

# Spinal Disorders

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# OBJECTIVES

- TO KNOW THE COMMON SPINAL DISORDERS
- HOW TO CLINICALLY DIAGNOSE SPINAL DISORDER CASES ?
- WHAT IS NATURAL HISTORY OF EACH CASE ?
- WHAT IS SUITABLE INVESTIGATION ,AND ITS LIMITS ?
- TREATMENT OF THE COMMON DISORDERS

# SPINAL DISORDERS

## THE COMMON DISORDERS ARE:

### DEFORMITY:

Scoliosis  
kyphosis

### INFECTION:

TB  
Pyogenic

### INTERVERTEBRAL DISC LESION

### SPONDYLOLYSIS and SPONDYLOLISTHESIS

### SPINE DEGENERATION and SPINAL CANAL STENOSIS

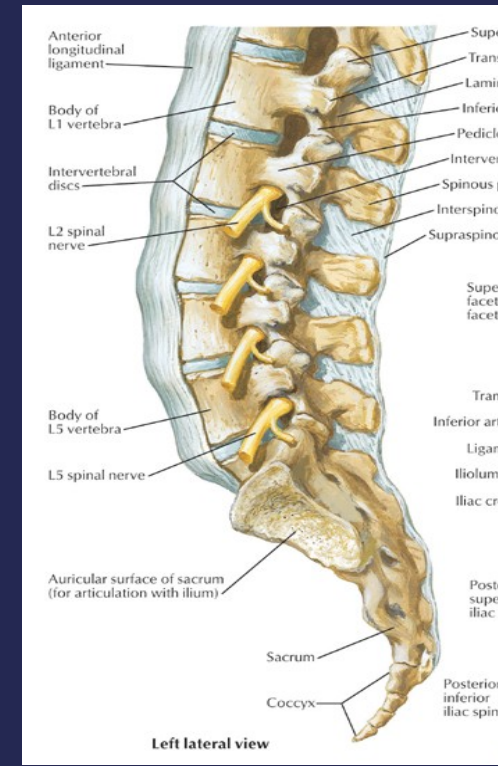
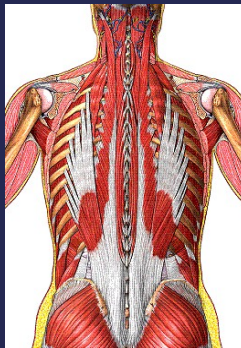
# SPINAL DISORDERS

- NORMALLY THE VERTEBRAL COLUMN IS FORMED OF 7 CERVICAL, 12 THORACIC , 5 LUMBER and SACRUM
- SPINE HAS 3 MAJOR COMPONENTS:

**SPINAL COLUMN** (BONE&DISC)

**NEURAL ELEMENTS** (SPINAL CORD & NERVE ROOTS)

**SUPPORTING STRUCTURES** (MUSCLES & LIGAMENTS)

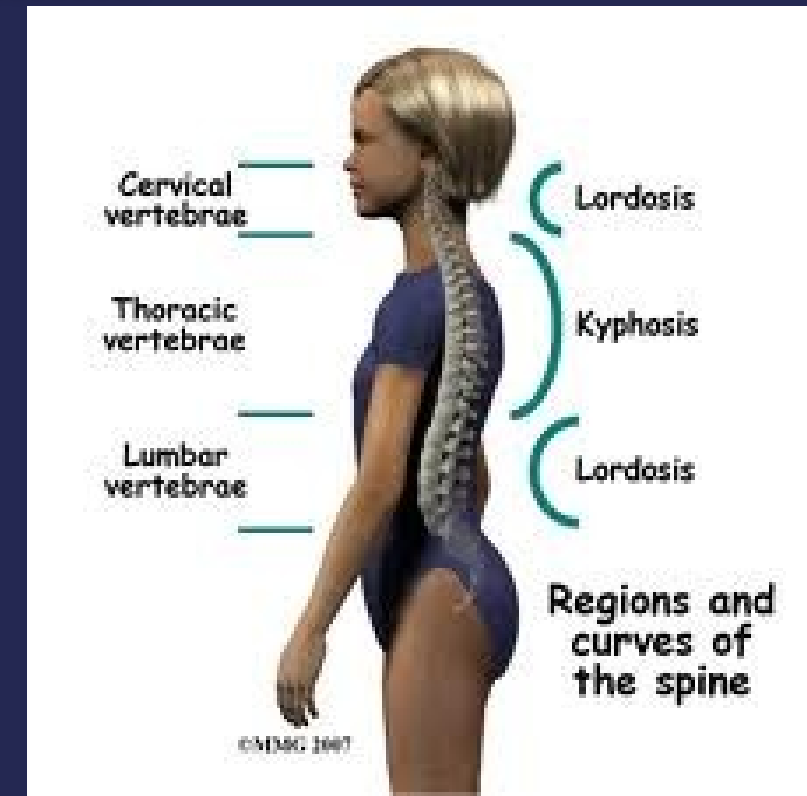


# SPINAL DISORDERS

- NORMALLY THE SPINE HAS 4 NATURAL CURVES THAT HELP TO DESTRIIBUTE MECHANICAL STRESS AS THE BODY MOVES:

**CERVICAL** & **LUMBER** ( LORDOTIC)

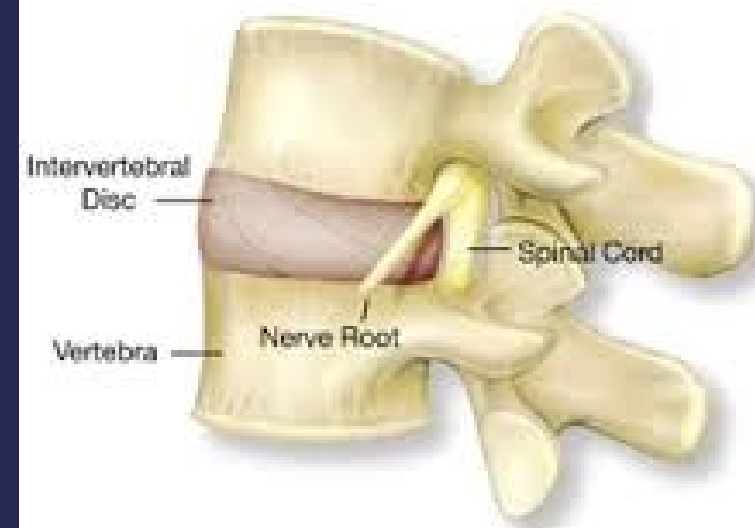
**THORACIC** & **SACRAL** (KYPHOTIC)



# SPINAL DISORDERS

- STRUCTURAL UNIT OF THE SPINE
- A NUMBER OF DISORDERS CAN CHANGE THE STRUCTURAL RELATIONSHIP OF THE SPINE,DAMAGE THE VERTEBRAE AS WELL AS THE SURROUNDING TISSUES.

**Normal Spinal Segment**



# CLINICAL ASSESSMENT

## SYMPTOMS:

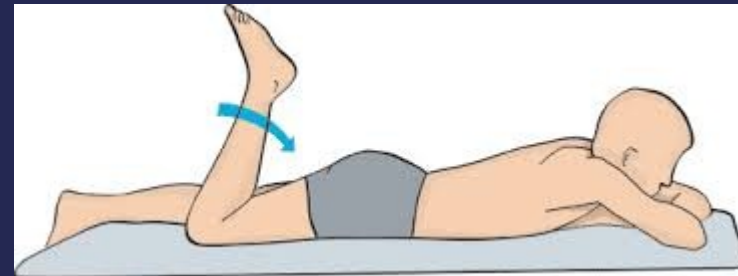
- Pain
- Stiffness
- Deformity
- Neurological symptoms (numbness , paresthesia & muscle weakness)
- Other symptoms (urethral discharge , sore eye , diarrhea)

# CLINICAL ASSESSMENT

## EXAMINATION

IT IS DONE IN 3 POSITIONS:

- With patient **standing**
- With patient **prone**
- With patient **supine**



# CLINICAL ASSESSMENT

## PATIENT STANDING EXAMINATION

### Look

- Posture
- Deformity :
  - Scoliosis
  - kyphosis
- Skin changes :
  - scar , sinus , redness
- Swelling :
  - abscess



# CLINICAL ASSESSMENT

## PATIENT STANDING EXAMINATION

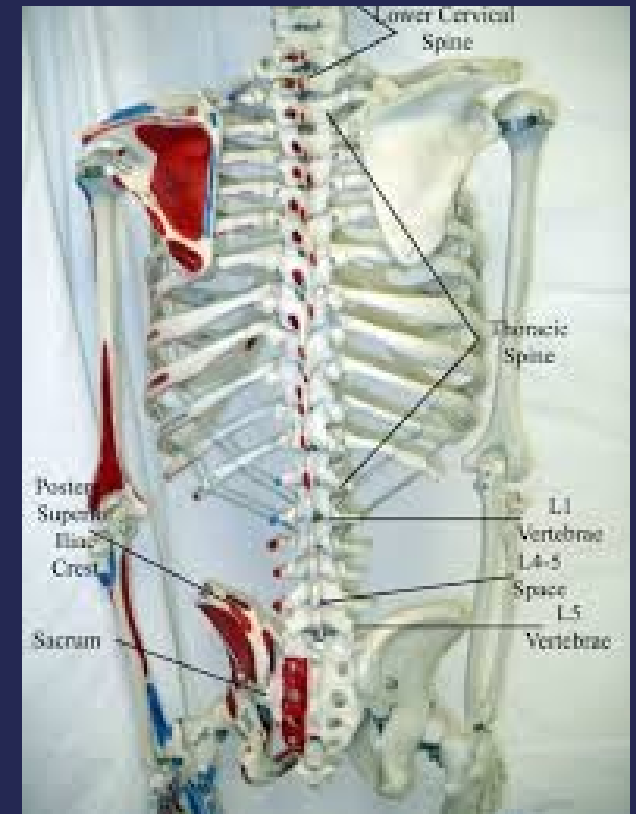
### FEEL

Tenderness

Temperature

Bony prominences

Step sign



# CLINICAL ASSESSMENT

## PATIENT STANDING EXAMINATION

### MOVE :

- Flexion
- Extension
- Lateral flexion
- Rotation
- Chest expansion
- Muscle power of :
  - Planter flexor (tip toes walking)
  - Dorsiflexor (heel walking)



# CLINICAL ASSESSMENT

## PATIENT SUPINE EXAMINATION

### Look

- Wasting quadriceps muscle
- Skin changes :
  - scare , sinus , redness
- Swelling :
- abscess



# CLINICAL ASSESSMENT

## PATIENT SUPINE EXAMINATION

### **FEEL :**

Abdominal or groin abscess

Pulses

### **MOVE:**

Flexion rotation of the hip to roll out hip problem

# CLINICAL ASSESSMENT

## PATIENT SUPINE EXAMINATION

### **SPECIAL TESTS:**

Sciatic nerve stretch , straight leg raising (SLR) test

Sacroiliac stress test

Full neurological ex of lower limbs



Straight leg raise test w/ hip

# CLINICAL ASSESSMENT

## PATIENT PRONE EXAMINATION

### Look

- Deformity
- Skin changes :  
scar , sinus , redness
- Swelling :
- abscess

### FEEL

- Tenderness
- Bony prominences
- Muscles
- Loin
- Popliteal pulse

# CLINICAL ASSESSMENT

## PATIENT PRONE EXAMINATION

### **SPECIAL TESTS:**

Femoral nerve stretch test

Sacroiliac stress test

Hamstring & gluteus max muscles examination



# IMAGING FOR SPINAL DISORDERS

## X RAY:

- AP , LAT ,OBLIQUE
- Flexion-Extension LAT
- Deformity series eg scoliosis series

## CT

## MRI

N.B. OTHER INVESTIGATIONS ARE REQUESTED ACCORDINGLY

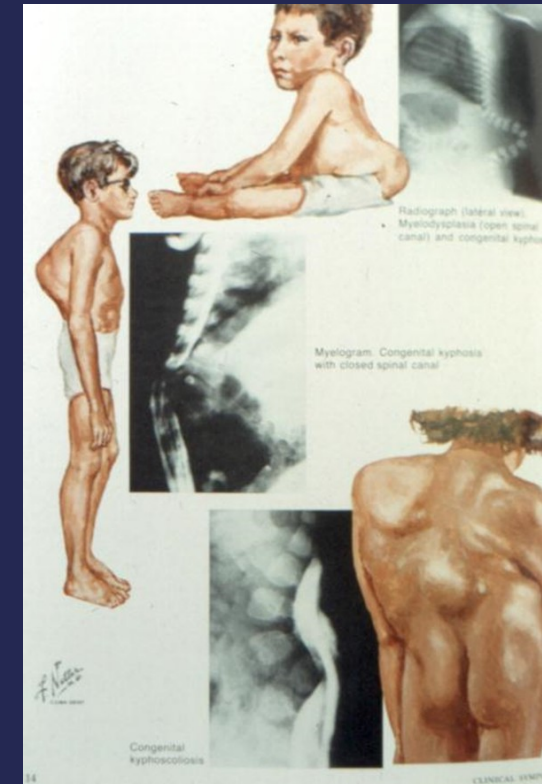
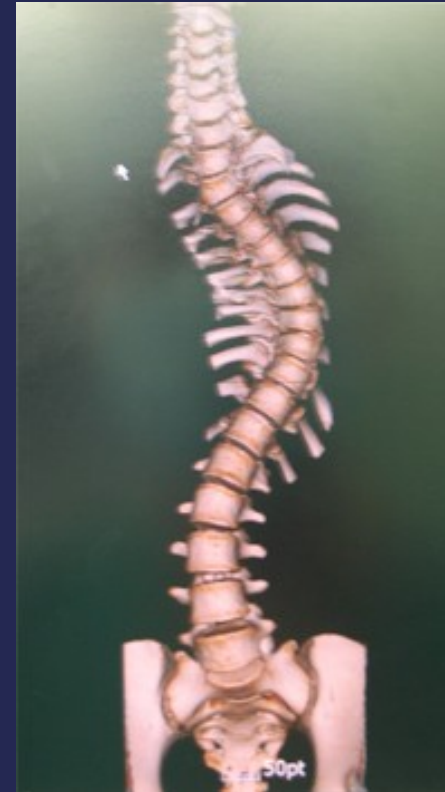




# SPINAL DEFORMITY

**SCOLIOSIS** : Lateral curvature of the spine  $>10^\circ$  accompanied by vertebral rotation

**KYPHOSIS** : Dorsal curvature of the spine  $>40^\circ$



# SCOLIOSIS

## ○ TYPES:

### COMPANSATORY:

Deformity is secondary to pathology outside the spine eg

Limb length discrepancy , pelvic tilt. Disappear with sitting

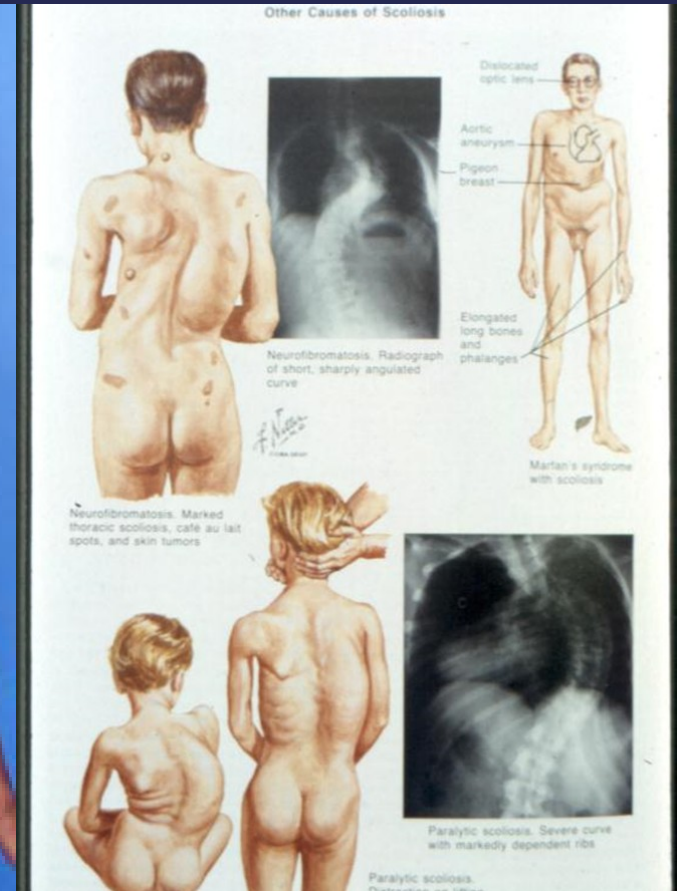
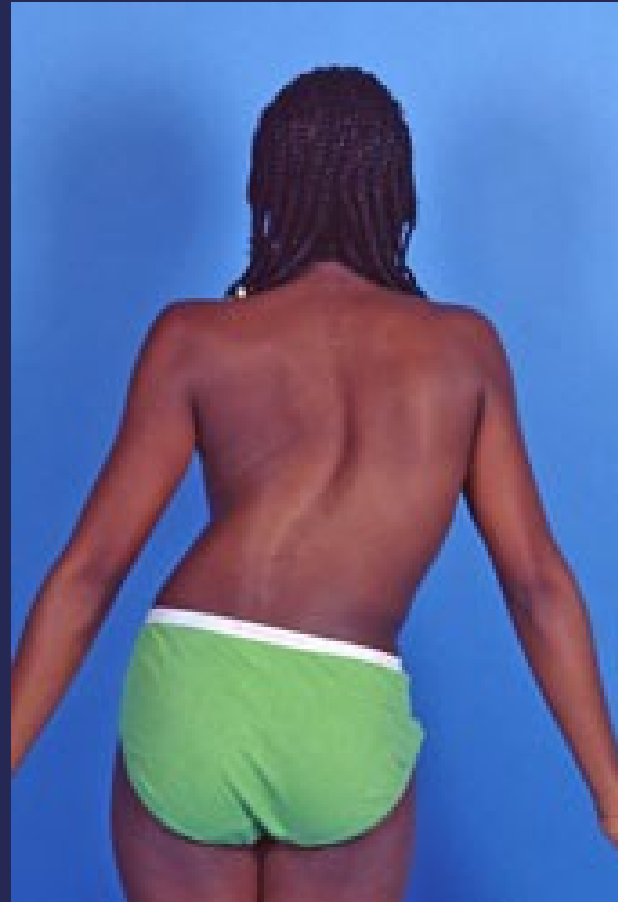
### STRUCTURAL:

Fixed does not disappear by sitting . Usually associated with bony abnormality.



# STRUCTURAL SCOLIOSIS

- **Idiopathic:**
  - Infantile
  - adolescent
- **Neuropathic( paralytic )**
- **Myopathy**
- **neurofibromatosis**



# ADOLLESCENT IDIOPATHIC SCOLIOSOS

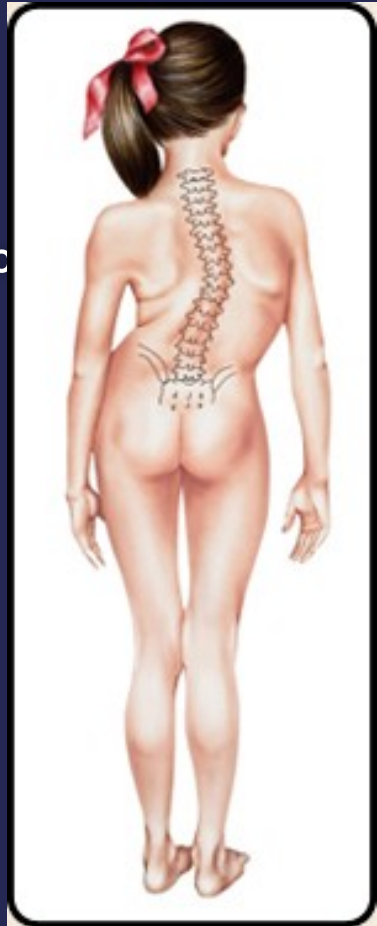
## A.I.S NATURAL HISTORY

- Present in 2 - 4% of kids aged 10 – 16 years
- Ratio of girls to boys with *small* curves ( $\leq 10^\circ$ ) is equal, but for curves  $>30^\circ$  the ratio is 10:1
- Scoliosis tends to progress more often in girls (so girls with scoliosis are more likely to require treatment)

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# ADOLLESCENT IDIOPATHIC SCOLIOSOS

## A.I.S

- Back pain not significantly higher in pts with scoliosis
- Curves in untreated adolescents with curves  $< 30^\circ$  at time of bony maturity are unlikely to progress
- Curves  $> 50^\circ$  at maturity progress  $1^\circ$  per year
- Life-threatening effects on pulmonary function do not occur until curve is  $> 100^\circ$  (ie: Cor pulmonale)

# ADOLLESCENT IDIOPATHIC SCOLIOSOS

## A.I.S

○ **Three main determinants of curve progression are:**

- (1) Patient gender
- (2) Future growth potential
- (3) Curve magnitude at time of diagnosis

# ADOLLESCENT IDIOPATHIC SCOLIOSOS

## A.I.S

### Assessing growth potential using Risser grading:

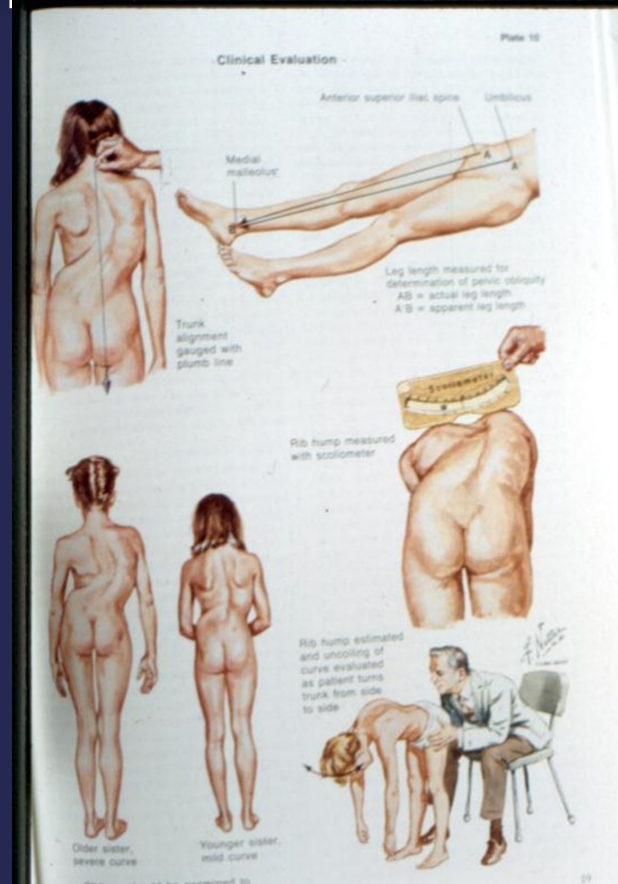
- Measures progress of bony fusion of iliac apophysis
- Ranges from zero (no ossification) to 5 (complete bony fusion of the apophysis)
- The lower the grade, the higher the potential for progression



# ADOLLESCENT IDIOPATHIC SCOLIOSOS

## A.I.S CLINICAL FEATURES

- Shoulders are different heights – one shoulder blade is more prominent than the other
- Head is not centered directly above the pelvis
- Appearance of a raised, prominent hip
- Rib cages are at different heights
- Uneven waist
- Changes in look or texture of skin overlying the spine
- Leaning of entire body to one side



# ADOLLESCENT IDIOPATHIC SCOLIOSIS

## A.I.S IMAGING

- X RAY:
- AP and LAT of all spine ( COBB ANGLE )
- AP pelvis ( RISSER GRADE )



# ADOLLESCENT IDIOPATHIC SCOLIOSOS

## A.I.S COBB ANGLE

- Choose the most tilted vertebrae above & below apex of the curve.
- Angle b/t intersecting lines drawn perpendicular to the top of the superior vertebrae and bottom of the inferior vertebrae is the Cobb angle.



# ADOLLESCENT IDIOPATHIC SCOLIOSOS

## A.I.S TRATMENT

### TREATMENT GUID LINES:

- Aim of treatment is to prevent curve progression
- Period of preliminary evaluation by photography , clinical evaluation , and radiological measuring the curve before deciding conservative or surgical treatment
- No treatment for curves  $< 10$
- Treatment is initiated if :
  - skeletal immature curves  $< 19$  progress 10 degrees /year
  - $20 < \text{curves} < 29$  progress 5 degrees /year

# ADOLLESCENT IDIOPATHIC SCOLIOSOS

## A.I.S TRATMENT

### BRACING

#### Indications:

40 > curves > 20

- Well balanced double curves
- Young children who need surgery to hold curve stationary
- To prevent recurrence



# ADOLLESCENT IDIOPATHIC SCOLIOSIS

## A.I.S TRATMENT

### SURGERY

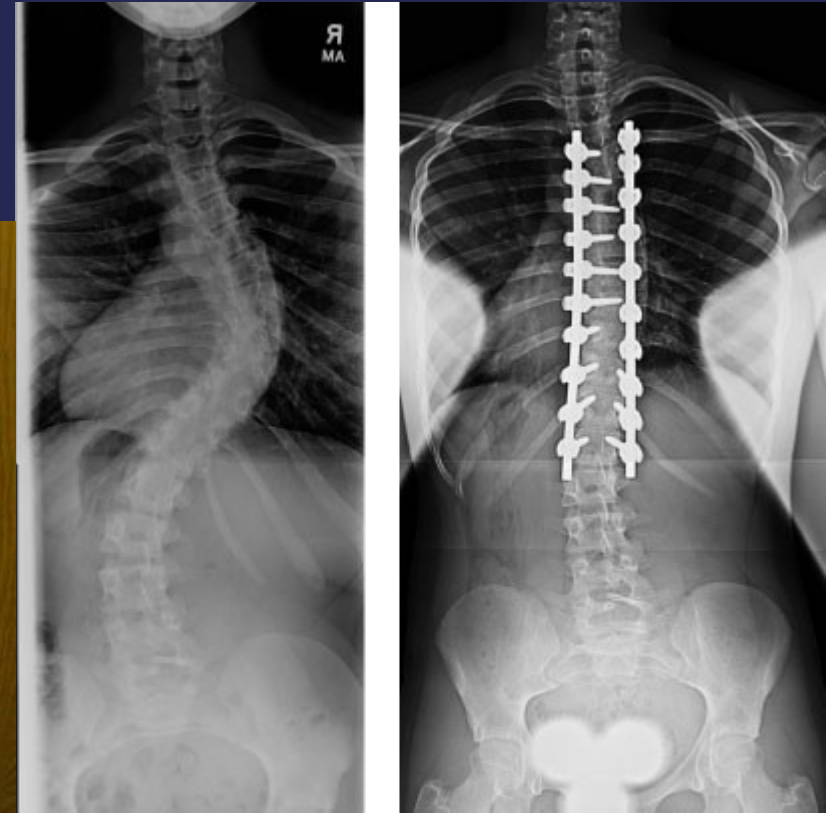
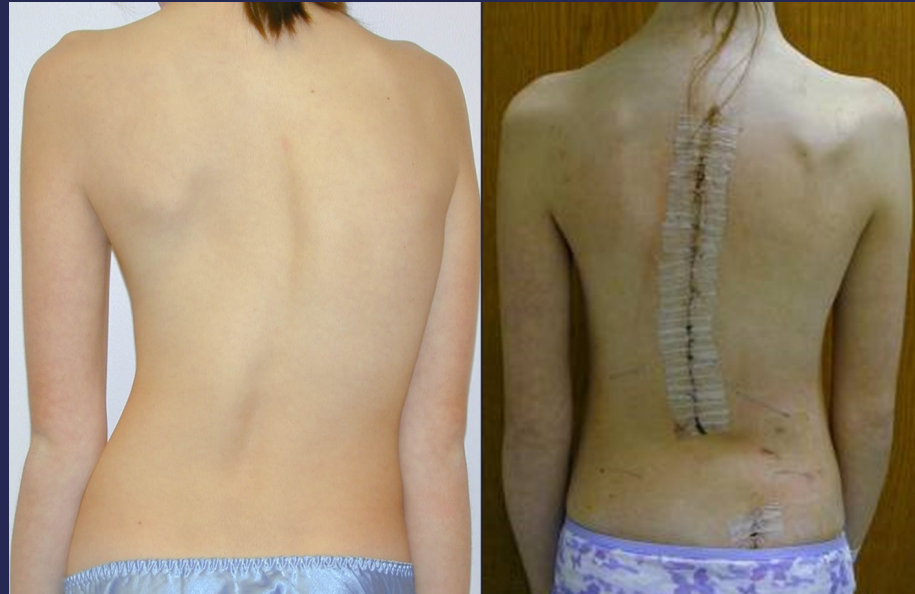
#### Indications:

Curves > 40 in skeletally immature

- Adult documented progressive curves

#### PROCEDURE:

- Correction
- Instrumentation
- Fusion





# KYPHOSIS

DEFINITION : BACKWARD ANGULATION ABOVE 40 DEGREES

## TYPES :

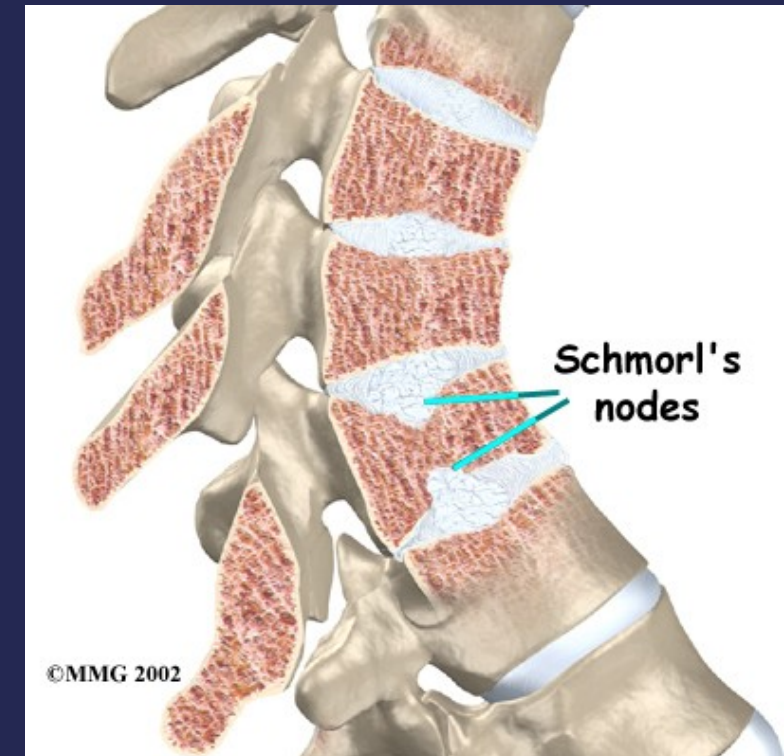
- **MOBILE :**
  - Compensatory
  - Postural
- **STRUCTURAL :**
  - Angular eg cong
  - TB
- **Rounded eg Scheurmann**
  - Senile osteoporosis
  - Ankyloses spondylitis



# SCHEURMAN DISEASE

## PATHOLOGY :

- Irregular ossification of vertebral body epiphysis
- Central herniation of disc material into the body (Schmorl's Node)
- Wedging of vertebrae
- TYPES :
  - Thoracic
  - Thoracolumbar



# SCHEURMAN DISEASE

## CLINICAL FEATURES :

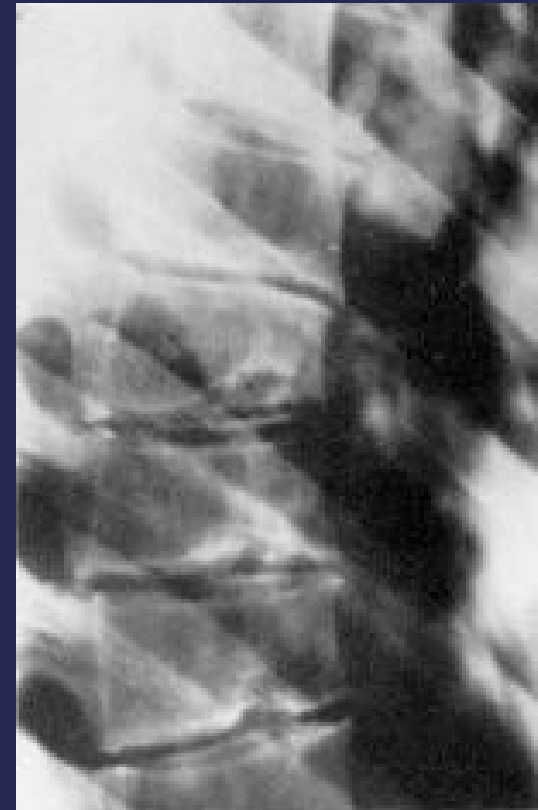
- Shortly after puberty i.e teen agers
- Boys > girls
- Mid thoracic
- Rounded shoulders
- Rounded fixed kyphosis



# SCHEURMAN DISEASE

## X RAY :

- Irregular ossification of vertebral body epiphysis
- Central herniation of disc material into the body(Schmorl's Node)
- Wedging of vertebrae



# SCHEURMAN DISEASE

## TREATMENT:

Mild → unnoticed

Mild early → brace

Severe → surgery

# T.B. SPINE( POTTS DISEASE)

## PATHOLOGY :

- Most common skeletal T.B
- Blood born infection
- Start bony adjacent to disc leads to caseation and destruction then spreads to adjacent disc and vertebra this will lead to claps and ANGULAR DEFORMITY
- Collection of caseas mater to form Cold Abscess
- Paraplegia

# T.B. SPINE( POTTS DISEASE)

## **PATHOLOGY :**

### **CAUSES OF PARAPLEGIA :**

- Spinal cord compression
- Chronic irritation
- Spinal artery thrombosis

# T.B. SPINE ( POTTS DISEASE)

## CLINICAL FEATURES

- TB toxemia
- Severe back pain
- Fixed angular kyphosis
- Cold abscess : paravertebral , ilio-psoas , gluteal
- Movement : limitation of spinal movement
- Paraparesis / paraplegia



# T.B. SPINE( POTTS DISEASE)

## INVESTIGATION

- High ESR
- CBC : leucopenia , lymphocytosis
- Mantoux test : is a good –ve test
- IMAGING : narrow disc space ,  
soft tissue abscess ,  
angular kyphosis ,  
destruction of 2 adjacent vertebrae with disc space in between.
- MRI : useful to asses spinal cord condition



# T.B. SPINE( POTTS DISEASE)

## TREATMENT

- Early i.e. no destruction ,no abscess : anti-TB chemotherapy
- Surgery is indicated in :
- Abscess
- Progressive deformity
- Neurological deterioration

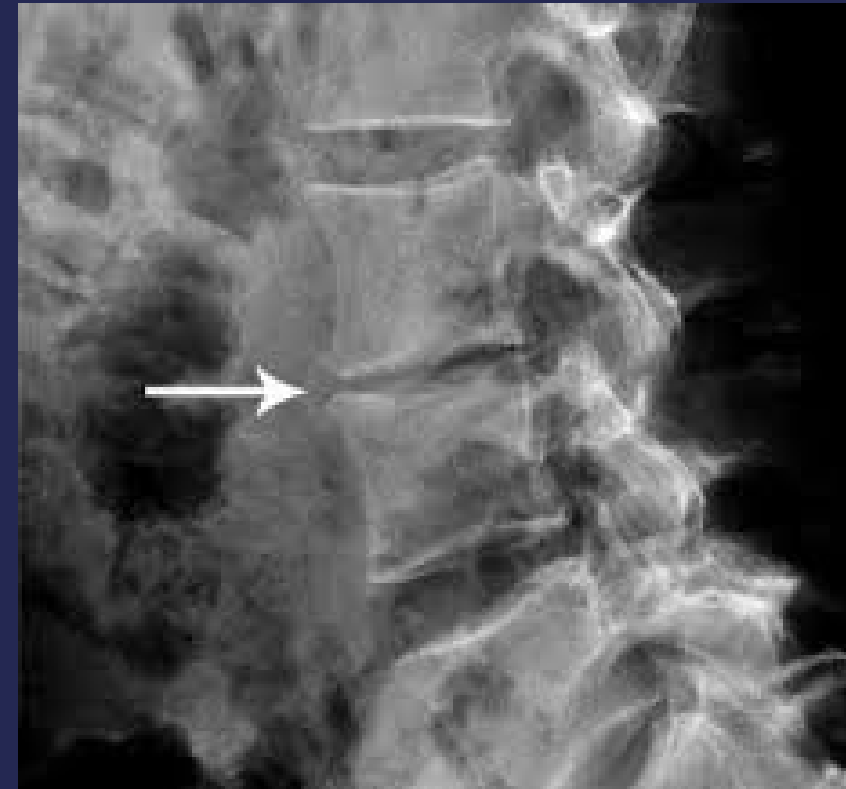
# PYOGENIC INFECTION

- Is not common may start in bone as spondylitis or in disc as biogenic discitis
- DIAGNOSIS
- Pain
- Tenderness: marked limitation of movement
- Marked limitation of movement

# PYOGENIC INFECTION

## INVESTIGATION

- High ESR , High CRP
- CBC : leukocytosis
- Blood culture
- Agglutination test for salmonella and brucella
- X ray



# PYOGENIC INFECTION

## TREATMENT:

- Bed rest
- Antibiotic for 6 weeks
- Brace



# INTERVERTEBRAL DISC LESION

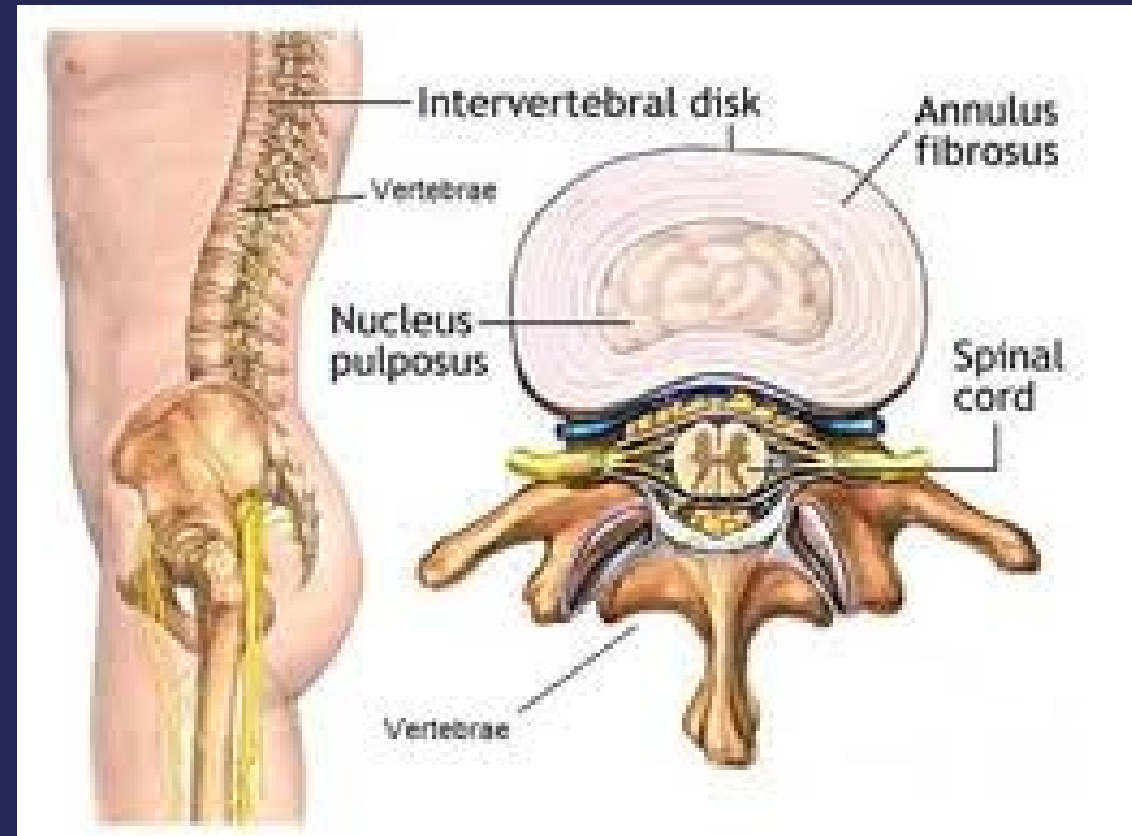
STRUCTURAL UNIT OF VERTEBRAL COLUMN



# INTERVERTEBRAL DISC LESION

## ANATOMY

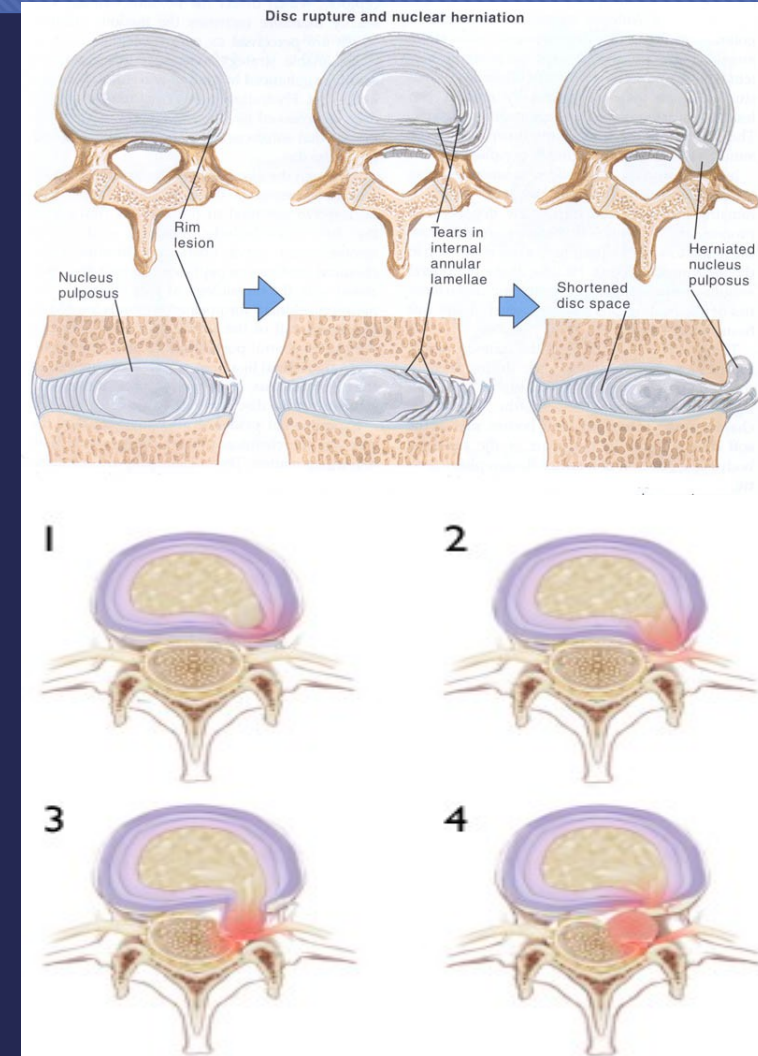
- Disc is formed of :
  - nucleus pulposus
  - annulus fibrosus



# INTERVERTEBRAL DISC LESION

## PATHOLOGY

- Bulge → back pain
- Protrusion → sciatica
- Prolapse & sequestration → numbness , paresthesia , weakness



# INTERVERTEBRAL DISC LESION

## CLINICAL PICTURE :

- Young adults are commonly affected but children and old age are not immune

## HISTORY AND SYMPTOMS :

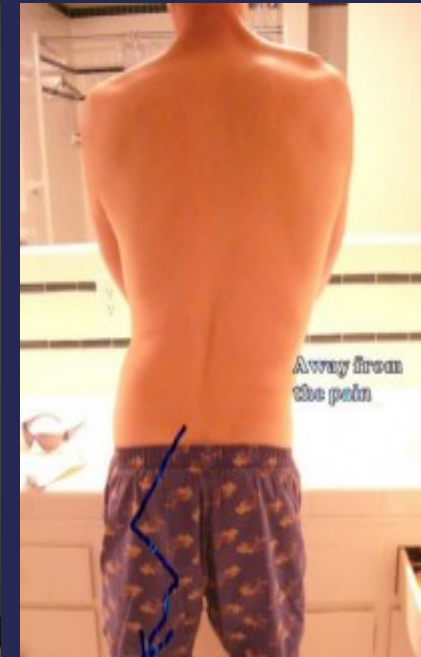
- Back pain and sciatica which increase with straining and coughing
- Numbness and paresthesia
- Motor weakness



# INTERVERTEBRAL DISC LESION

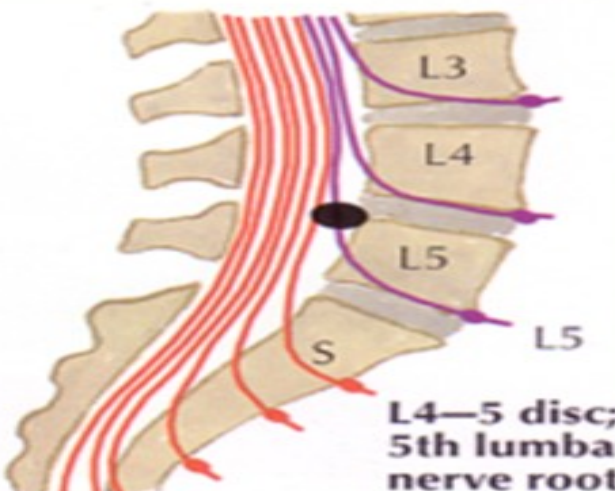
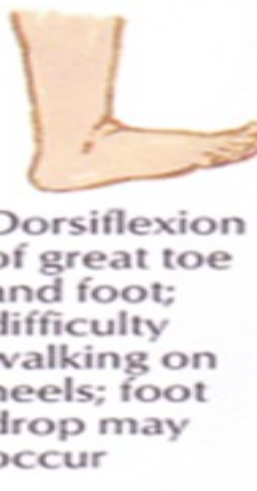
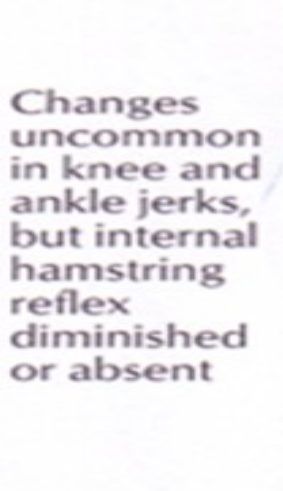
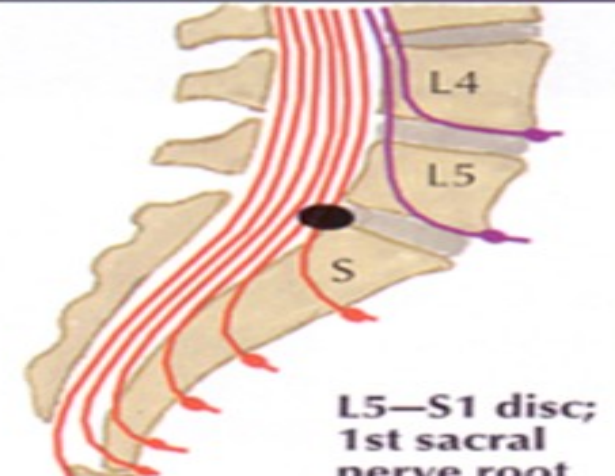
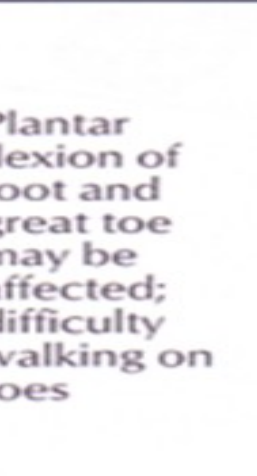
## EXAMINATION AND SIGNS

- Spinal list
- Tenderness over the midline and paravertebral muscles
- Straight leg raising test
- Cross straight leg raising
- Femoral stretch
- Full neurological assessment
- Cauda equina lesion : sphincteric problem , and loss of sensation in the saddle area



# INTERVERTEBRAL DISC LESION

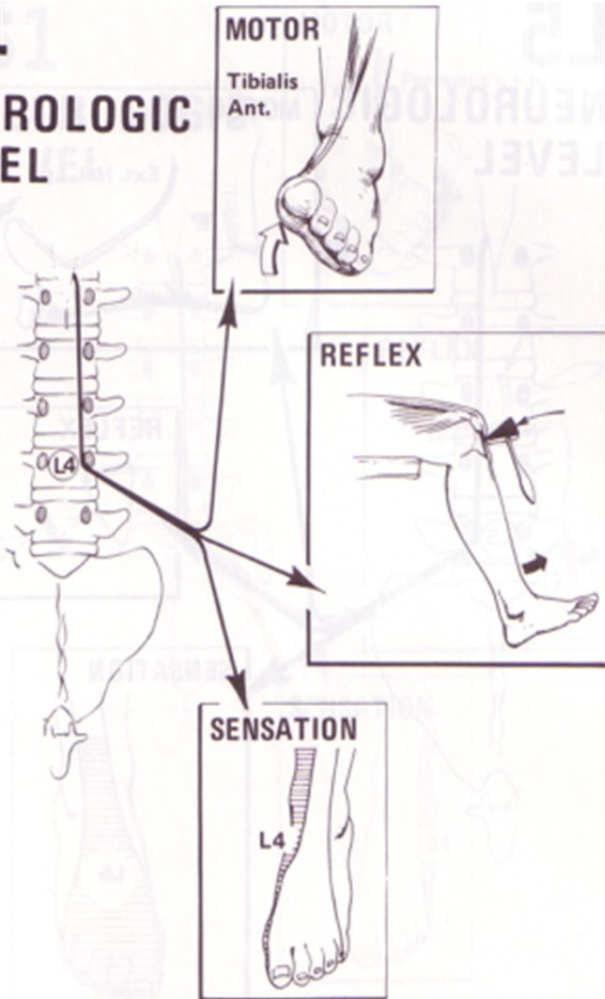
Clinical features of herniated lumbar nucleus pulposus

| Level of herniation                                                                                                                 | Pain                                                                                                                                                         | Numbness                                                                                                                            | Weakness                                                                                                                                                                        | Atrophy                                                                                                              | Reflexes                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>L4—5 disc;<br/>5th lumbar<br/>nerve root</p>   |  <p>Over sacro-iliac joint, hip, lateral thigh and leg</p>                 |  <p>Lateral leg, first 3 toes</p>                |  <p>Dorsiflexion of great toe and foot; difficulty walking on heels; foot drop may occur</p> |  <p>Minor</p>                     |  <p>Changes uncommon in knee and ankle jerks, but internal hamstring reflex diminished or absent</p> |
|  <p>L5—S1 disc;<br/>1st sacral<br/>nerve root</p> |  <p>Over sacro-iliac joint, hip, posterolateral thigh and leg to heel</p> |  <p>Back of calf, lateral heel, foot to toe</p> |  <p>Plantar flexion of foot and great toe may be affected; difficulty walking on toes</p>   |  <p>Gastrocnemius and soleus</p> |  <p>Ankle jerk diminished or absent</p>                                                             |

# INTERVERTEBRAL DISC LESION

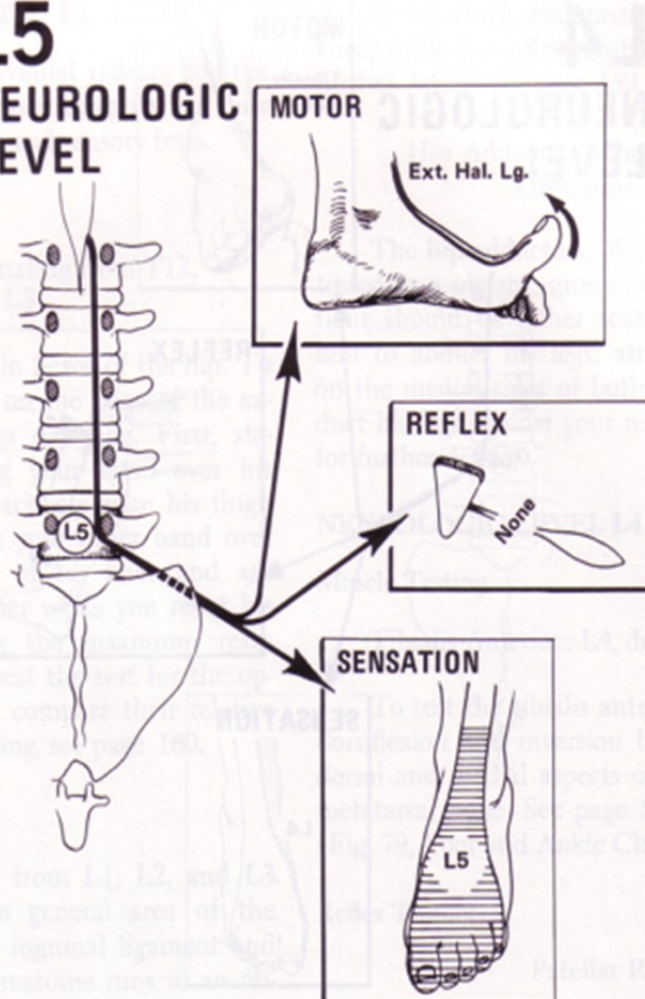
## L4

NEUROLOGIC  
LEVEL



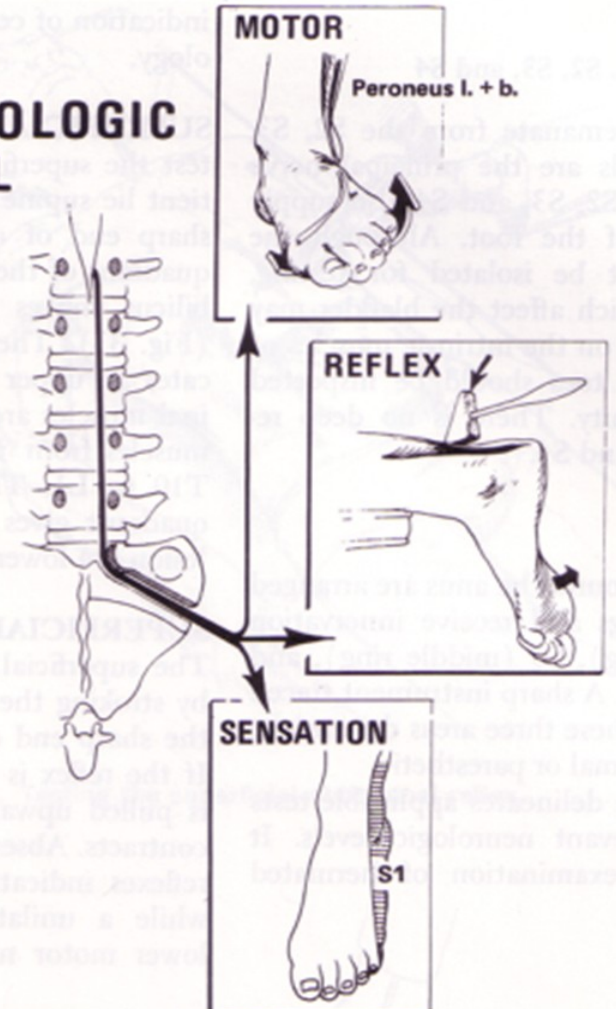
## L5

NEUROLOGIC  
LEVEL



## S1

NEUROLOGIC  
LEVEL



# INTERVERTEBRAL DISC LESION

## IMAGING

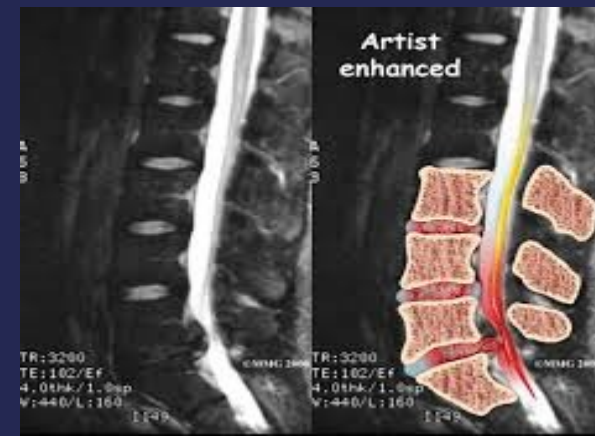
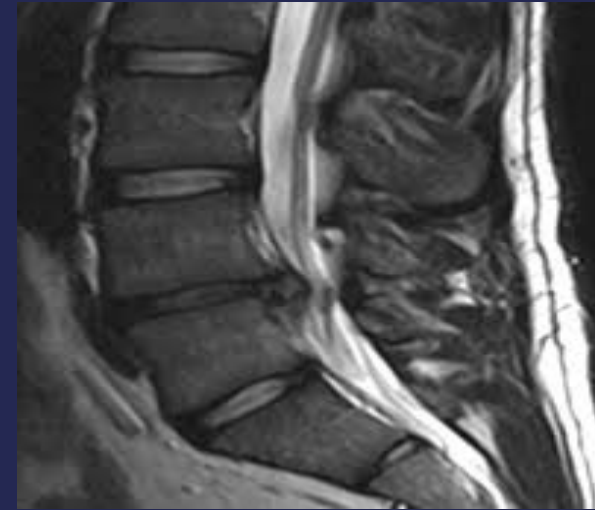
- **X ray**

to rule out other bony pathology

Narrowing of the disc space

- **MRI**

Is the gold standard to identify the disc and localize the lesion



# INTERVERTEBRAL DISC LESION

## TREATMENT

### CONSERVATIVE

- Rest
- NSAID
- Muscle relaxant
- Physiotherapy

### SURGICAL

- Absolute indication
- Cauda equina lesion

### Relative indication

- Persistent pain
- Progressive neurological manifestations
- Frequent attacks



# SPONDYLOLISTHIASIS

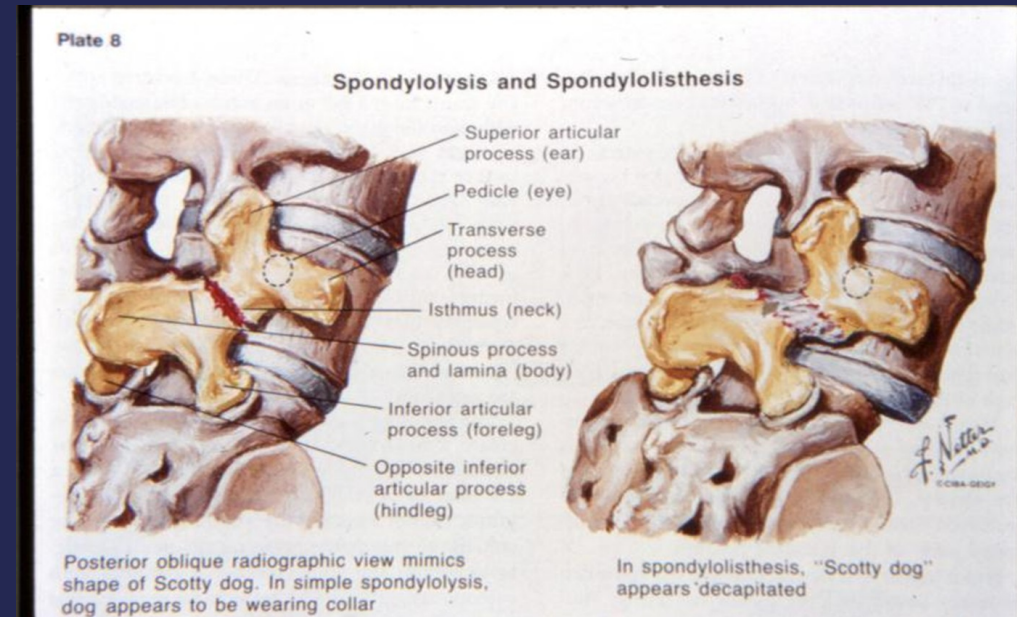
## SPONDYLOLISTHIASIS

- Anterior vertebral displacement

## SPONDYLOLISIS

- Defect in the pars interarticularis

- Normal anatomy preventing anterior displacement: lamina and facets



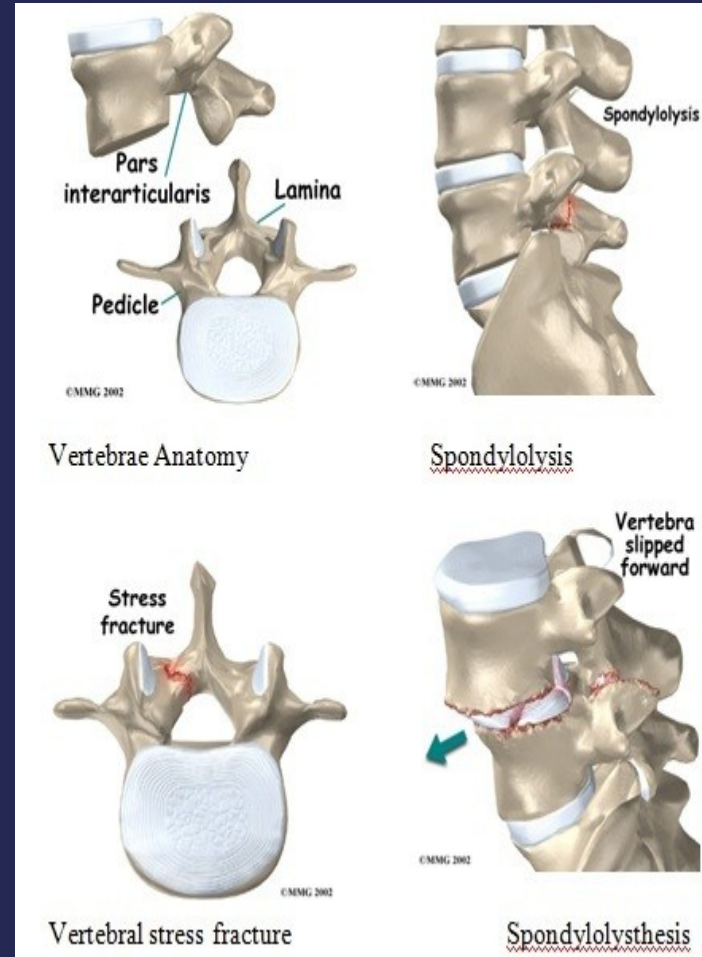
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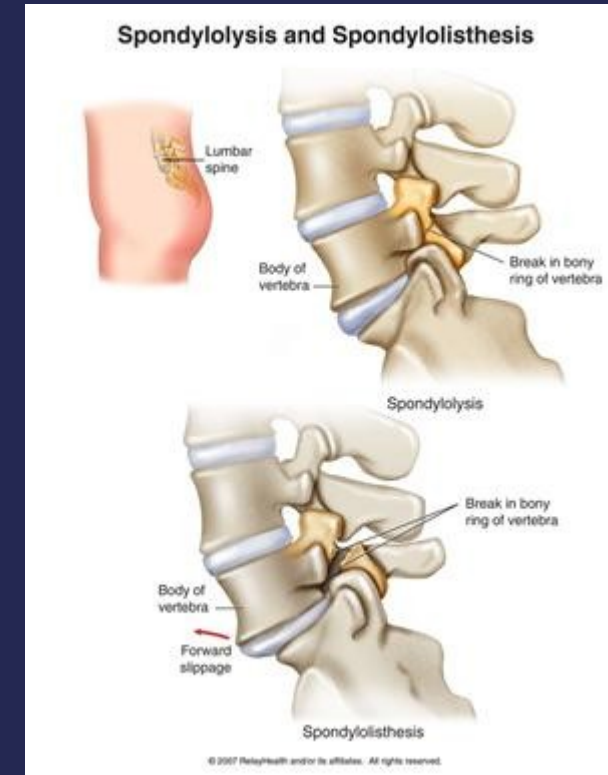
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# SPONDYLOLISTHIASIS

## CAUSES OF SPONDYLOLISTHIASIS :

- Dysplasia
- Spondylolysis
- Degenerative
- Destruction by trauma , TB ,tumor



# SPONDYLOLISTHESIS

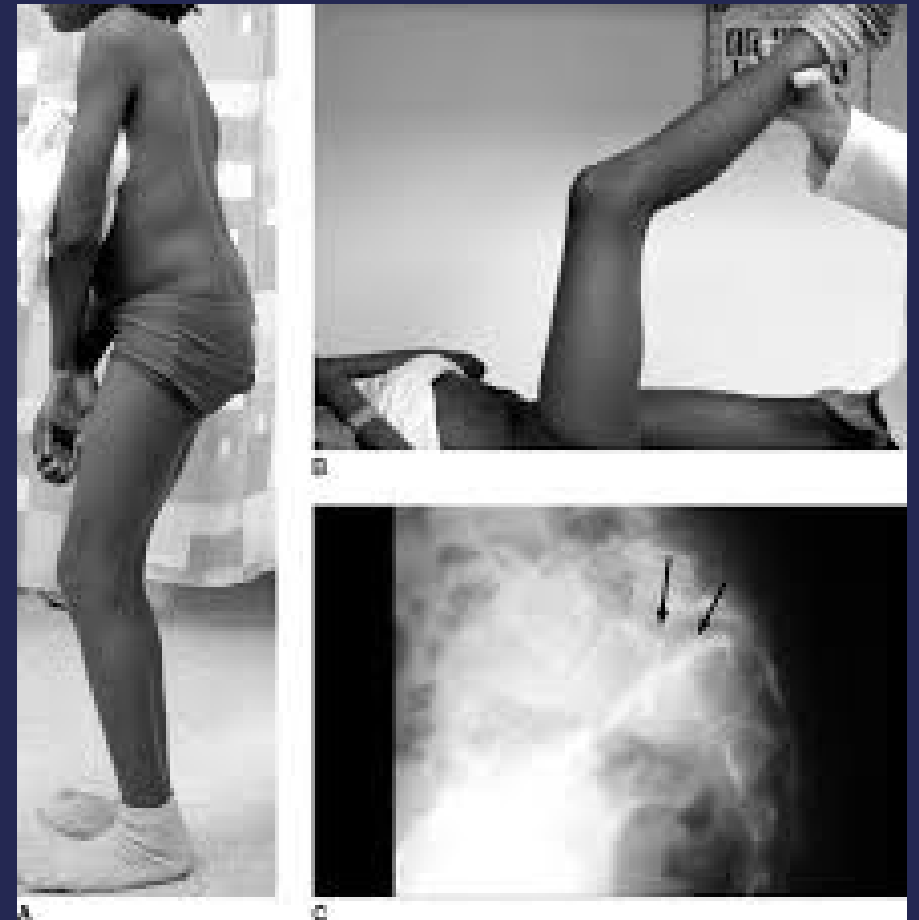
## CLINICAL FEATURES

### DYSPLASTIC TYPE :

Children , painless

### POSTURAL PROBLEM :

Protruding lower abdomen ,  
tip toe walking with flexed knees



# SPONDYLOLISTHESIS

## CLINICAL FEATURES

### SPONDYLOLYTIC TYPE :

Adult (most common type)

Backache after exercises

Flat buttock

Step sign

### DEGENERATIVE TYPE :

- Female > male ,
- 40 years
- Ch back pain
- Spinal stenosis symptoms



# DEGENERATIVE SPINE DISORDER

## ○ CAUSES :

Recurrent attacks of disc prolapse

Aging leads to loss of hydration of the disk

Spinal instability

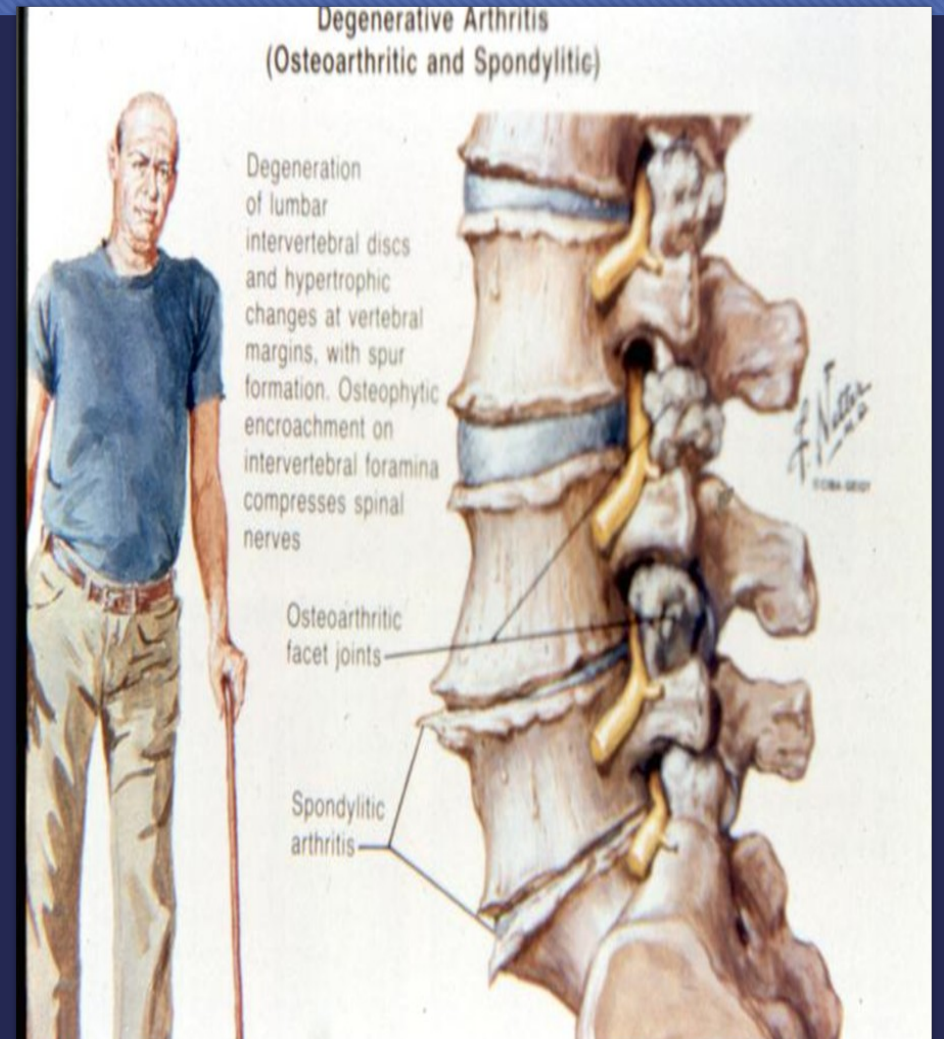
# DEGENERATIVE SPINE DISORDER

## ○ **PATHOLOGY :**

Decrease in the disc height

Osteophytes of the vertebral margins

Degenerative changes of the facet joint



# DEGENERATIVE SPINE DISORDER

## CLINICAL FEATURES

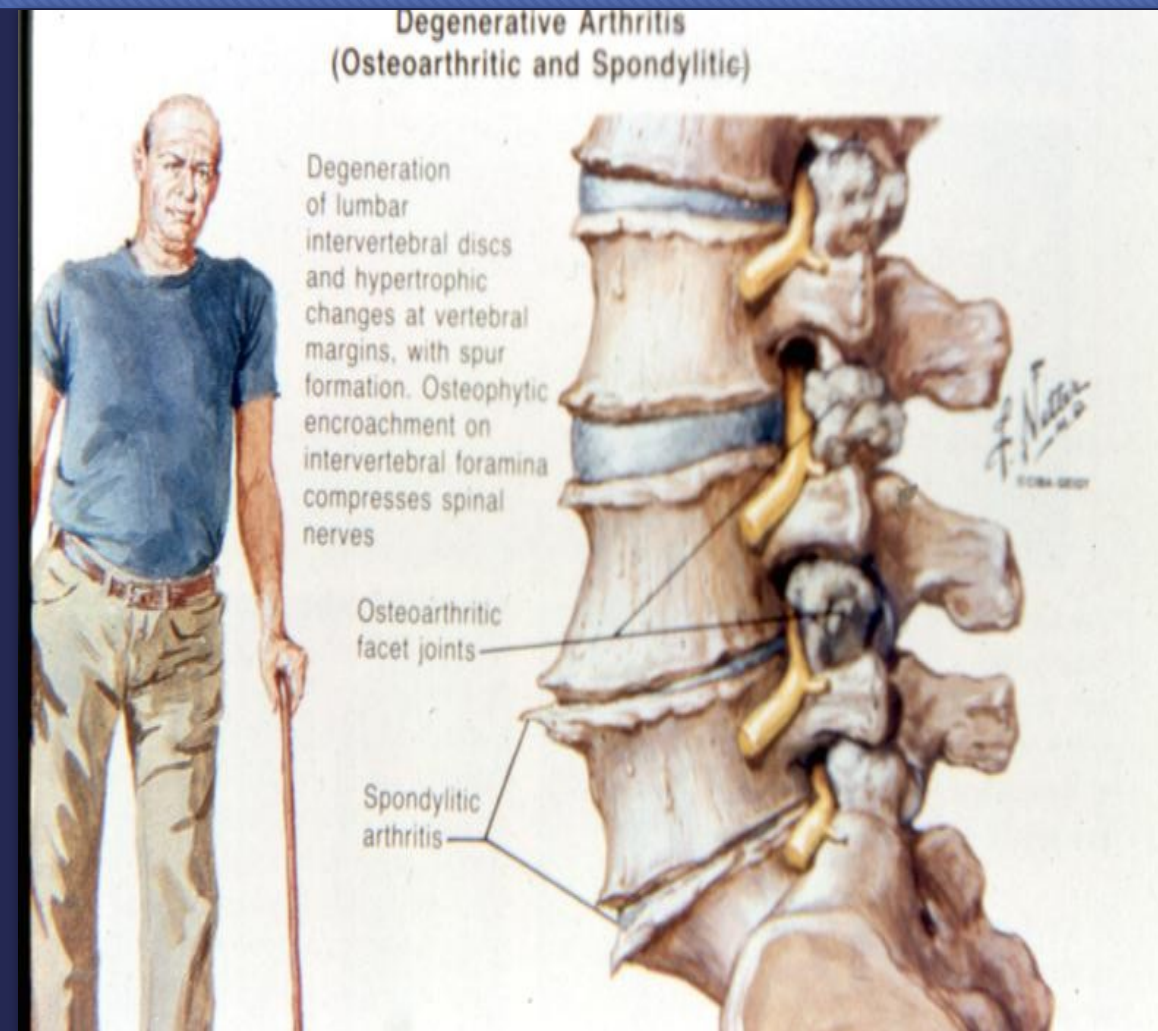
- Recurrent attacks of back pain
- Catching sign (locking)

## X-RAY

- Narrowing of the disc space
- Osteophytes
- Osteoarthritic changes in facet joint

## TREATMENT

- Conservative measures



# SPINAL CANAL STENOSIS

## **DEFINITION :**

Narrowing of the spinal canal

## **Causes :**

Degenerative changes of the bone and soft tissue of the spine

## **CLINICAL FEATURES :**

Neurogenic claudication after standing or walking for a long time

Relieved by sitting or squatting (i.e flexing the spine)

# SPINAL CANAL STENOSIS

## IMAGING

X-ray: Lateral view may show degenerative spondylolisthesis or degenerative changes of the spine

## MRI

Essential to show the extent of the stenosis

## Treatment

Mild → Conservative

Severe → Surgical



THANK YOU