

# Differential Diagnosis : Back Disorders

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# Spinal Disorders

- Congenital OR Acquired :
- Developmental
- Traumatic
- Infection
- Inflammation
- Tumor
- Degenerative
- Metabolic
- Psychological

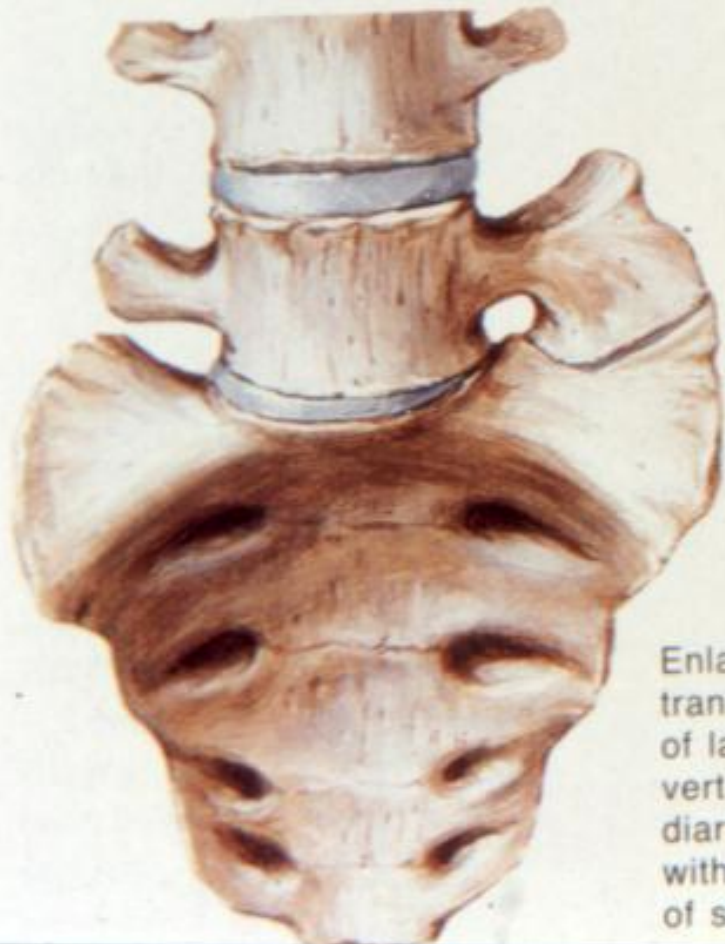
# CONGENITAL

- May present early with obvious deformity or
- May present **later** accidentally or symptomatically
- Usually **Painless**

# Congenital Anomalies: Sacralisation

Plate 5

## Transitional Lumbosacral Vertebrae (Sacralization of L5)



Enlarged left  
transverse process  
of last presacral  
vertebra forms  
diarthrodial joint  
with lateral mass  
of sacrum

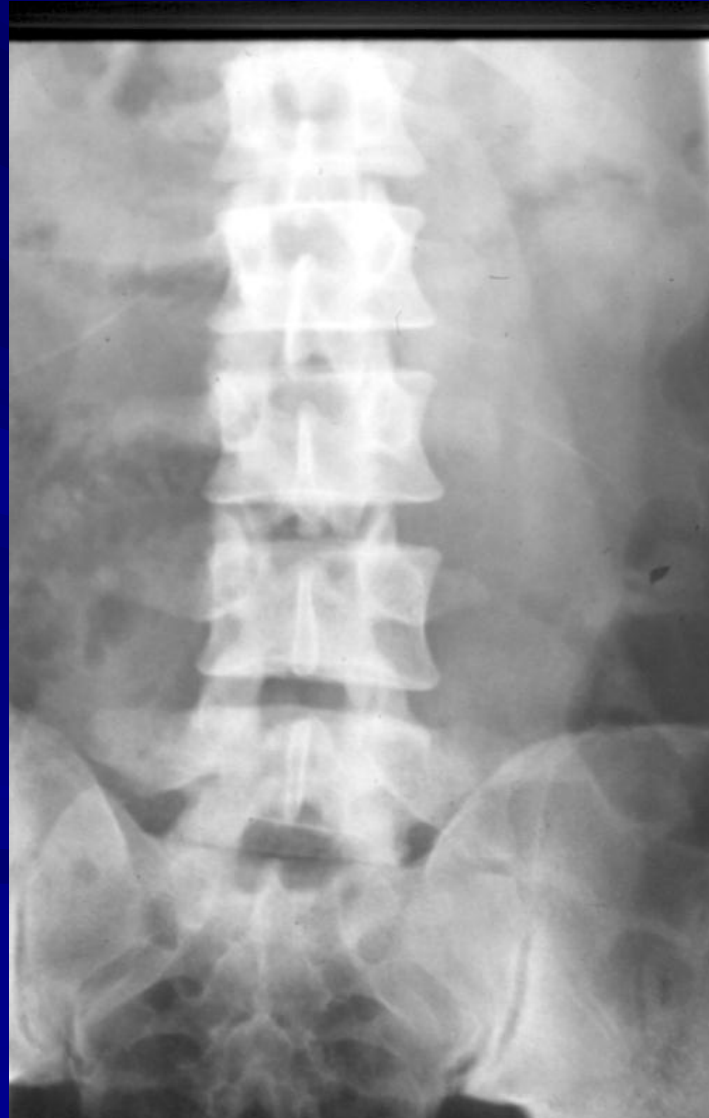
*F. Netter M.D.*  
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Complete  
bony fusion



# X Ray of incomplete hemi-Sacralisation



# X Ray of R Hemi-Sacralisation



# X Ray of complete Sacralisation

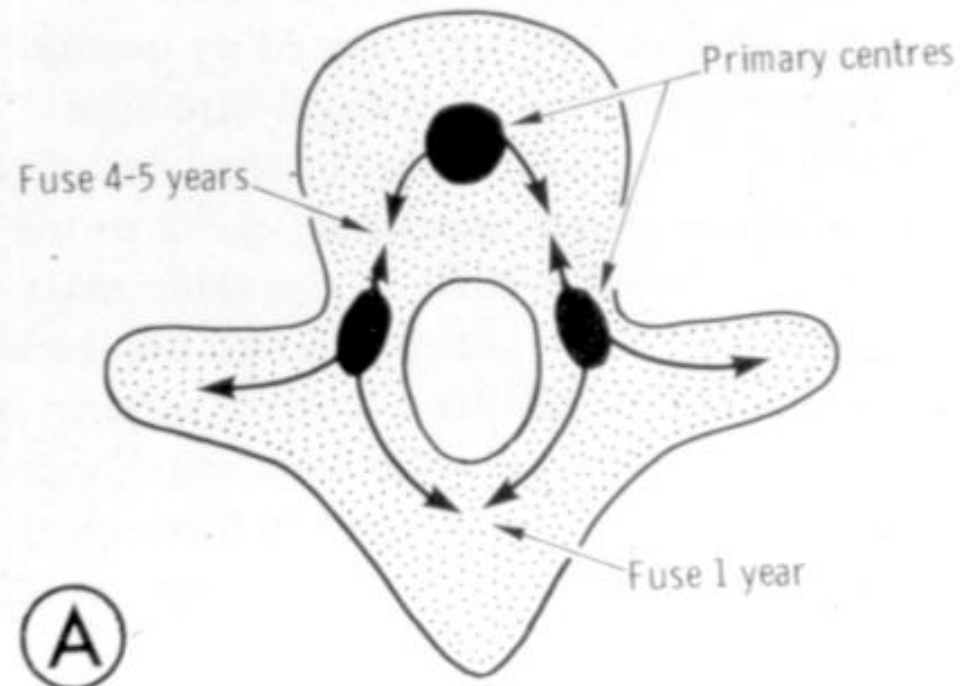


# Lumbarisation



# Congenital anomalies : Aetiology

OSSIFICATION OF VERTEBRA: Primary centres (black)  
Cartilage model (stipple)



# Aetiology

- **Failure of formation** : part of ossification centre fails to grow whilst the other part grows so a WEDGE vertebra forms ( anterior or lateral )
- **Failure of Segmentation** : part of ossification center fails to separate from above or below ossification center so a BLOCK vertebra forms



# Failure of Formation

Plate

## Congenital Scoliosis

Closed vertebral types  
(MacEwen classification)

Partial  
unilateral  
failure of  
formation  
(wedge  
vertebrae)



Complete  
unilateral  
failure of  
formation  
(hemivertebra)



# Failure of Segmentation

Unilateral  
failure of  
segmentation  
(congenital bar)

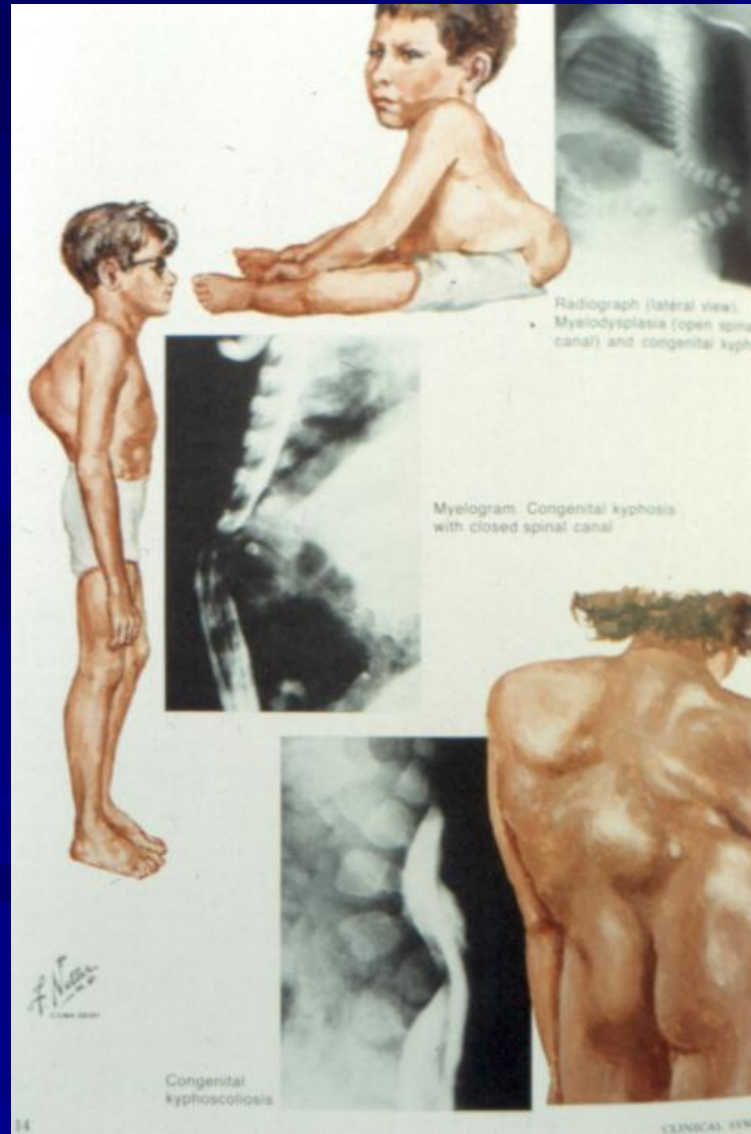


Bilateral  
failure of  
segmentation  
(block vertebra)



*f. n.*

# Congenital Kyphosis : Wedge Vertebra





# Klippel-Feil syndrome



# Klippel-Feil Syndrome



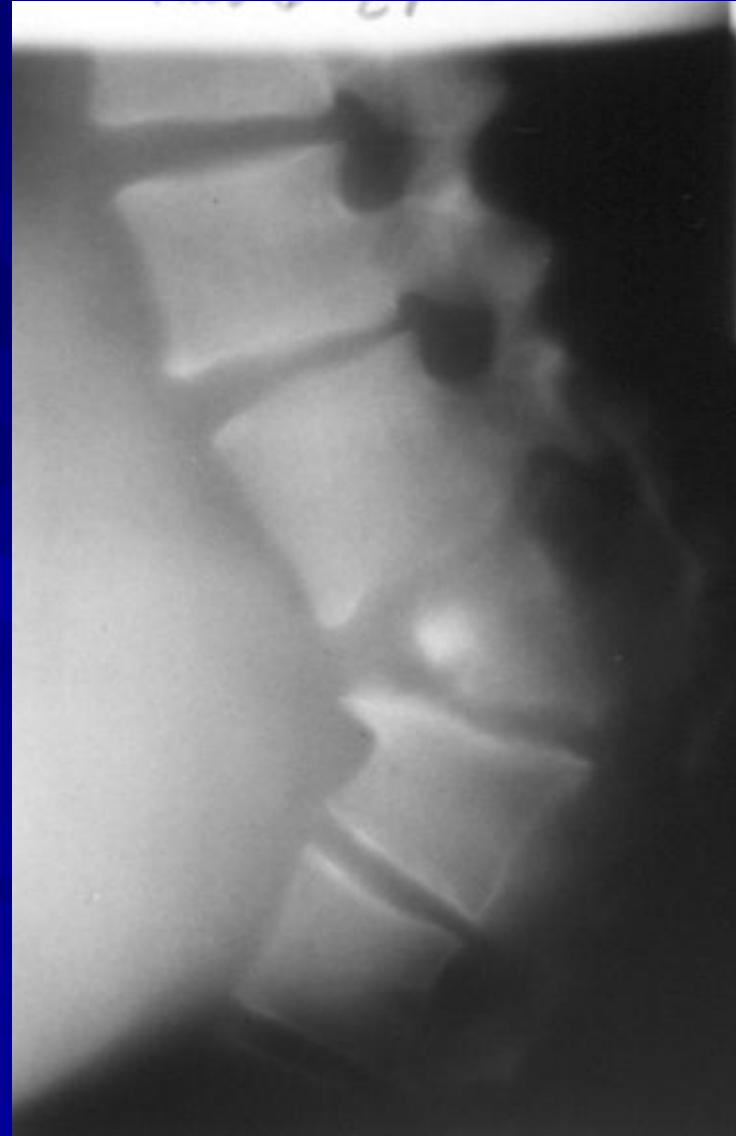
- Characterised by both **failure of formation** (Wedge vertebra=congenital scoliosis or kyphosis)
- **Failure of segmentation=Block vertebra**
- Short neck and high scapula are very characteristic

# Congenital Scoliosis





# Congenital Kyphosis



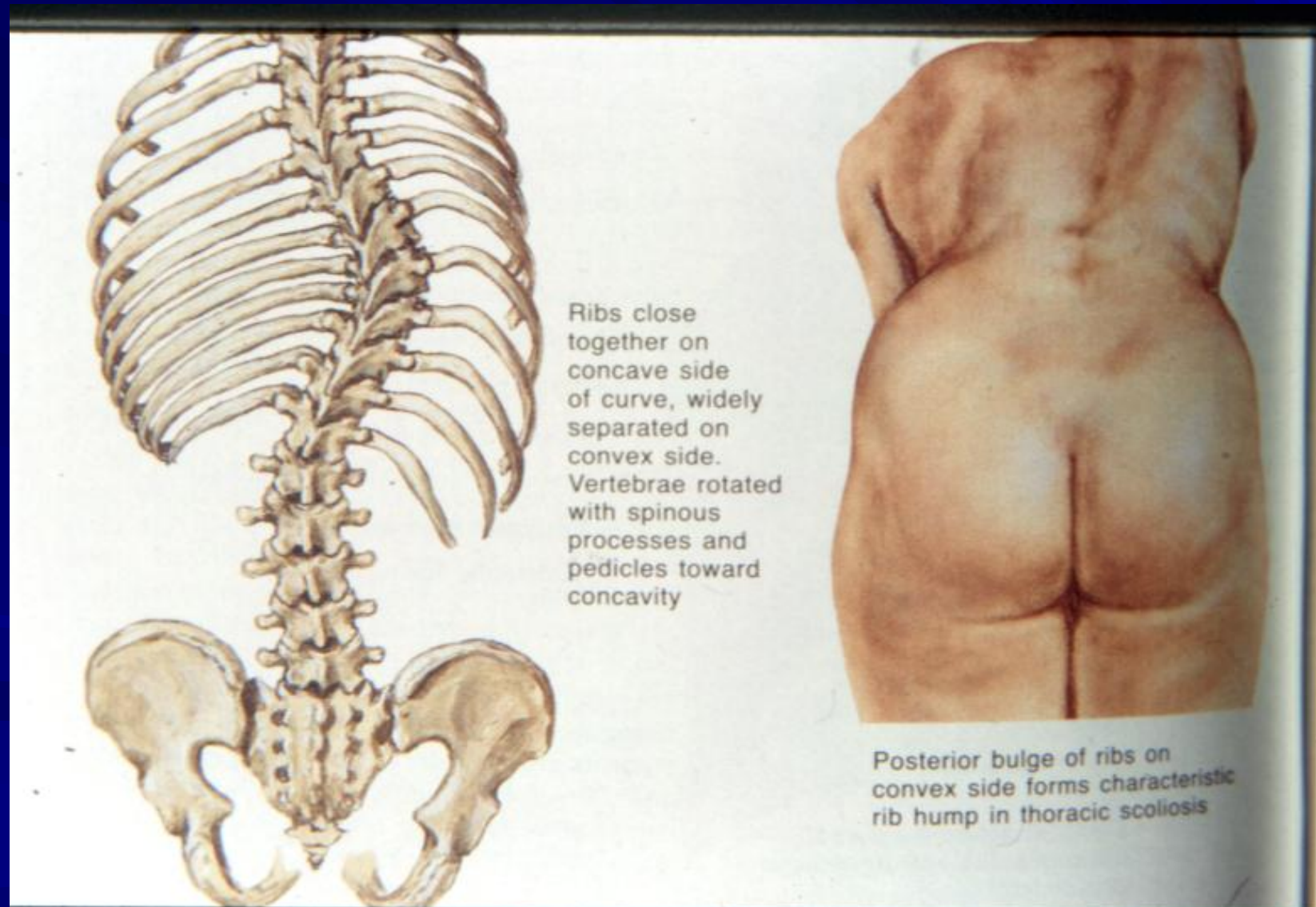
# Scoliosis

- Many causes:
- Most common is **Idiopathic**.
- Other causes include : **congenital**, **neuropathic** (e.g. polio), **Myopathic** e.g. (muscular dystrophy), **connective tissue disease** e.g. (Marfan's syndrome), **tumour, trauma, infection ( T.B.)**

# Idiopathic Scoliosis

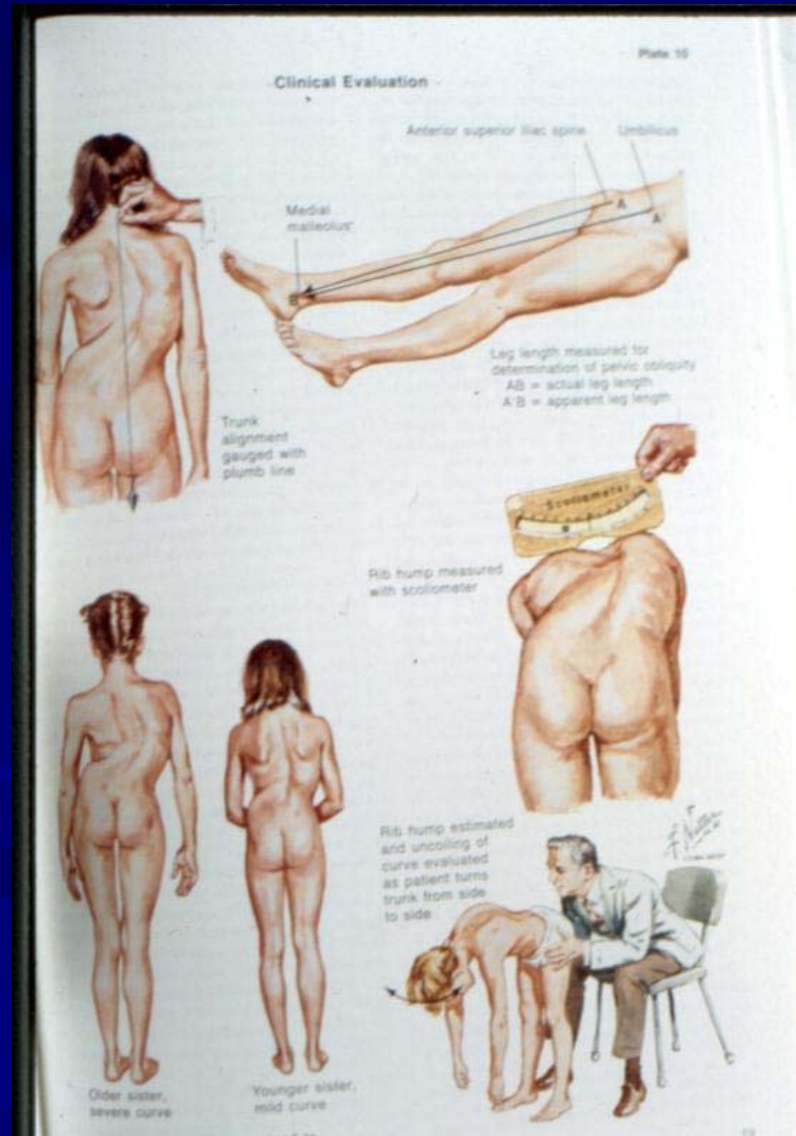


# Idiopathic Scoliosis is associated with rotation of vertebrae



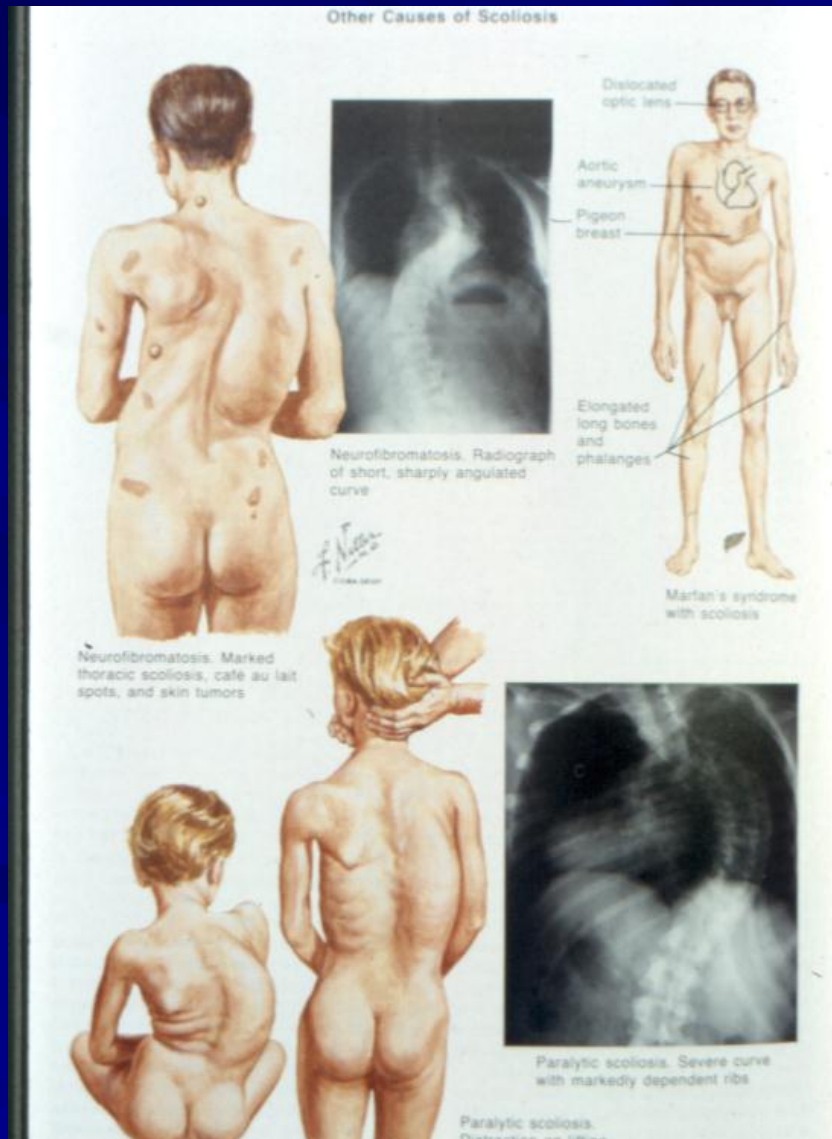


# Scoliosis: Important Points



- Observation of deformity during back flexion is most accurate
- Leg length asymmetry is a cause of scoliotic deformity
- Rib hump elevation may be measured by a scoliometer

# Some causes of Scoliosis

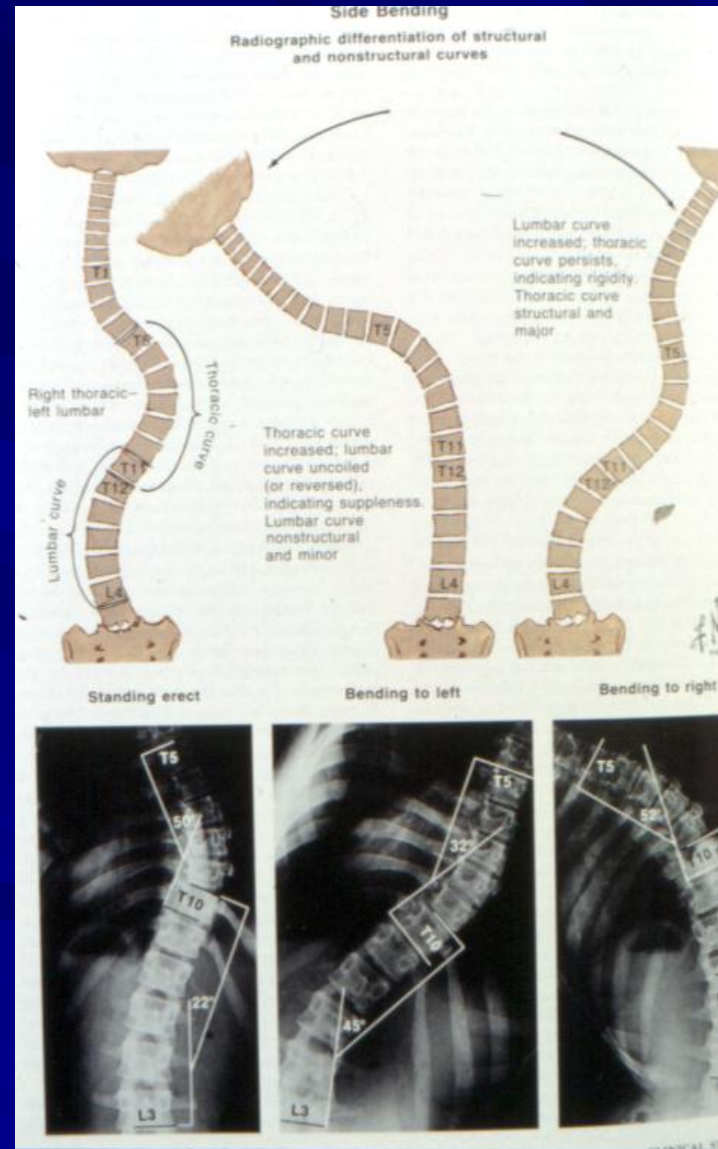




# X Ray of Idiopathic Scoliosis



# Cob's angle: lateral bending



# Principles of Scoliosis management

- Mild cases < 25 Degrees = Programme of **exercise** and intermittent traction
- Between 25 and 40 = **Orthosis** or Plaster of Paris cast
- >40-50 degrees = consider **Surgery**

# Traction for Scoliosis



Cotrel dynamic traction

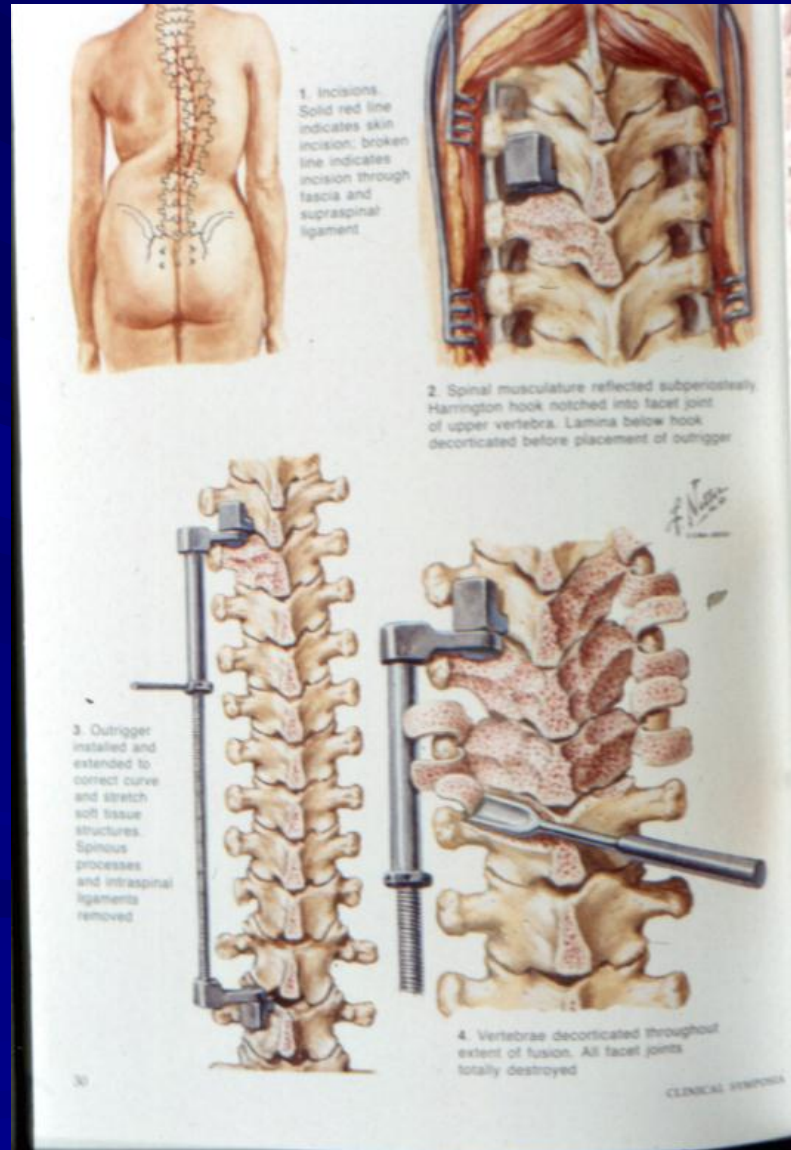
# Scoliosis: correction with a cast



Correction of a scoliosis with a localiser pad



# Scoliosis: Principles of Surgery





# Scoliosis : Principles of Surgery

- Usually extensive surgery
- Blood transfusion is required
- Bone graft is always done
- Correction is done by **Instrumentation**

**Either :**

- **Posterior** Approach ( more common and for less rigid deformities )
- **Anterior** Approach (includes Thoracotomy or Thoracoscopic approaches )

# Scoliosis : Principles of surgery

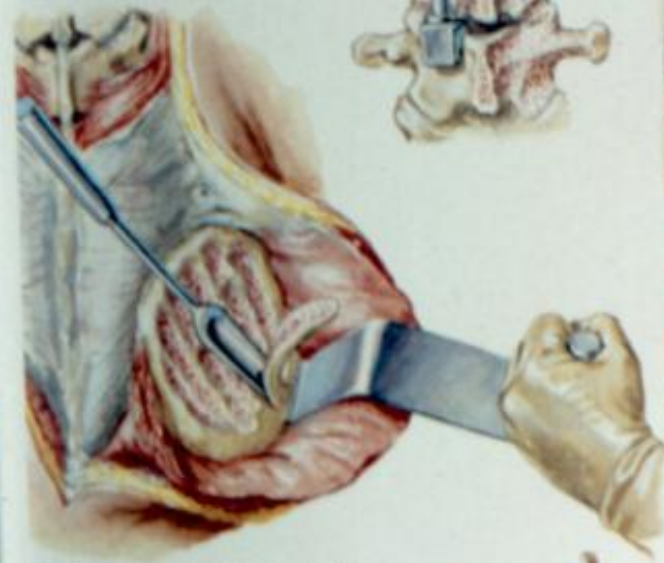
- Correction is done by release of tight structures, distraction , compression and rotation with instrumentation
- Instrumentation includes rods, hooks, plates and pedicular screws
- Bone graft to insure spinal fusion in corrected position is mandatory



5. Posterior intervertebral articulations in lumbar area excised with double-action rongeur



6. Harrington rod inserted and maximally extended

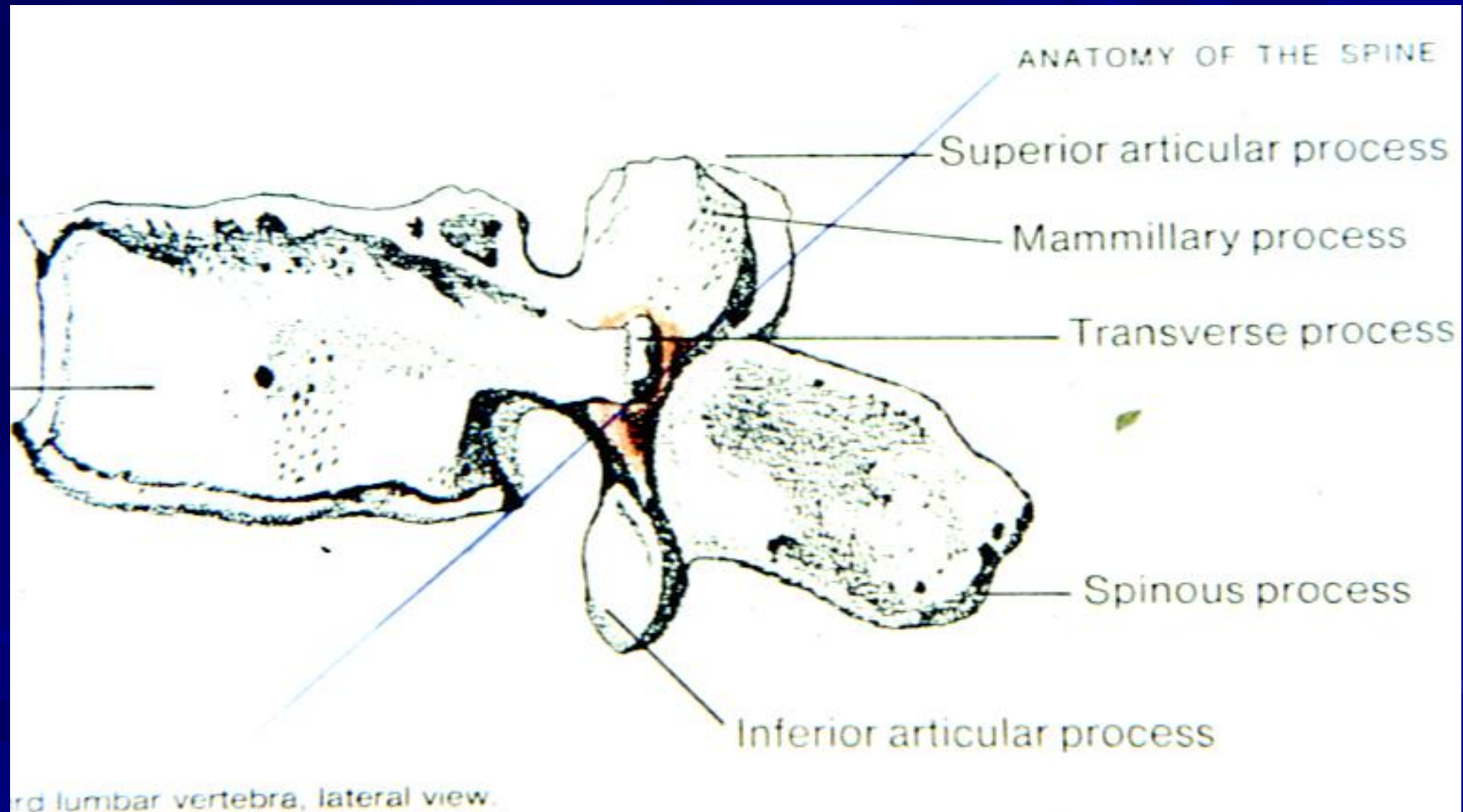


7. Interior end of incision greatly retracted and bone graft material obtained from ilium



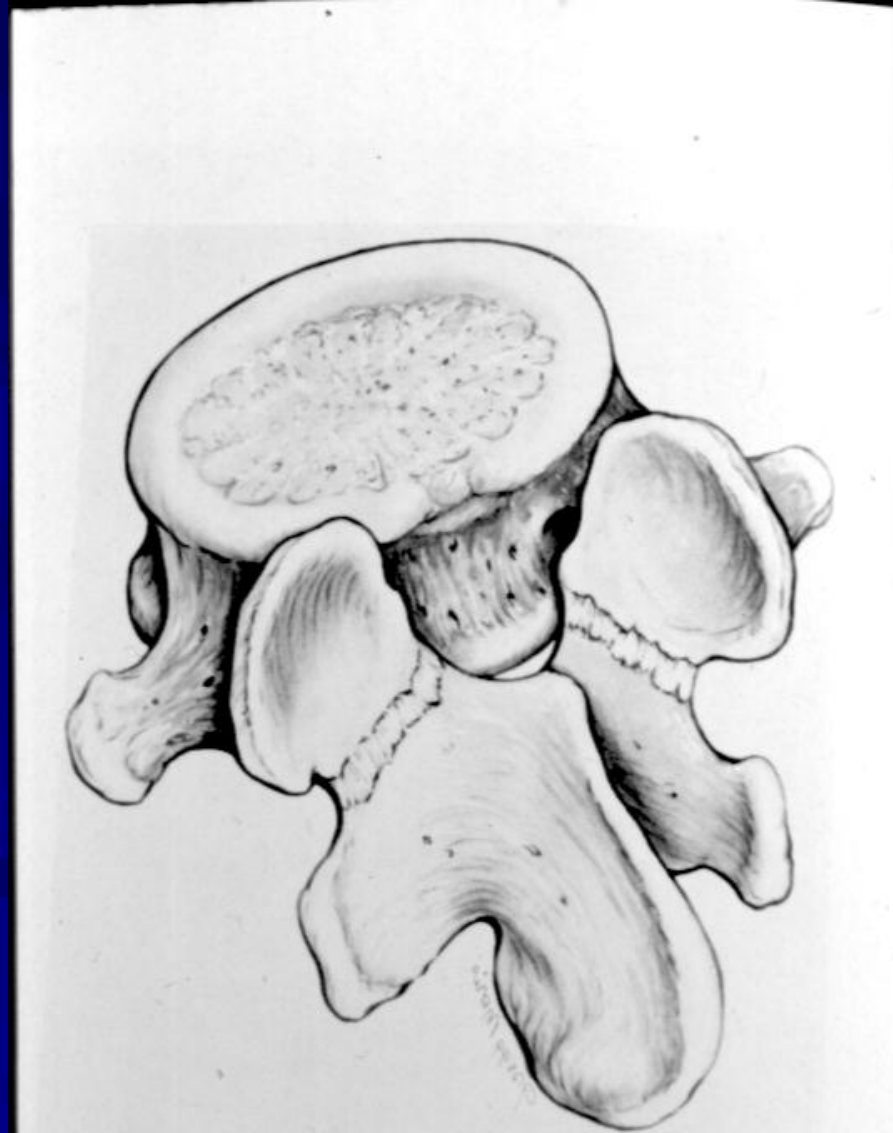
8. Bone graft material cut into matchstick-sized strips and packed over posterior cortical bone

# Spondylolysis= Defect in the pars inter-articularis: Lateral view



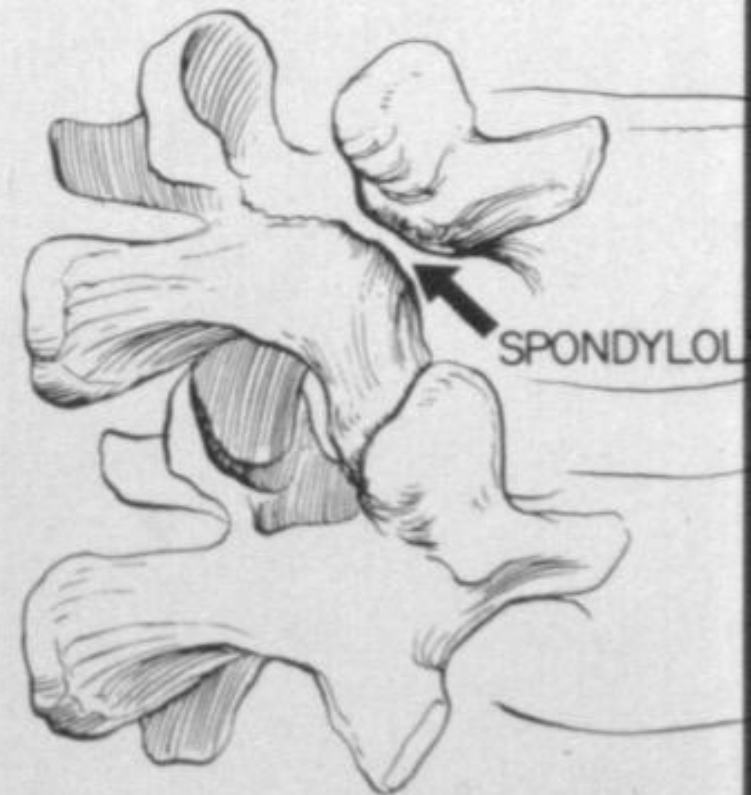
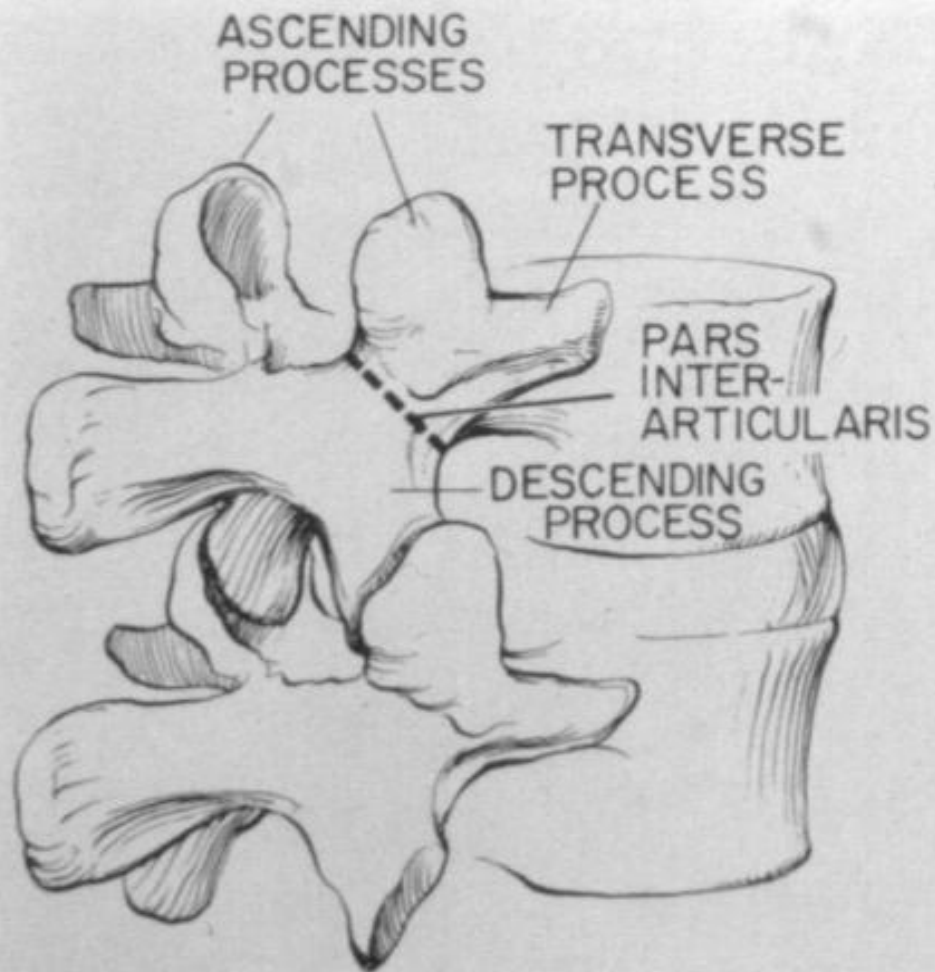


**Spondylolysis= Defect in the  
Pars- Interarticularis: superior view**





# Spondylolysis : dog Appearance

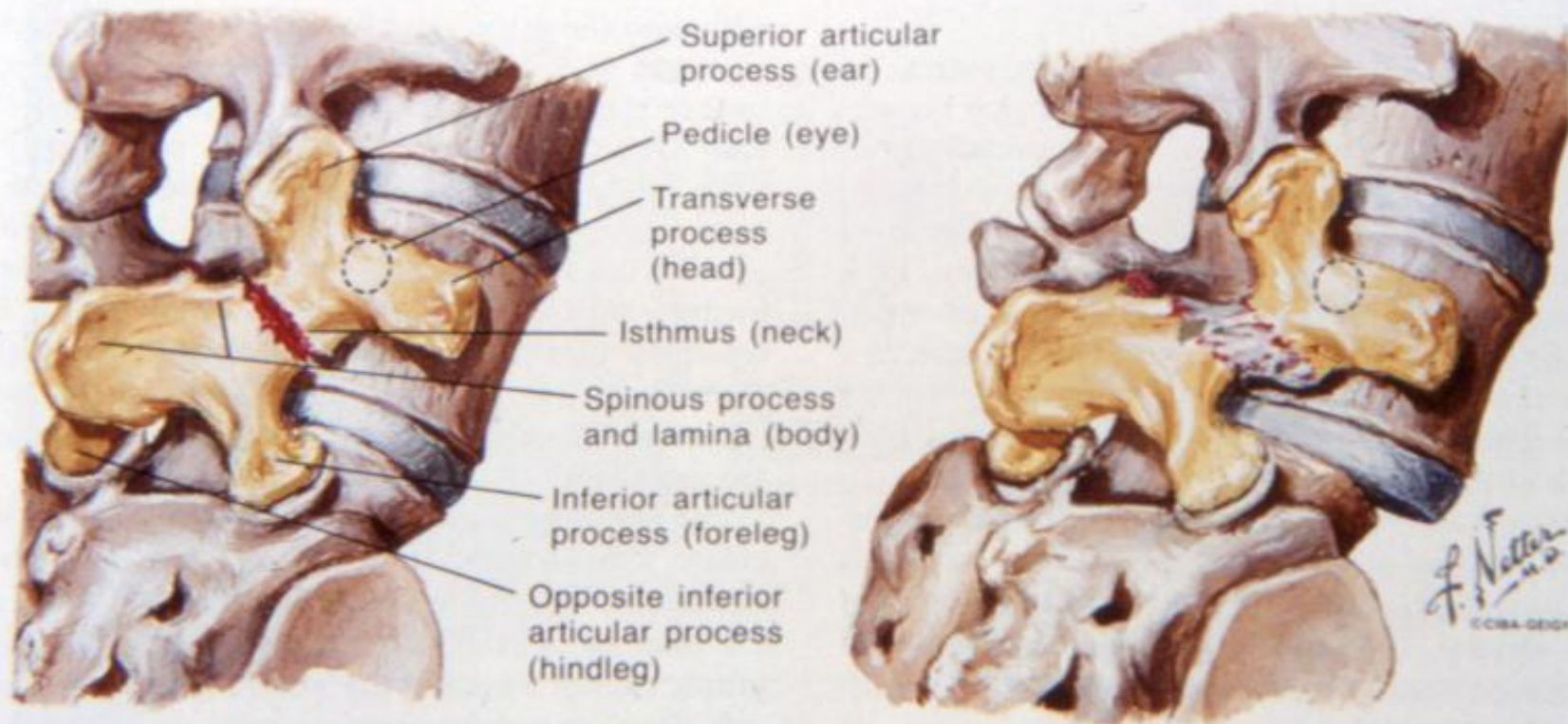


PEDICLE-"EYE"

# Spondylolysis: Decapitated dog

Plate 8

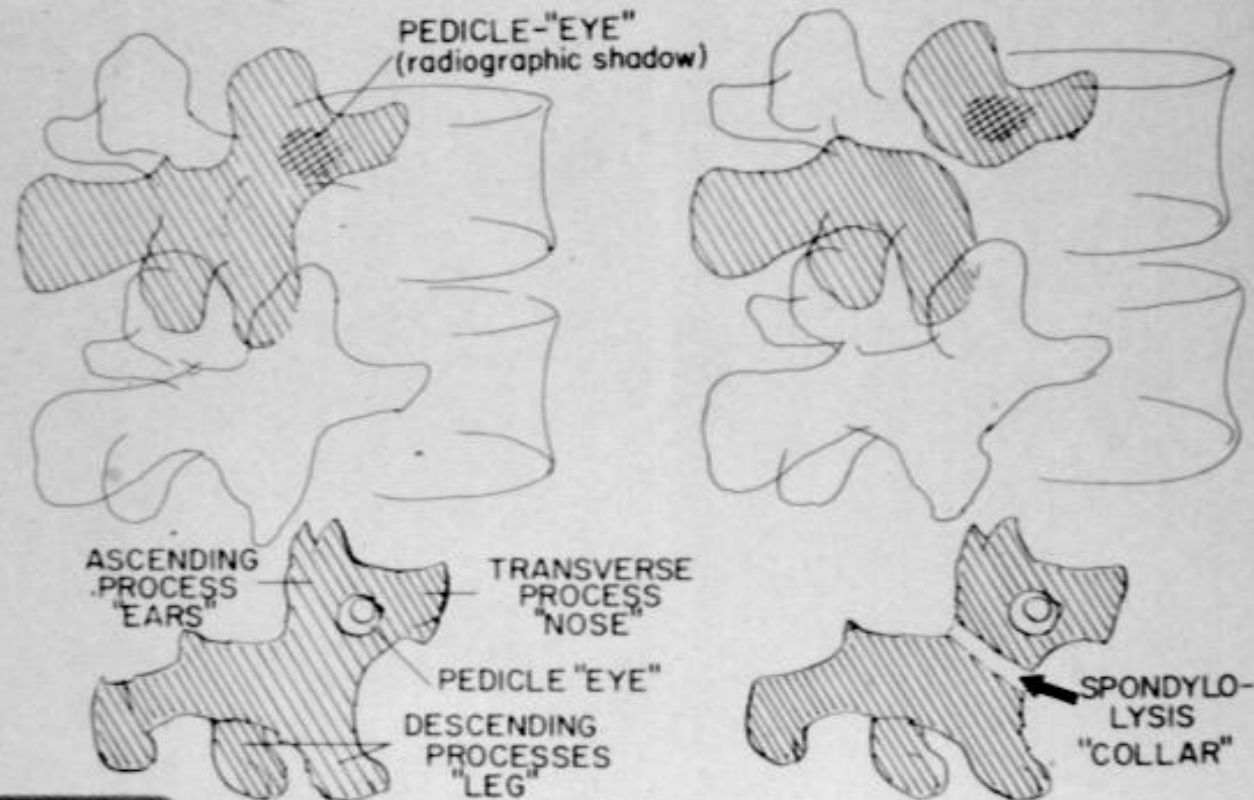
## Spondylolysis and Spondylolisthesis



Posterior oblique radiographic view mimics shape of Scotty dog. In simple spondylolysis, dog appears to be wearing collar

In spondylolisthesis, "Scotty dog" appears 'decapitated'

# Spondylolysis: Dog Appearance



Schematic drawing of an oblique roentgenogram of the lumbar spine, showing the characteristic "scotty dog" look of its posterior elements. Note that the defect in the pars interarticularis appears to be a collar around the dog's neck.



# Spondylolysis :45 degrees Oblique view of spine

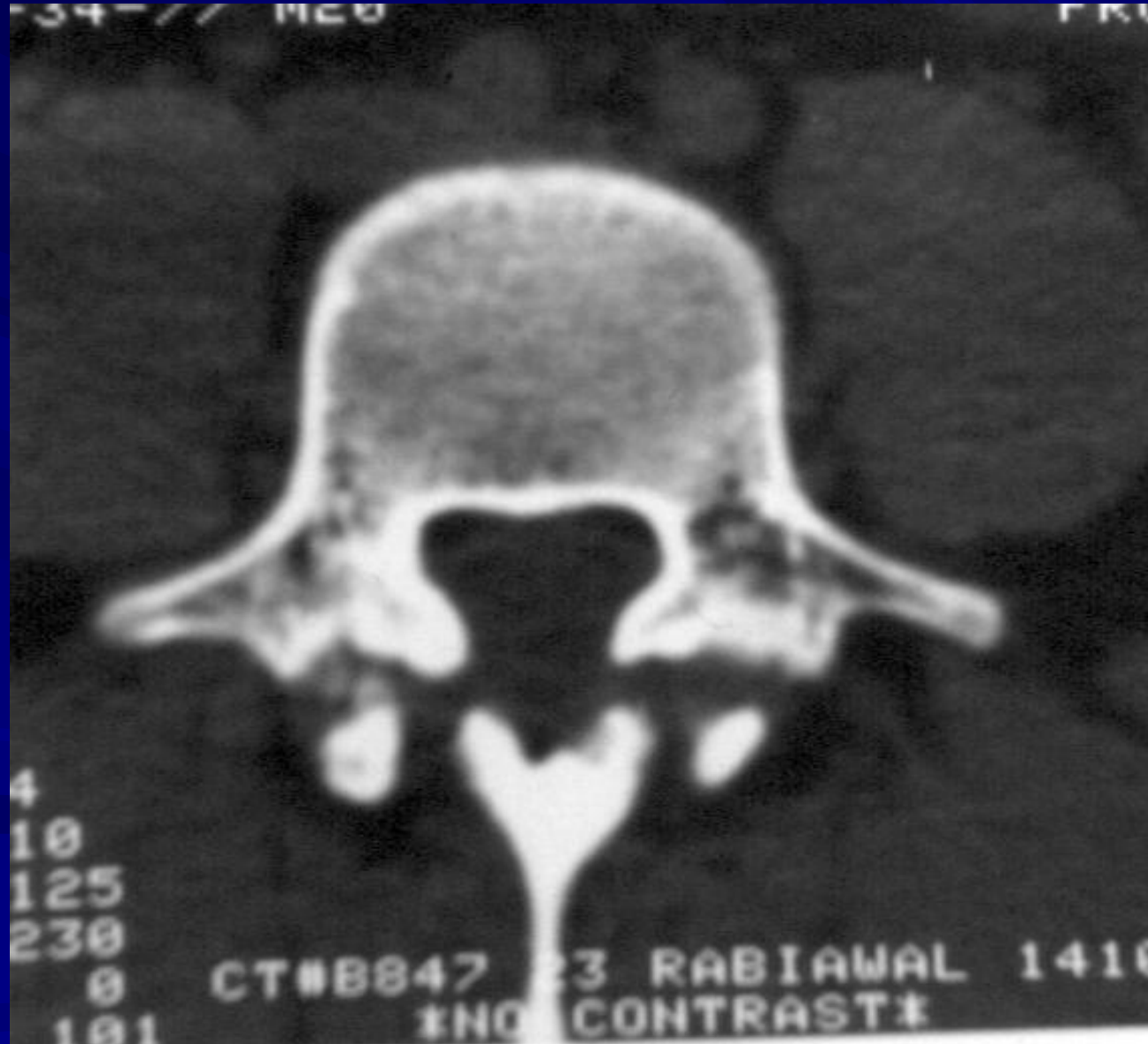


# Spondylolysis :Lateral view of spine





# Spondylolysis : C.T. Scan



# Spondylolysis : Aetiology

## **Isthmic**

- Congenital defect of Pars Inter-Articularis
- Traumatic ( Fracture of the pars )
- Pathological defect due to infection or tumour

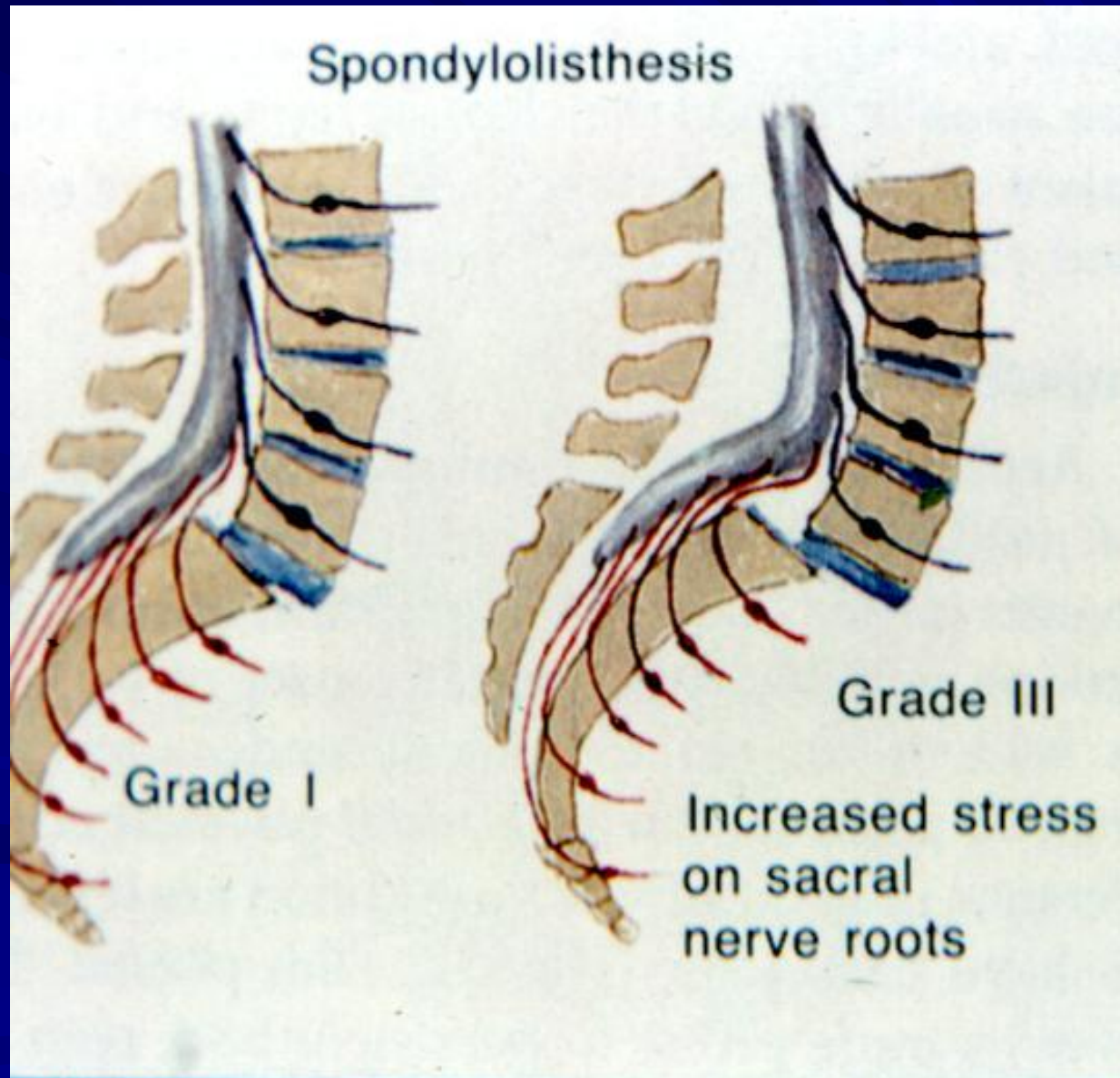
## **Dysplastic**

Developmental or degenerative deformity of the facet joints

# Clinical Picture

- Spondylolysis may cause deep seated low back pain due to micro movement at site of defect
- Spondylolysis may be diagnosed incidentally during x ray of spine or KUB
- Spondylolysis result in Spondylolisthesis
- Spondylolisthesis causes traction on nerve roots and radicular pain

# Spondylolisthesis



# Spondylolisthesis

- Usually L4-5 or L5-S1
- Graded in 4 grades 1-4
- Grade 1 is 25% slip on the vertebra below
- Grade 4 is 100% slip on the vertebra below
- Pain is more on standing than walking



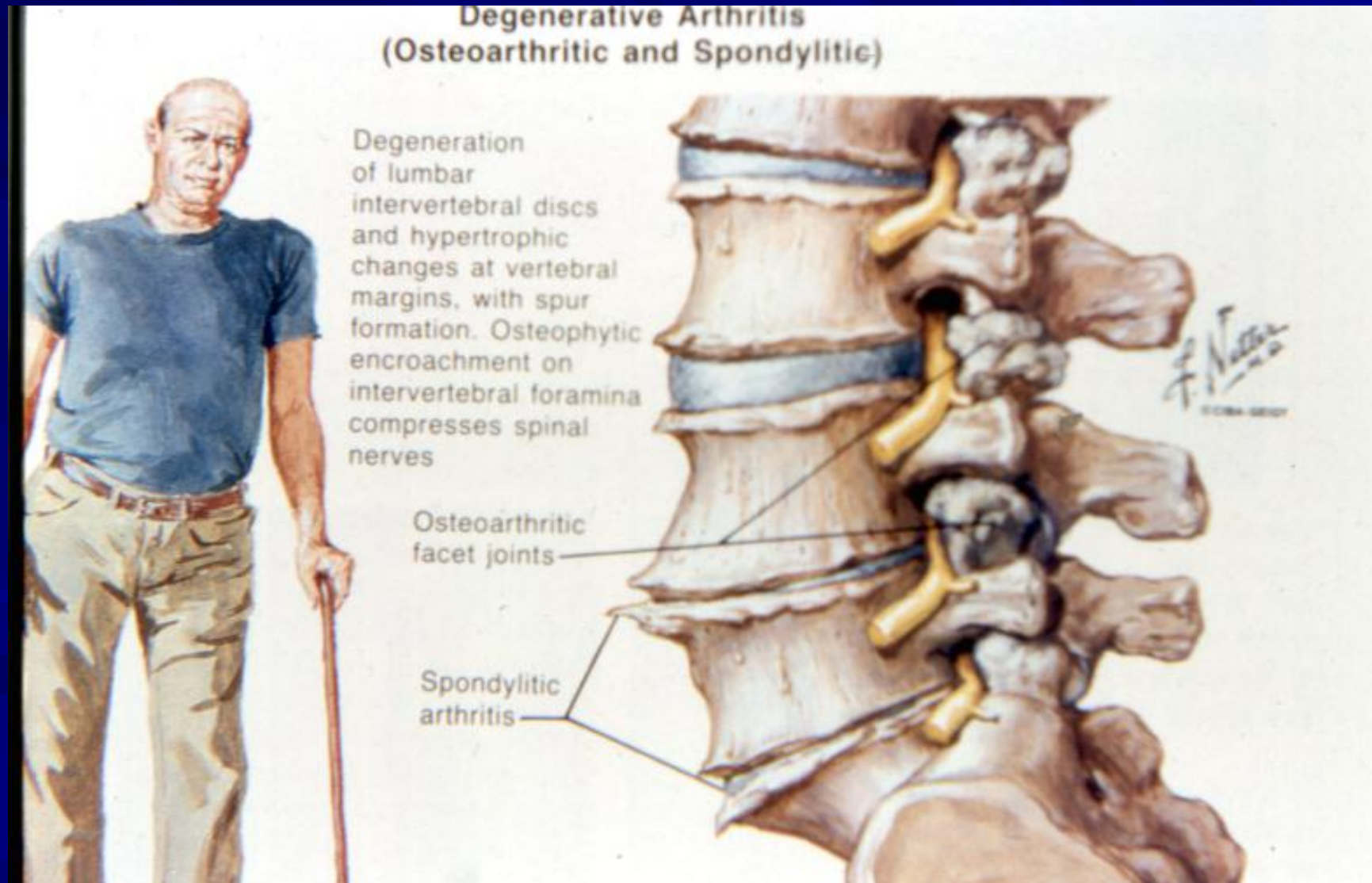
# Management of Spondylolysis

- NOT every spondylolysis is symptomatic
- Treatment is usually conservative by exercise and analgesics ( NSAIDs )
- Rarely surgery is indicated for repair of defect ( Fixation and bone graft )

# Management of Spondylolisthesis

- Usually **conservative** for grades 1 and 2
- **Surgical** for grades 3 and 4 and lower grades when they fail to respond to conservative treatment
- Fusion of the spine at the site ( Fusion in situ with instrumentation or Fusion following reduction by instrumentation )
- Bone graft is used

# Degenerative Disorders : O.A. of Spine



# Spinal Stenosis

- **Congenital ( Rare ) OR**
- **Acquired**
- Is a cause of Backache , Sciatica and **Intermittent Claudication**
- Intermittent claudication ( **Neurogenic Claudication** ) is characterised by progressive weakness of the legs during walking forcing patients to stop and take a rest (usually in flexed back position or squatting ) till pain goes away

## Spinal Stenosis



Characteristic posture with neck, spine, hips, and knees flexed relieves pressure on cauda equina and resulting pain. Back is flat or convex with absence of normal lordotic curvature.



Metrizamide-enhanced CT scan shows severe compromise of spinal canal with compressed dural compartment.

Inferior articular process of superior vertebra

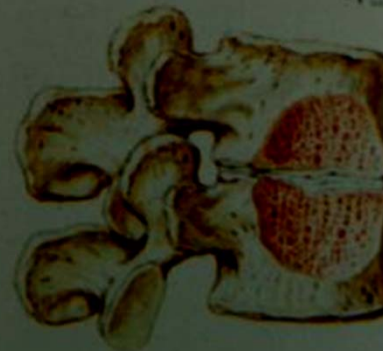
Superior articular process of inferior vertebra

Lateral recess

Central spinal canal narrowed by enlargement of inferior articular processes of superior vertebra. Lateral recesses narrowed by subluxation and osteophytic enlargement of superior articular processes of inferior vertebra.



Properly spaced lumbar vertebra with normal thickness of intervertebral disc.



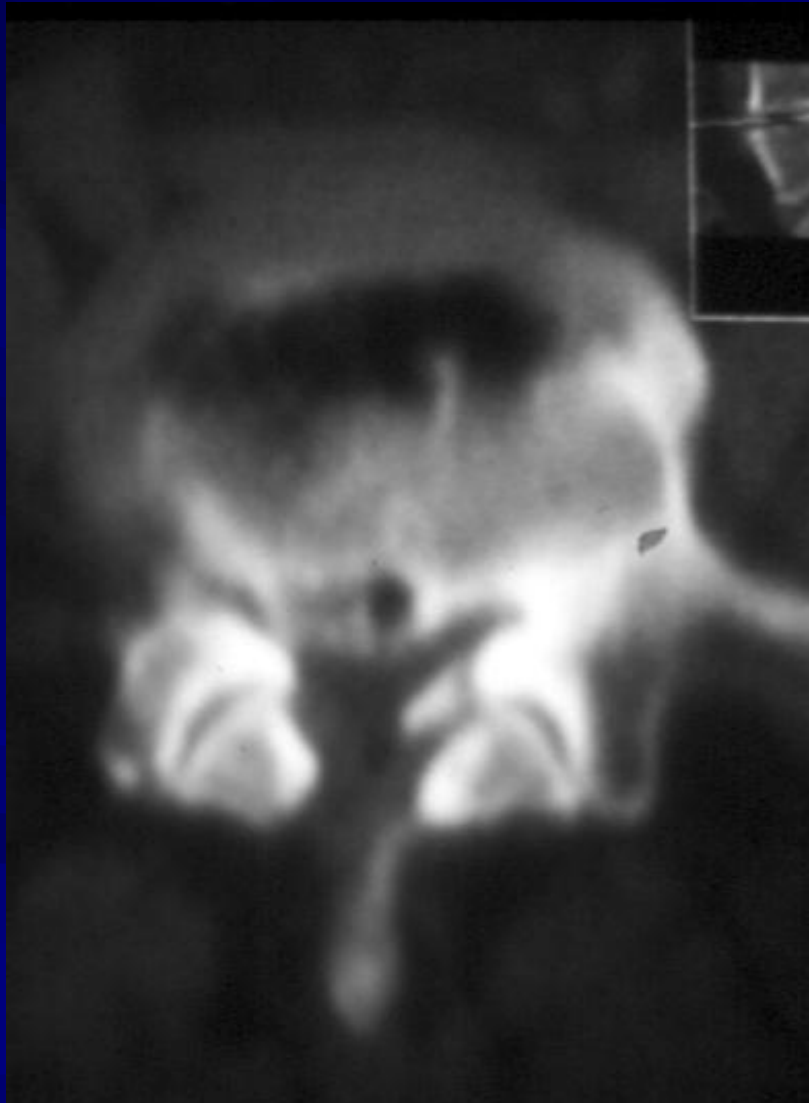
Vertebrae approximated due to loss of disc height. Subluxated superior articular process of inferior vertebra encroaches on foramen. Internal disruption of disc shown in cut section.



# Myelography in Spinal Stenosis



# Spinal Stenosis



- C.T. scan of spinal Stenosis
- Hypertrophy of Facet Joints and Ligamentum Flavum are seen
- Fractured osteophyte of Facet Joint is seen on left side
- Calcified bulge of Intervertebral Disc and air shadow anteriorly

# MRI in Spinal Stenosis



# Management of Spinal Stenosis

- Initially **conservative**
- Conservative management includes exercise, NSAIDs and neurotrophic vitamins
- **Surgery** is indicated for intractable symptoms
- Surgery includes **Decompression** of stenosed part and stabilisation by instrumentation

# Ankylosing Spondylitis



Chest expansion decreases



Ossification of anterior longitudinal ligament and intervertebral discs



Ossification of radiate ligaments of head of rib





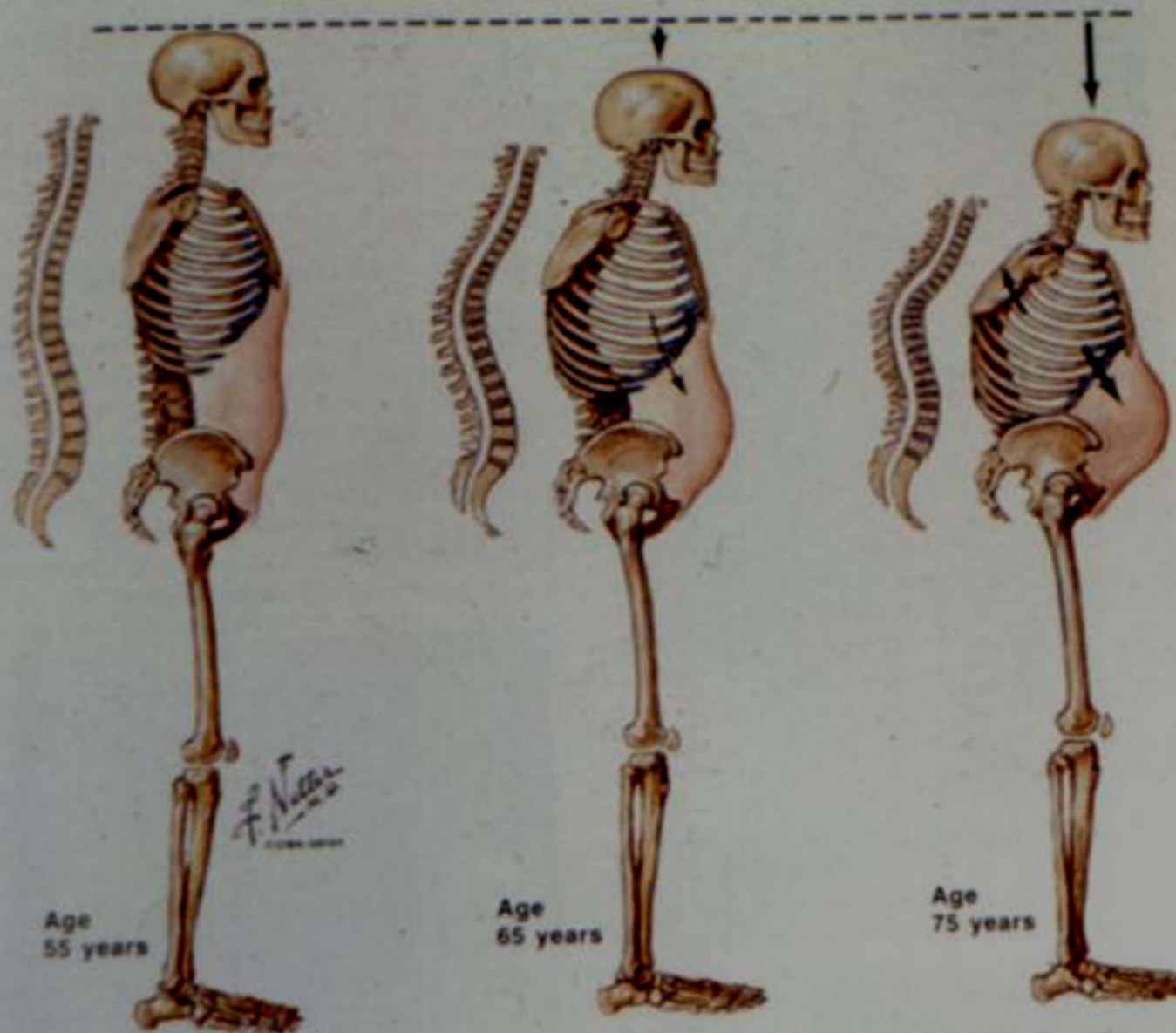
# Ankylosing Spondylitis

- Is Inflammatory disorder affecting mainly young men
- It is characterised later by severe spine stiffness
- Early symptoms include reduced chest expansion due to ankylosis of costo-chondral ligaments
- Late X Ray sign is Bamboo Spine

# Ankylosing Spondylitis

- Haziness of Sacro =Iliac joints is an early radiological sign
- Positive HLA- B27 is significant diagnostic criteria
- Severe neck and spinal flexion are late findings
- **Early** management is **Conservative** by exercise and NSAIDs
- **Late** management is by **Surgery** to reduce severe spinal flexion

## Progressive Spinal Deformity in Osteoporosis



Compression fractures of thoracic vertebrae lead to loss of height and progressive thoracic kyphosis (dowager's hump). Lower ribs eventually rest on iliac crests, and downward pressure on viscera causes abdominal distention

# Spinal Osteoporosis

- One of the most serious sequel to osteoporosis
- Micro-fractures of vertebrae cause chronic backache
- Osteoporotic vertebral fractures are common following minor trauma
- Severity is measured by DEXA exam  
( **D**ual **E**nergy **X** ray **A**bsorptionometry )

# Principles of Osteoporosis Management

- Exercise can improve bone mass before menopause or old age and may delay the process at that time

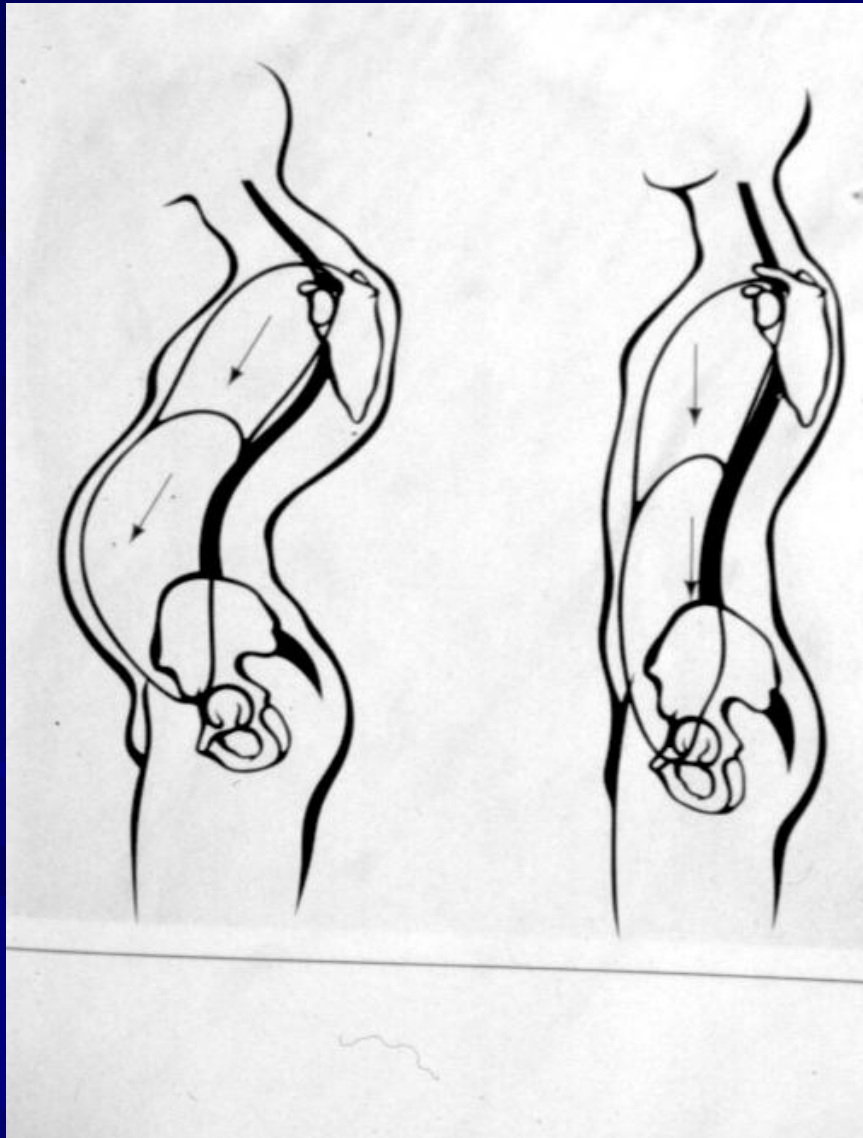
Post menopausal therapy includes :

Inhibition or reduction of osteoclastic activity to reduce bone resorption

Stimulation or increasing of osteoblastic activity to increase bone formation



# Backache in Pregnancy



- Very common
- Difficult to treat
- NSAIDs should not be given in first trimester
- Mechanism of pain is faulty mechanics of spine due to lax abdominal muscles and shift of center of gravity

# Current time cause of Backache

