

# Adolescent Back Pain

(Quit yer whinin'...)



# Case Presentation

- CC: College physical
- HPI: 19yo WM presents for routine physical. No current concerns.
  - Oh wait, actually my back hurts. Past 4-6mo. Pain low mid-back just above belt level, band-like distribution but no radiation above or below. Occurs in AM after exercising day prior; gone by noon. Does not use heat, ice, or meds. No pain in buttocks or legs. No reported numbness/weakness. No specific hx trauma.
- PMHx: None
- Meds: None

# Case Presentation

- HEADSS:
  - Younger brother, good family relationships
  - Soph at Miami of Ohio
  - Excellent grades
  - Government major
  - Basketball, LAX as club sports
  - Girlfriend x9mo, no SA
  - Occasional EtOH, no smoking, no drug use



# Case Presentation

- Physical Exam:
  - AFVSS; Ht 75%; Wt 75%
  - Exam unremarkable
  - Back: symmetric, no scoliosis, no erythema/edema, no tenderness to palpation, no paraspinal spasm, FROM flex/ex
    - Positive lumbar hyperextension test bilat
  - LE: decreased hamstring flexibility (1/10), normal strength & sensation, FROM hips, knees, ankles



# Back Pain in Pediatrics

- Uncommon CC, but common occurrence
  - 7% of 12yo with >1 episode LBP
  - 50% of 18yo F, 50% of 20yo M
- Most not definitively diagnosed
- Most benign etiologies
- ~Half of episodes musculoskeletal (ER)
  - 10% infectious, 13% idiopathic, 13% SCD
  - Remember, backpacks <15-20% of weight!

# Back Pain in Pediatrics: Differential Diagnosis

## Causes of Back Pain in Children

### Musculoskeletal

Nonspecific musculoskeletal back pain  
Spondylolysis/spondylolisthesis  
Scoliosis  
Scheuermann disease  
Disc degeneration and/or prolapse  
Other :  
Intervertebral disc calcification  
Congenital absence of pedicle  
Vertebral apophyseal fracture  
Aneurysmal bone cyst  
Sacroiliac joint stress reaction  
Idiopathic juvenile osteoporosis

### Infectious

Discitis  
Vertebral osteomyelitis,  
including tuberculosis (Pott's disease)  
Epidural abscess  
Sacroiliac joint infection  
Non-spinal infection :  
Paraspinous muscle abscess  
Pyelonephritis  
Pneumonia  
Pelvic inflammatory disease  
Endocarditis  
Viral myalgias

### Inflammatory

Ankylosing spondylitis  
Psoriatic arthritis  
IBD-associated arthritis  
Reiter disease

### Neoplastic

Osteoid osteoma  
Leukemia or lymphoma  
Solid malignancy, primary or metastatic  
Other benign tumor :  
Neurofibroma  
Vascular malformation

### Other

Sickle cell pain crisis  
Syringomyelia  
Cholecystitis  
Pancreatitis  
Chronic recurrent multifocal osteomyelitis  
Psychosomatic illness

# Red Flags!

- Infectious, Neoplastic, Rheumatologic
- Acute trauma
- Night pain
- Worsening pain
- Systemic symptoms
- Neuro symptoms
- Hx CA/TB exposure
- Severe disability
- Young age (<4yo)

## Red Flags in Pediatric Back Pain

Young age: prepubescent, especially before school-age

Fever

Acute trauma

Weight loss

Constant pain

Night pain

Progression of symptoms over time

Significant pain or disability

Sciatica

Repetitive microtrauma, especially lumbar hyperextension

History of malignancy

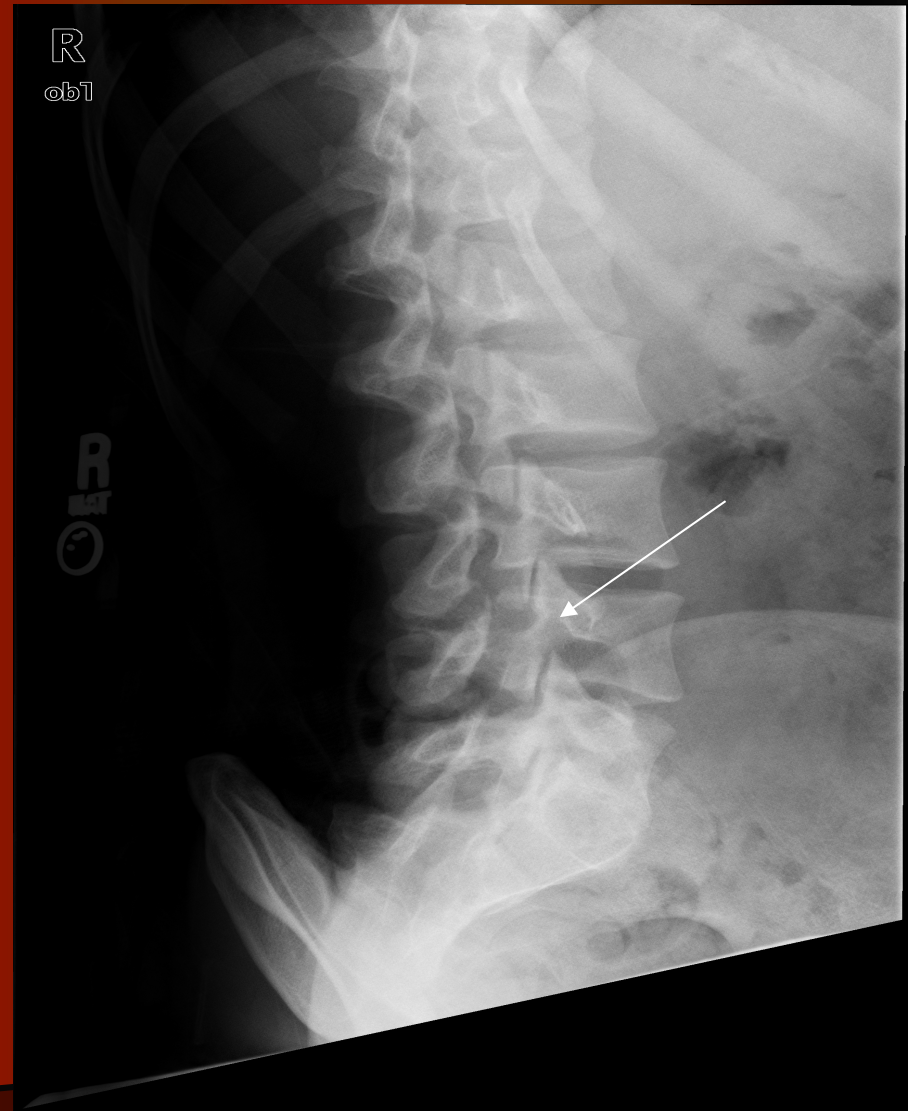
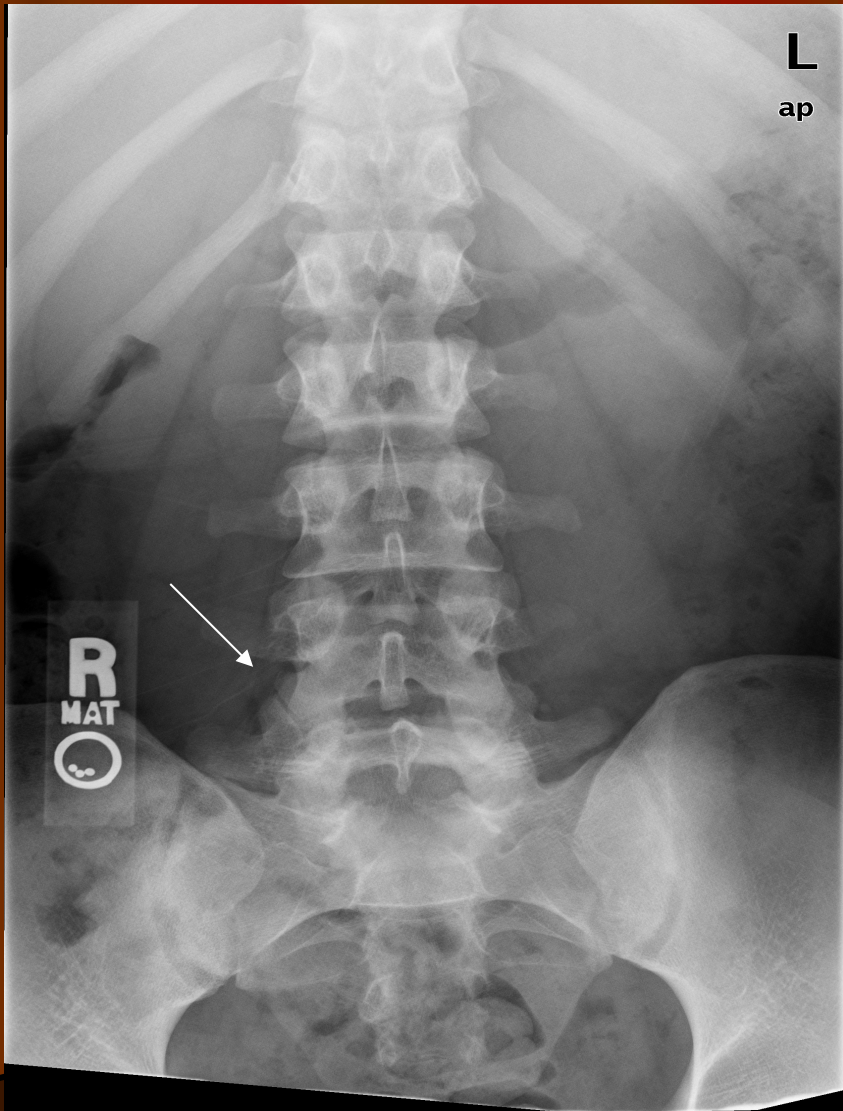
History of TB exposure

Bowel or bladder symptoms

Abnormal neurological examination:

asymmetric reflexes, Babinski, low rectal tone

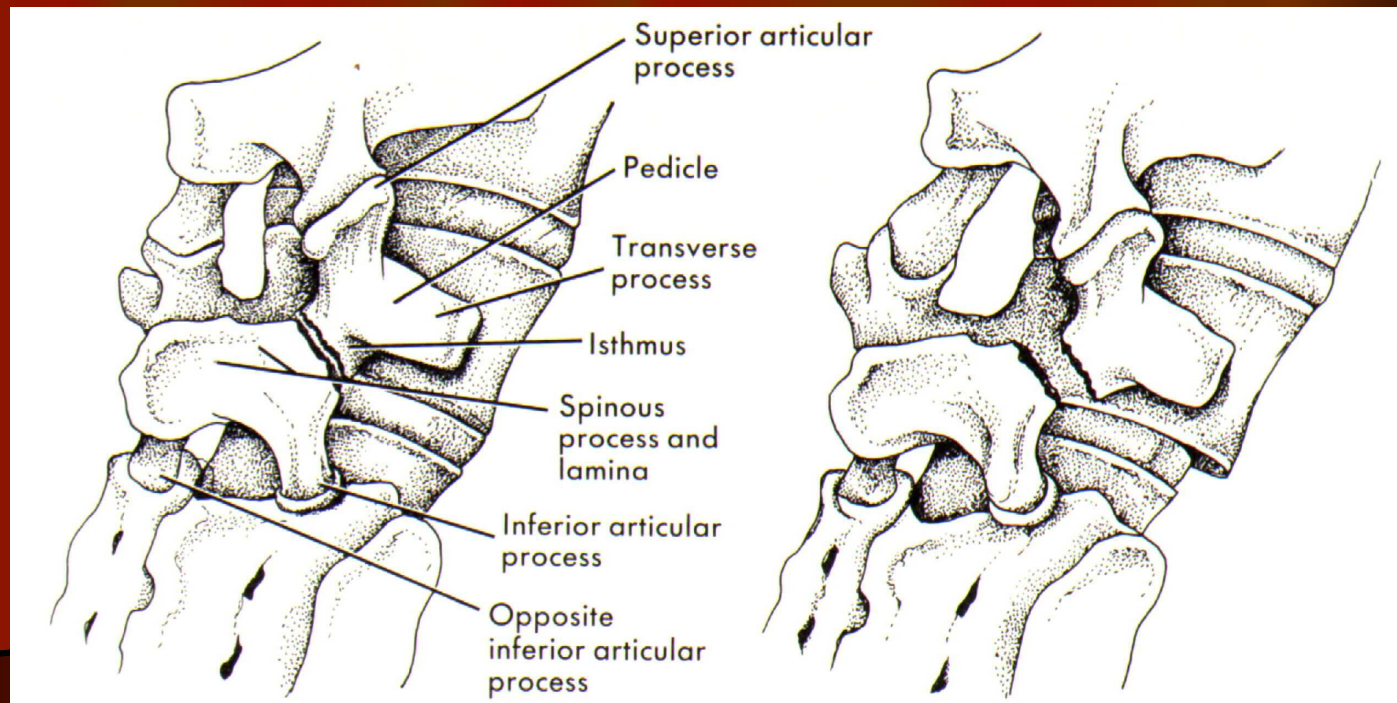
# RedHawk's Films





# What does he have?

- **Spondylolysis:** Defect (separation) in pars interarticularis
- **Spondylolisthesis:** Anterior slippage of vertebral body over next lowest body



# Spondylolysis

- Found in 7-8% of general population
  - Found in 5% by age 6
- Males > Females (2:1)
  - Females more likely to progress to spondylolisthesis
- White > African-American
- Most commonly at L5 (90%; 80% bilat)
- Often asymptomatic/incidental finding

# Who is at risk?

- Genetic predisposition
  - Alaskans 40% adults
  - Eskimos 54% adults
  - Family history
  - Spina bifida occulta?
- Athletes with repetitive hyperextension
  - Gymnasts
  - Divers
  - Football offensive linemen
  - Pole vaulters
  - Weight lifters
  - Wrestlers
  - LAXers!



# Spondylolysis:

## Presentation

- Low back pain, typically at belt line
- Insidious onset, may increase with activity
- Rarely radiating
- Commonly in preadolescent growth spurt
  
- Usually no hx trauma
- Usually no neuro deficits

# Spondylolysis: Physical Findings

- Hyperlordosis
- Vertical sacrum
- Iliac crests high, ribs look low
- "Short" torso
- +/- "Step-off" at L5
- +/- Facet joint tenderness
- Hamstring spasm – classic in adolescents!
- Phalen-Dickson sign (hip-flexed, knee-flexed gait)



# Lumbar Hyperextension Test



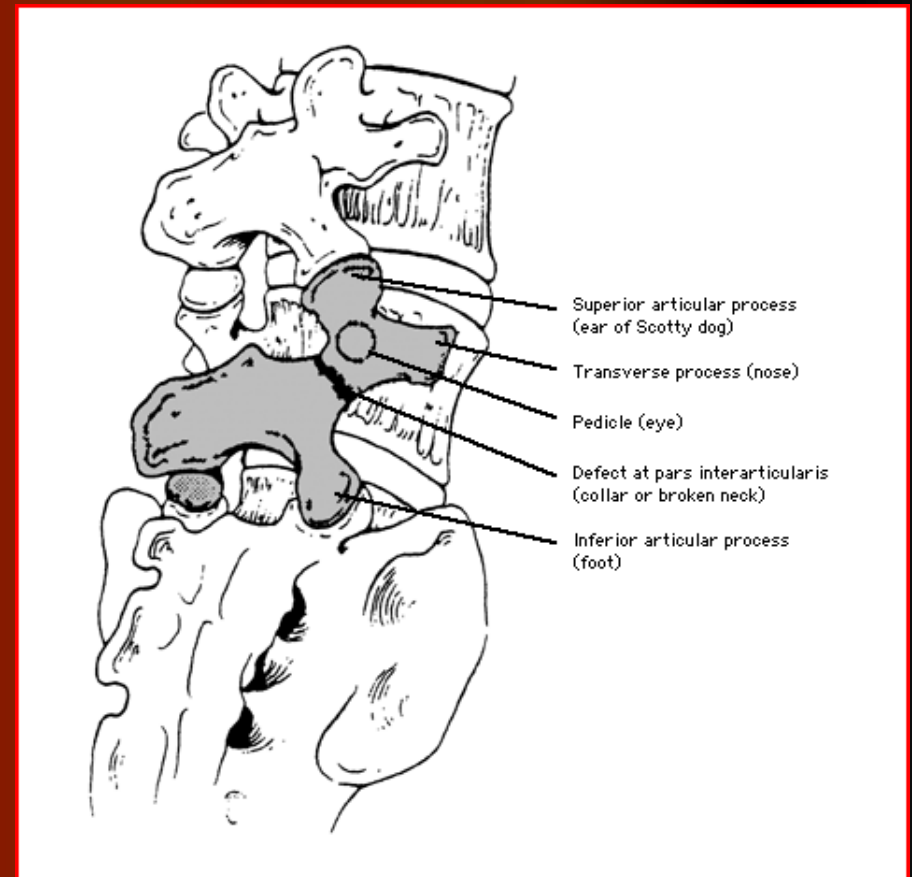
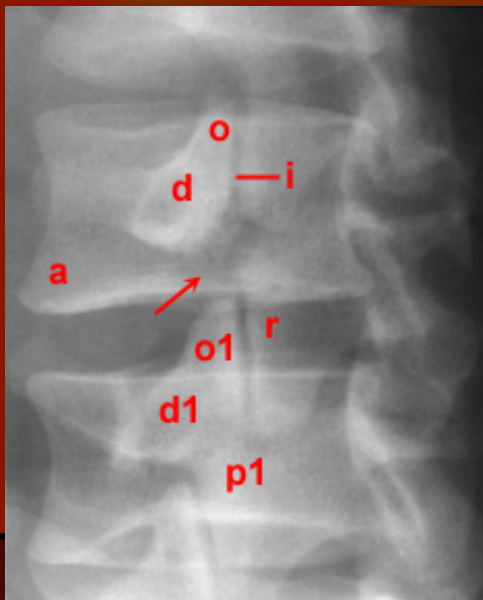
**Lumbar hyperextension test** The one-leg lumbar hyperextension test usually accentuates and reproduces the type of pain the young athlete is experiencing. When the reaction is unilateral, the test will be distinctly more positive when this maneuver is performed on the unilateral lower extremity. Reproduced with permission from: Jackson, DW, Wiltse, LL, Dingeman, RD, Hayes, M. Stress reactions involving the pars interarticularis in young athletes. *Am J Sports Med* 1981; 9:304. Copyright © 1981 American Journal of Sports Medicine.

# Spondylolysis: Diagnosis

- **X-Ray: First-line!**
- SPECT: If films negative but H&P suggestive
- CT: If SPECT positive but dx inconsistent
- Bone Scan: If suspected acute pars fx
- MRI: If neuro involvement

# Plain Films

- Oblique X-ray:
  - “Collar” of Scottie dog
  - Greyhound sign
- PA/Lat X-ray:
  - Contralateral sclerosis



**Spondylolysis** Oblique radiographs in patients with spondylolysis reveal the defect at the pars interarticularis as a crack or collar on the neck of the "scotty dog." Reproduced with permission from: Smith, JA, Hu, SS. Management of spondylolysis and spondylolisthesis in the pediatric and adolescent population. Orthop Clin North Am 1999; 30:487. Copyright © 1999 Elsevier.



# Scottie Dog

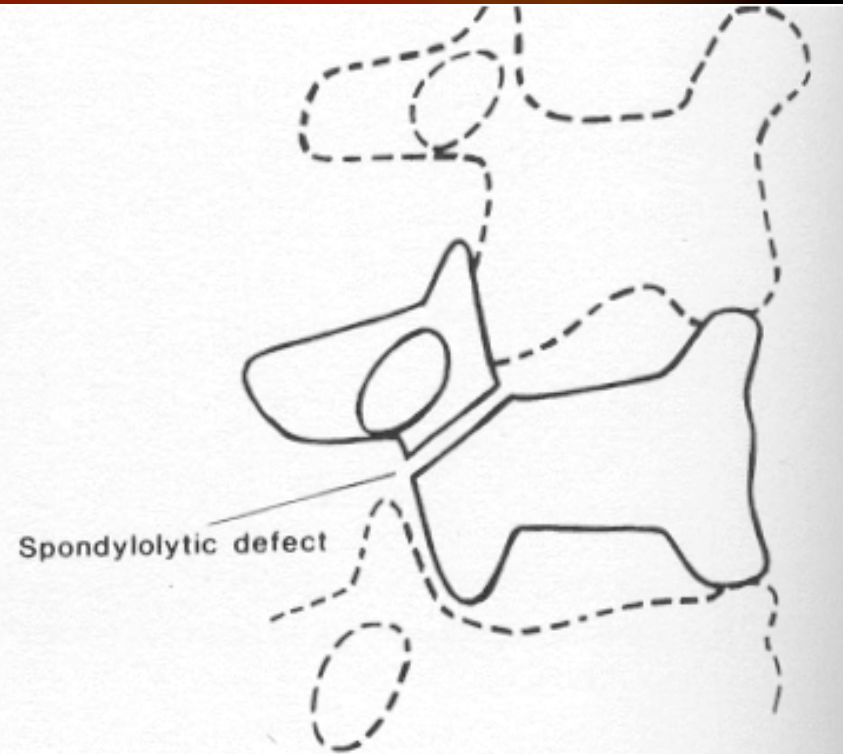
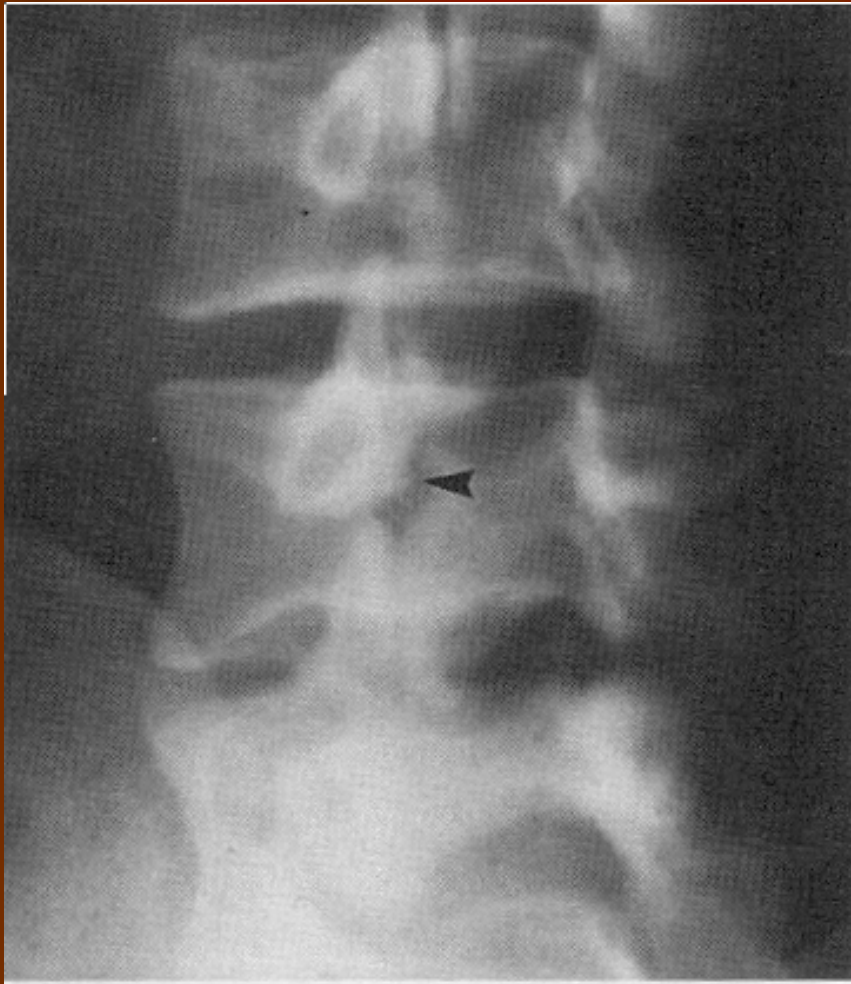


FIGURE 2. Diagrammatic of lumbar vertebrae showing spondylolytic defect.

# Spondylolysis:

## Proposed Classification

- Type I: Dysplastic
- Type II: Developmental
- Type III: Traumatic
  - A: Acute
  - B: Chronic
    - Stress reaction
    - Stress fracture
- Type IV: Pathologic

# Treatment

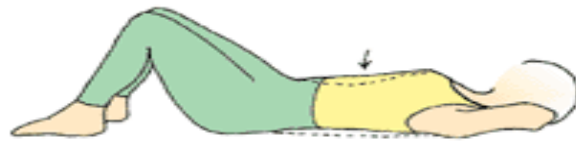
- Depends on SLIPPAGE and SYMPTOMS and SKELETAL MATURITY
  - Spondylolysis and Grade I Spondylolisthesis (<25%):
    - Regular activity. PT. Annual x-rays.
  - Grade II (25-50%):
    - Activity restriction. PT. Re-eval 3-6mo.
  - Grade III (50-75%) - Grade IV (>75%):
    - Surgery for >50% slippage, **or >30% in skeletally immature pts**; progressive slippage, persistent pain, or neurological symptoms.

# Conservative Treatment

- Activity restriction
- NSAIDs
- Physical therapy
  - Abdominal/back strengthening
  - Hamstring stretching
- Bracing/Casting
  - Symptomatic
  - Acute pars fx



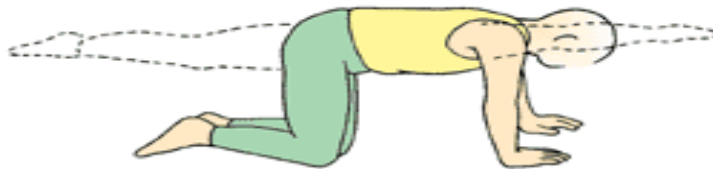
## Spondylosis/Spondyloisthesis Exercises



**Pelvic tilt**



**Dead bug**



**Quadruped arm/leg raises**

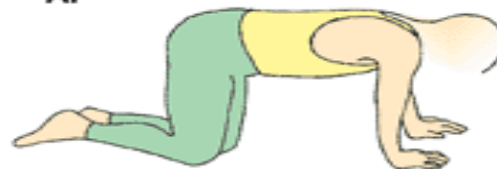


**Piriformis stretch**



**Partial curl**

**A.**



**B.**



**All-fours-to-heels sit**

# Conclusions

- Don't dismiss a patient with back pain
- Rule out Red Flags
- Full ortho & neuro exams
- Start with plain films



- Spondylolysis is the most commonly diagnosed organic cause of back pain, and is easily treated!

# References

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