Common Orthopedic Conditions of the Spine

Learning Objective

- Given a scenario describing a patient with symptoms suggestive of an orthopedic or musculoskeletal condition, formulate a treatment plan after ordering and interpreting diagnostic tests and making a preliminary diagnosis.

Learning Objective

- **Identify the etiology, clinical presentation, lab/radiologic studies, evaluation, and treatment for the following spine conditions:**
  - **Back Strain/Sprain**
  - **Ankylosing Spondylitis**
  - **Cauda Equina**

Learning Objective

- **Identify the etiology, clinical presentation, lab/radiologic studies, evaluation, and treatment for the following spine conditions:**
  - **Herniated Nucleus Pulposus (HNP)**
  - **Spinal Stenosis**
  - **Kyphosis/Scoliosis**
  - **Low Back Pain (LBP): Spondylolysis, Spondylolisthesis**

Disorders Of The Back/Spine

- **Back Strain/Sprain**
- **Ankylosing Spondylitis**
- **Cauda Equina**
- **Herniated Nucleus Pulposus (HNP)**
- **Spinal Stenosis**
- **Kyphosis/Scoliosis**
- **Low Back Pain (LBP): Spondylolysis, Spondylolisthesis**

Back Strain/Sprain

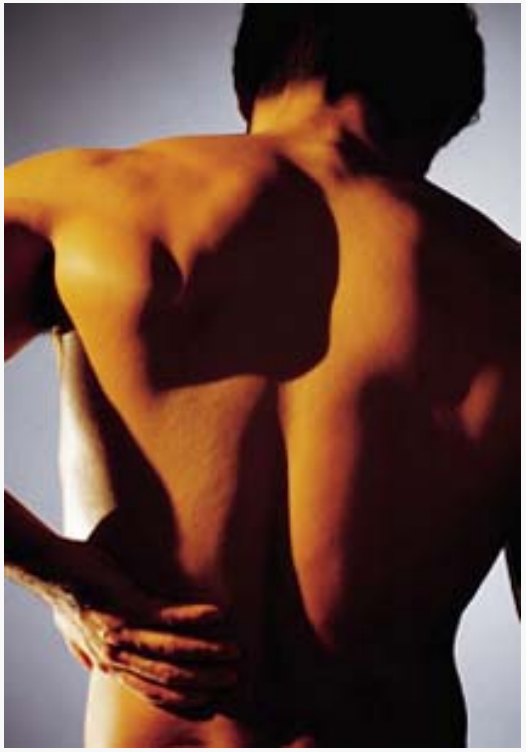
- **LBP is the most frequent cause of lost work time and disability in adults <45 years**
- **Most symptoms of limited duration**
- **85% of patients improve and returning to work within 1 month**

Back Strain/Sprain

The 4% of patients whose symptoms persist longer than 6 months generate 85% to 90% of the costs to society for treating low back pain

Back Strain/Sprain

By strict definition, a low back sprain is an injury to the paravertebral spinal muscles. However, the term also is used to describe ligamentous injuries of the facet joints or annulus fibrosus



Back Strain/Sprain

Repeated lifting and twisting or operating vibrating equipment most often precipitates a back sprain

Back Strain/Sprain

- **Other risk factors include poor fitness, poor work satisfaction, smoking, and hypochondriasis**
- **Recurrent episodes are separated by many months or years; more frequent recurrences suggest degenerative disk disease**

Back Strain/Sprain – Clinical Symptoms

- Patients report the acute onset of low back pain, often following a lifting episode
- Lifting may be a trivial event, such as leaning over to pick up a piece of paper
- Pain often radiates into the buttocks and posterior thighs

Back Strain/Sprain – Clinical Symptoms

- **Patients may have difficulty standing erect, may need to change position frequently for comfort**
- **Condition often first occurs in the young adult years**

Back Strain/Sprain

Clinical Symptoms - First Major Episode

- May show signs of nonorganic behavior, such as exaggerated responses, generalized hypersensitivity to light touch, or facial grimacing

Physical Examination

- **PE reveals diffuse tenderness in the low back or sacroiliac region**
- **ROM of the lumbar spine, particularly flexion, is typically reduced and elicits pain**

Physical Examination

- **The degree of lumbar flexion and the ease with which the patient can extend the spine are good parameters by which to evaluate progress**
- **The motor and sensory function of the lumbosacral nerve roots and lower extremity reflexes are normal**

Back Strain/Sprain

- **Diagnostic Tests**
  - **Plain radiographs usually are not helpful for patients with acute low back strain, as they typically show changes appropriate for their age**

Back Strain/Sprain

- **Diagnostic Tests (cont’)**
  - **Adolescents/young adults, have little or no disk space narrowing. Adults older than age 30 years, have variable disc space narrowing and/or spurs**

Back Strain/Sprain

- **Diagnosis**
  - **For patients with atypical symptoms, such as pain at rest or at night or a history of significant trauma, AP and lateral radiographs are necessary**
  - **These views help to identify or rule out infection, bone tumor (visualize up to T10), fracture, or spondylolisthesis**

Back Strain/Sprain

- **Differential Diagnosis**
  - **Ankylosing spondylitis (family history, morning stiffness, limited mobility of lumbar spine)**
  - **Drug-seeking behavior (exaggerated symptoms, inconsistent and nonphysiologic examination)**
  - **Extraspinal causes: ovarian cyst, nephrolithiasis / pancreatitis/ ulcer disease**

Back Strain/Sprain

- **Differential Diagnosis**
  - **Fracture of the vertebral body (major trauma or minimal trauma with osteoporosis)**
  - **Herniated nucleus pulposus or ruptured disc (unilateral radicular pain symptoms that extend below the knee and are equal to or greater than the back pain)**

Back Strain/Sprain

- **Differential Diagnosis**
  - **Infection [fever, chills, sweats, elevated erythrocyte sedimentation rate (ESR)]**
  - **Myeloma (night sweats, men older than age 50 years)**

Back Strain/Sprain-Treatment

- **Focuses on relieving symptoms, short period of bed rest (1 to 2 days)**
- **NSAIDs, other non-narcotic pain medications (7 to 14 days)**

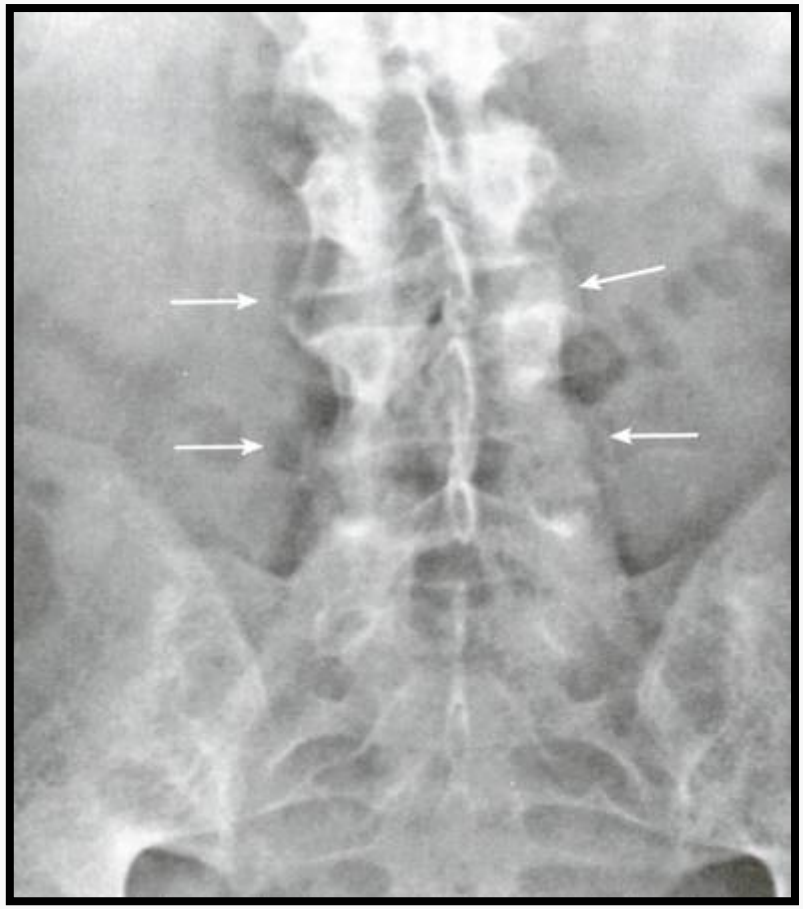
Back Strain/Sprain-Treatment

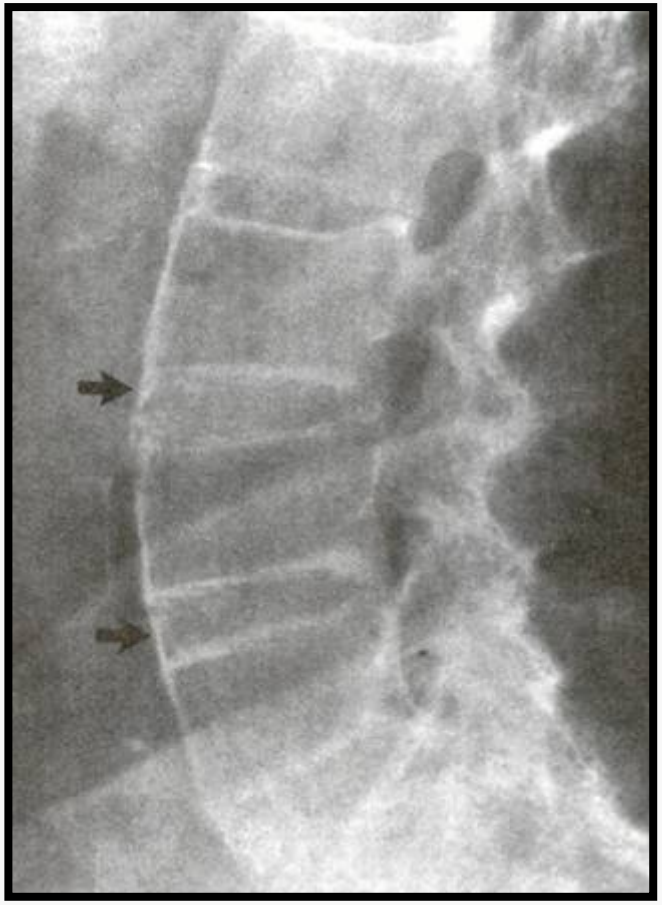
Muscle relaxants may be helpful in the first 3 to 5 days, but narcotic analgesics/sedatives should be avoided

Back Strain/Sprain - Treatment

- **Treatment**
  - **Couple medications with reassurance**
  - **Once the acute pain has diminished, emphasize aerobic conditioning and strengthening regimens**
  - **Goal is to assist patient in returning to normal activity within 4 weeks**

Ankylosing Spondylitis





Bamboo Spine

Ankylosing Spondylitis

- Men
- 3rd to 4th decade of life
- Insidious onset of back and hip pain
- Morning stiffness
- + HLA-B27

Ankylosing Spondylitis

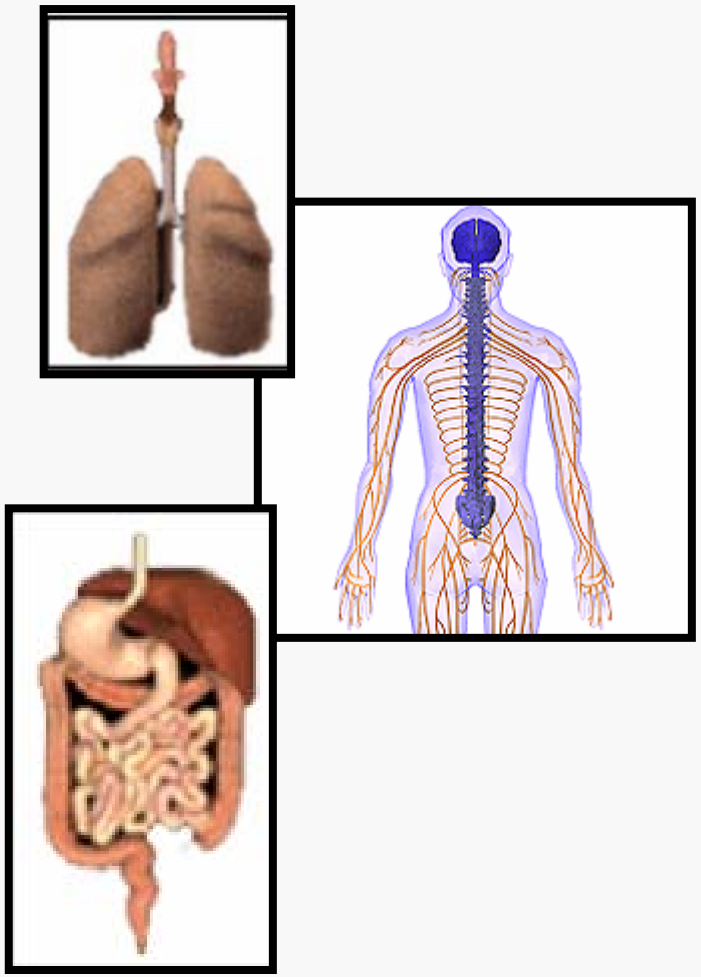
- **Progressive spinal flexion deformities (may progress to a chin-on-chest deformity)**

Ankylosing Spondylitis

- **Spine becomes rigid (ankylosed)**
- **Bilateral Sacroiliitis**

Ankylosing Spondylitis

- **Systemic:**
  - **Pulmonary fibrosis**
  - **Iritis**
  - **Aortitis**
  - **Colitis**
  - **Arachnoiditis**
  - **Amyloidosis**
  - **Sarcoidosis**

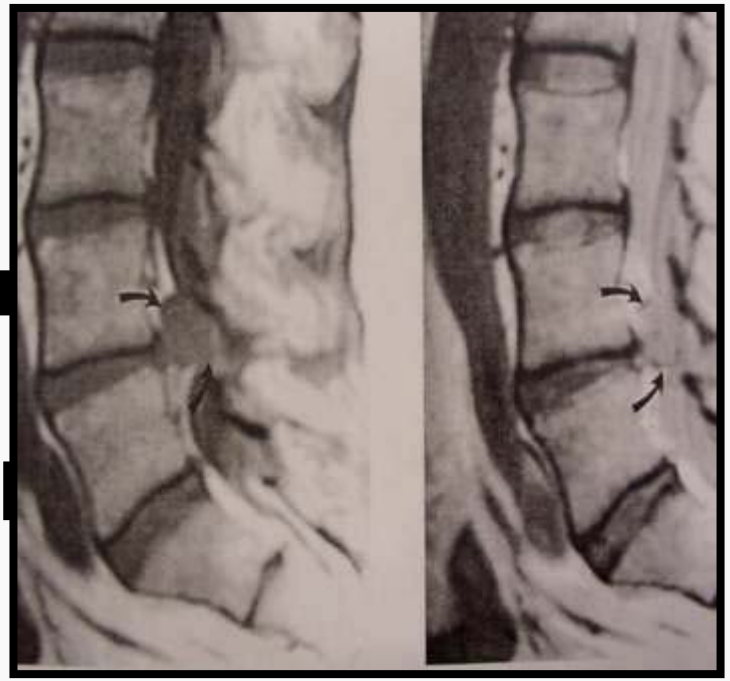


Ankylosing Spondylitis - Treatment

- **Physical Therapy**
- **NSAIDs, Tylenol or ASA**
- **Hip-THA**
- **Spine-Corrective osteotomies for flexion deformities**

Neurological Syndromes

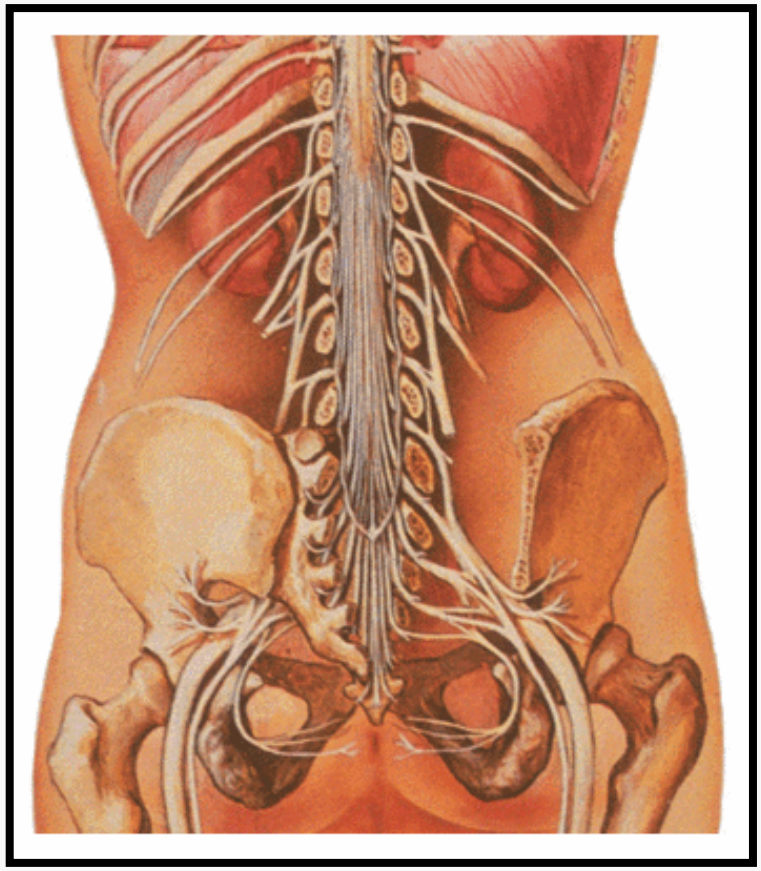
- **44 yo F w/ 2 yr h/o LBP but new bilateral sciatica, saddle numbness**
- **Onset: p moving furniture**
- **PE: distressed; sensor loss L5-S4 (anal area) weakness in feet DF/Pl**
- **W/U: emergent MRI & surgical referral**



DX: ?

Cauda Equina Syndrome

- **Distal end of the spinal cord, the conus medullaris, terminates at the LI-2 level**
- **Below this, spinal canal is filled with L2-S4 nerve roots, known as the cauda equina**



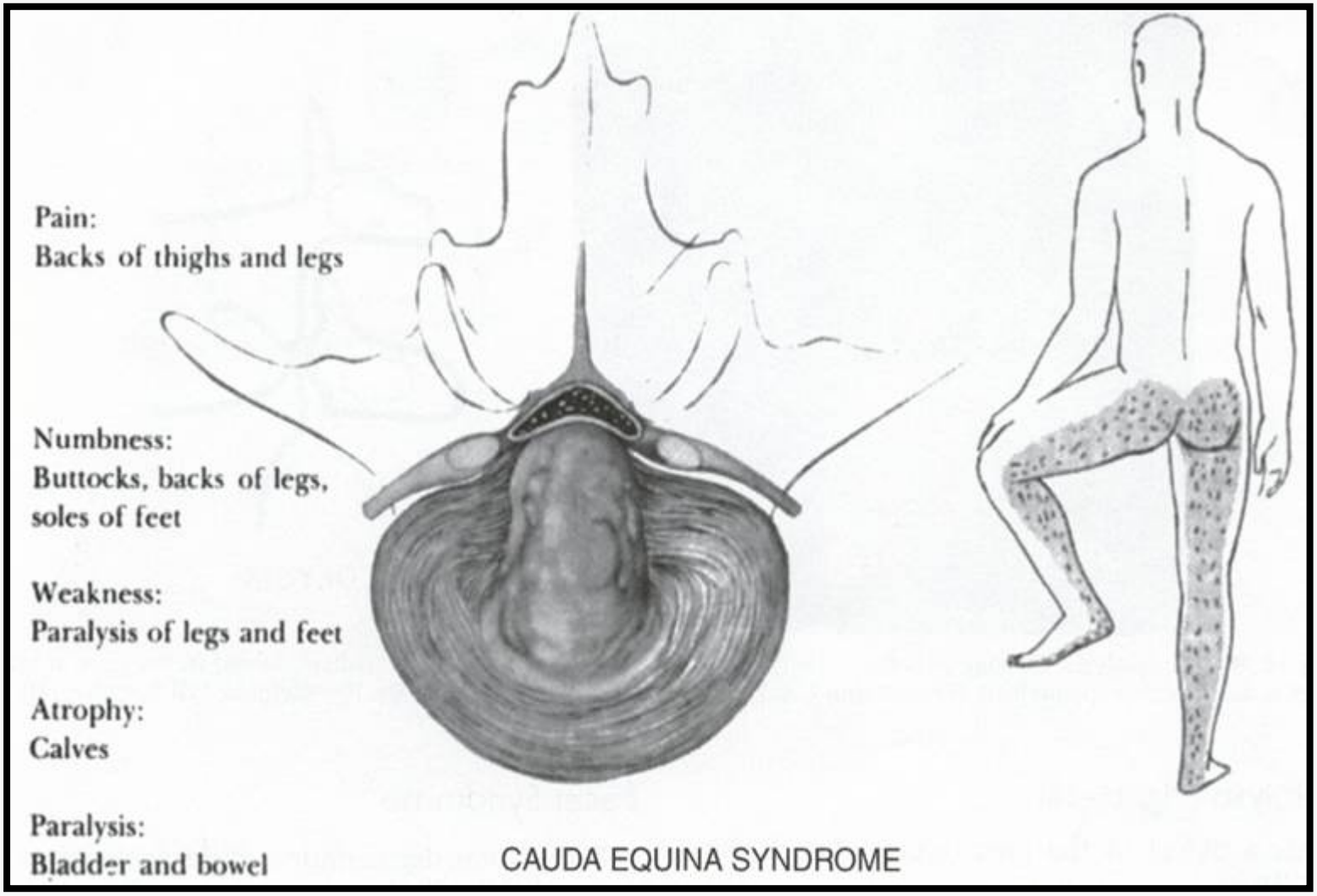
Cauda Equina Syndrome

- **Compression of roots distal to the conus causes paralysis without spasticity**
- **RARE : <1-2% of HNP or spinal masses**
  - **L5/S1 is the most common level**
  - **Involves bilateral sacral roots**

Cauda Equina Syndrome

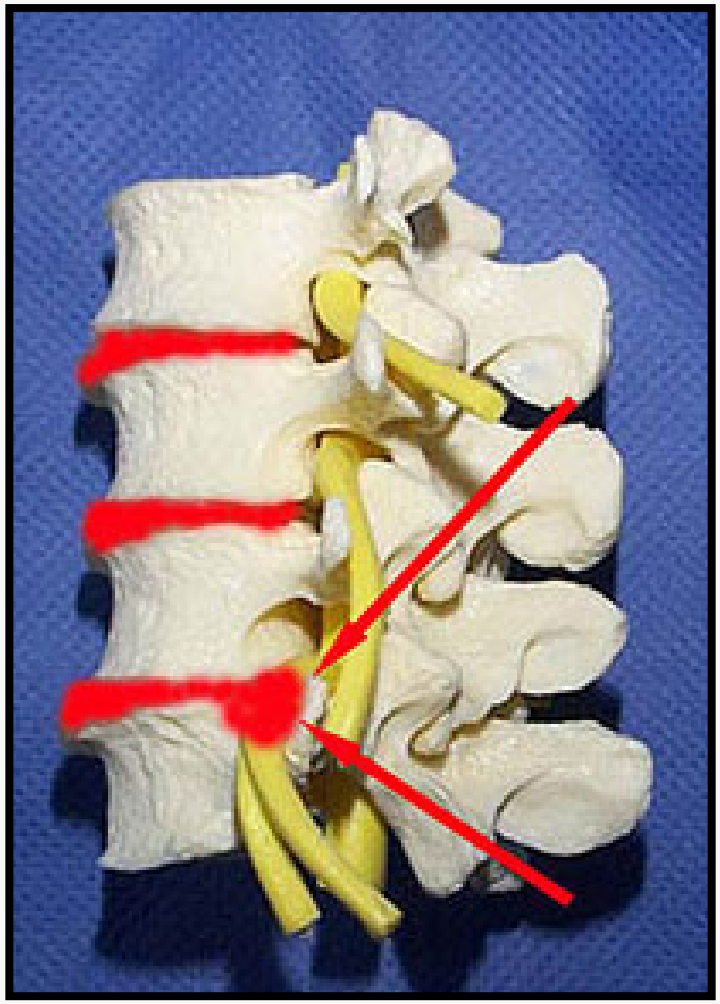
- **A massive central herniation of a lumbar disc that presents with**
  - **Bilateral sciatica +/- foot weakness**
  - **Progressive motor weakness and numbness**
  - **Saddle anesthesia (buttock anesthesia)**
  - **Loss of bowel and bladder control**

This represents a surgical emergency!


Pain:
Backs of thighs and legs
Numbness:
Buttocks, backs of legs,
soles of feet
Weakness:
Paralysis of legs and feet
Atrophy:
Calves
Paralysis:
Bladder and bowel
CAUDA EQUINA SYNDROME

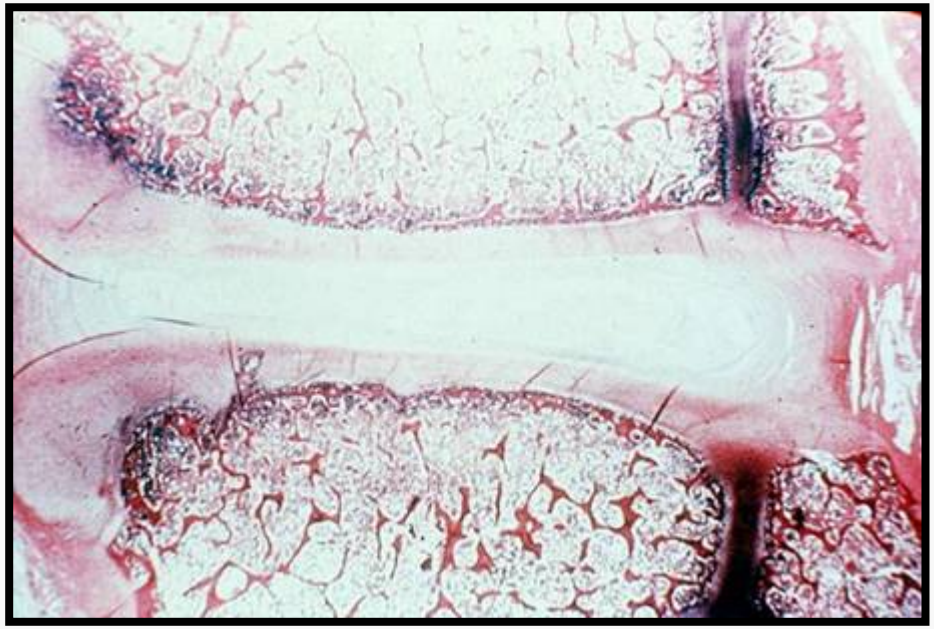
Herniated Nucleus Pulposus (HNP) of the Lumbar Spine

- **Displacement of the central area of the disc (nucleus) resulting in impingement on a nerve root**



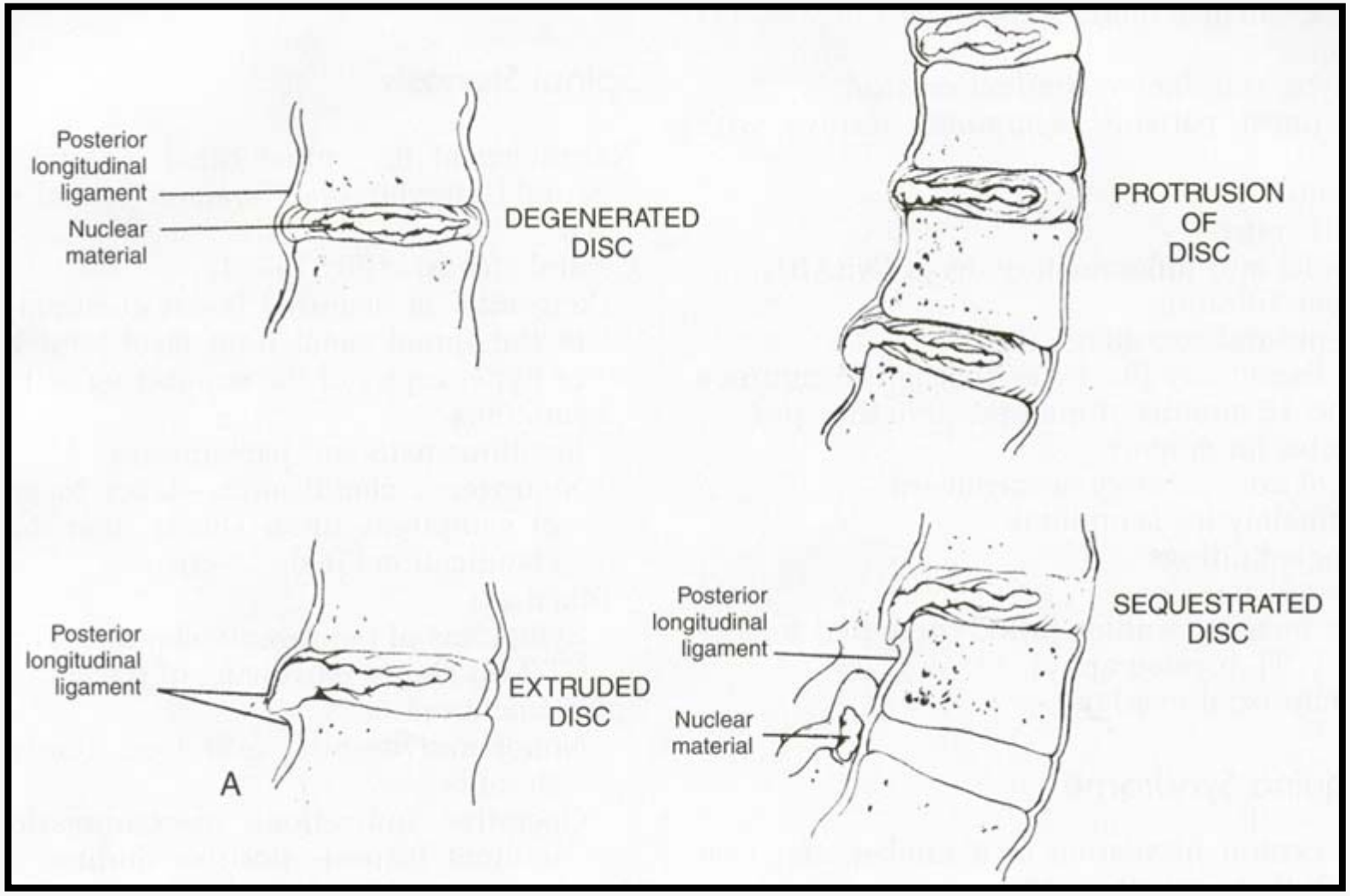
HNP of the Lumbar Spine

- **Classification based on degree of disc displacement**

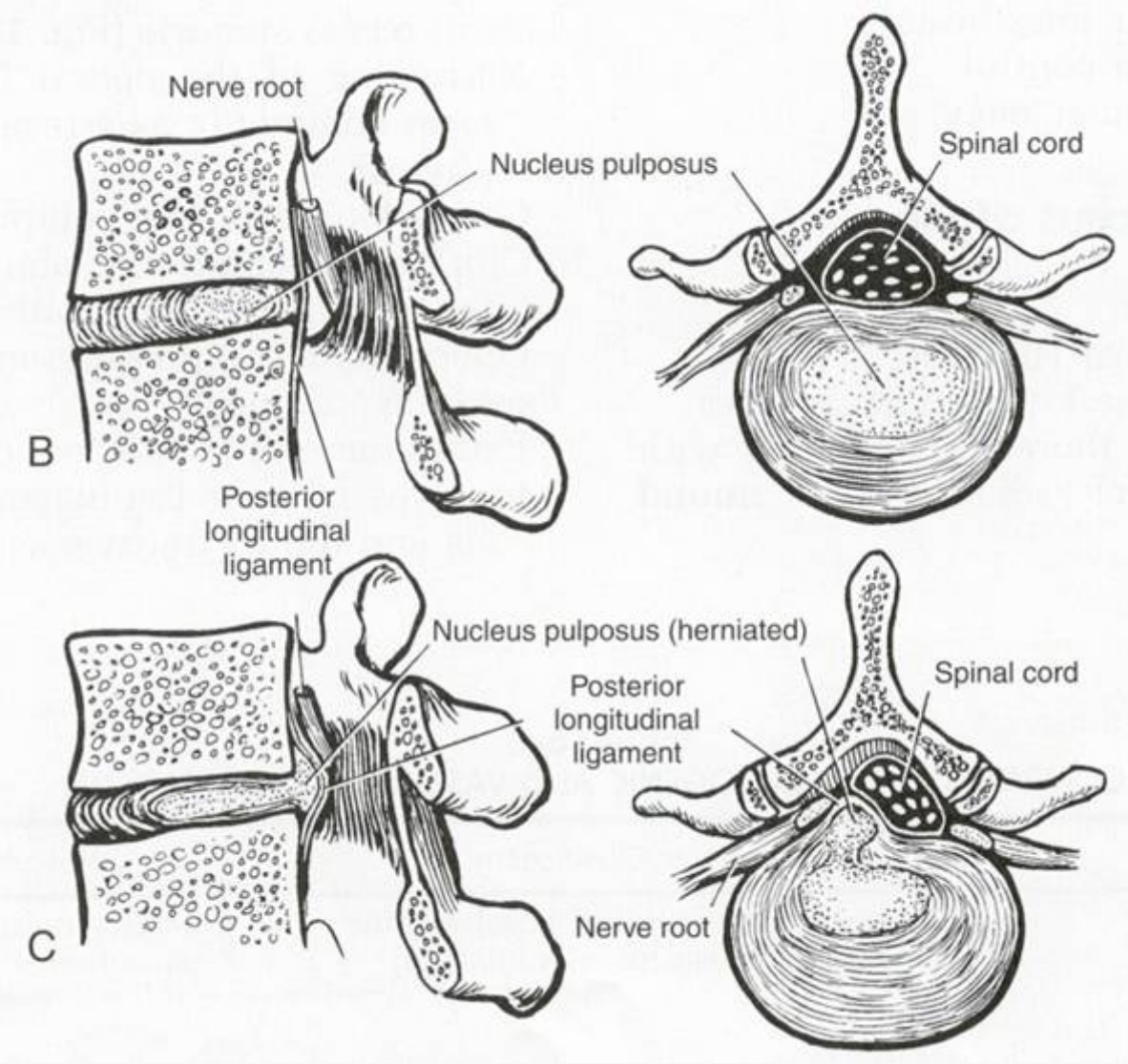


- **Most commonly involves the L4-5 disc (L5 nerve root)**

Disc Pathology



HNP of the Lumbar Spine



HNP of the Lumbar Spine

- History
  - Radicular leg pain
  - May also have lower back pain

HNP of the LS – Physical Findings

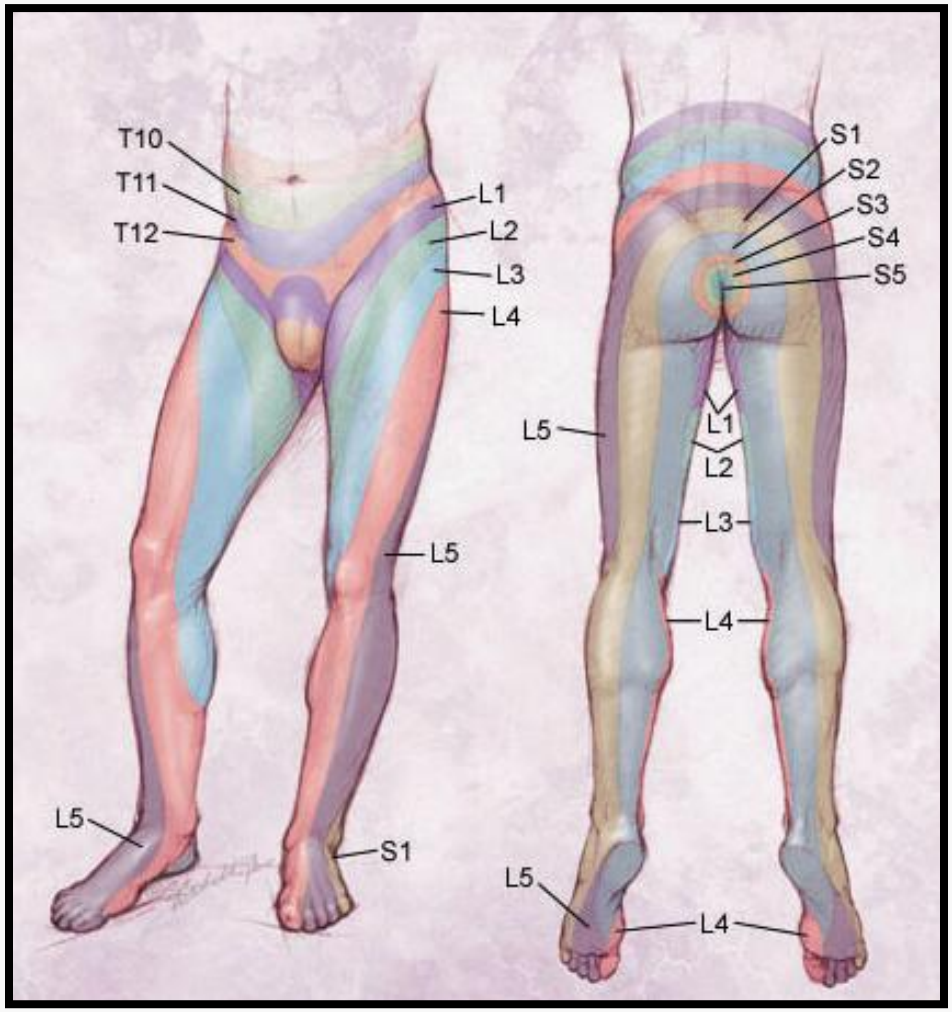
- **Motor weakness**
  - **L4 nerve root—tibialis anterior weakness**
  - **L5 nerve root—extensor hallicis longus weakness**
  - **S1 nerve root--achilles tendon weakness**

HNP of the LS – Physical Findings

- **Physical findings cont'd:**
  - **Asymmetric reflexes**
    - **Knee jerk (L4)**
    - **Tibialis Posterior or Medial Hamstring tendon reflex (L5)**
    - **Ankle jerk (S1)**

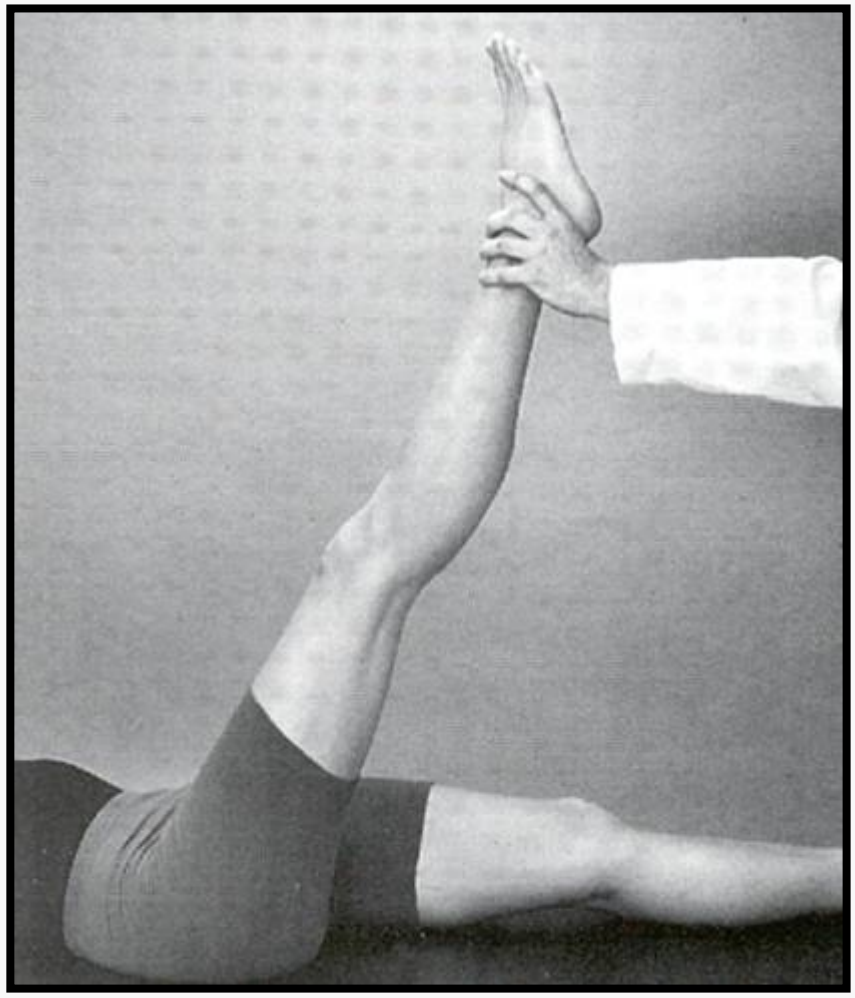
HNP of the Lumbar Spine

- **Sensory findings**
  - **Light touch**
  - **Sharp Dull**



HNP of the Lumbar Spine

- **Positive tension signs**
  - **Straight Leg Raise (Supine & Sitting)**



HNP of the Lumbar Spine

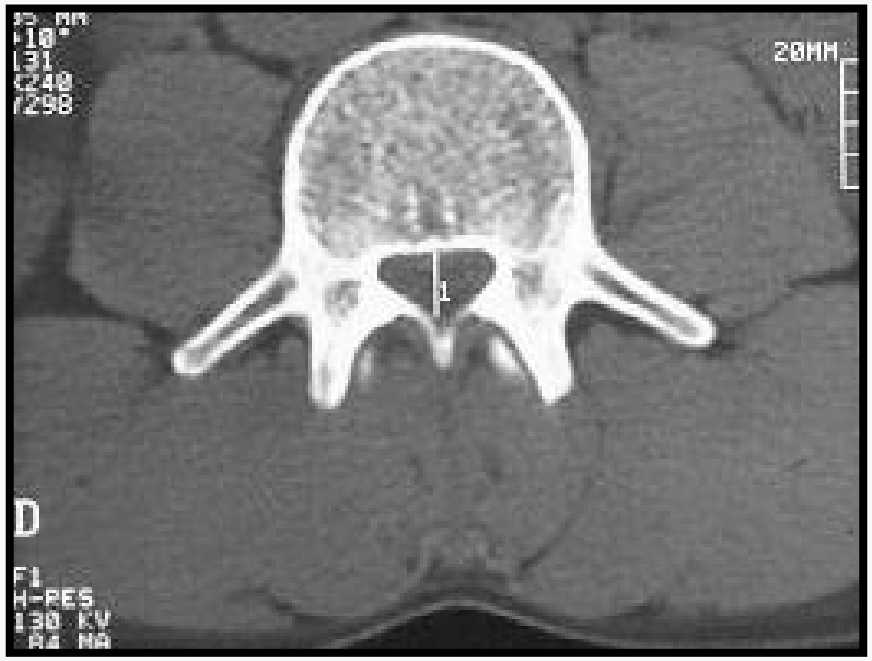
- Diagnostic tests
  - Magnetic resonance imaging (MRI)
  - Myelography
  - Electromyography /nerve conduction studies

HNP of the Lumbar Spine

- **Treatment (most sxs resolve with time)**
- **Symptomatic**
  - **Physical therapy**
  - **NSAIDs, Tylenol or ASA**
  - **Aerobic conditioning**
  - **Lumbar epidural steroids**

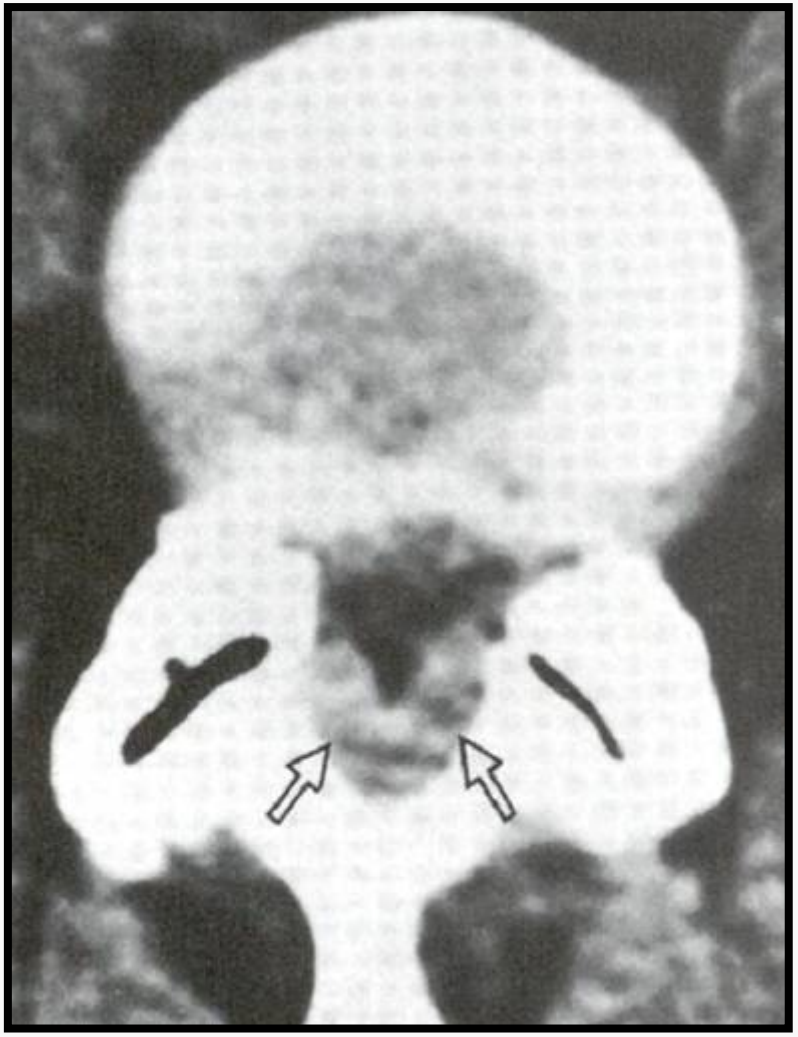
Neurological Syndromes

- **71 yo M w/ long ho LBP & 6 mos. R buttock > calf pain w/ vague numbness**
- **Worse: Standing, walking**
- **Improves: Stooping, sitting, forward bending**



DX: ?

Spinal Stenosis



HNP/Spinal Stenosis Comparisons

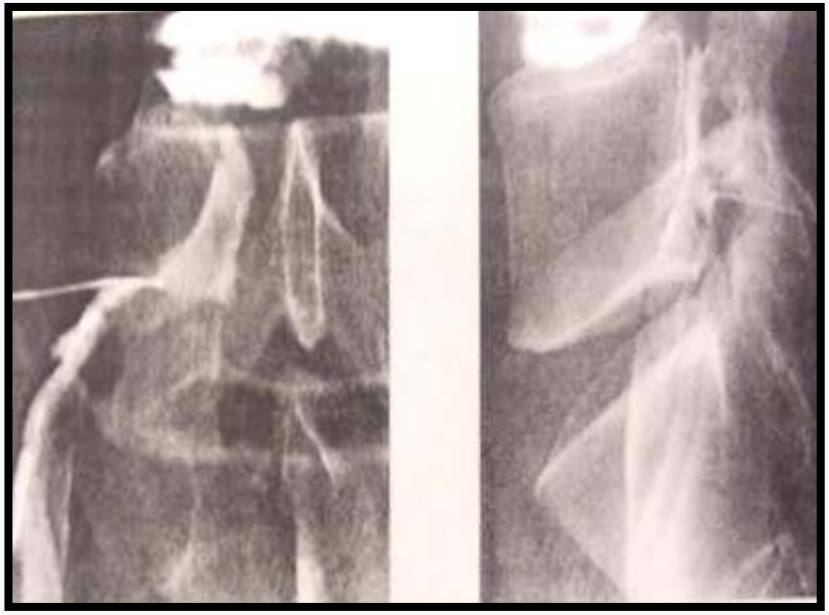
- **HNP vs Stenosis**
  - **Age: 30-50 vs >50**
  - **Sciatica: Classic for HNP vs Atypical for Stenosis**
  - **Aggravated: Flexion/Sitting vs Extension & Standing**

HNP/Spinal Stenosis Comparisons

- **HNP vs Stenosis (cont')**
  - **Nerve Tension Signs (SLR): Usual vs Unusual**
  - **Prognosis: Worse, More Chronic in Stenosis**

HNP and Spinal StenosisTreatment

- **NSAIDs (COX-2 inhibitors), Tylenol or ASA**
- **“Muscle relaxants”**
- **Narcotics**
- **Tramadol [generic]**
- **Corticosteriods (including spinal injections)**



HNP/Spinal Stenosis Treatment

- Decompression
  - Laminectomy
  - Foraminotomy
  - Fusion

Kyphosis

- **Defined: abnormally increased convexity in the curvature of the thoracic spine as viewed from side**
- **Scheuermann’s Disease**
  - **Hyperkyphosis that does not reverse on attempts at hyperextension**

Scheuermann’s Disease

Most common in adolescent males

Scheuermann's Disease

Dx made by X-ray

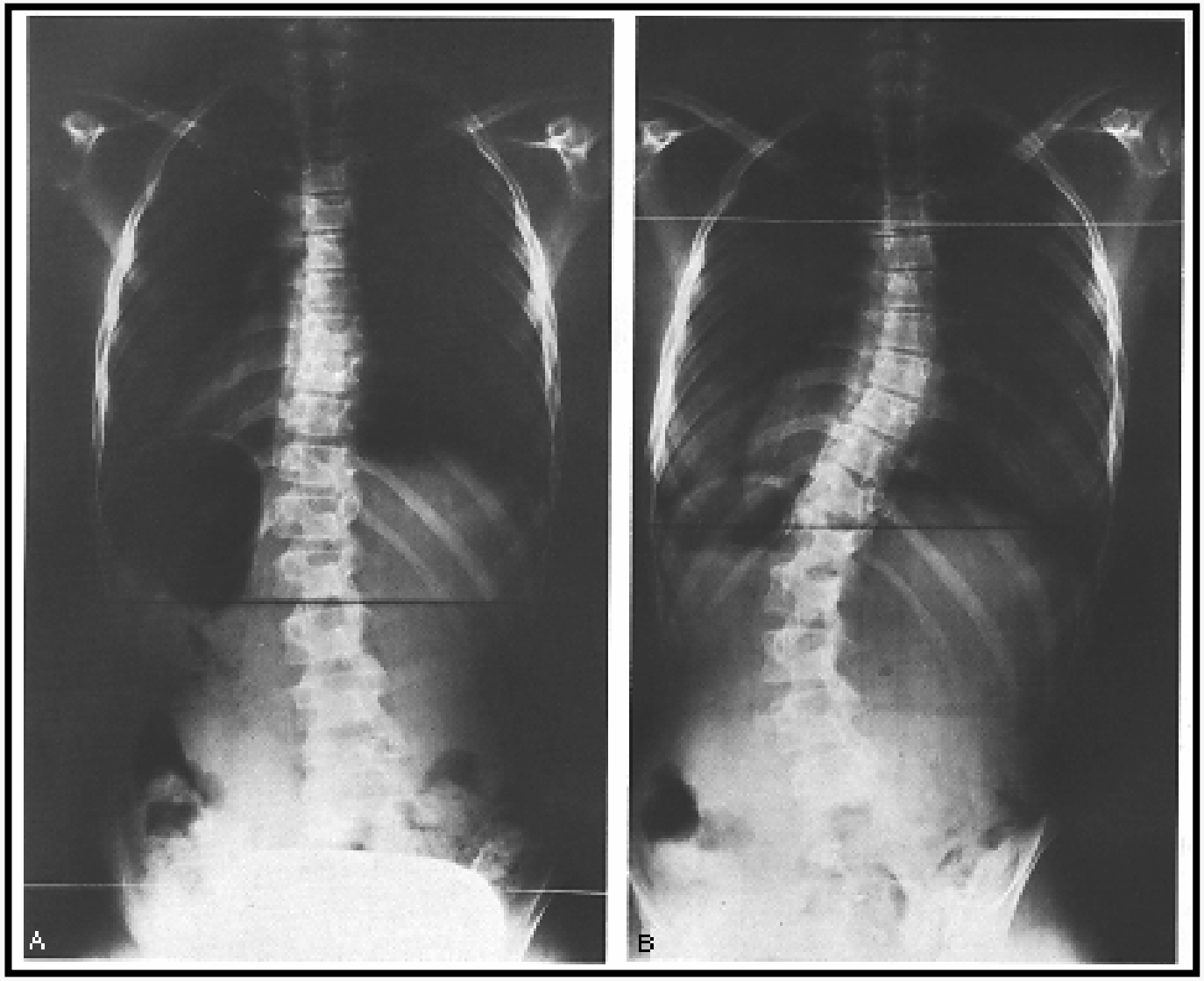
- **45 degrees**
- **With 5 degrees or more of vertebral wedging at 3 sequential vertebrae**

Scheuermann’s Disease (cont’)

Treatment

- **Observation**
- **+/- Bracing**
- **Spinal Fusion**

Scoliosis



Scoliosis - Defined

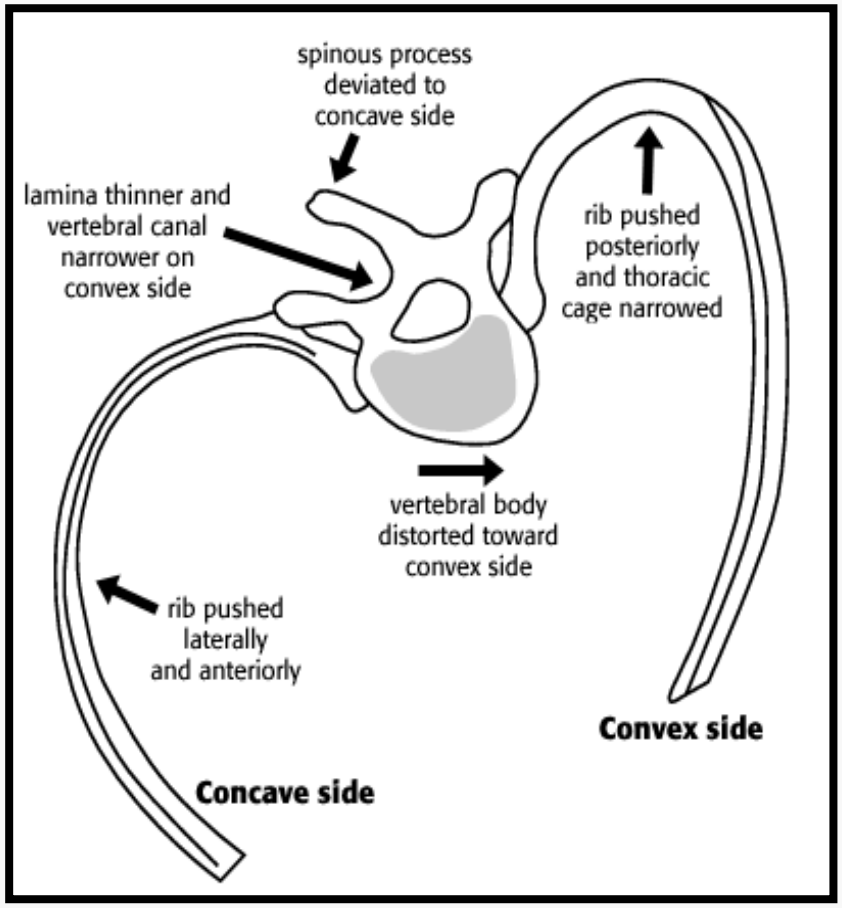
Lateral curvature of the spine of greater than 10 degrees, usually thoracic or lumbar, associated with rotation of the vertebrae and sometimes excessive kyphosis or lordosis

Scoliosis

- **Idiopathic scoliosis**
- **Lateral deviation and rotation of the spine without an identifiable cause**

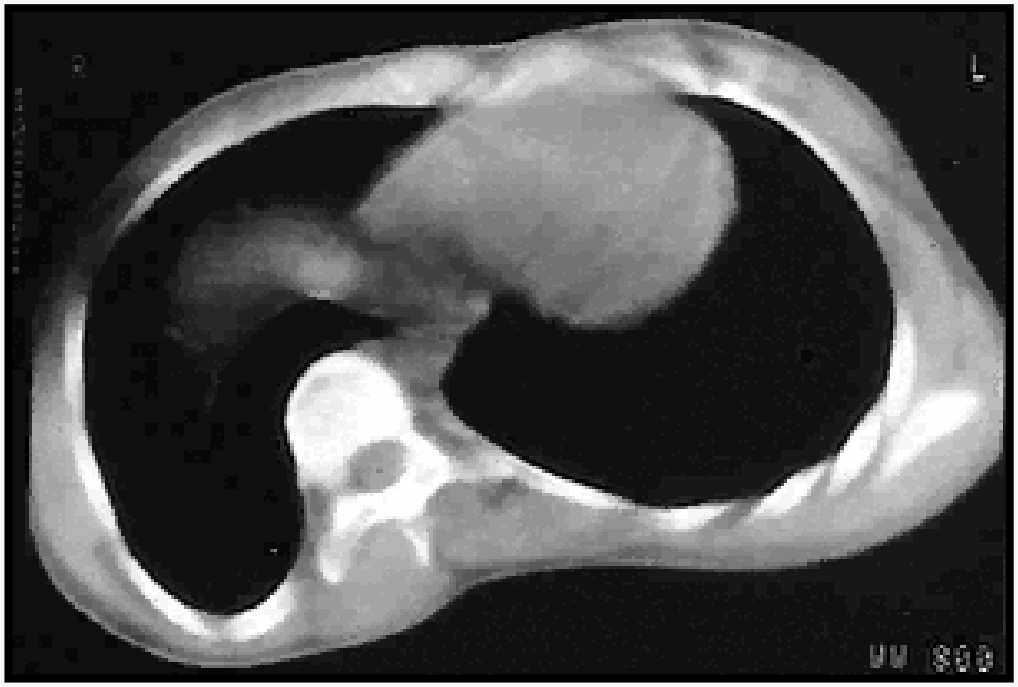
Scoliosis

Assoc. rib hump with forward bending



Scoliosis

- **Assoc. rib hump with forward**



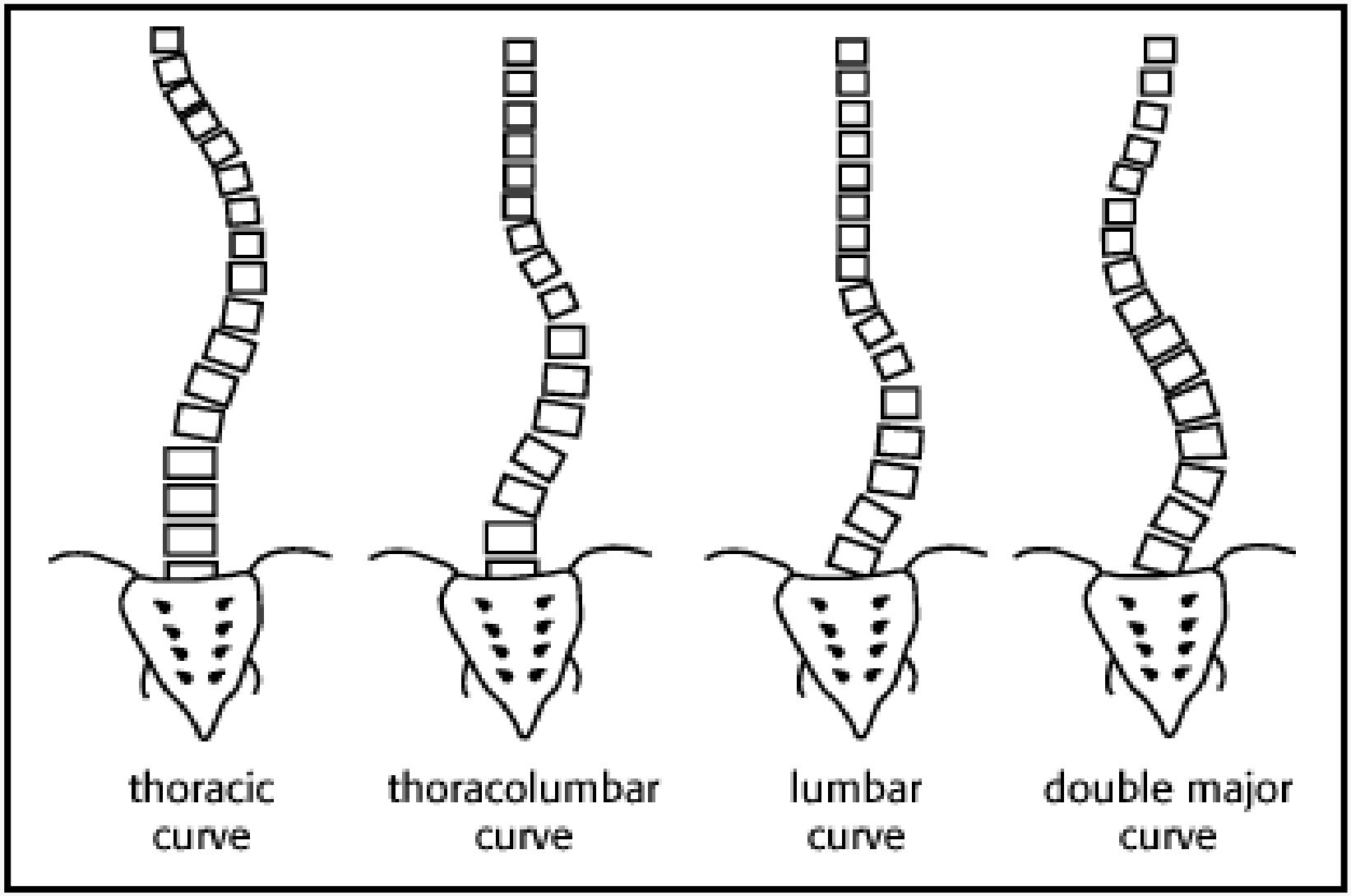
Scoliosis

- **Curve description – curve described by its apex (position and direction [right or left] that it points to**

Scoliosis

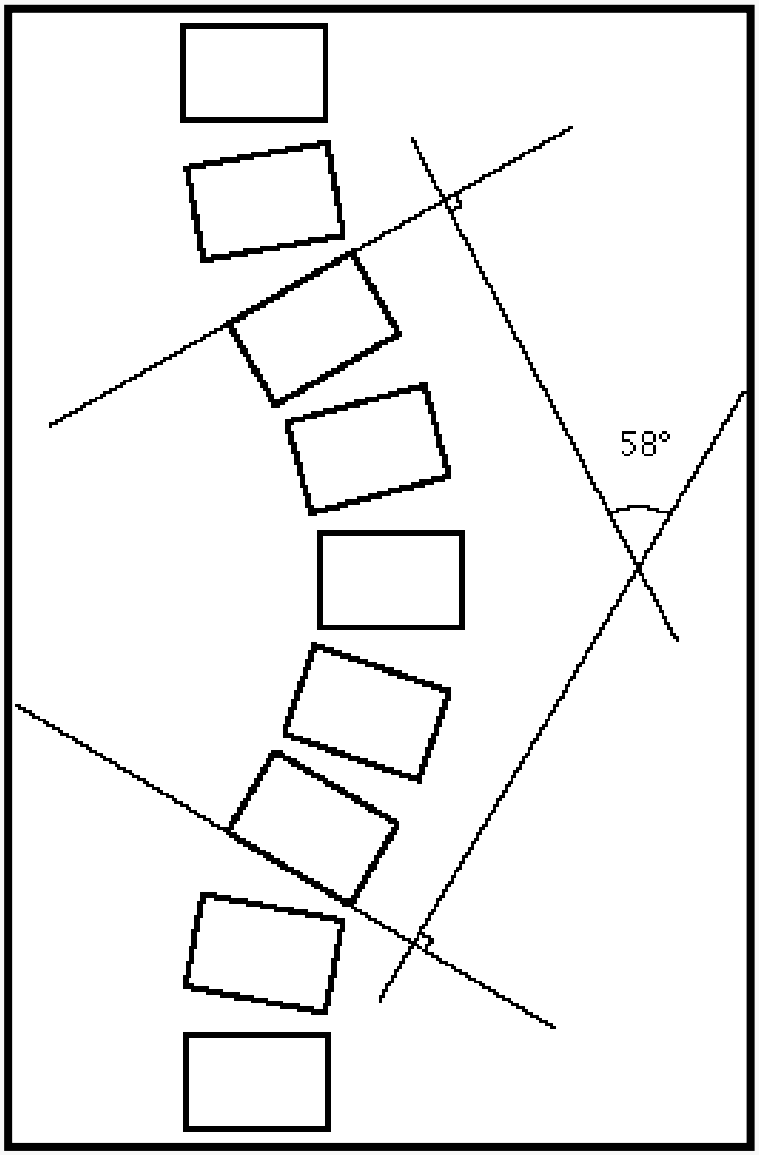
- **Right thoracic curves -- apex at T7 or T8 (MC)**
- **Double major curves -- right thoracic curve with left lumbar curve**
- **Left lumbar curves, Right lumbar curves**

Scoliosis


thoracic curve
thoracolumbar curve
lumbar curve
double major curve

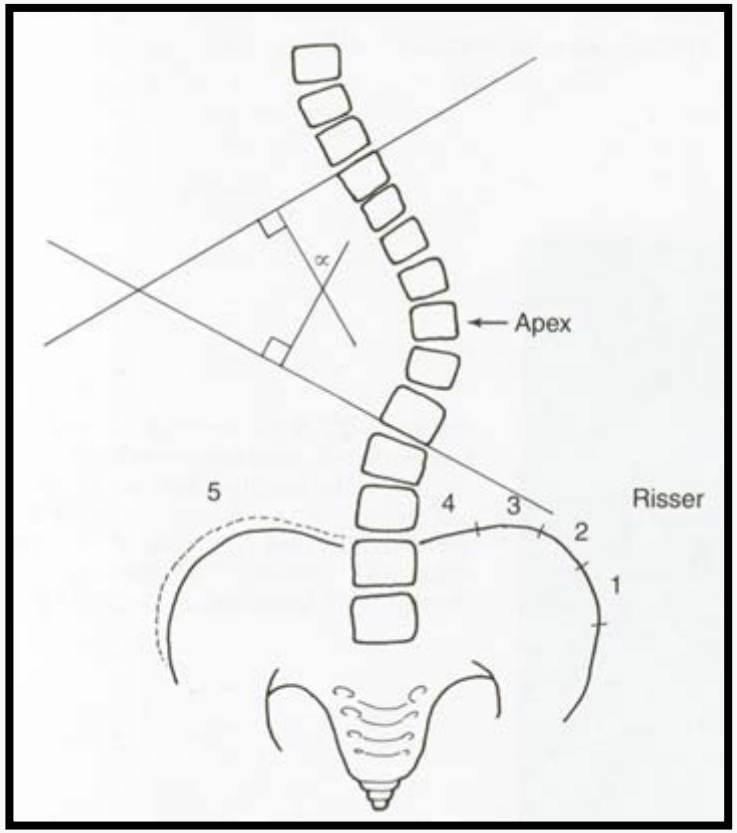
Scoliosis

- **Curve measurement**
- **Most common method used is Cobb method**
- **Measurements are made on standing PA X-rays**



Scoliosis

- **Determination of skeletal maturity**
  - **Risser staging -- based on ossification of iliac crest apophysis**
  - **Risser staging is graded 0 (least mature) to 5 (most mature)**



Scoliosis

- Adolescent idiopathic scoliosis
- Presents between ages 10 & 18
- MC form of idiopathic Scoliosis
- Curve progression is most likely with
  - Curve > 20 degrees
  - Age at dx < 12
  - Risser stage of 0 or 1

Scoliosis

- **Approx. 75% with curves of 20 - 30 degrees progress at least 5 degrees**
- **Severe curves of 90 degrees or more are assoc. with cardiac & pulmonary impairment**
- **<u>Left thoracic curves are rare and require eval of spinal cord with MRI</u>**

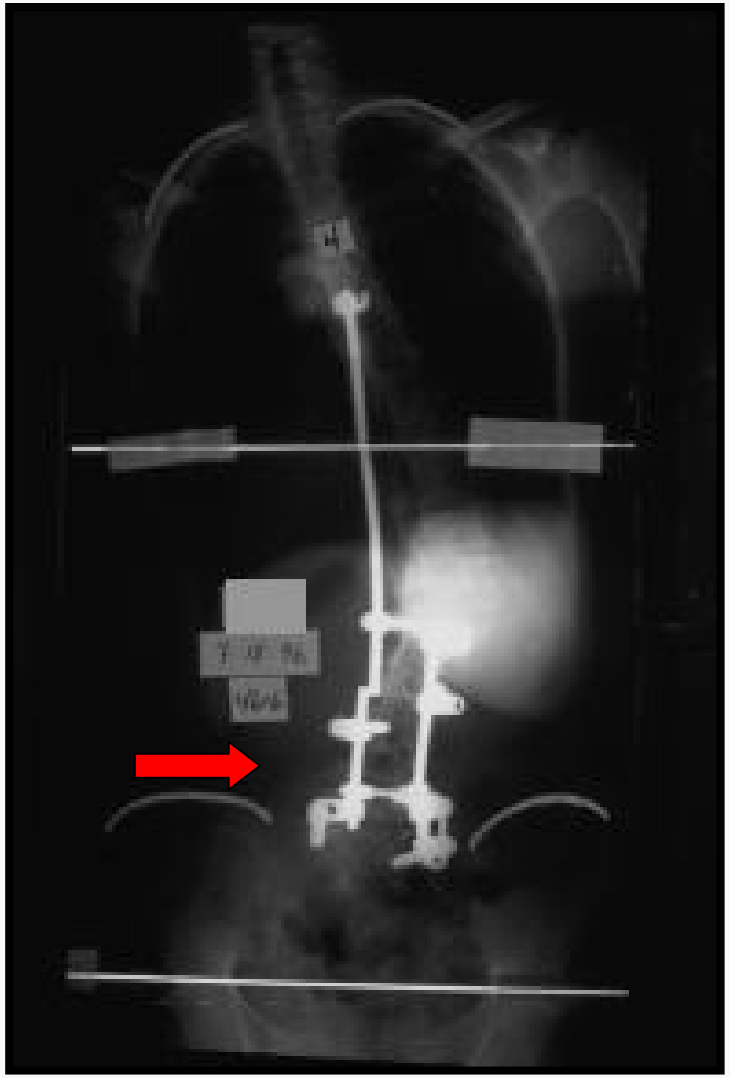
Scoliosis

- **Treatment options include:**
- **Observation**
- **Bracing**

Scoliosis

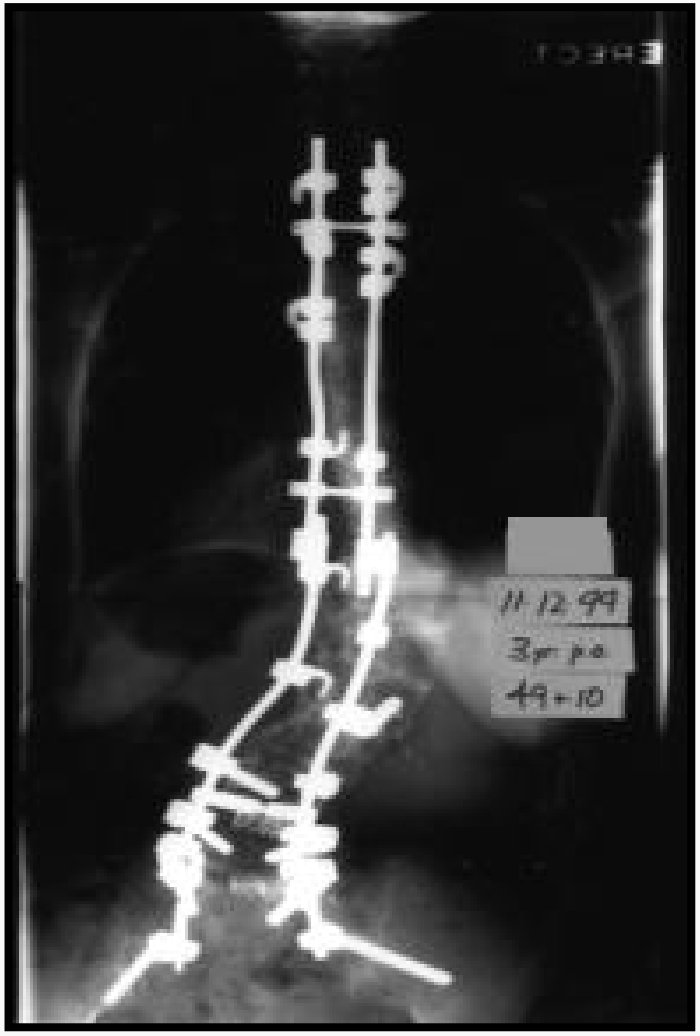
- **Surgery**
  - **Based on likelihood of curve progression**
  - **Curve Magnitude**
  - **Age at DX**
  - **Skeletal Maturity**
  - **Presence of Menarche**
  - **Curve progression during observation period**

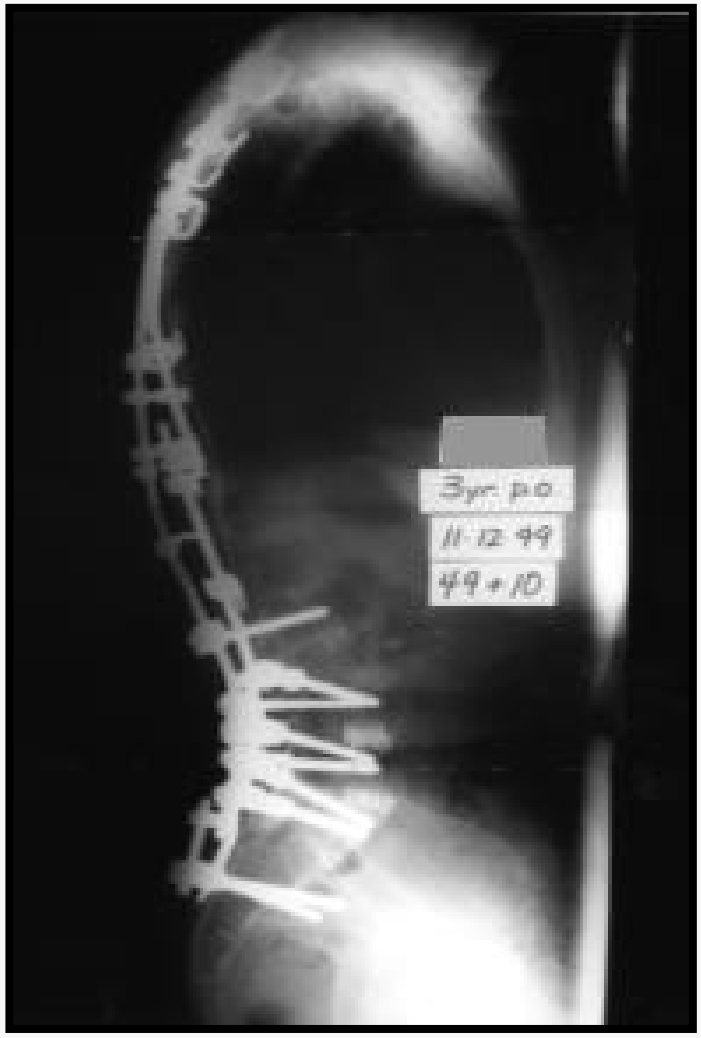
Scoliosis



Scoliosis

Scoliosis





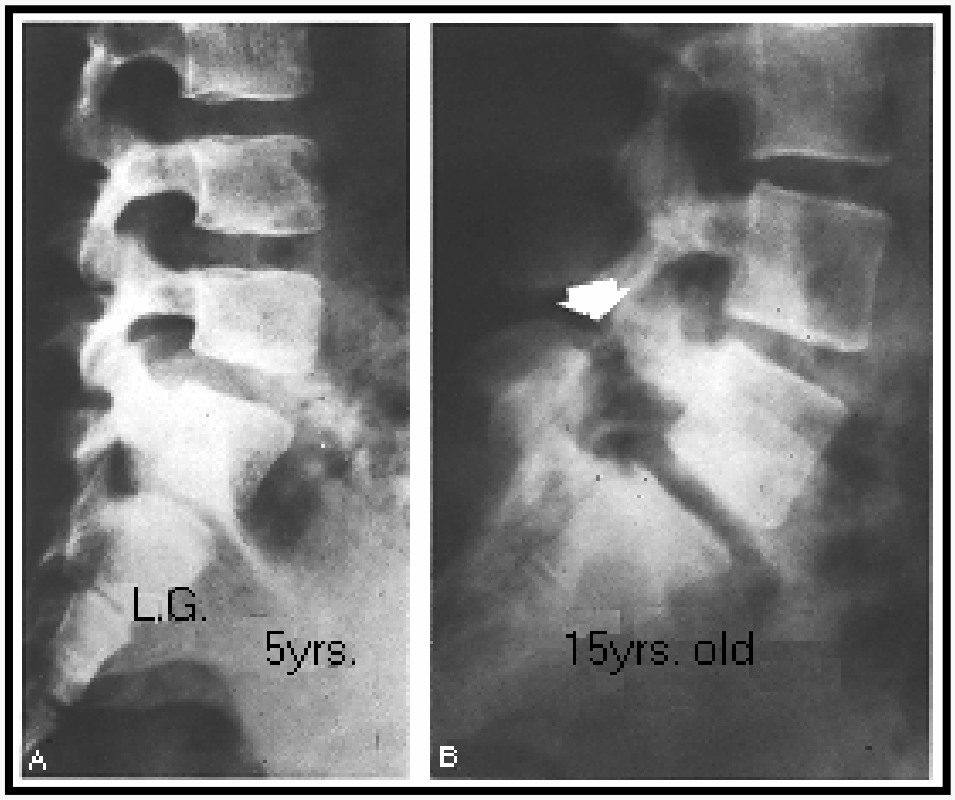
Scoliosis

Scoliosis

- **Adolescent idiopathic scoliosis is typically not painful, and the child presenting with a painful curvature should be given a thorough w/u**

Low Back Pain

- **Spondylolysis**
  - **Defect in pars interarticularis (Unilateral)**
  - **MC cause of lower back pain in children and adolescents**

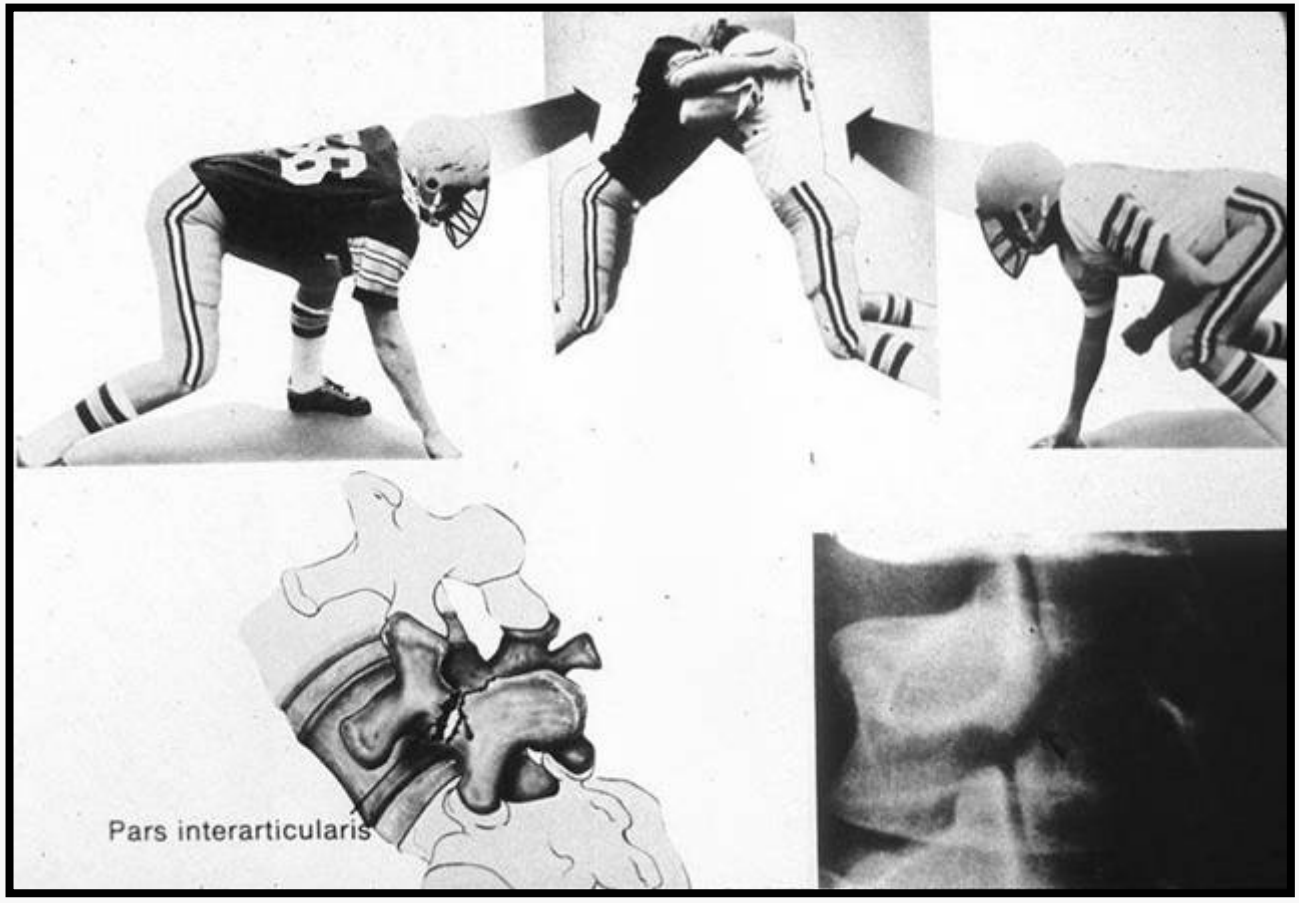


Low Back Pain

- **Spondylolysis**
  - **Unilateral Pars defect is the result of a fatigue fx from repetitive hyperextension**

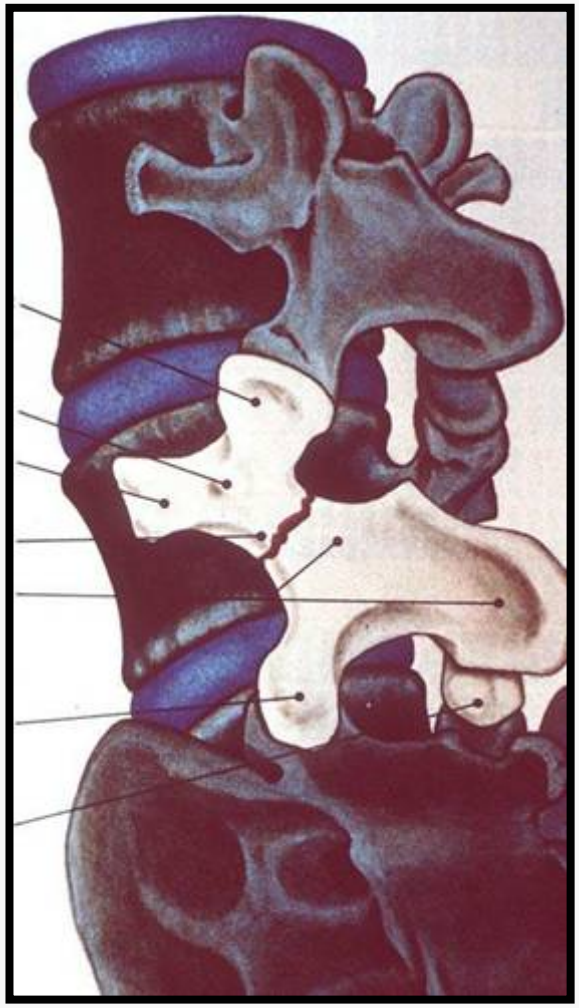
Low Back Pain

Most common in gymnasts and football lineman



Low Back Pain

- Spondylolysis



Low Back Pain

Spondylolysis

- **Treatment**
  - **Modification of activity**
  - **NSAIDs, Tylenol/ASA**
  - **Physical therapy**
    - **Flexibility & strengthening exercises**
    - **Thoracolumbosacral orthosis**

Low Back Pain

- Spondylolisthesis
  - Bilateral Pars Interarticularis defect
  - Forward slippage of one vertebra on another
  - Usually L5-S1

Low Back Pain

- **Spondylolisthesis**
  - **Most common in children involved in hyperextension activities**

Low Back Pain

- **Spondylolisthesis**
  - **Meyer Classification**

Low Back Pain

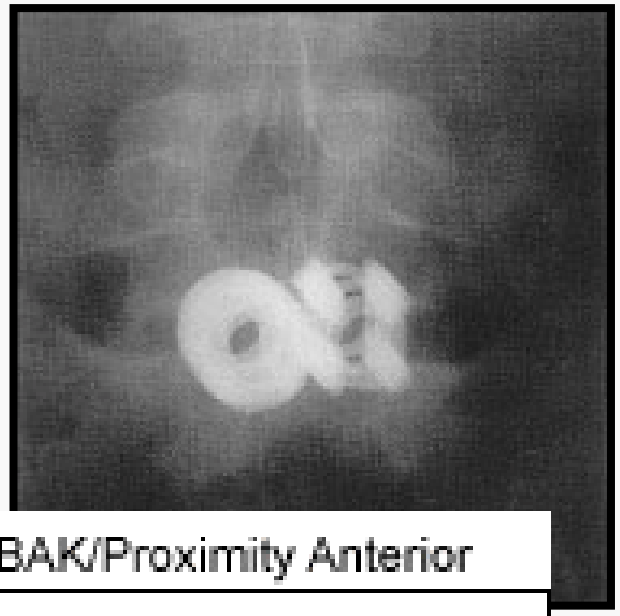
Spondylolisthesis

- Treatment
  - Modification of activity
  - NSAIDs, Tylenol, ASA
  - Physical therapy
  - Flexibility & strengthening exercises
  - Thoracolumbosacral orthosis

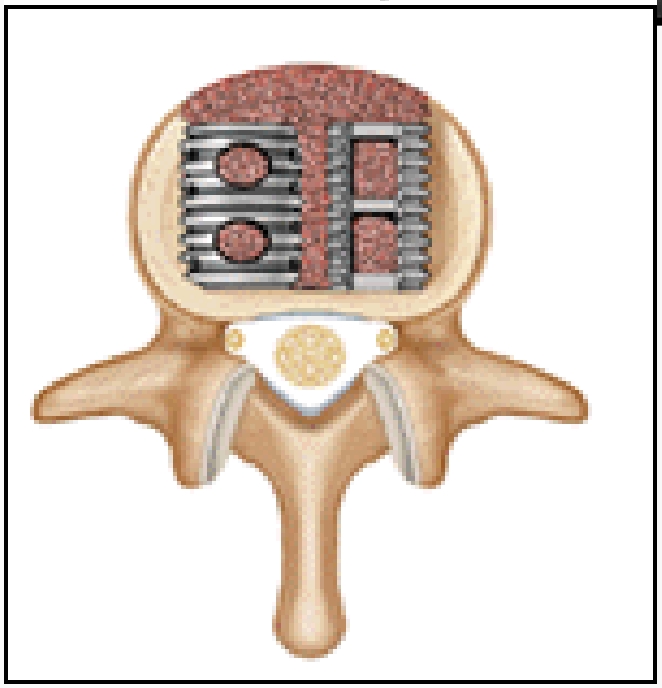
Low Back Pain

Spondylolisthesis

- Treatment
  - Severe pain not responding to non-operative management requires surgical decompression and/or stabilization



BAK/Proximity Anterior



Summary

- **Symptoms suggestive of an orthopedic or musculoskeletal condition, formulation of a treatment plan after ordering and interpreting diagnostic tests, and making a preliminary diagnosis**

Summary

- **Etiology, clinical presentation, lab/radiologic studies, evaluation, and treatment for the following spine conditions:**
  - **Back Strain/Sprain**
  - **Ankylosing Spondylitis**
  - **Cauda Equina**

Summary

- **Etiology, clinical presentation, lab/radiologic studies, evaluation, and treatment for the following spine conditions:**
  - **Herniated Nucleus Pulposus (HNP)**
  - **Spinal Stenosis**
  - **Kyphosis/Scoliosis**
  - **Low Back Pain (LBP): Spondylolysis, Spondylolisthesis**