

APPROACH TO SPINAL DEFORMITIES

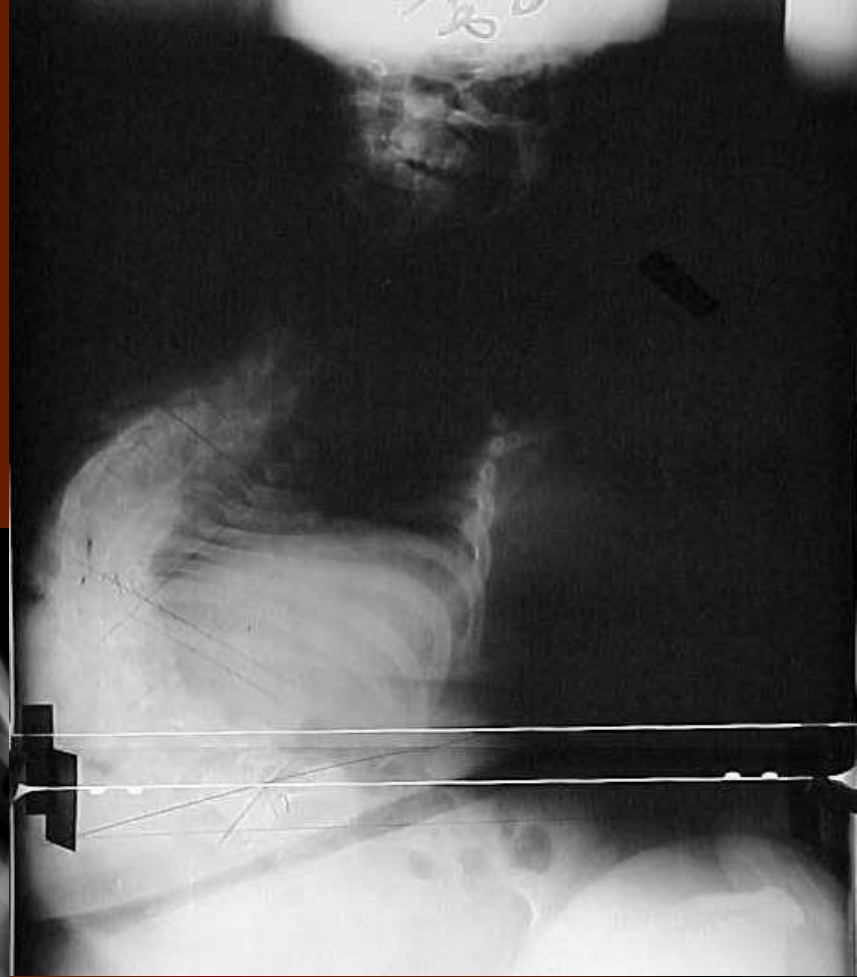


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SPINAL DEFORMITIES

Type

- SPINAL DEFORMITY
 - SCOLIOSIS
 - KYPHOSIS
 - LORDOSIS
 - KYPHOSCOLIOSIS
 - LORDOSCOLIOSIS
- SPINAL BALANCE (?DECOMPENSATION)
 - CORONAL
 - SAGITTAL
 - BIPLANAR
 - GLOBAL

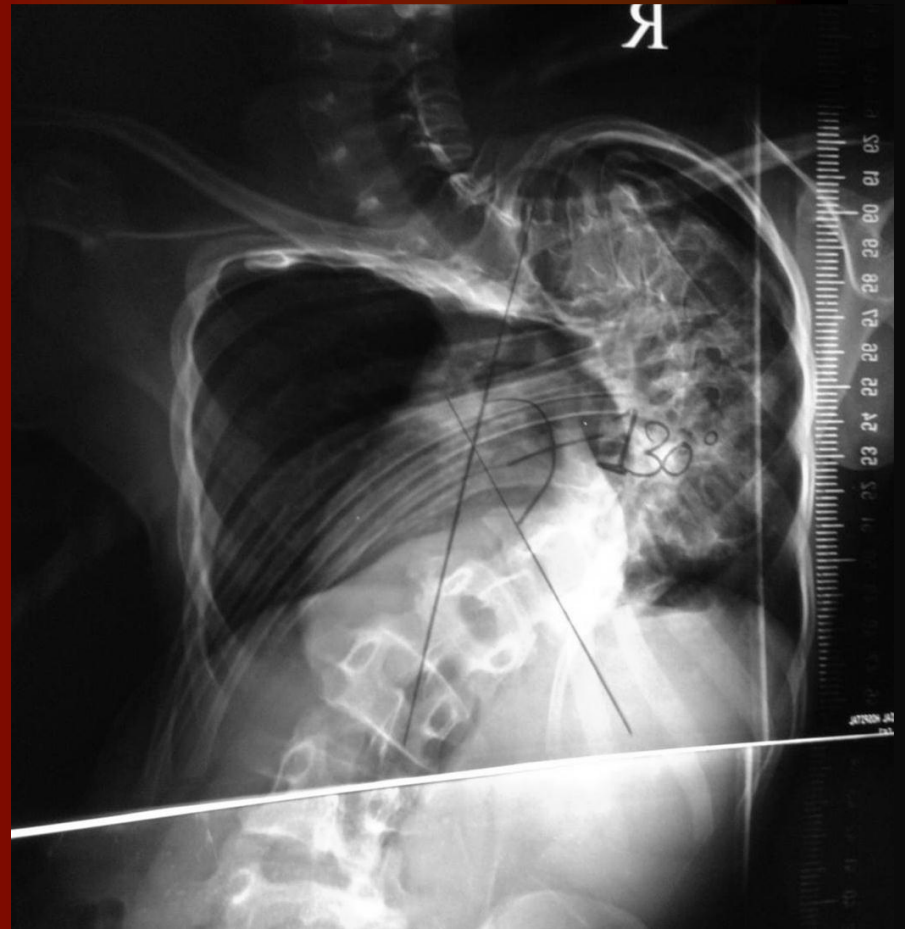


Congenital scoliosis

key: ribs anomalies



Idiopathic scoliosis









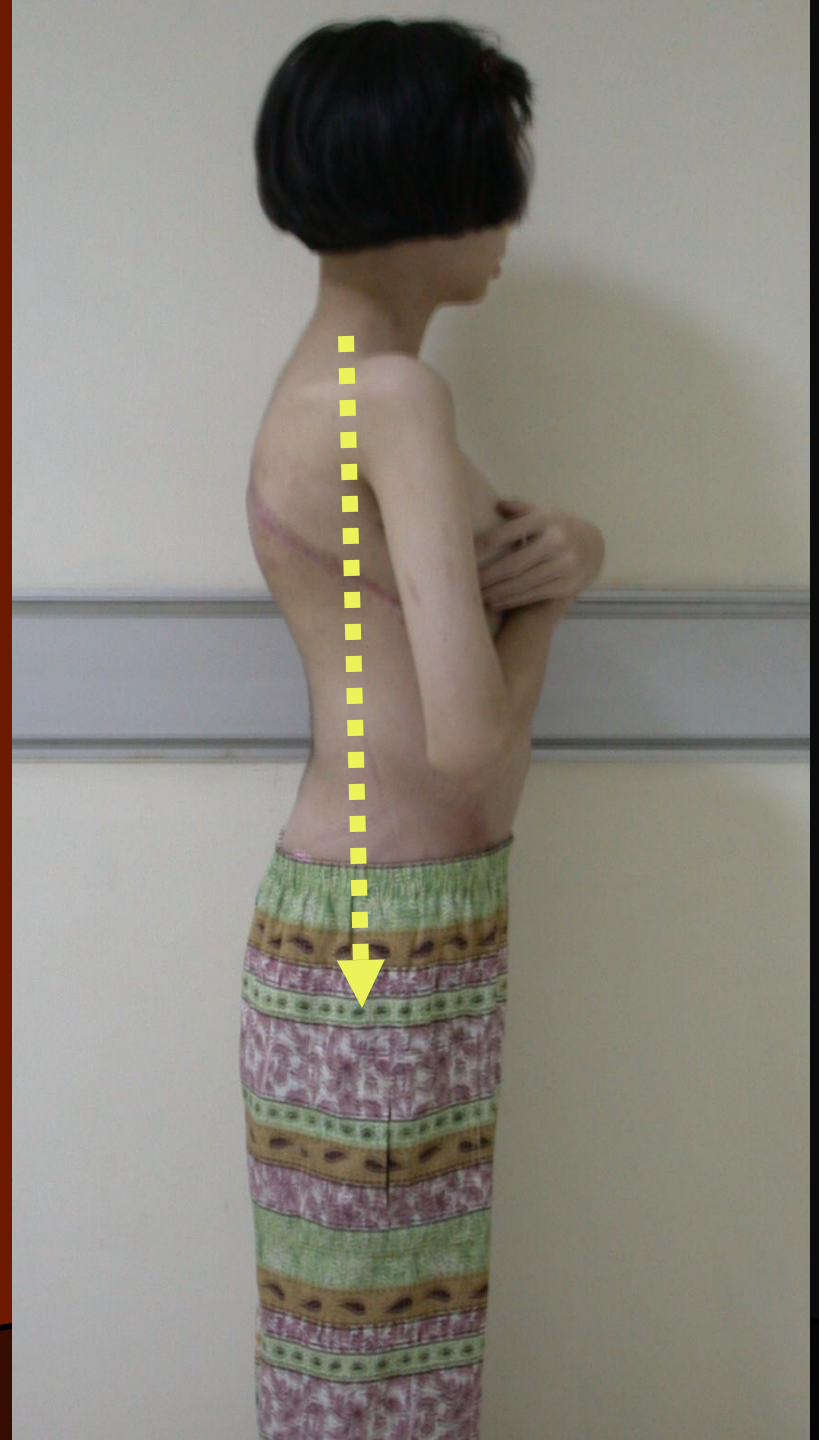
PRE-OP



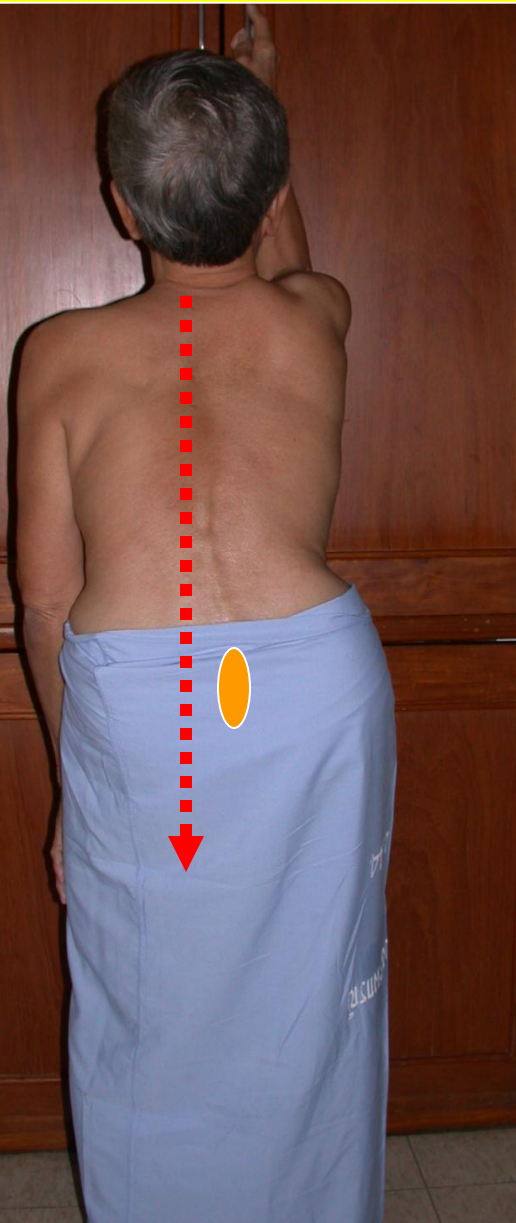
Post Op



10 cm Height increment



FROM DISEASE: DEGEN L-SCOLIOSIS/KYHOSIS





74 years old female

Progressive back pain radiating to
Lt. leg, abdominal discomfort









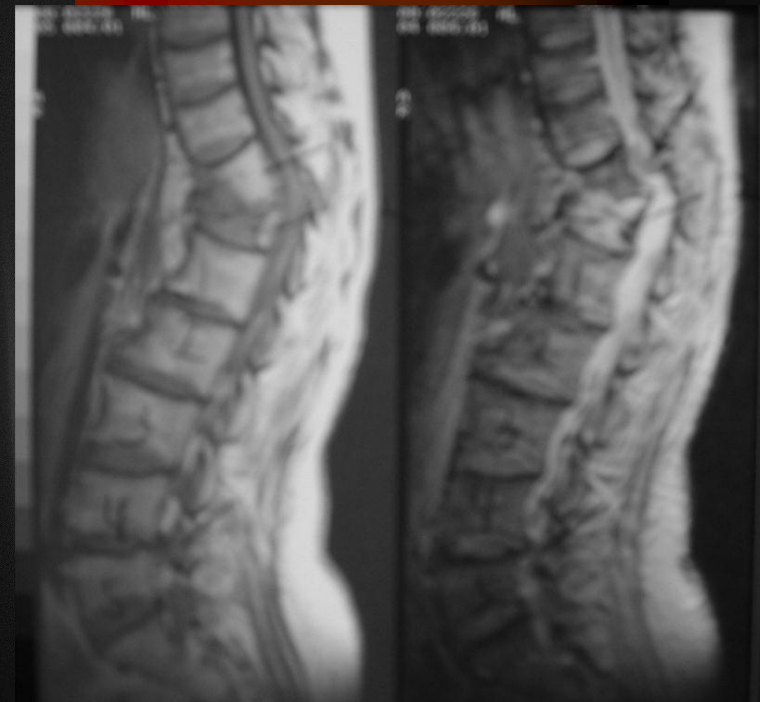
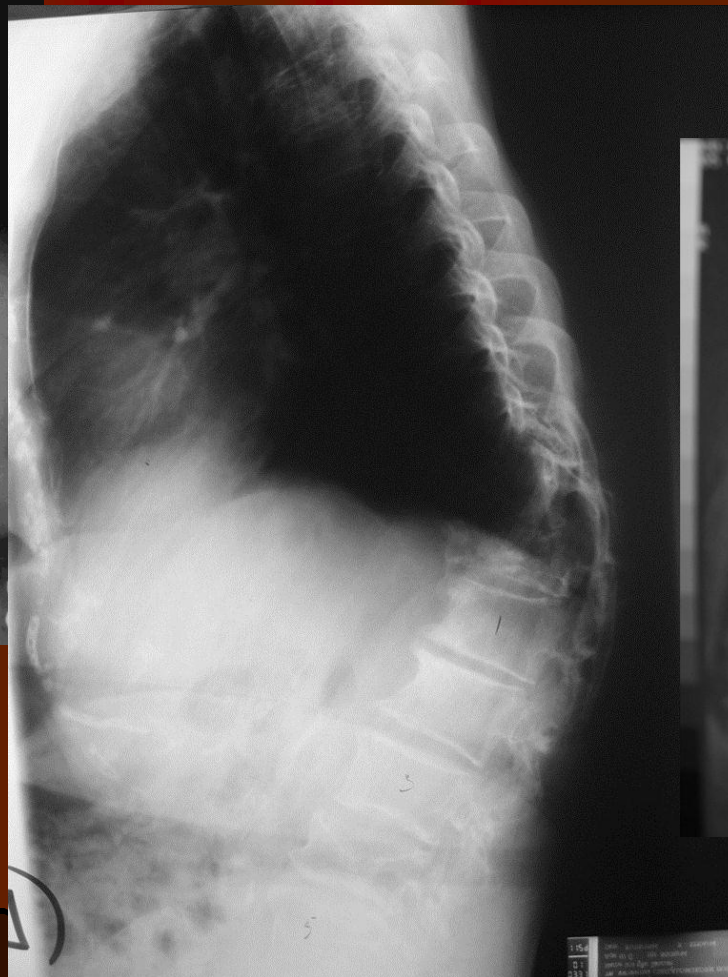
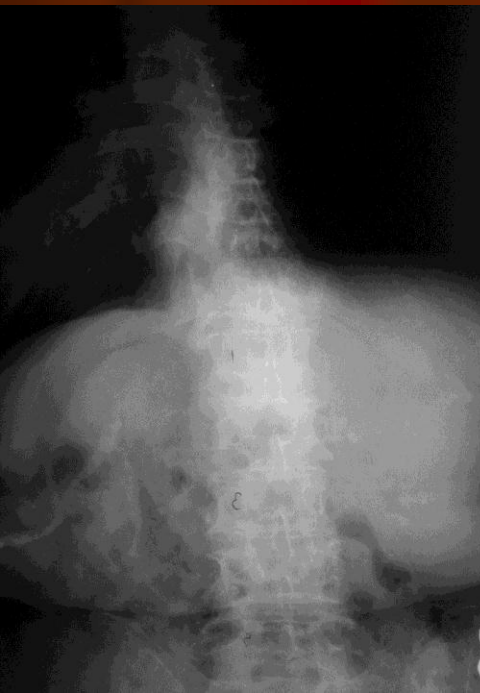
Coronal plane deformity



Sagittal plane deformity



Sagittal plane deformity



SPONDYLOPTOSIS



Coronal plane decompensation



Rib Hump

Sagittal plane decompensation



Biplanar decompensation



Problems with deformity & imbalance

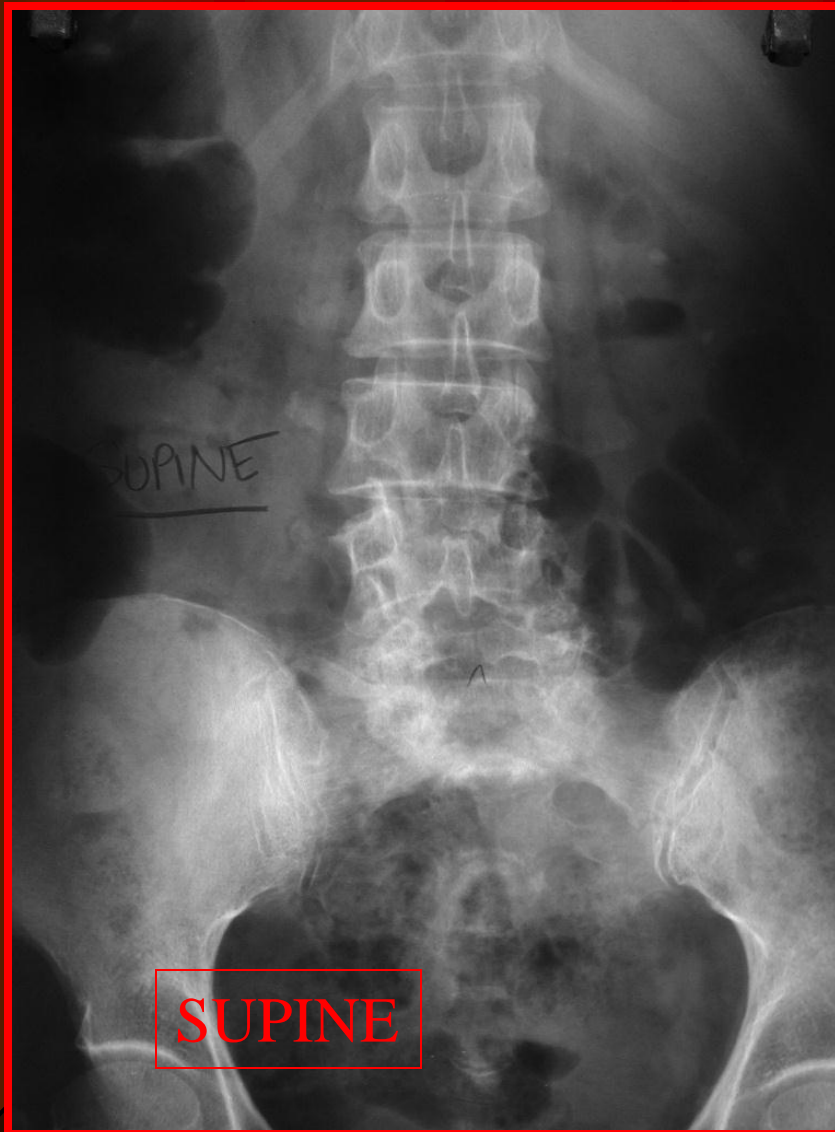
- **Early>>instability phase**.....When deformity is in dynamic stage; pain is a main concern(young pt normally is able to compensate or tolerate)
- **Late>>>stabilization phase**.....When deformity becomes static and rigid; pain may not be a major issue if no stenosis but backache, fatigue, clumsy....slowly progressive. The degree of miserable depends on patient's activity and life style.
- **Final>>> spinal decompensation**
(if occurs)...loss of trunk balance....frequently falls then unable to stand or walk if deformity has progressed.

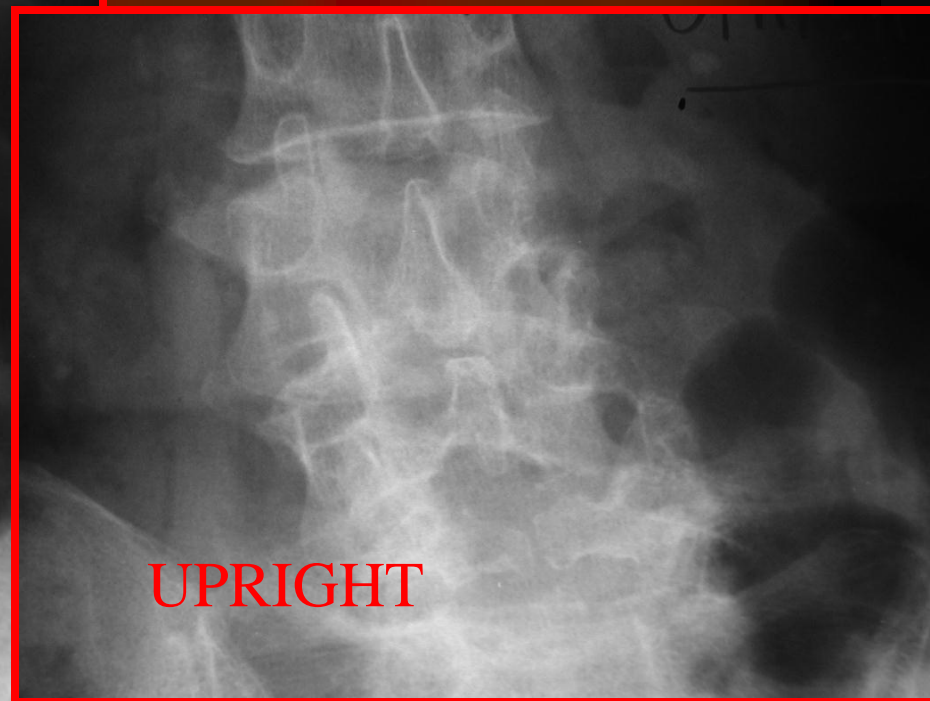
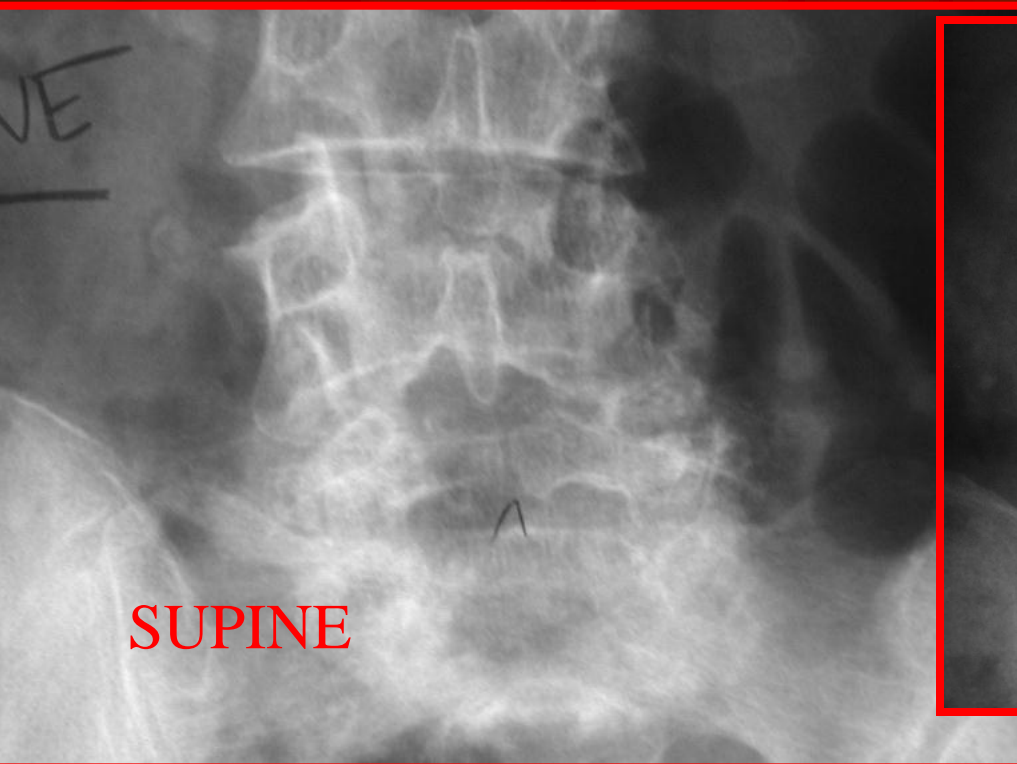
ASSESSMENT OF SPINAL DEFORMITY

- **DEFORMITY ITSELF**
 - SEGMENTAL
 - GLOBAL
- **SPINAL BALANCE(TRUNK BALANCE)**
 - CORONAL
 - SAGITTAL
 - BIPLANE

RADIOGRAPHIC ASSESSMENT

- **Rule of thumb!!**
 1. All X-rays must always be taken while patient in **standing** position in order to visualize the actual deformity.
 2. In addition to regional x-ray; **“whole spine standing”** x-ray must be obtained in order to assess global trunk balance to prevent the decompensation after surgical correction (some have subtle compensatory curve above or below the major deformity and it is usually overlooked!!)





Regional and standing whole spine radiographs

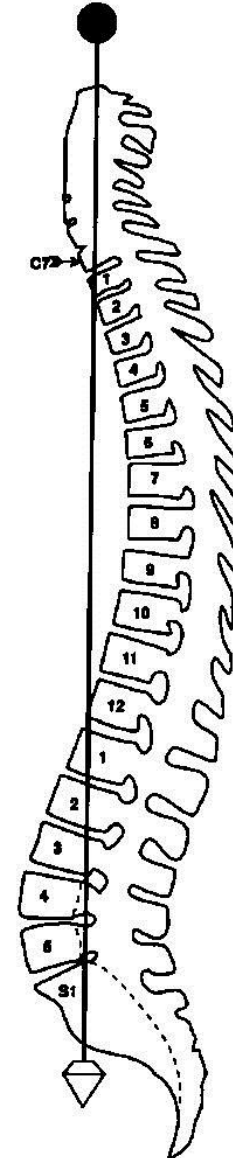


RADIOGRAPHIC EVALUATION

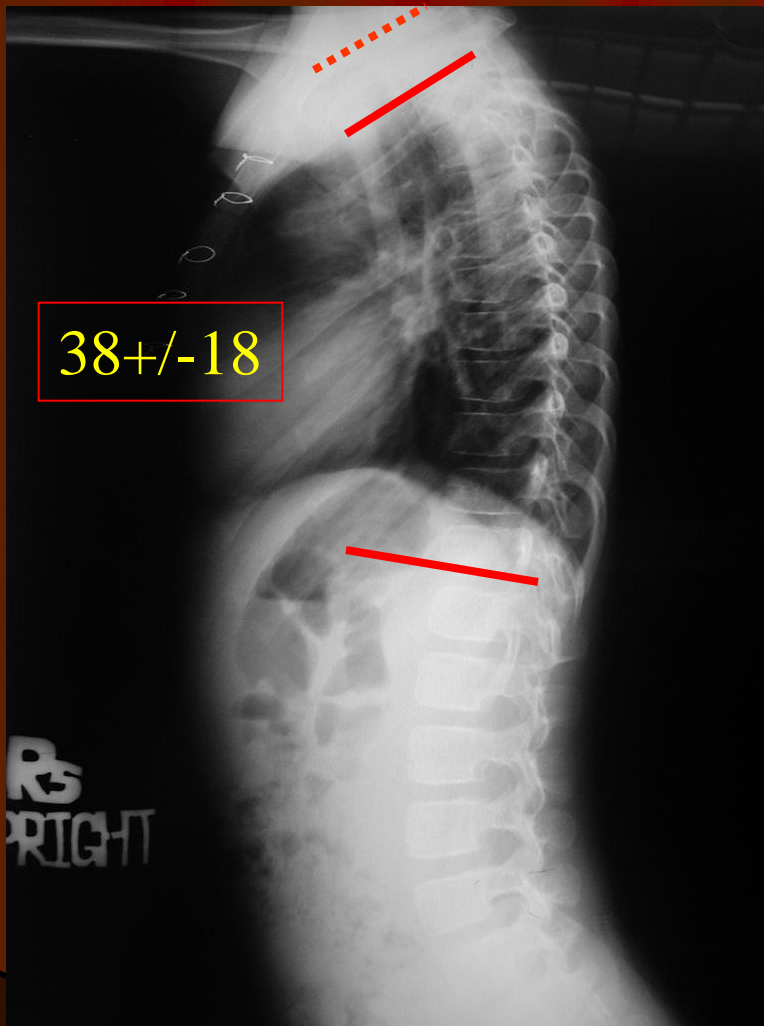
- RADIOGRAPHIC MEASUREMENT
 - CERVICAL LORDOSIS
 - THORACIC KYPHOSIS
 - LUMBAR LORDOSIS
 - GLOBAL SAGITTAL AND CORONAL BALANCE

NORMAL SAGITTAL PLANE ALIGNMENT

- Plumb line
Odontoid
process
or body of C7
intersects within
L5/S1 disc
space

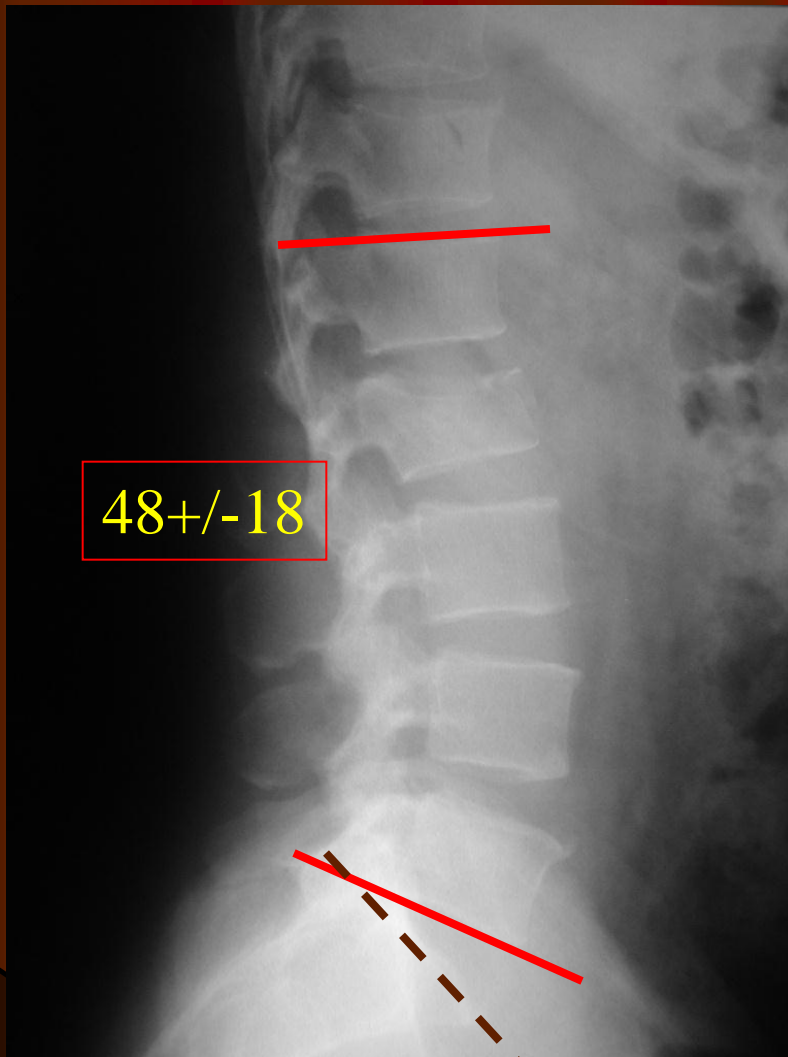


Radiographic measurement

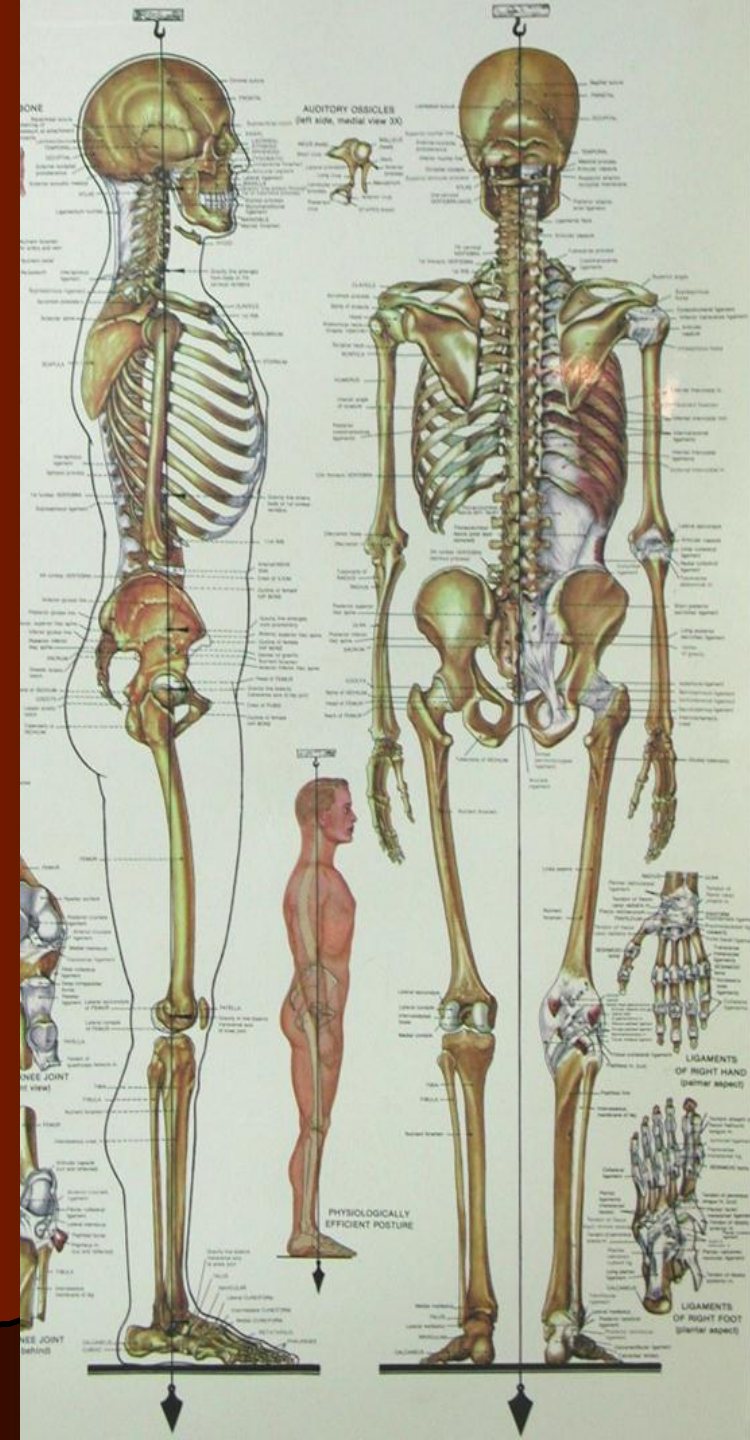
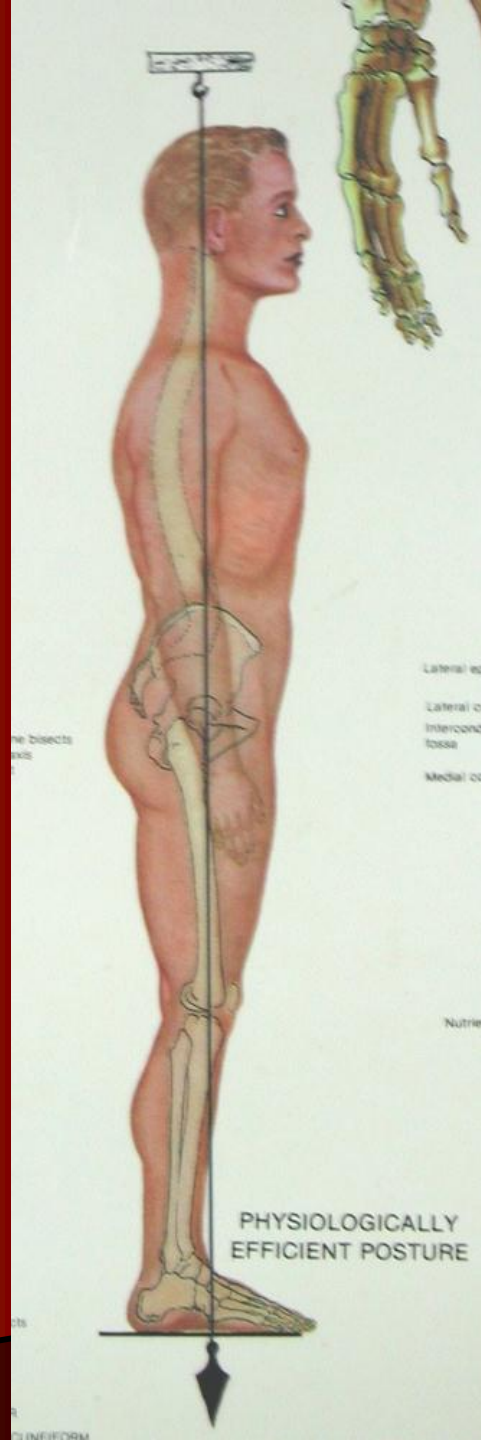


- Thoracic kyphosis
 - Upper end plate of T1(hard to be visualized, so some use T3 in stead)
 - Lower end plate of T12
 - Normal.....varies
 - 38 +/- 18 degrees

Radiographic measurement



- Lumbar lordosis
 - Upper end plate of L1
 - Lower end plate of L5 or upper end plate of S1
 - Normalvaries
48 +/- 18 degrees



CLINICAL ASSESSMENT

- GLOBAL DEFORMITY
- SEGMENTAL DEFORMITY
- PATIENT APPEARANCE
 - Coronal Plane
 - Sagittal Plane

Index of suspicious

- Looking @ the patients
 - Any appearance of spinal deformities
 - If yes, >>> just "segmental deformity"
>>> or having a "global imbalance or spinal decompensation" either in coronal , sagittal plane or both

Idiopathic Scoliosis

- Abnormal spinal curvature in the coronal plane occurring in normal healthy patients.
- No evidence of any underlying neurologic or muscular disorders/ no congenital vertebral anomalies

Etiology

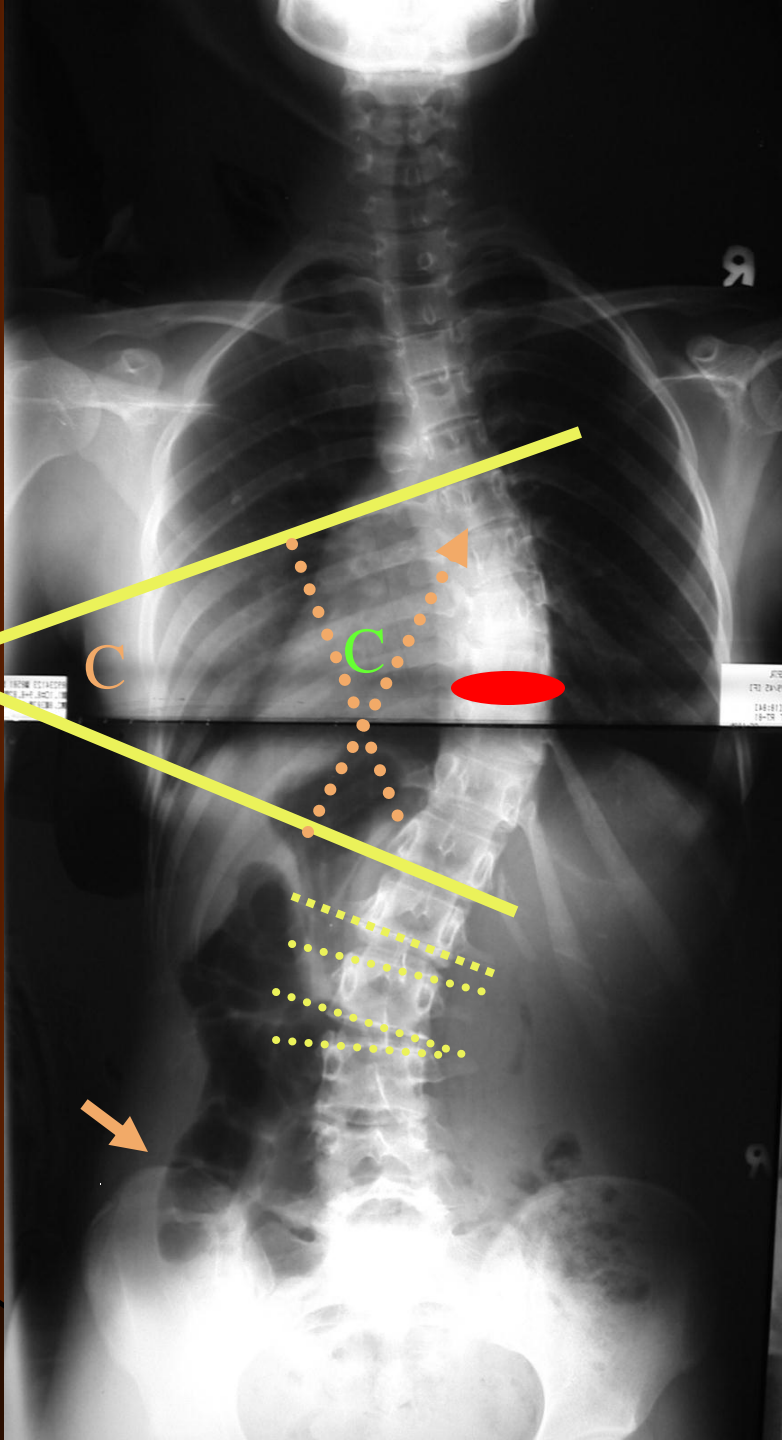
- Unknown, despite extensive researches
- Familial component
 - Siblings affected 7%
 - Parents affected 6% to 14%
 - Discrete gene or mode of inheritance not identified
- Can be created in lab animals by pinealectomy

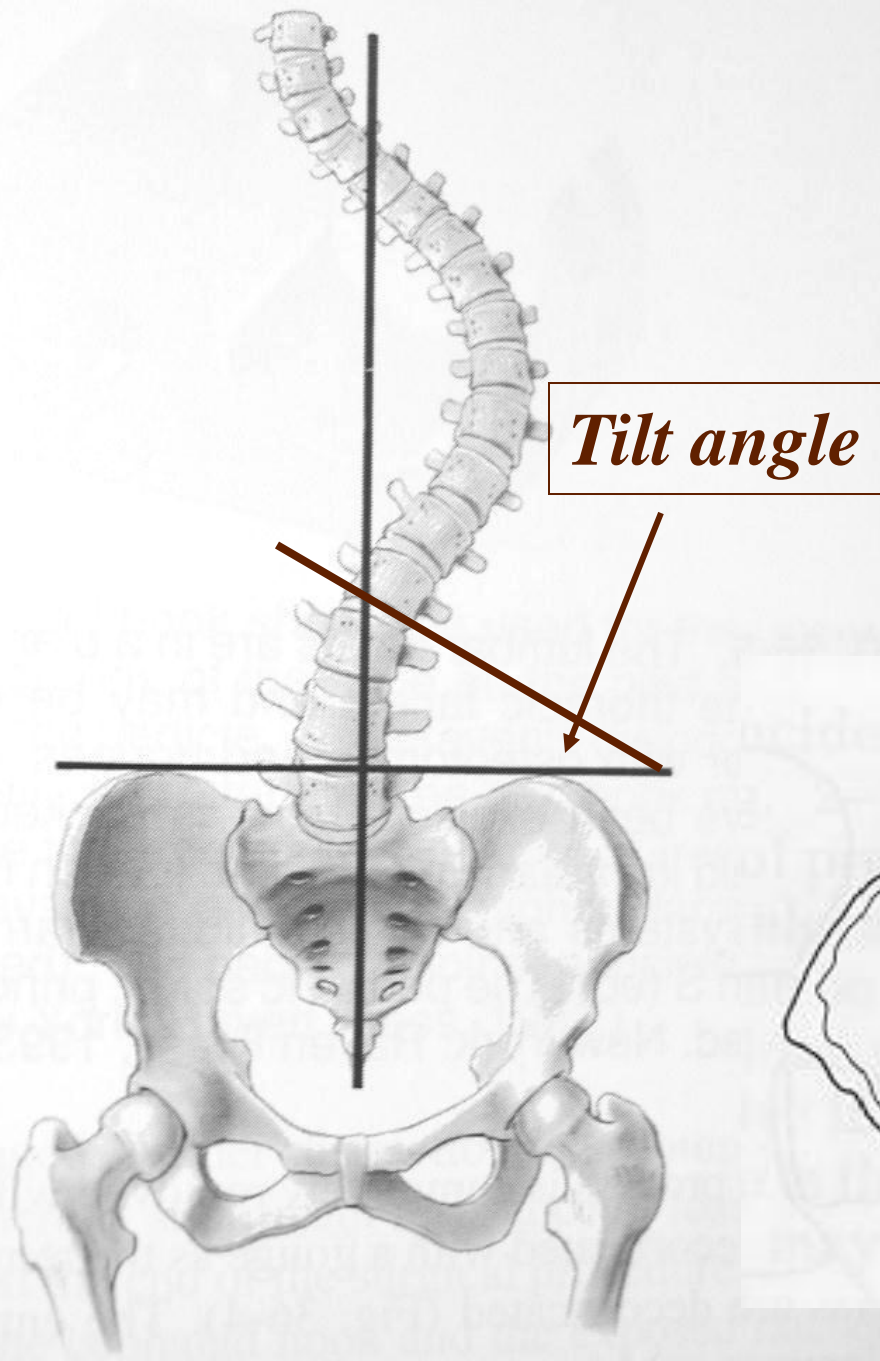
Prevalence

- Definition
 - Cobb > 10 *deg on standing* PA
 - Curves < 10 deg should be considered as “SAUE”(Spinal Asymmetry of Unknown Etiology)
- Female:Male ratio
 - Cobb > 10 deg; 1.4:1
 - Cobb > 30 deg; 10:1

What to look for?

- The location of the end and apical vertebra
- *Magnitude of the curve (Cobb angle)*
- Pattern of curve
- *The tilt angle of the most inferior end vertebra*
- *Risser Sign*

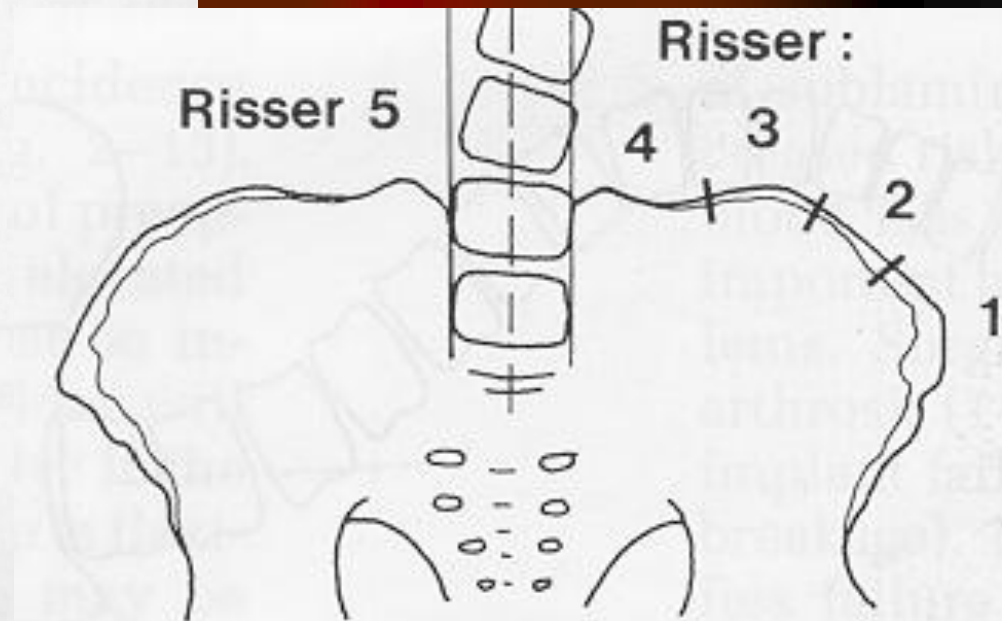


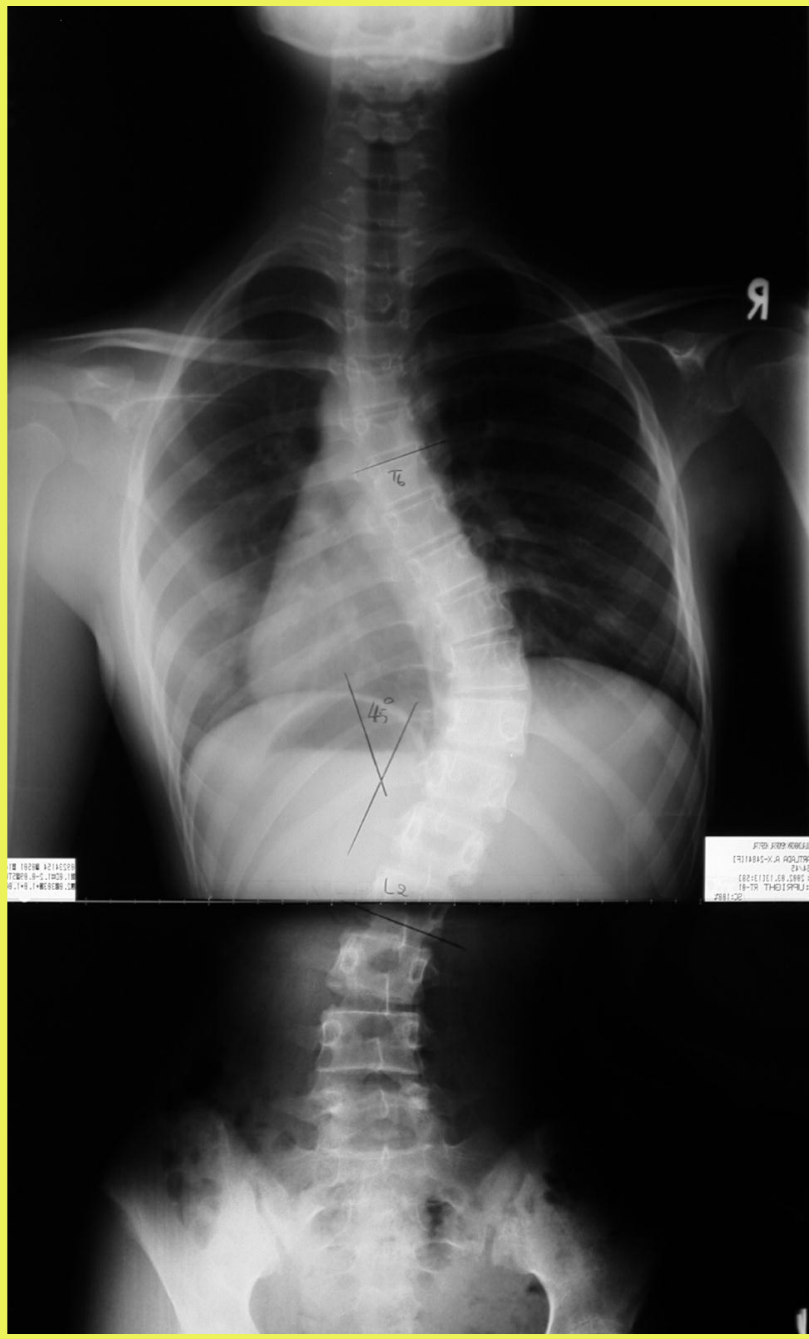


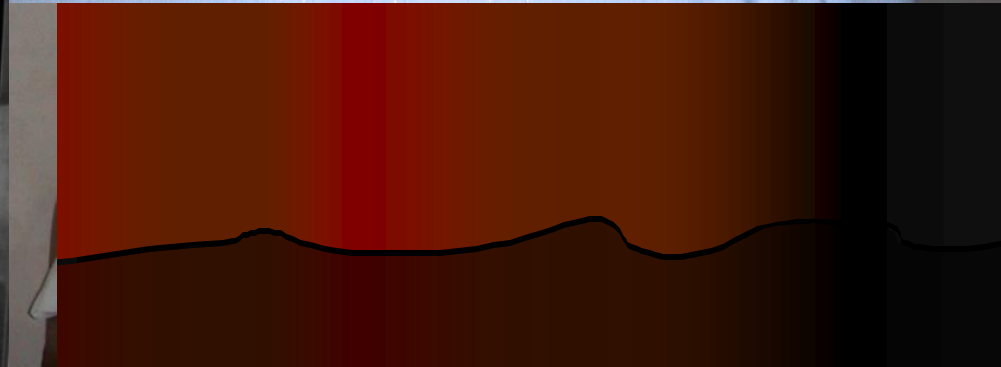
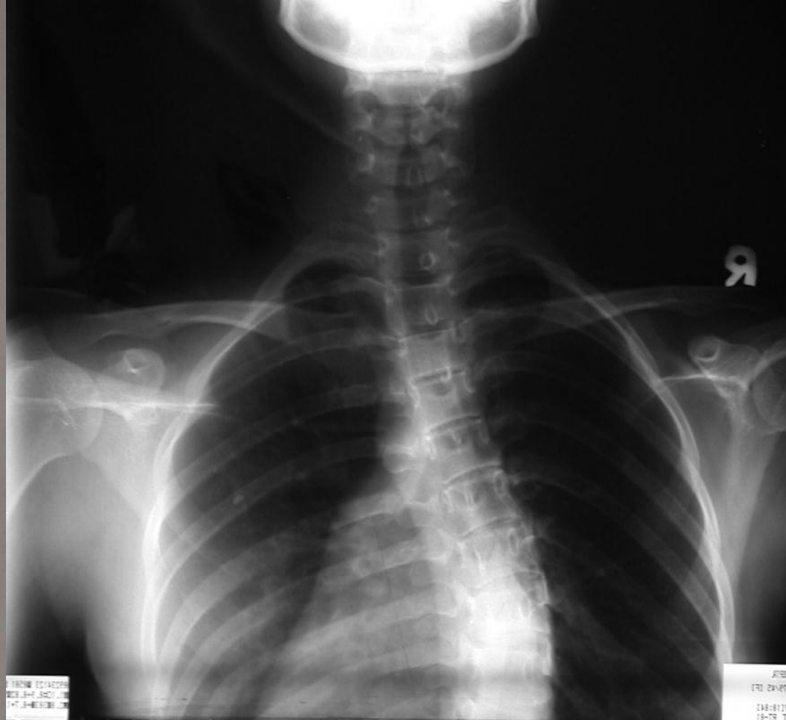
TA <10 = OK

>20 = Bad prognosis

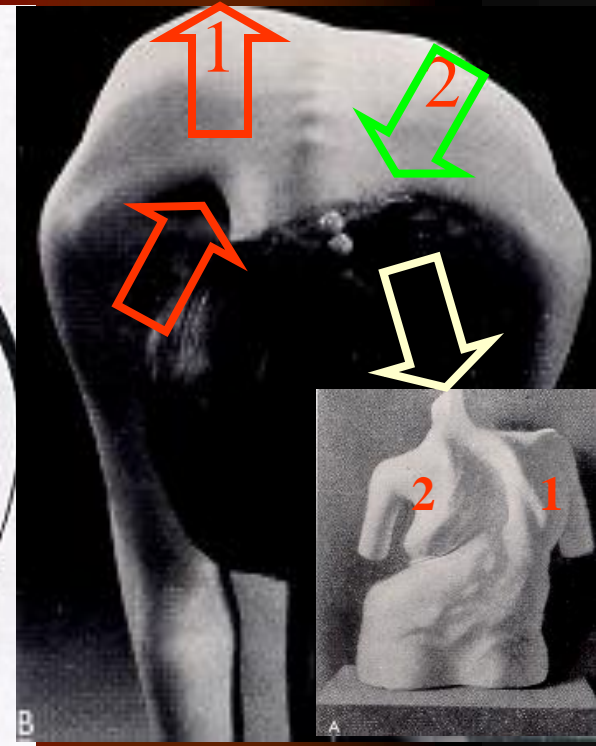
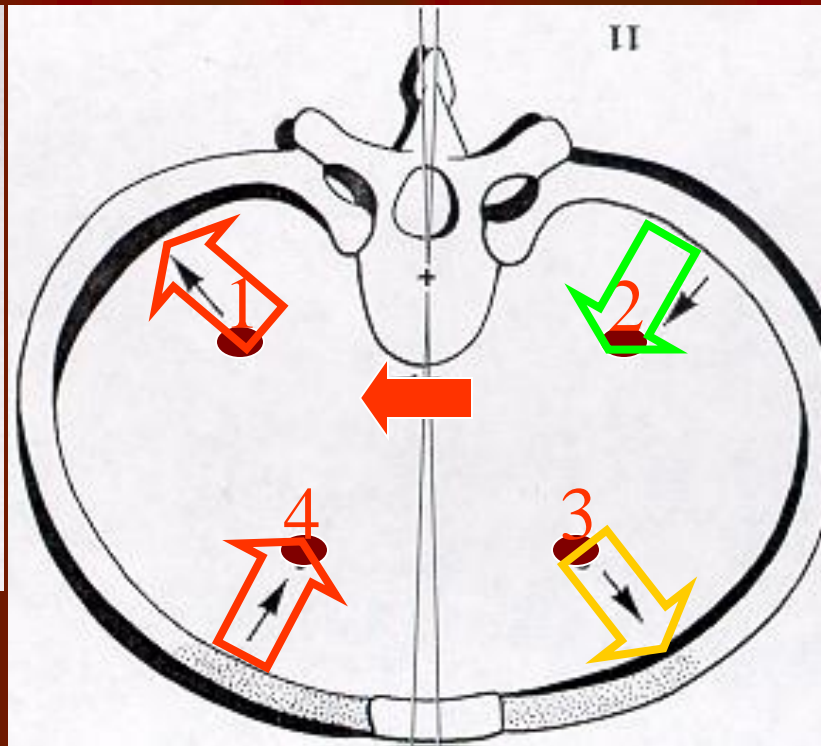
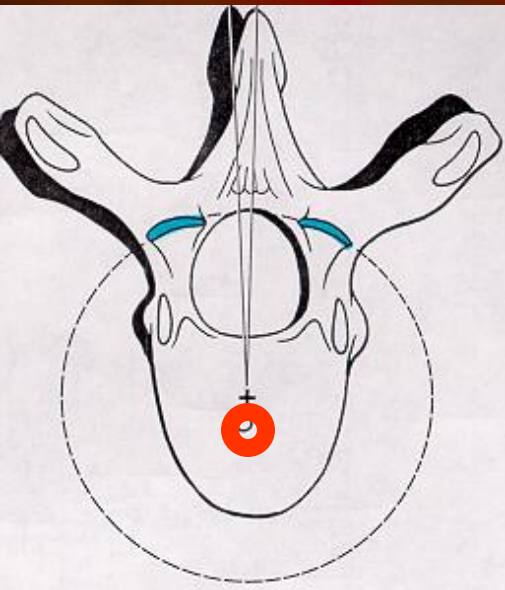
For conservative treatment





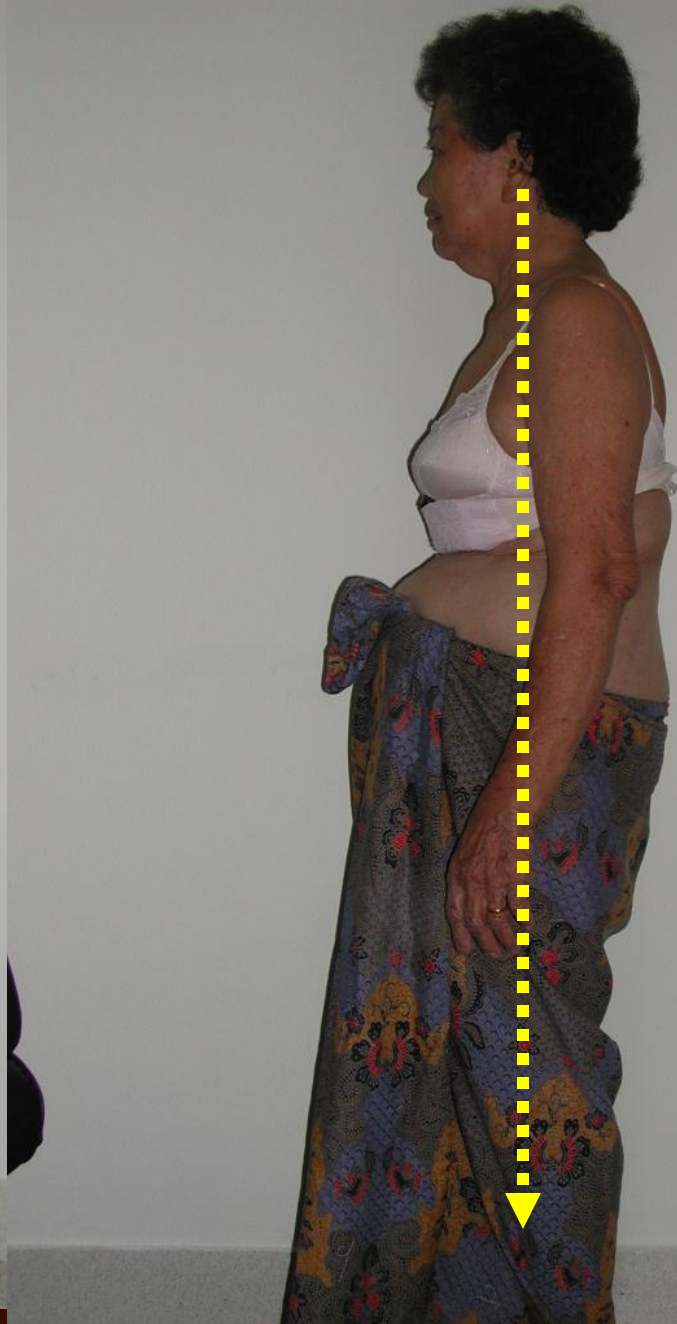
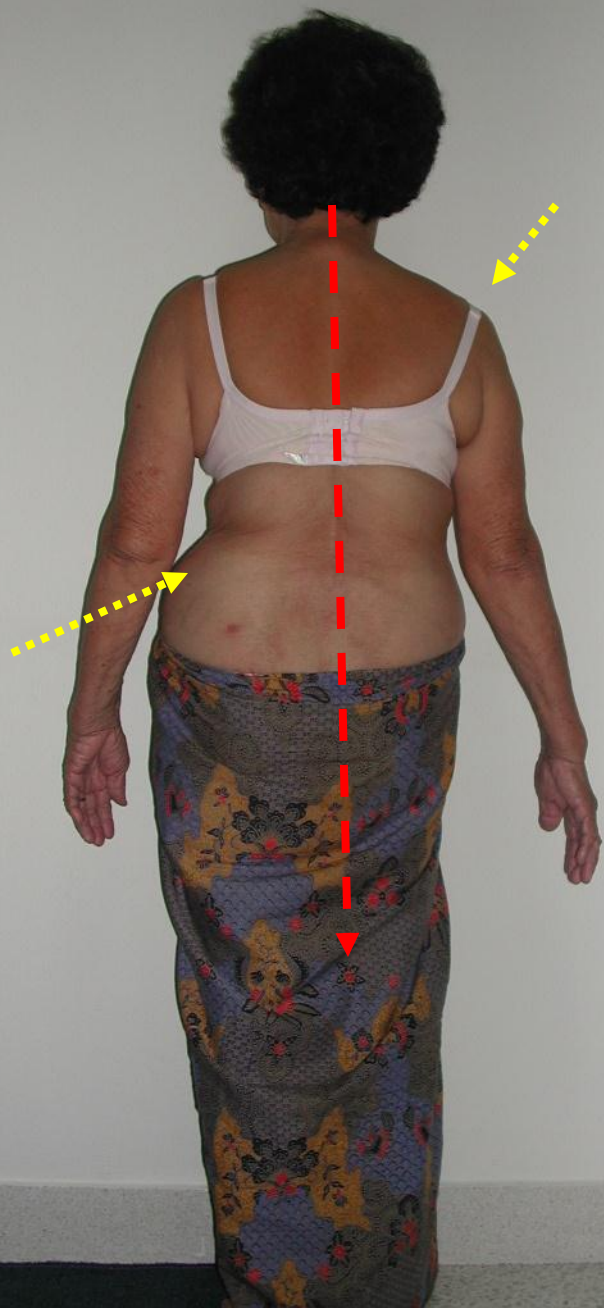


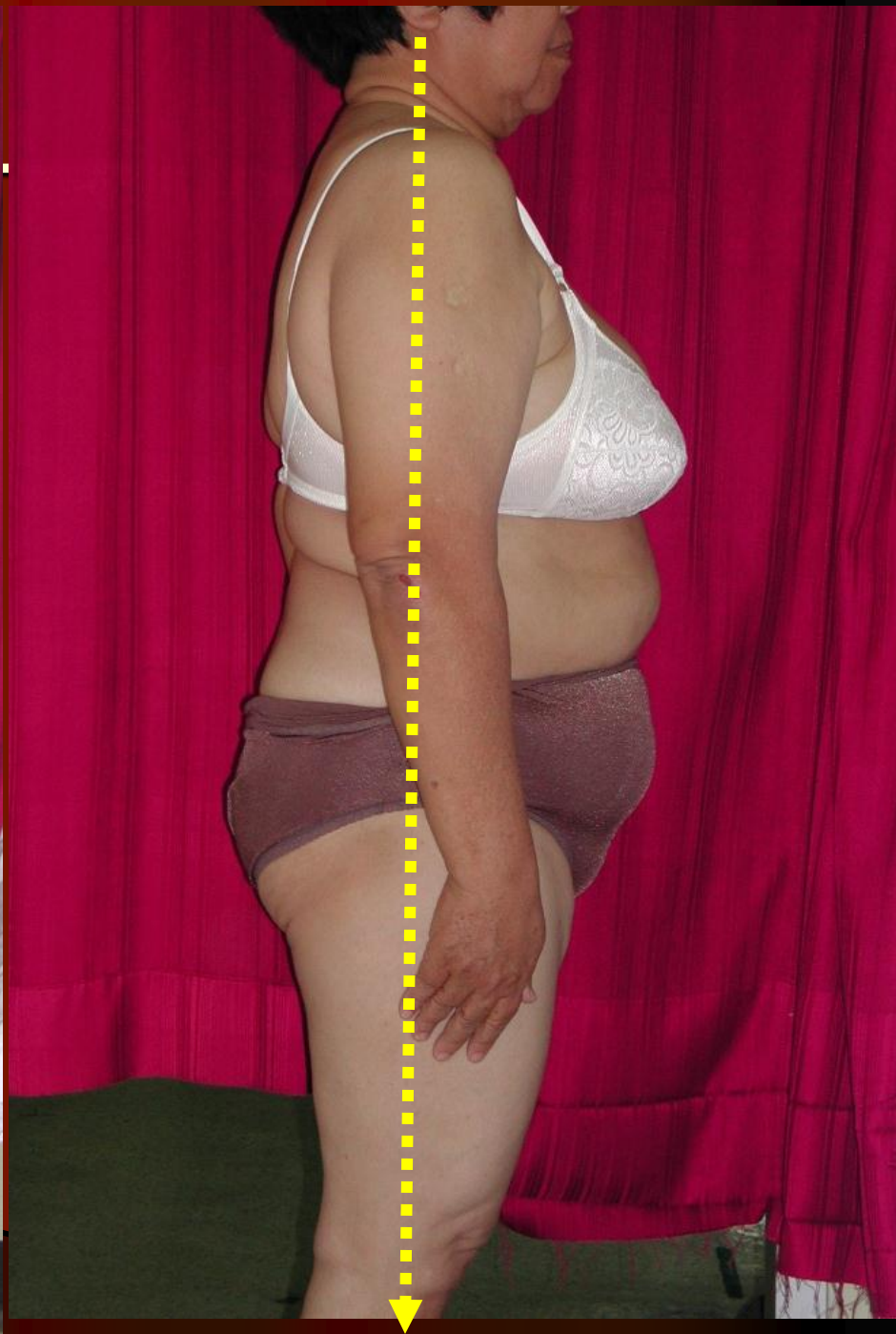
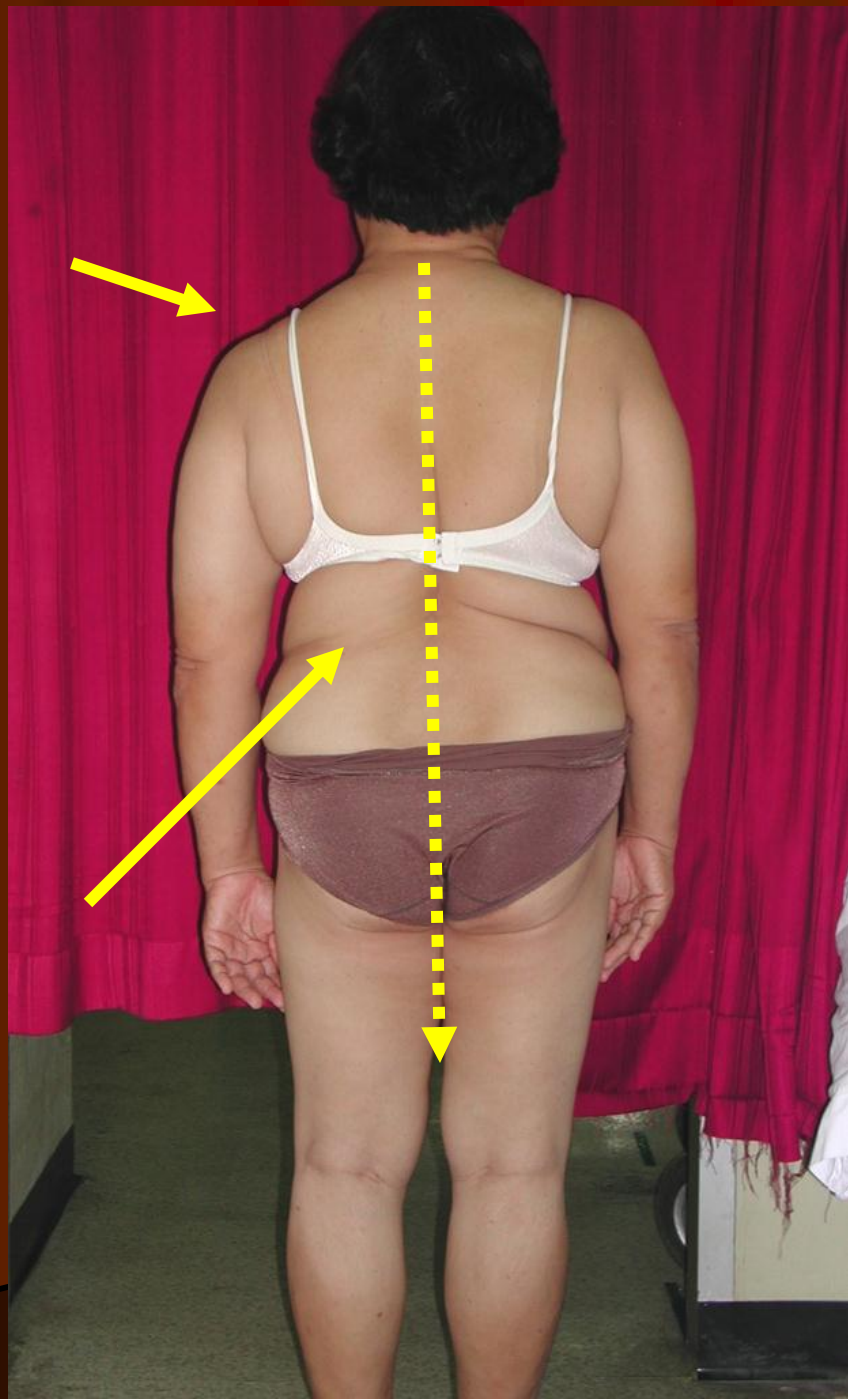
Thoracic spine - axial rotation



The center of rotation is in the projection of the center of the each body

1. Accentuation of the rib concavity on the side of rotation
2. Flattening of the rib concavity on the opposite side
3. Accentuation of the chondrocostal concavity on the opposite side
4. Flattening of the chondrocostal concavity on the side of rotation

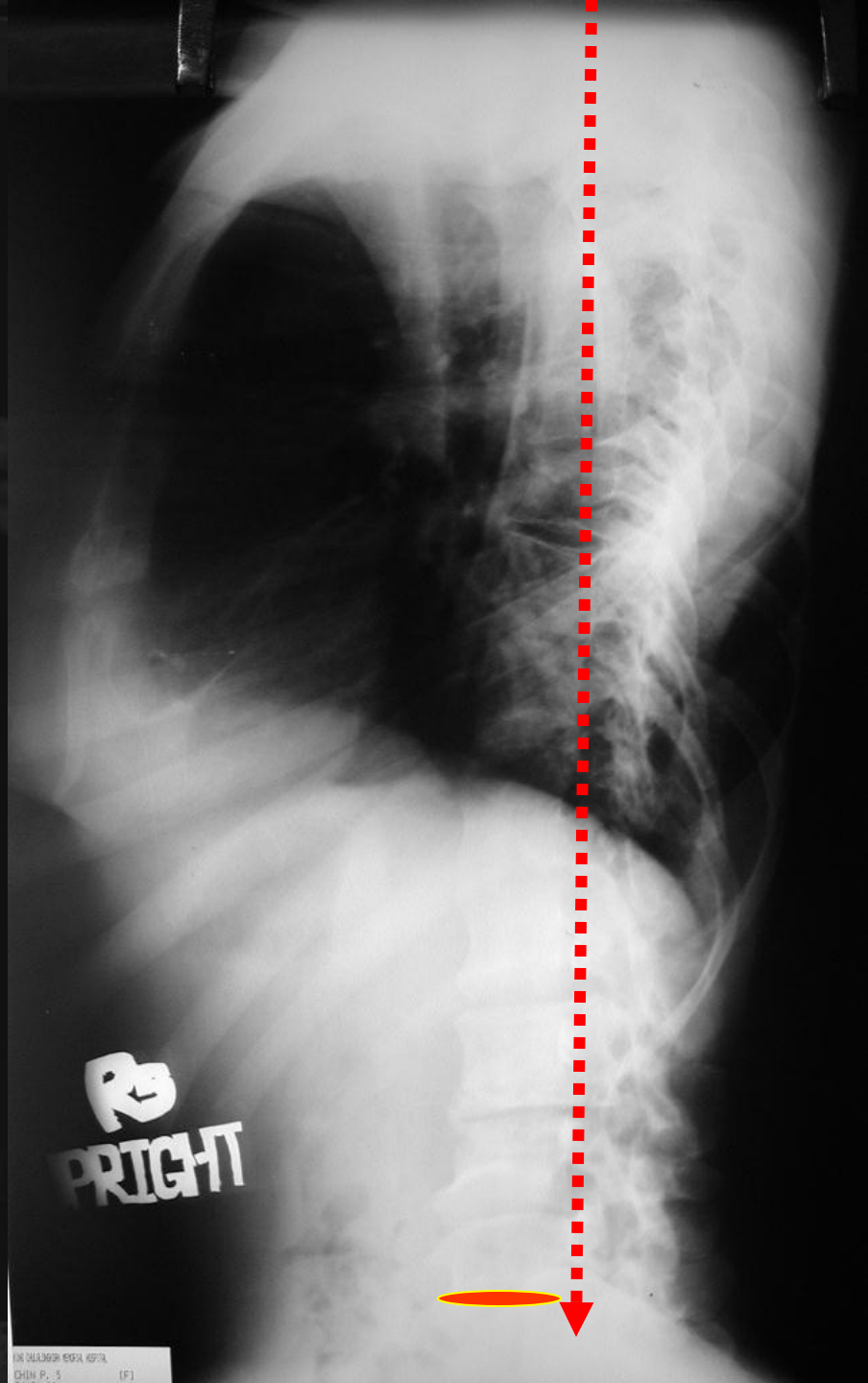
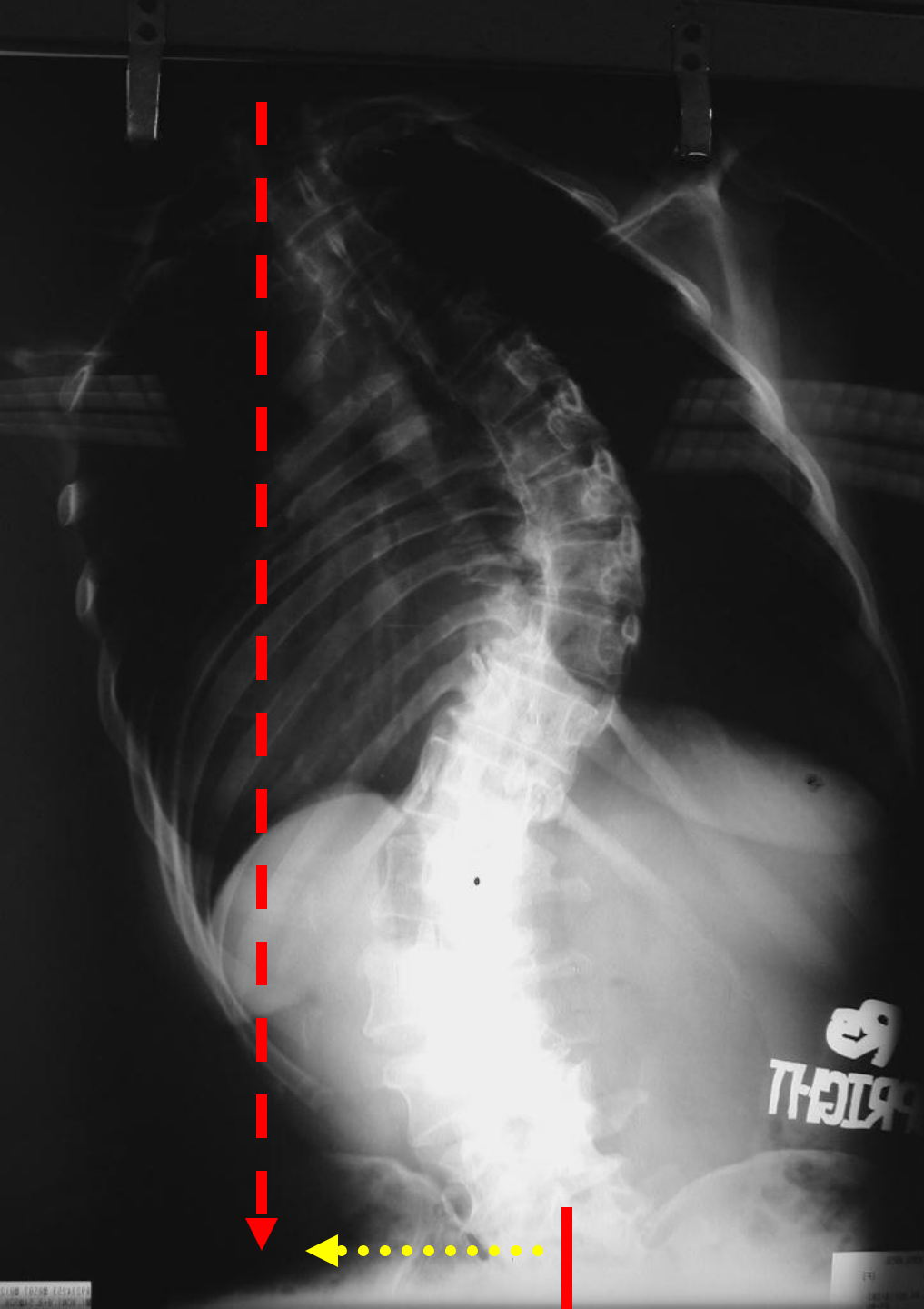




Physical assessment



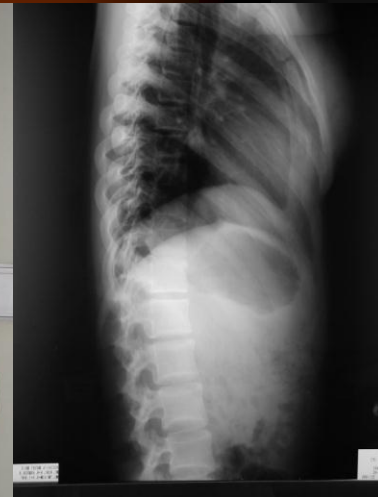




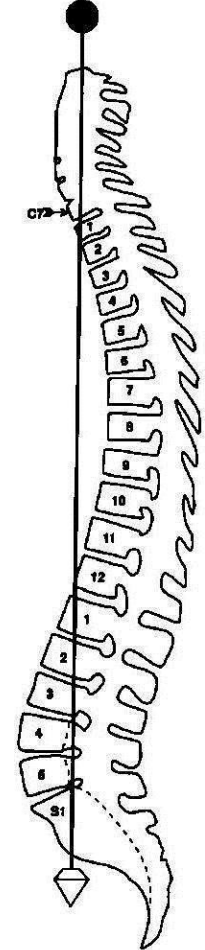
What should be looked at?

- Shoulder level >> uneven ?
- Waist line symmetry?
- Hump @ thoracic or lumbar (Adam's forward bending test)
- Patient stands up straight enough without bending the knees (Ear-shoulder-greater trochanter-lateral femoral condyle are in the single straight line)
- Belly's kyphotic skin crease?
- Obviously lumbar lordotic curve?

Normal Back?



Sagittal Spinal Balance Measurement; Clinically



Coronal Spinal Balance Measurement; Clinacally



Spinal Decompression



Sagittal plane deformity

- Female, age 16 y/o
- CC: progressive LBP with occasionally pain radiating down to both legs and feet

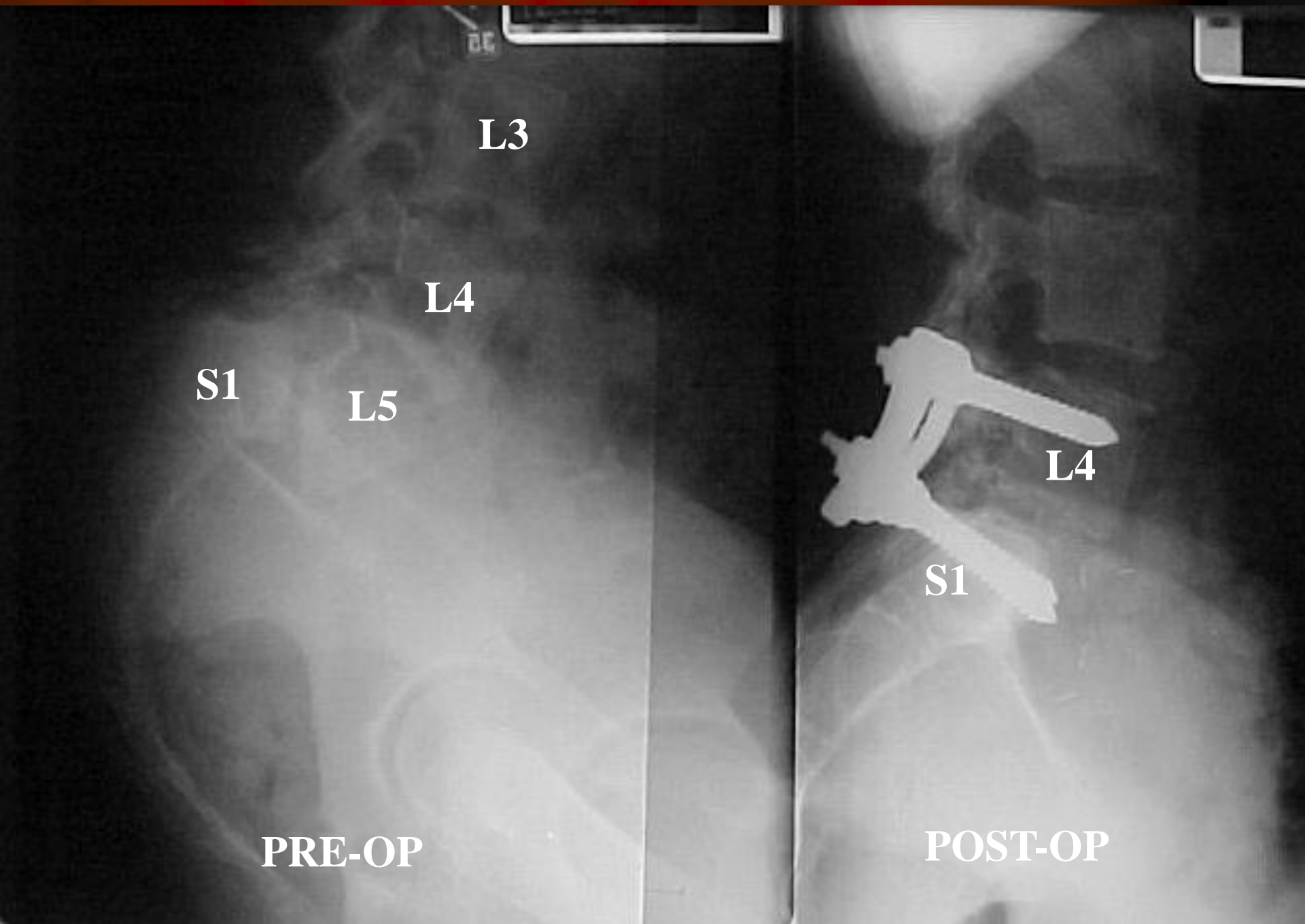








1160



7 months
Post Op



7 months
Post Op



PRE-OP



PRE-OP



POST OP 7 months



7 months
Post Op



ตัวอย่างผู้ป่วยกระดูกสันหลังคด



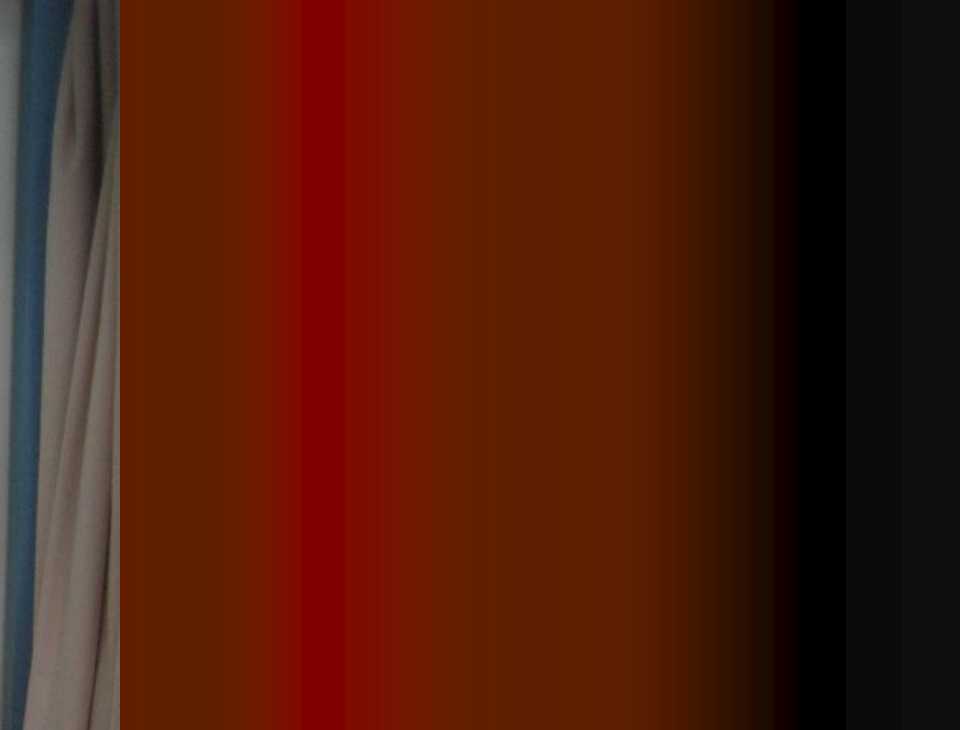


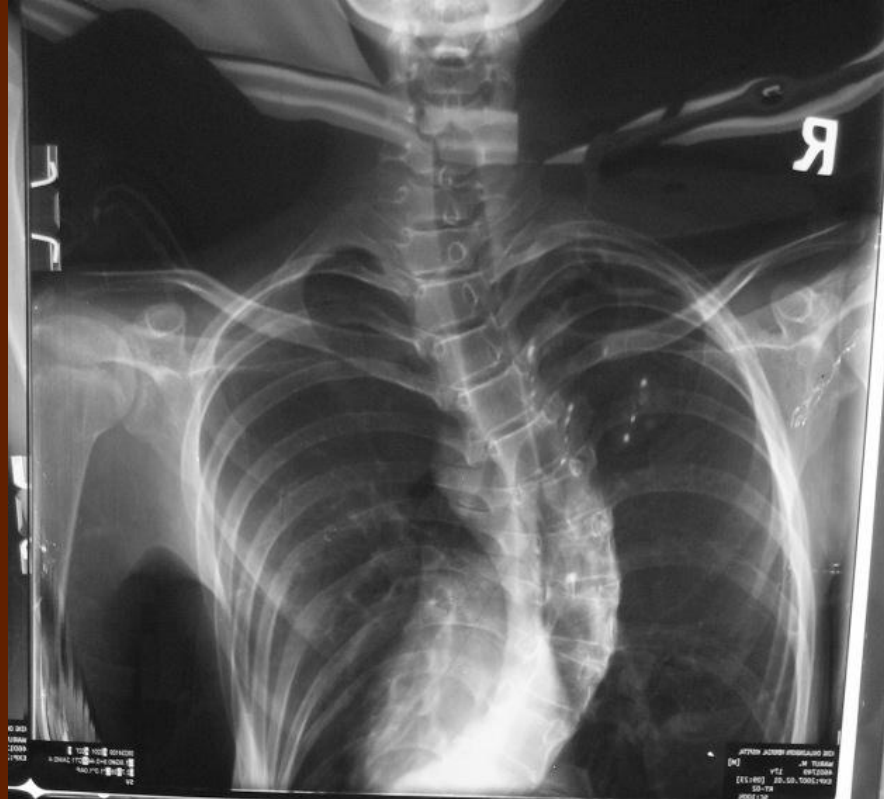
DOB: 17/11/1990

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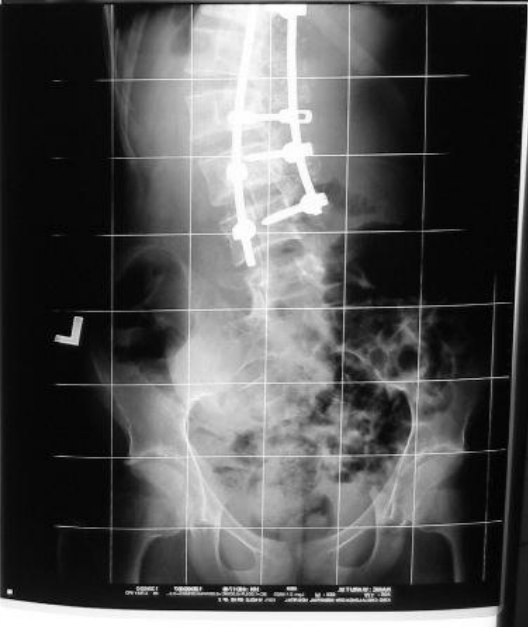
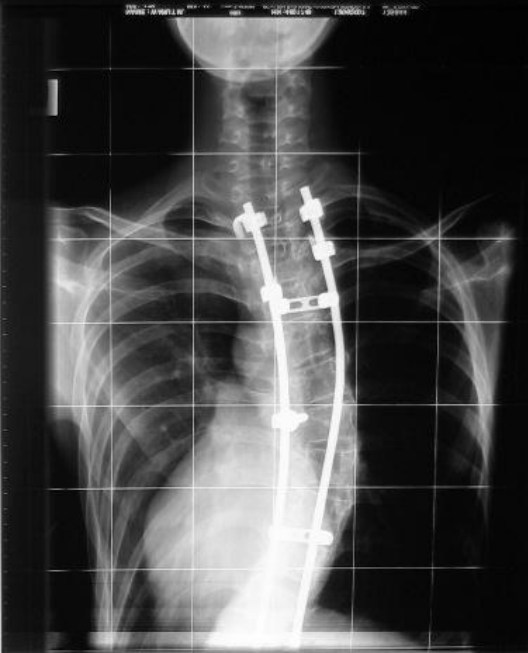
















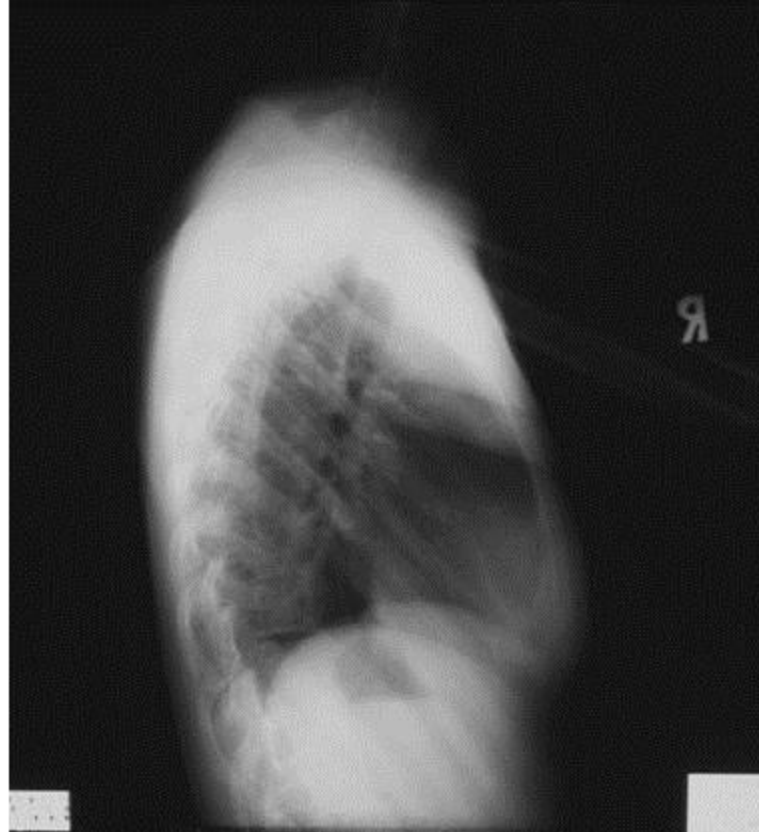
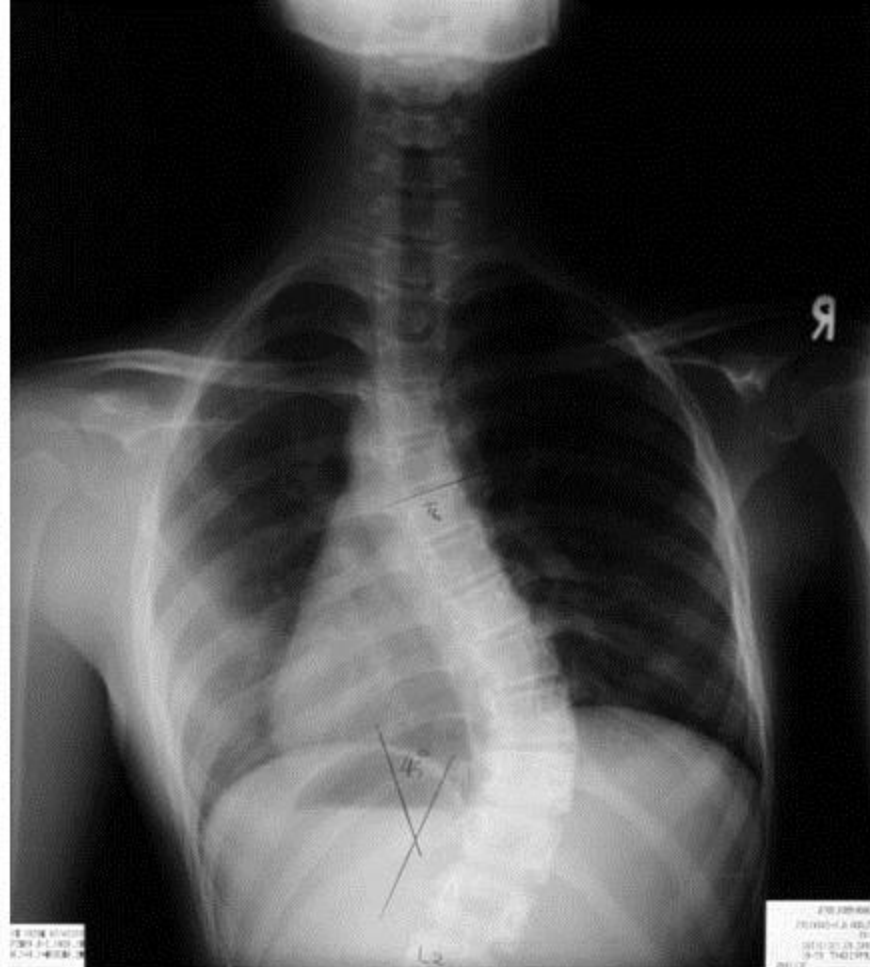


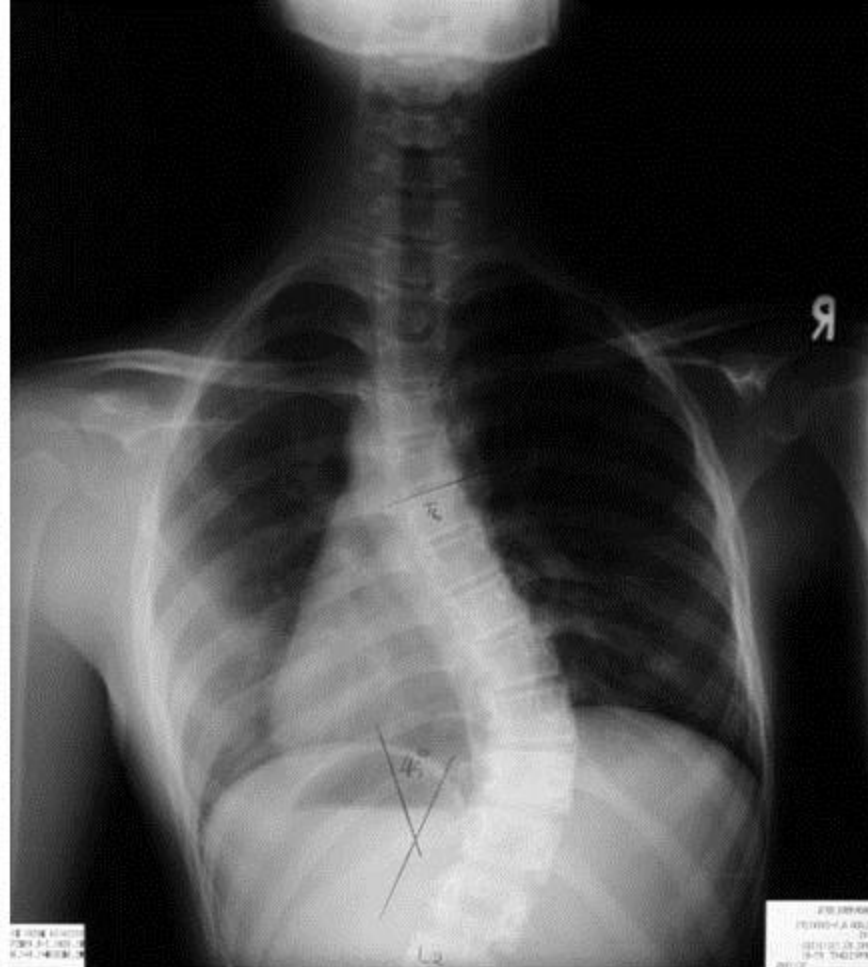


นาคลดา อุบลลี อายุ 12 ปี

Syringomyelia with Rt. T-scoliosis 45

ผ่าตัด 12 เม.ย. 2545















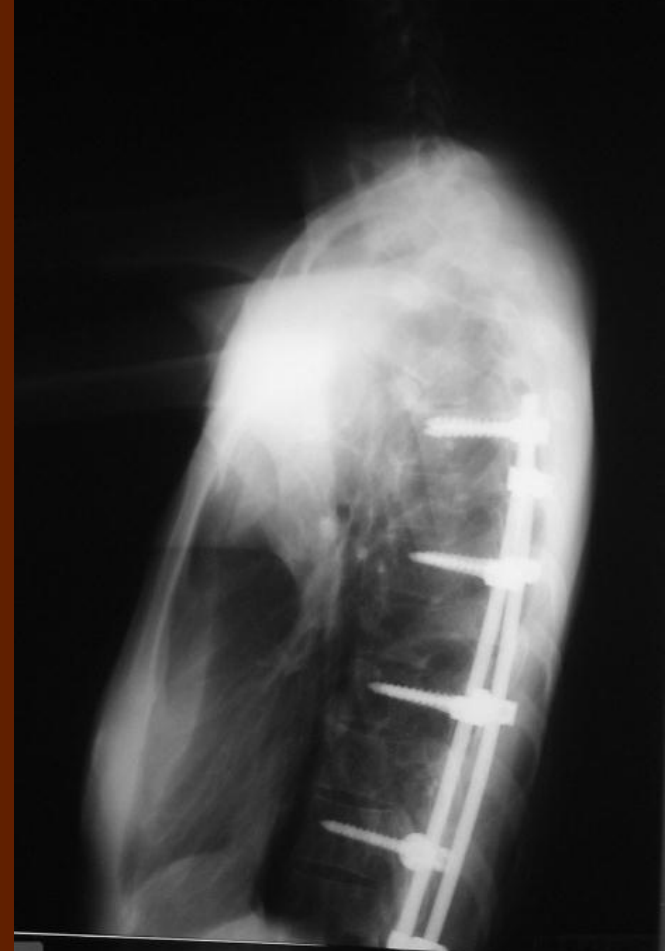


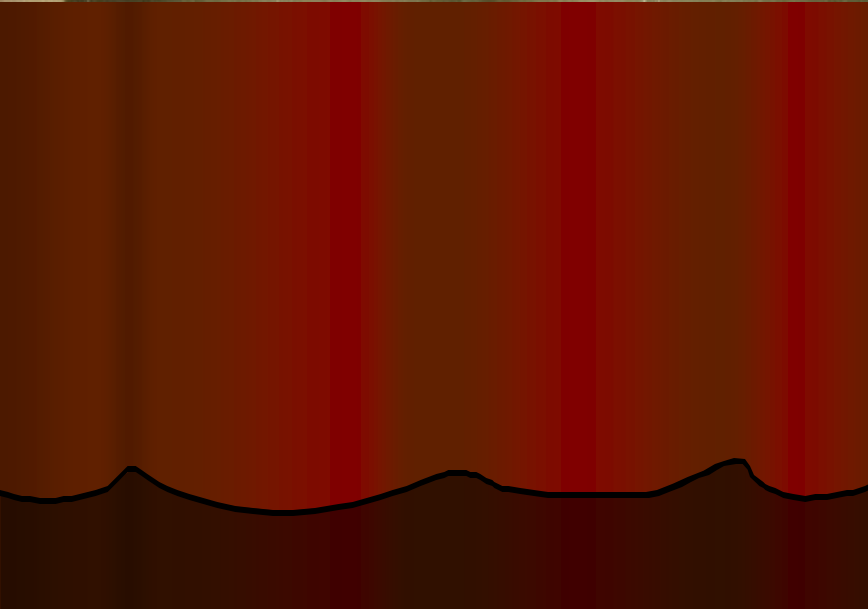
8 months follow-up
8 Jan 2003









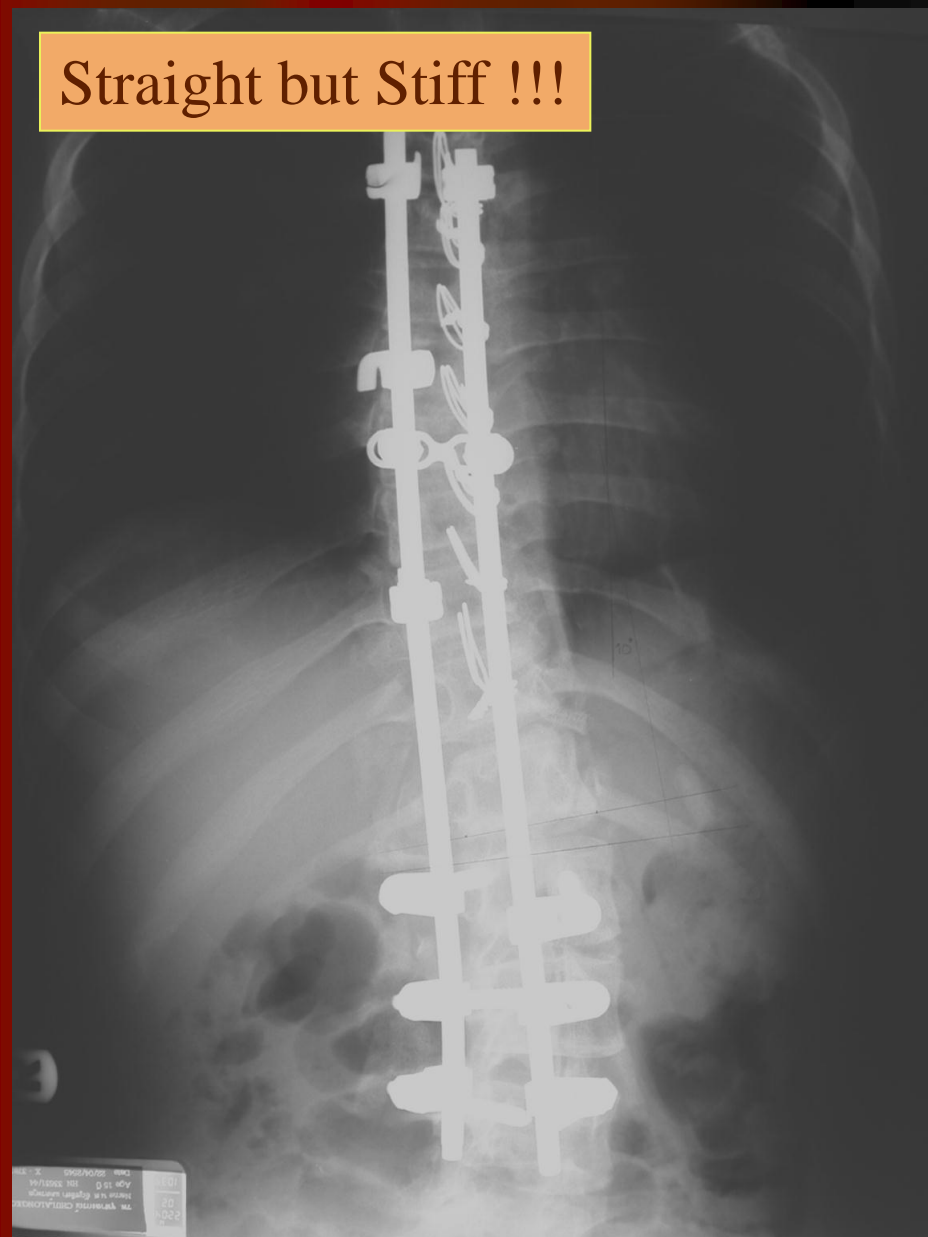




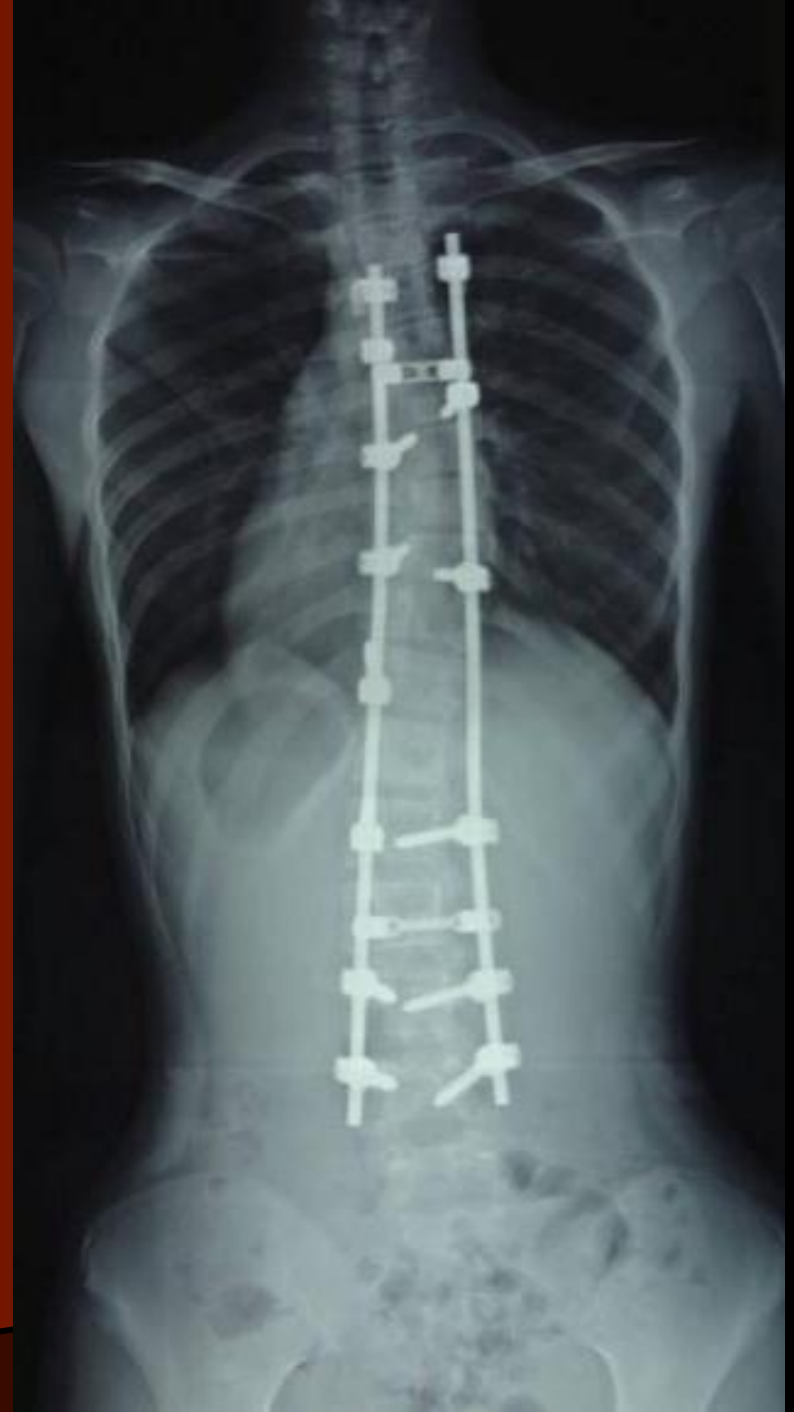


Mobile/Painless with
A curving back!!

Straight but Stiff !!!







AIS: Take Home Message !

- Good Balance both coronal & sagittal plane
- Curve < 20 degree.....Watch
- Curve 20-30 degree.....Brace (Risser < 3)
- Curve 40 - 50 degree.....Surgery !!!
- Curve 30-40 degree.....Individual basis
- Document curve progression.....consider surgery earlier

Timing

If curve flexible.....no matter to WAIT!!

If curve rigid or trunk balance offside.....Surgery

