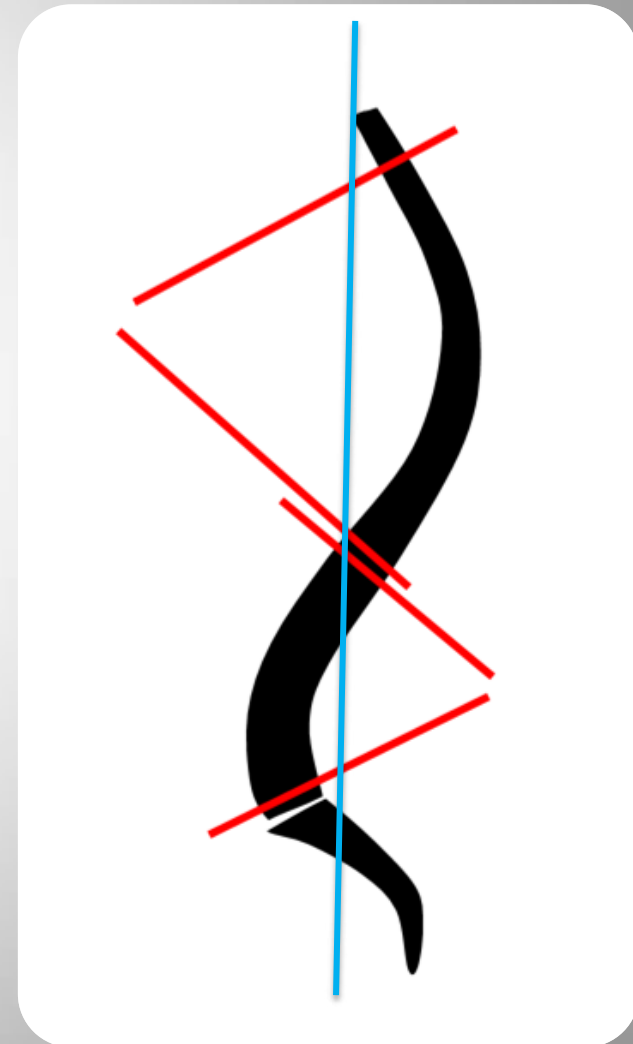
TL 66°

TK 56°

SVA 11 cm

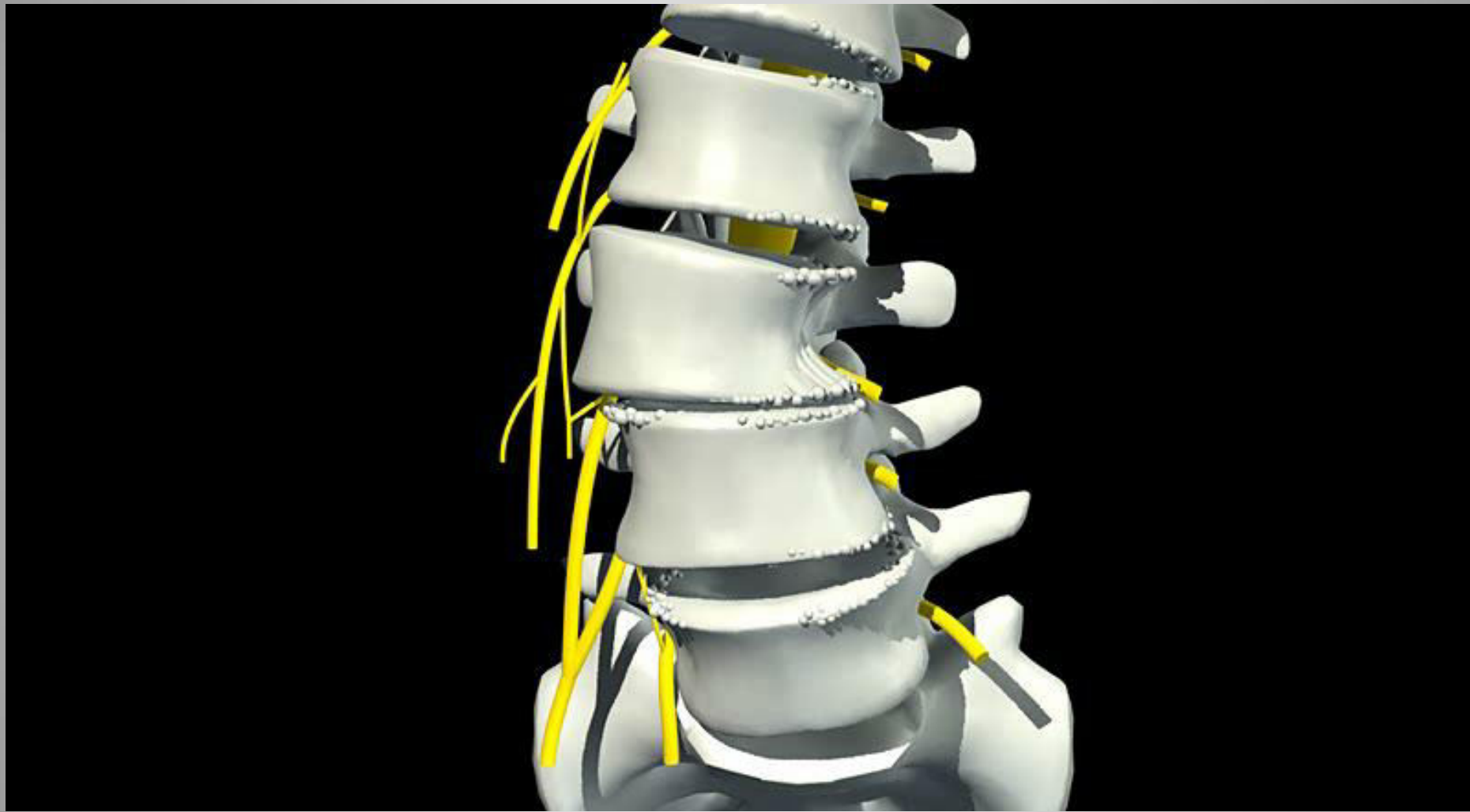
Aims of intervention

- Restore the lordosis
- Restore the plumb line
- Restore the 'curves'



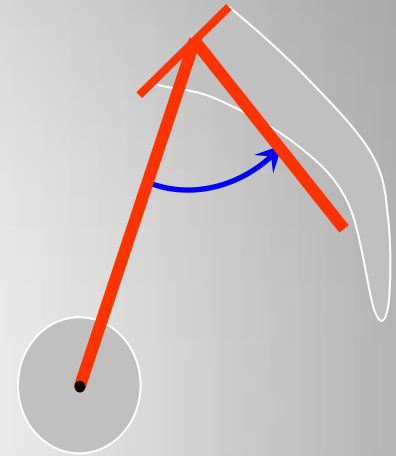
Adult Deformity: Surgical goals

- 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



$$LL=PI \pm 9^{\circ}$$



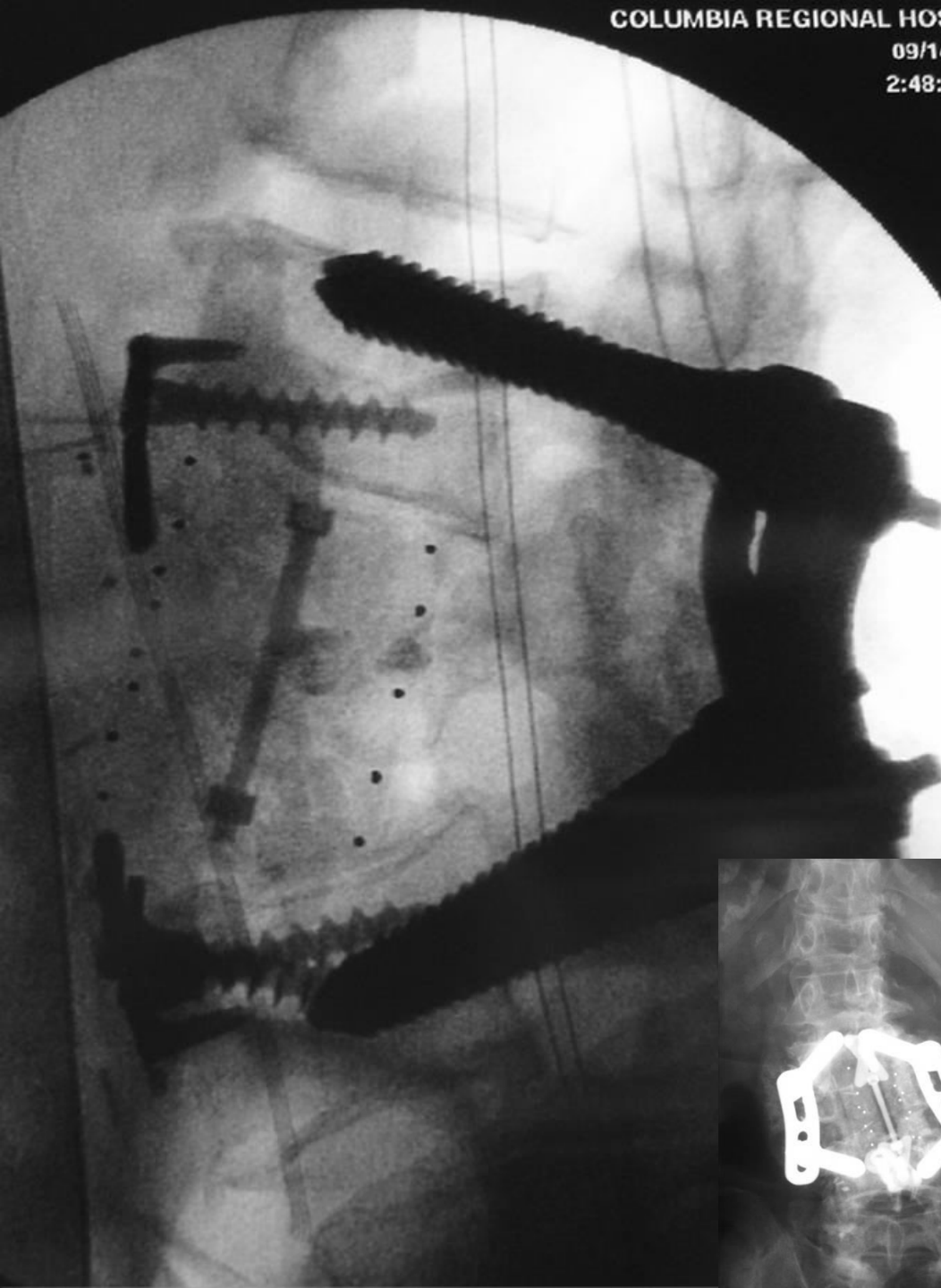
Surgical reconstruction: Adult Deformity

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





MM
86Y



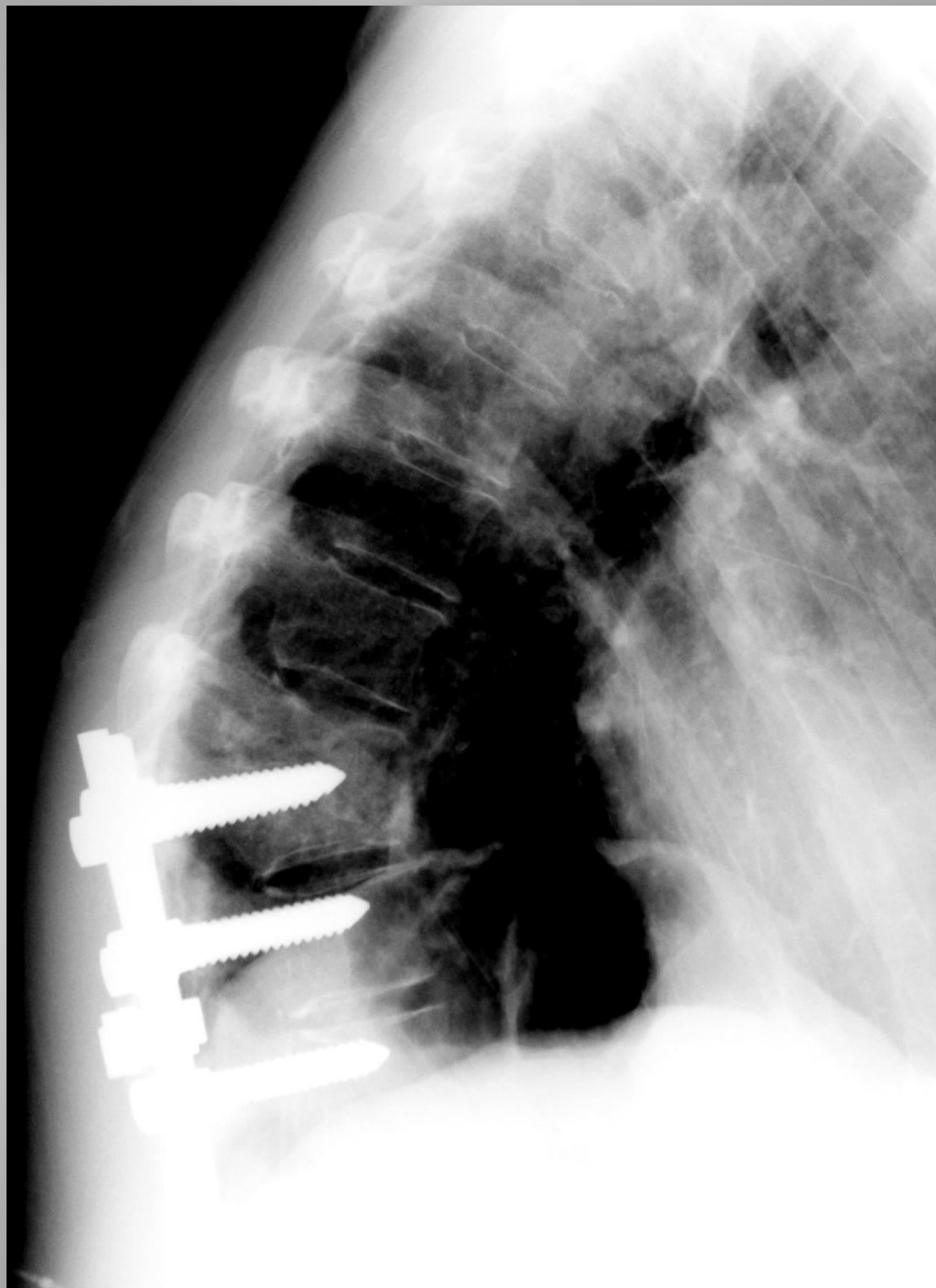


18 1:54PM

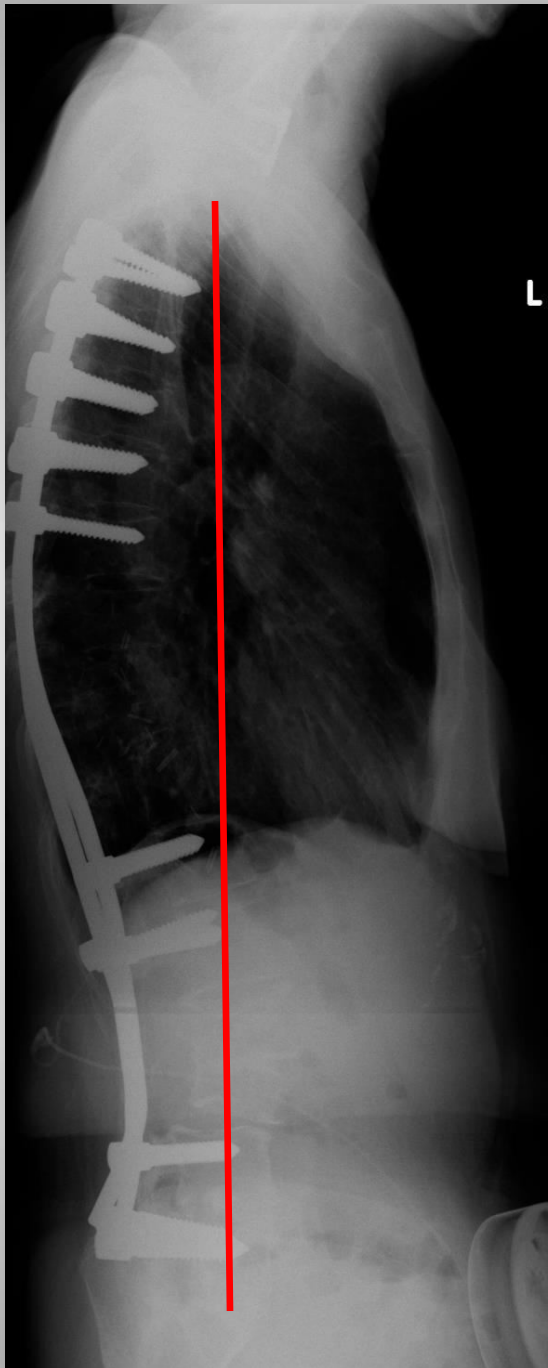


Problems

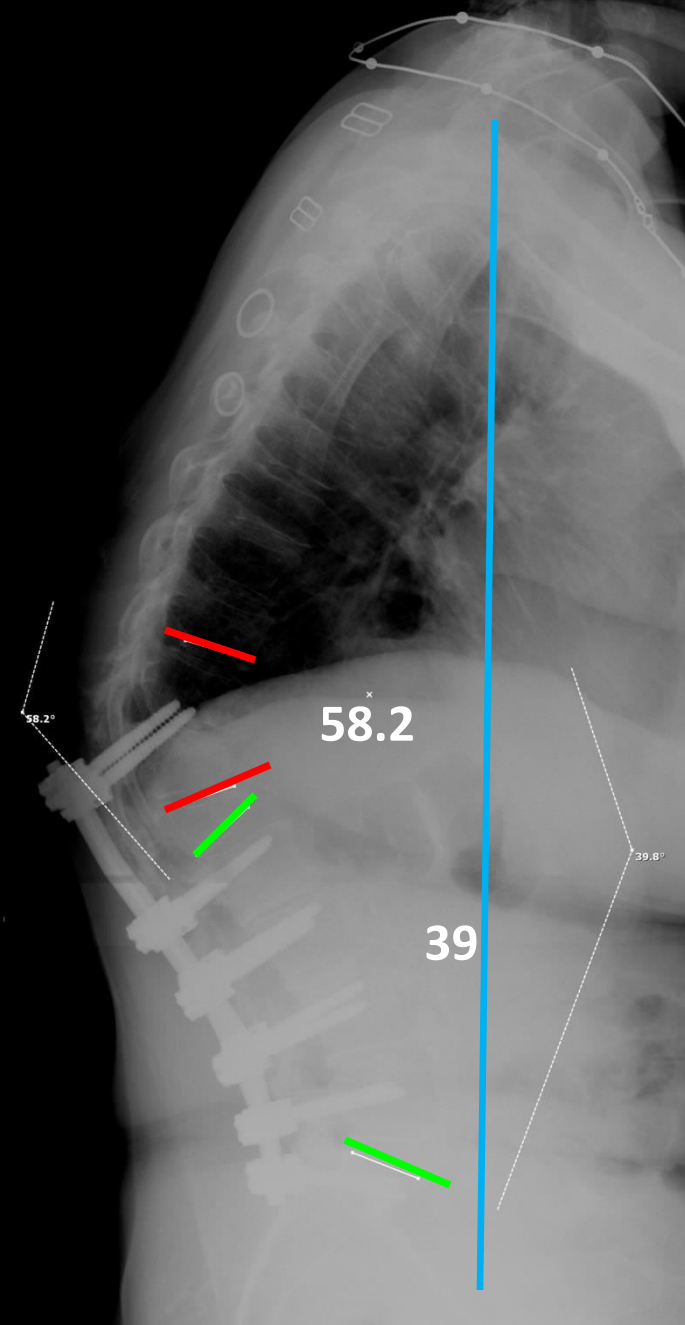
- Realistic expectations
- Medical co-morbidities
- Osteoporosis
- Junctional problems



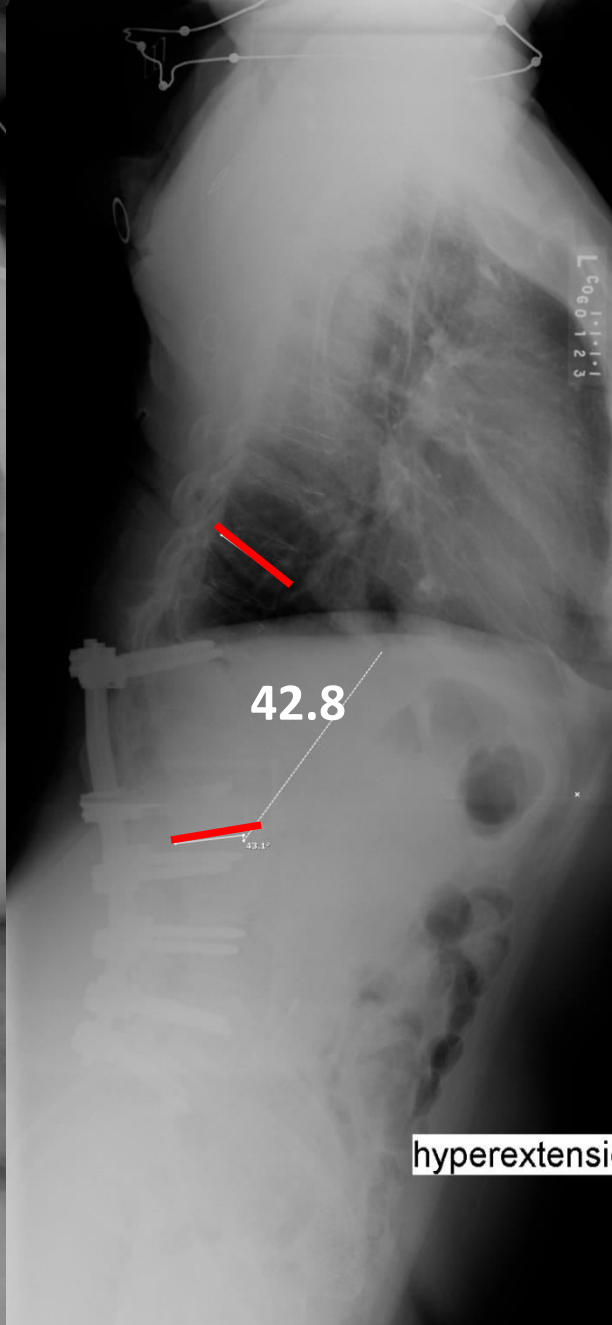




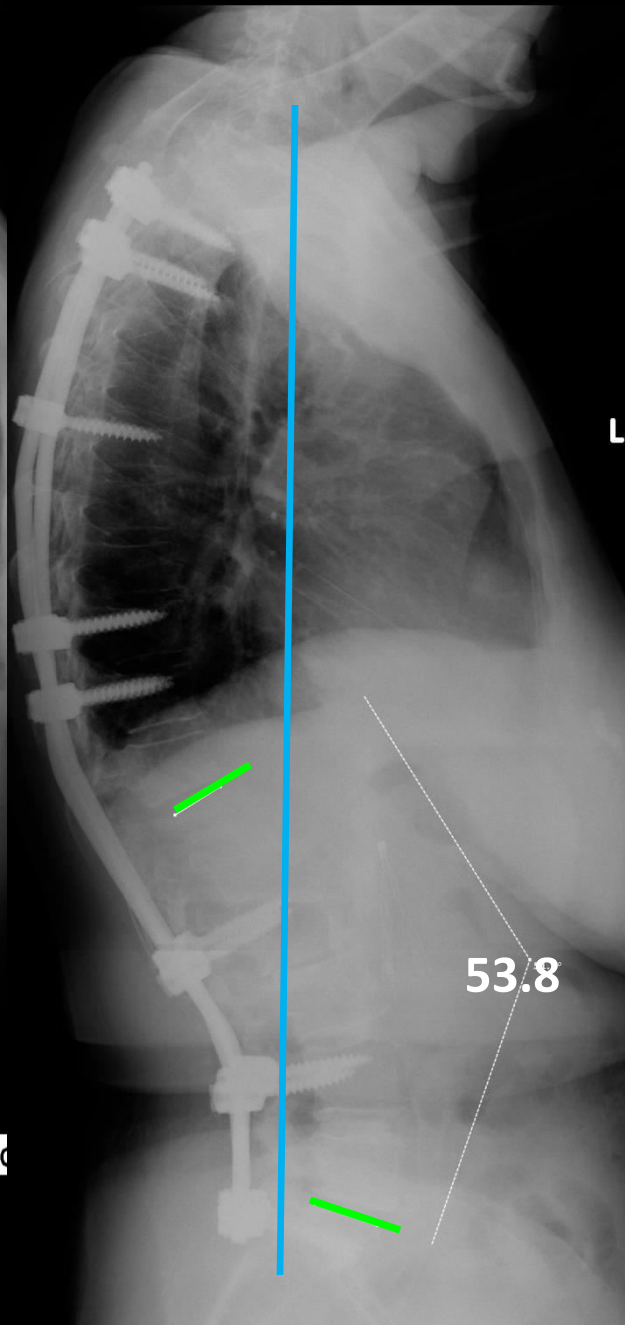




Pre-op standing lateral



Hyper-extension lateral

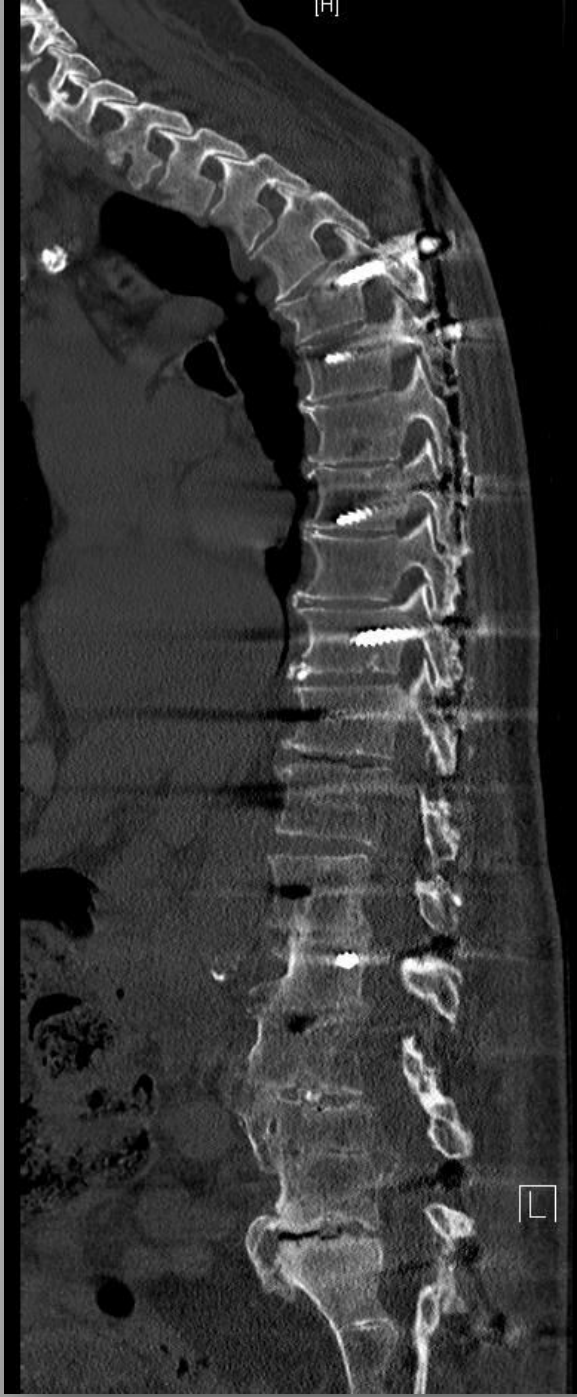


Post-op standing lateral

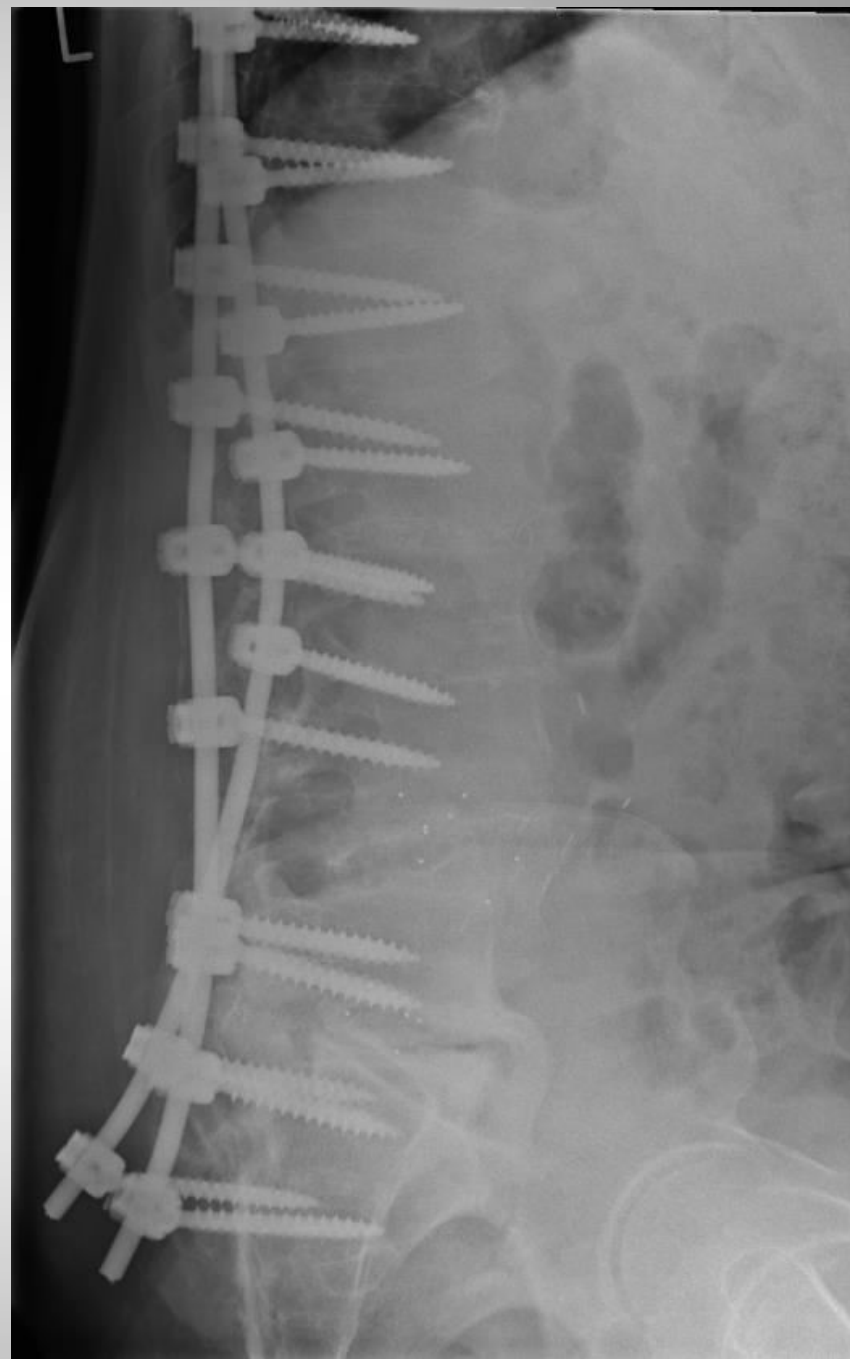
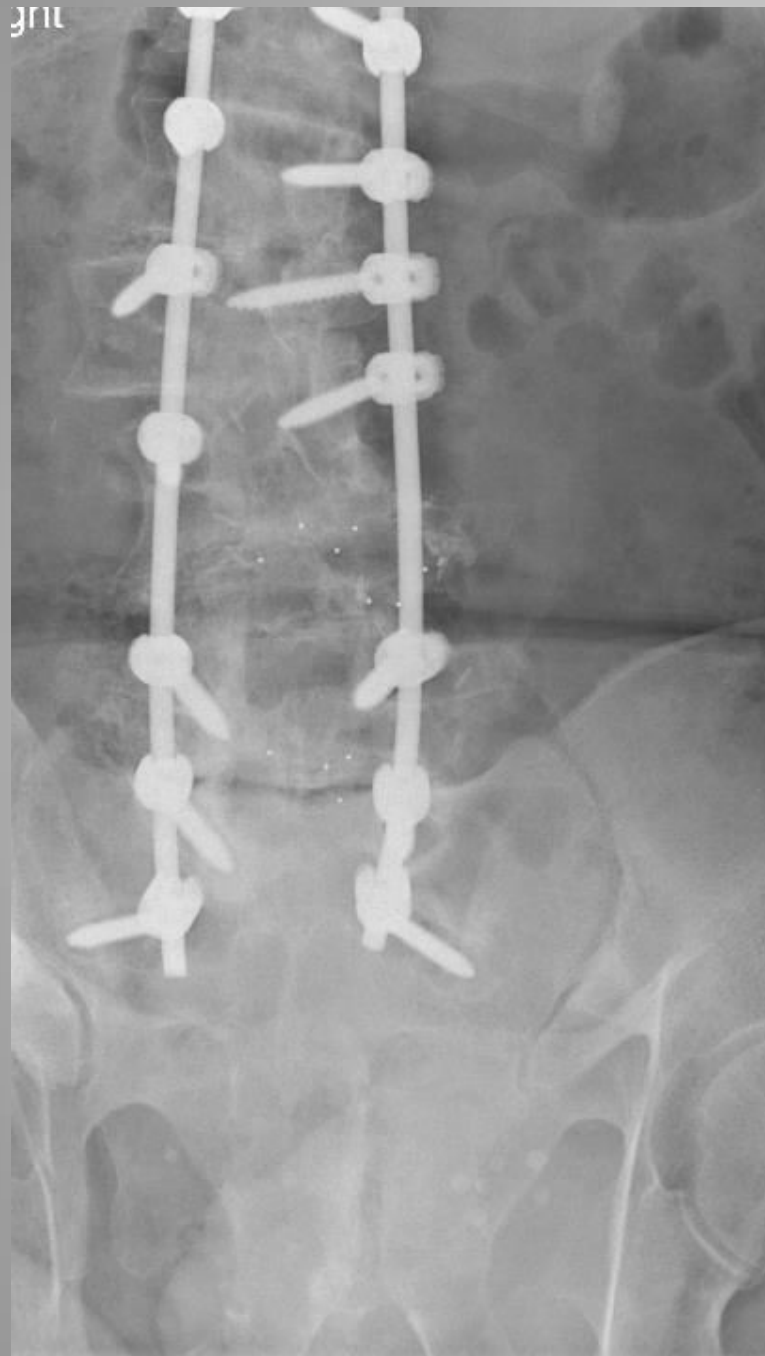








3111

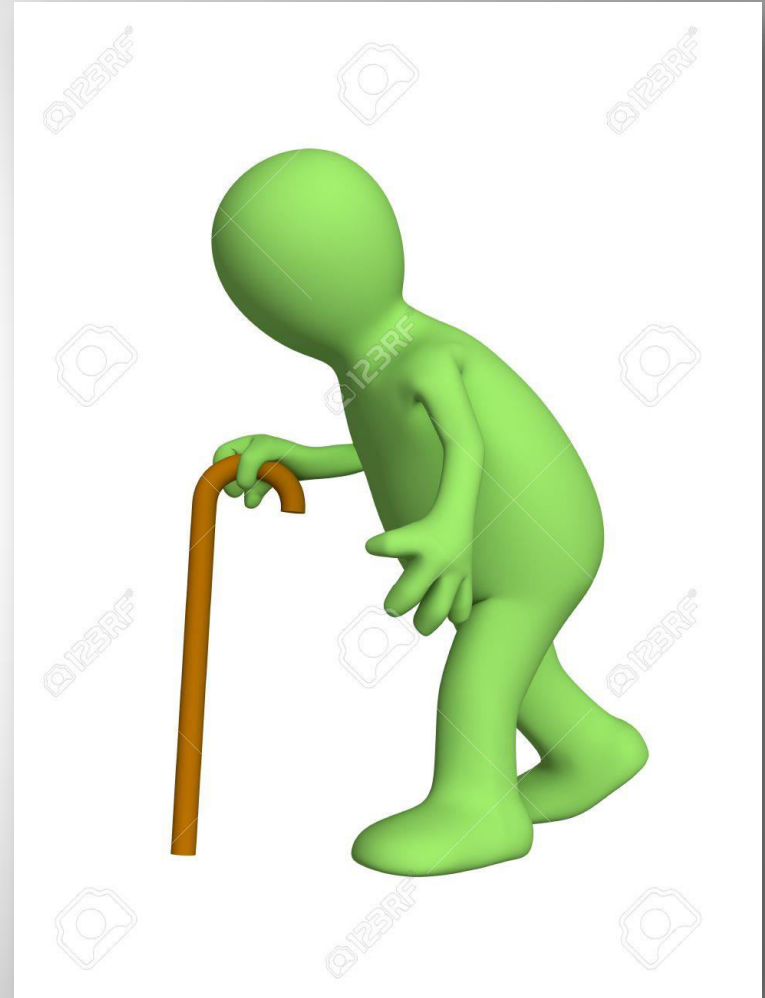






When to refer

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



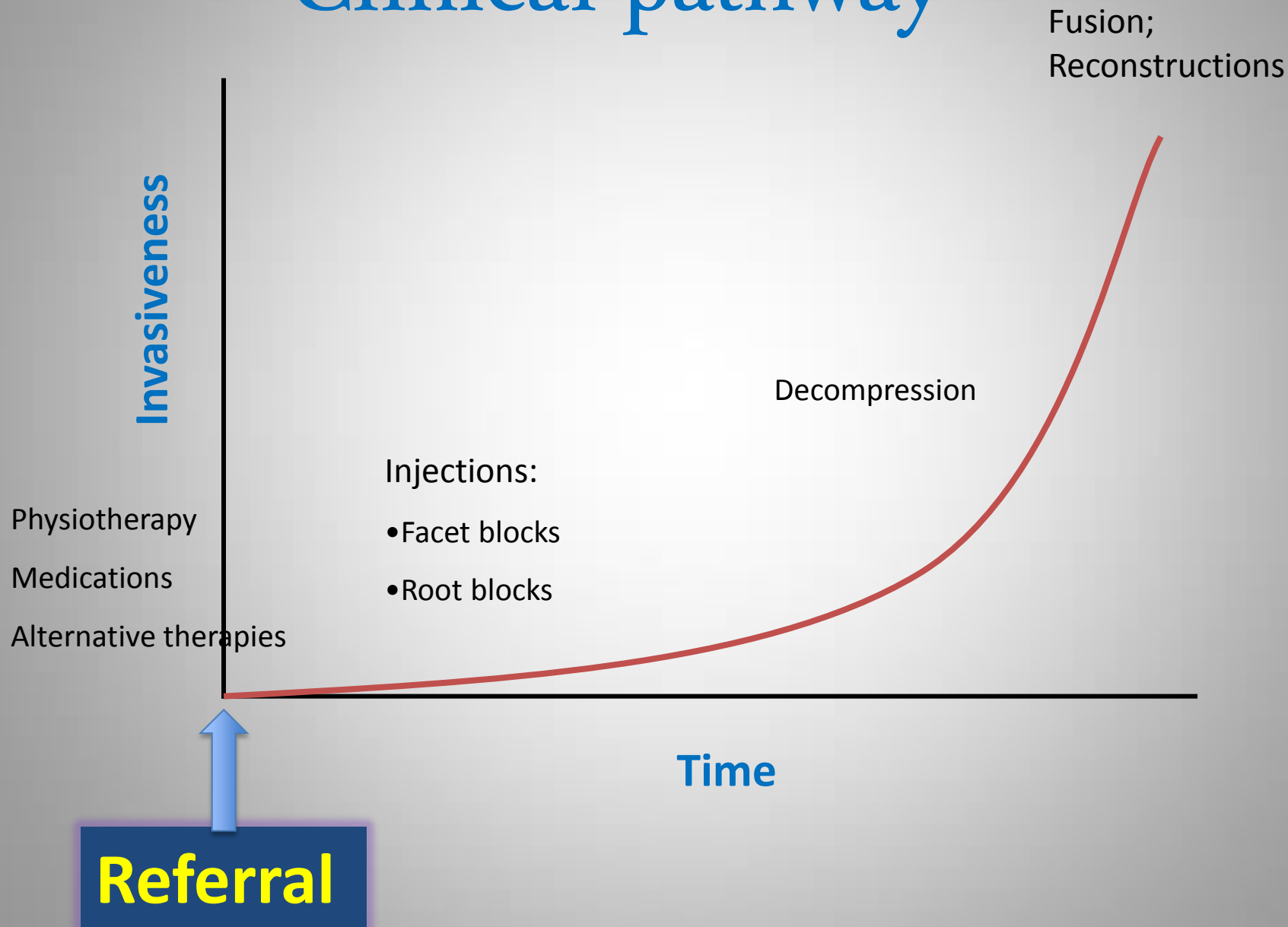
When to refer

- 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

