

Low Back Pain Evaluation

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Introduction

- Lower back pain commonly seen in primary care.
- A thorough history is critical to ruling out more serious causes.
- Physical exam can help confirm the diagnosis and assess functional status.
- The initial treatment of the most common causes of low back pain is symptomatic.



Epidemiology

- 85% of people experience LBP in their lifetime.
 - 2nd leading symptom (behind URI's) prompting all physician visits in the US.
 - Up to 50% of working age people admit to low back pain during the year.
 - General prevalence in US population 15-20%.
- LBP often recurs; becomes chronic in 5-10% of patients.



Epidemiology

- Back symptoms are the most common cause of disability for persons younger than age 45.
- 1% of US population is disabled due to LBP.
- Annually 175 million work days are missed, with a 20 billion dollar loss of productivity.
- Total societal costs for low back pain exceed 50 billion dollars per year!

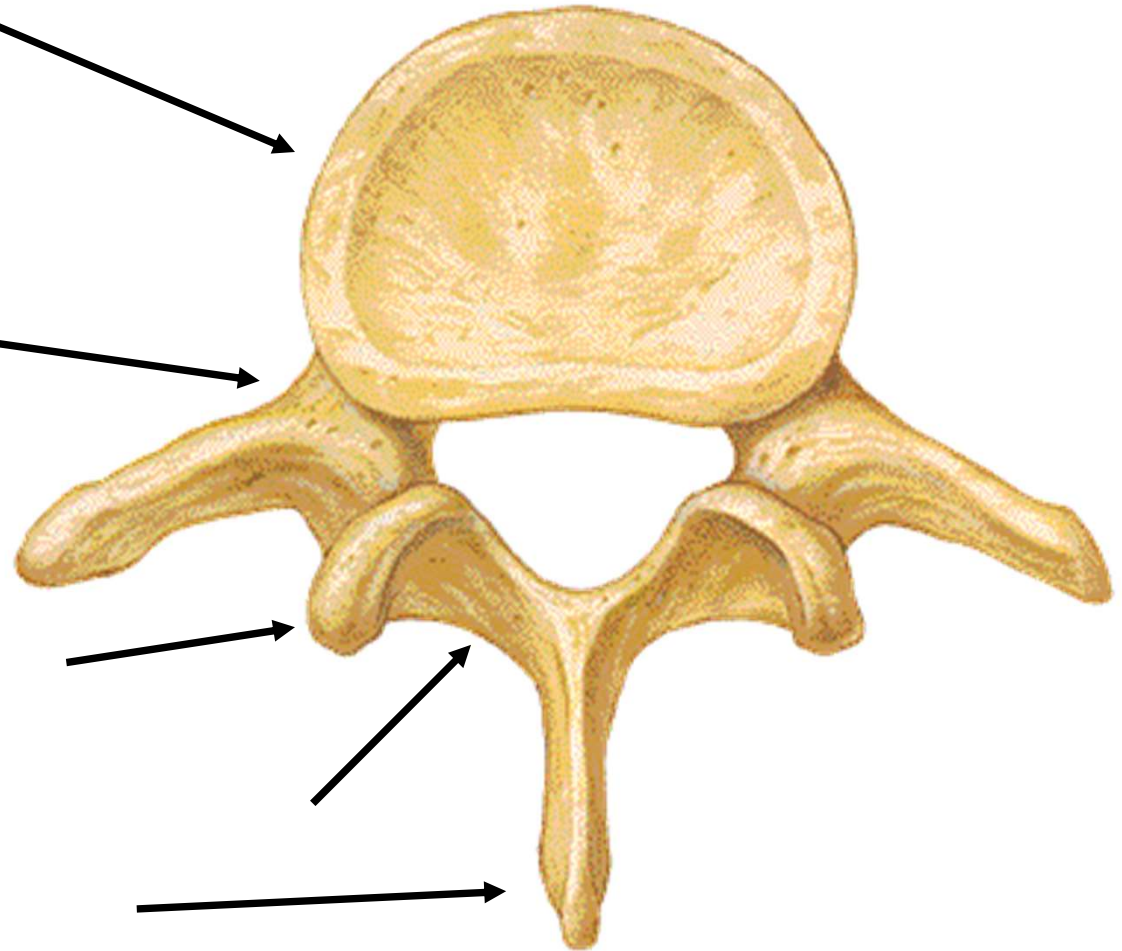


Natural History of LBP

- It gets better!
 - 40 to 50% of patients improve within one week.
 - 85 to 90% of injured workers improve in 6-12 wks.
 - 75% of sciatica patients recover within 6 mo.
 - 90% improve with conservative treatment only.
- But usually comes back!
 - 40% of patients with acute low back pain report recurrence at 6 mo follow-up.
 - 44% of patients are in a chronic phase by 2 yrs.
 - No definitive diagnosis found in 85% of LBP cases.

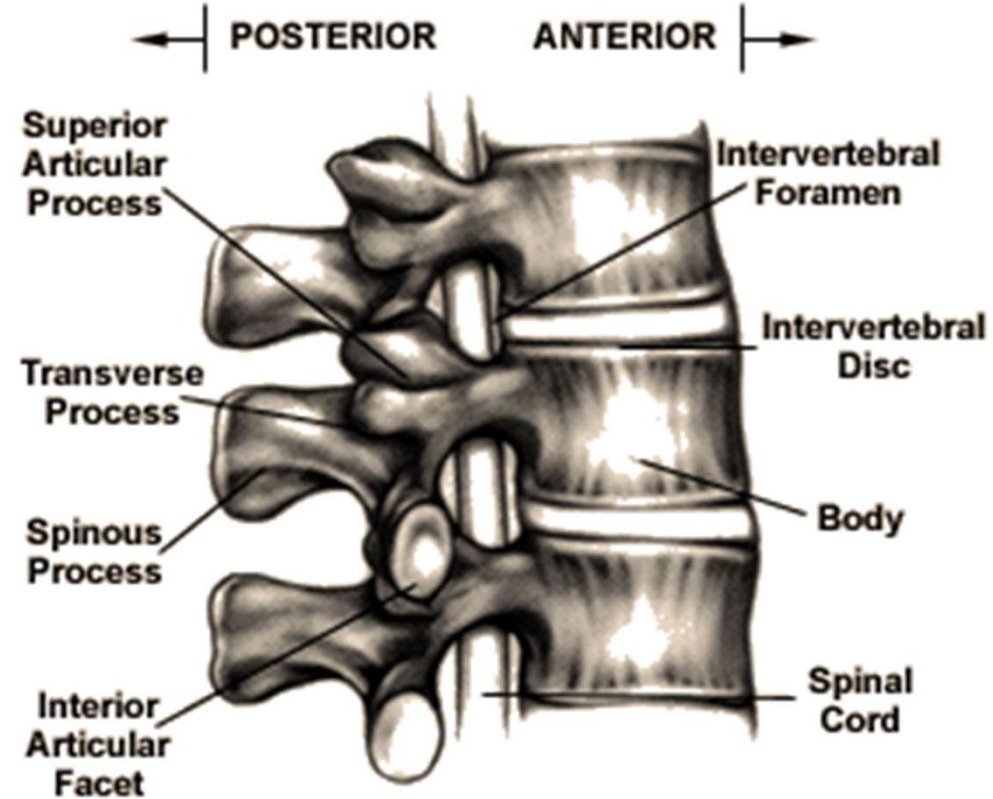
Anatomy of Lumbar Vertebrae

- Anterior Elements:
 - *Vertebral* body: provide bulk and height; Sustain compression loads.
- Middle Elements:
 - *Pedicles*: transfer forces from posterior to anterior elements.
- Posterior Elements:
 - *Articular* processes and facet jts, *laminae*, *spinous* processes.
 - Lock spine to prevent forward sliding and twisting; Insertion sites for muscle.

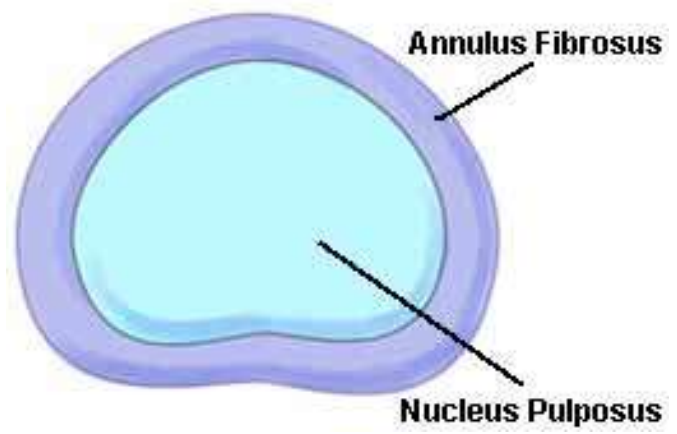


Lumbar Joints

- 3 Joint Complex:
 - Intervertebral disc: principal joint between vertebrae.
 - 2 Facet Joints: formed by superior and inferior articular processes.
- Disc consists of:
 - Nucleus pulposus
 - Annulus fibrosis
 - Vertebral endplates

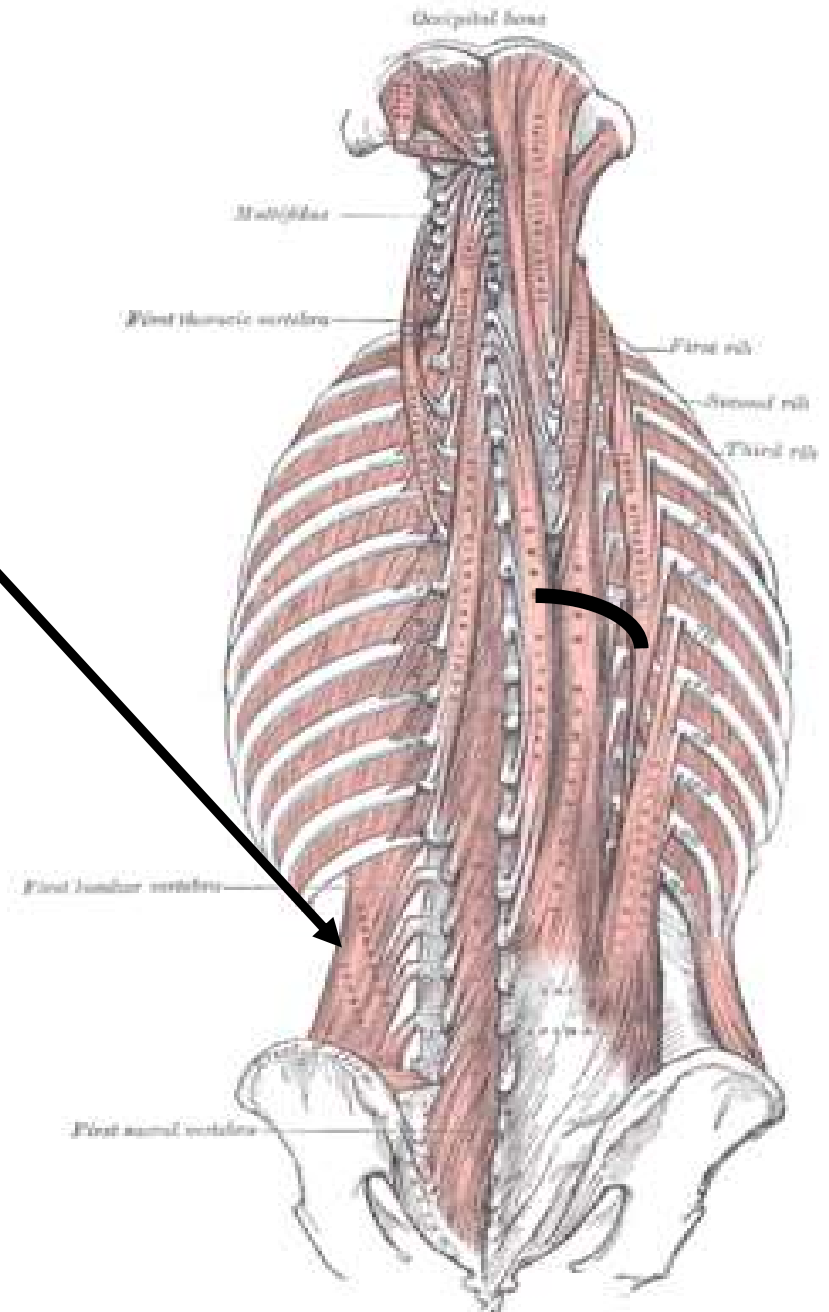


Axial (Overhead) View of Intervertebral Disc



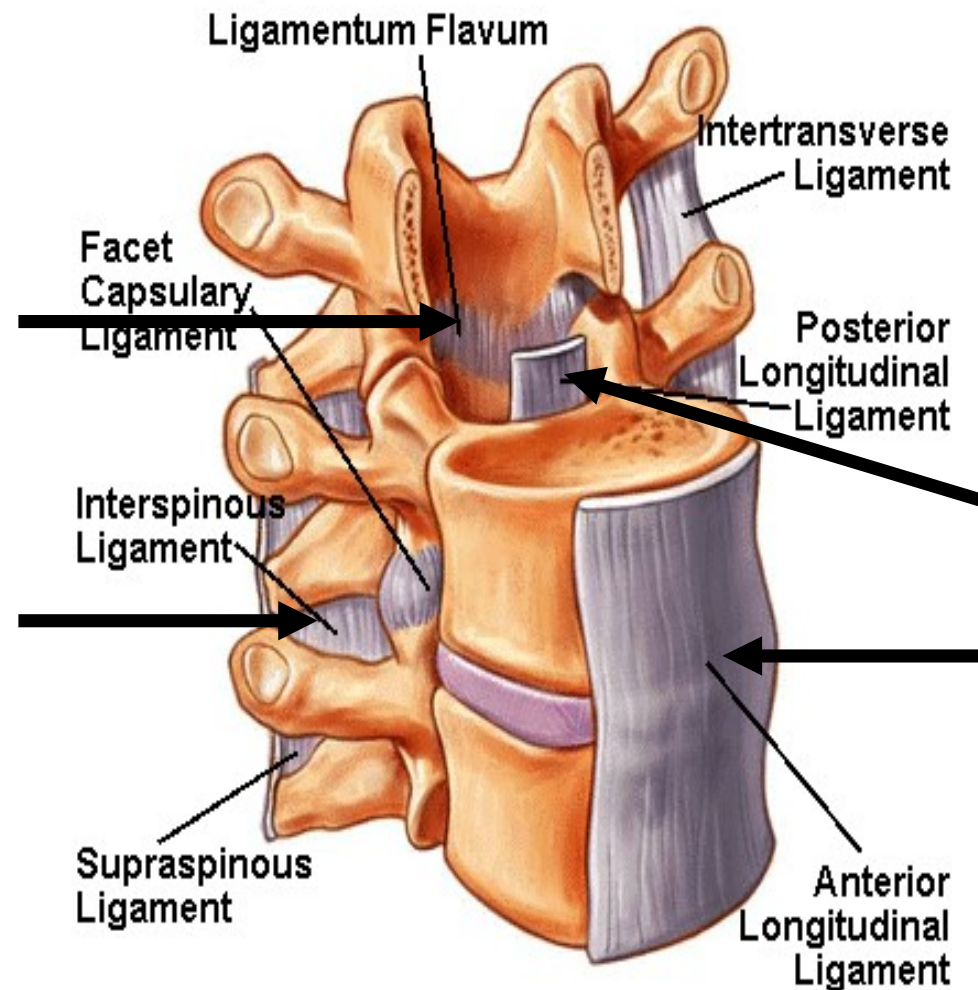
Muscles of Lumbar Spine

- 3 major groups:
 - *Psoas* major and minor: provide hip flexion.
 - *Quadratus lumborum*: assists lateral flexion.
 - *Paraspinous* muscles (erector spinae): control flexion, extension and twist.
 - Multifidus
 - Interspinalis
 - Iliocostalis



Lumbar Spine Ligaments

- Serve to aid spinal stability. They include:
 - *Ligamentum Flavum*: connects laminae; roof for spinal canal.
 - *Interspinous Ligament*: connects spinous process.
 - *Ant / Post longitudinal ligaments*: cover vertebral body for stability.



What Causes Acute Low Back Pain

- Muscle strain?
- DJD or OA?
- Disc disease?
- Who cares?!
 - Initially they are all treated same for the most part.
 - Most all get better with conservative treatment.
- Beware of the serious causes!

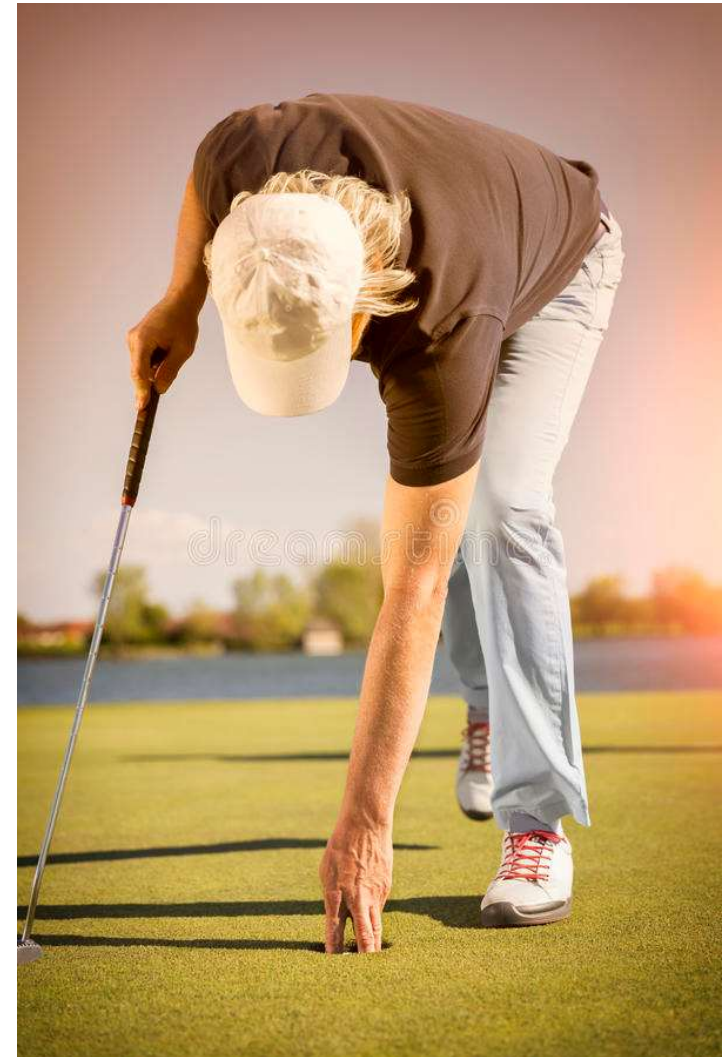


Evaluation of the Patient With LBP

- Start with a detailed history – your best diagnostic tool.
 - Get an idea of the severity.
 - Look for the “red flags” of serious causes.
- Use the physical exam to confirm what you suspect based on history.
- Keep in mind:
 - Most of the time you won’t have a definitive diagnosis.
 - Imaging rarely changes initial treatment.
 - Most patients get better with conservative Rx.

What Was the Mechanism of Injury or Overuse?

- Was there an acute trauma or injury?
 - Motor vehicle accident or fall.
 - Sudden severe pain with bending.
- Was there a recent history of excessive lifting or bending?



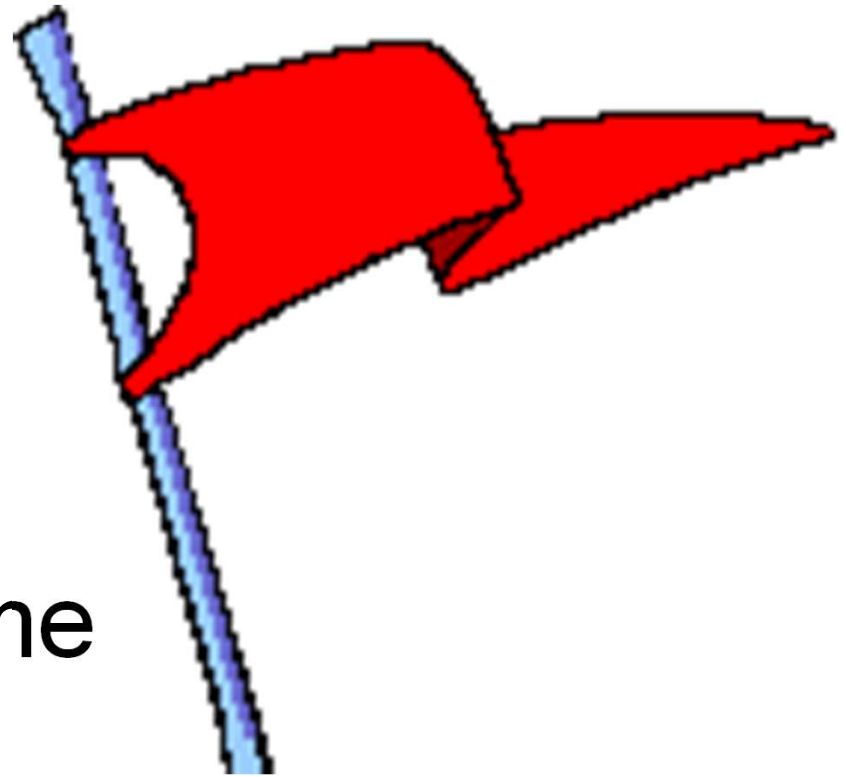
How Severe Is Your Pain?

- Are you able to work?
- What activities does the pain prevent you from doing?
- What have you used to relieve the pain, and did it work?



Evaluate for “Red Flags”: May Signal Serious Causes of LBP

- Cancer
- Infection
- Fracture
- Sciatica
- Cauda Equina syndrome
- Ankylosing spondylitis



Cancer (Primary or Metastatic)

- Pain at rest, not mechanical.
- Age over 50?
- History of cancer?
 - Multiple myeloma most likely primary.
 - Mets most likely from prostate, breast, kidney, thyroid and lung (PB KTL).
- Ask about:
 - Recent weight loss, rest pain, or pain lasting more than 4-6 weeks despite therapy?
 - Bowel or bladder symptoms?

Spinal Infection

- Pain often insidious and constant.
- Staph and Strep most common; Spread to disc.
- Ask about:
 - Fever?
 - Night pain or rest pain?
 - Recent infection (skin or UTI)?
 - IV drug use?
 - Immuno-compromised state? (from diabetes, steroid use, HIV, organ transplant).



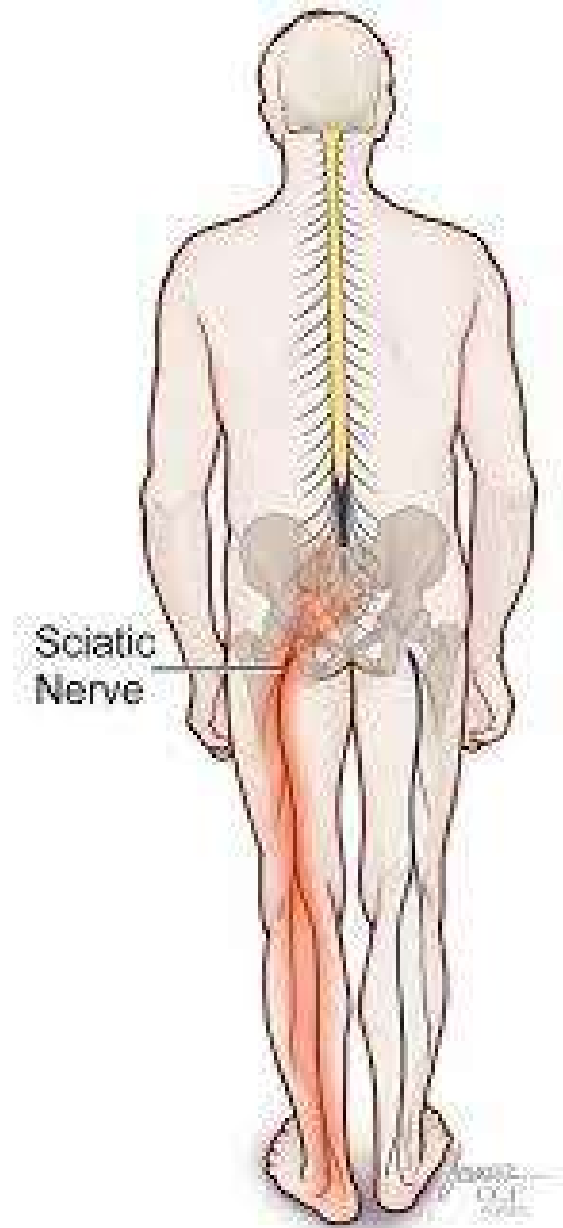
Fracture

- Compression fracture most common.
 - Osteoporotic vertebral fracture occur in 1/3 women >65 yrs.
 - *Most common* fracture seen in primary care.
- Age over 70 or history of osteoporosis?
- Ask about:
 - recent trauma? (may occur simply with bending over)
 - Corticosteroid use?



Sciatica

- Pain radiating down the posterior or lateral aspect of the leg, to below the knee?
- Ask about:
 - Numbness, paresthesia, or motor loss in legs?
 - Pain worse with cough, sneeze or Valsalva?



Sciatica

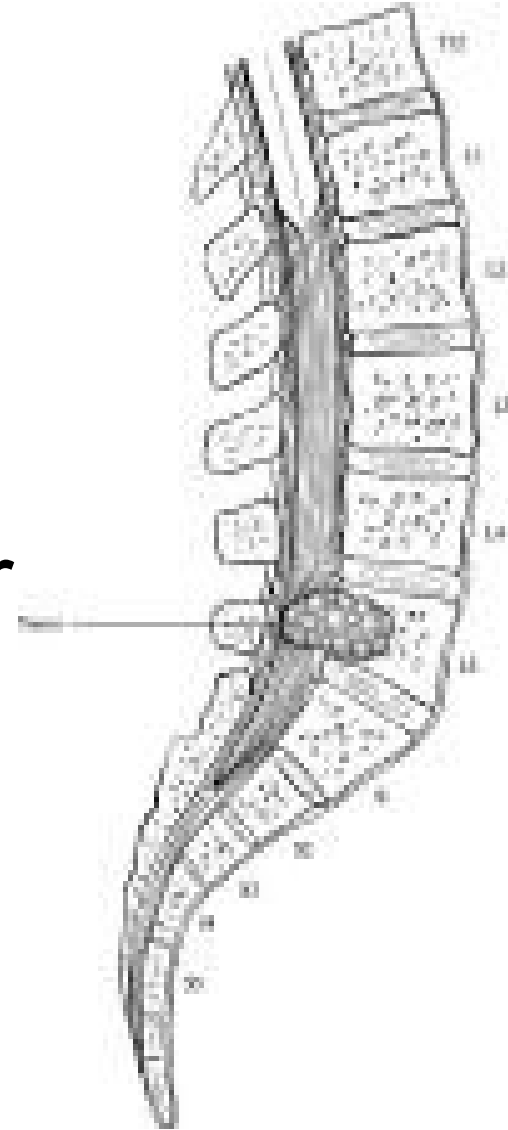
- Pain radiating down the posterior or lateral aspect of the leg, to below the knee?
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“Wait a minute here, Mr. Crumbley
....Maybe it isn't sciatica after all.”

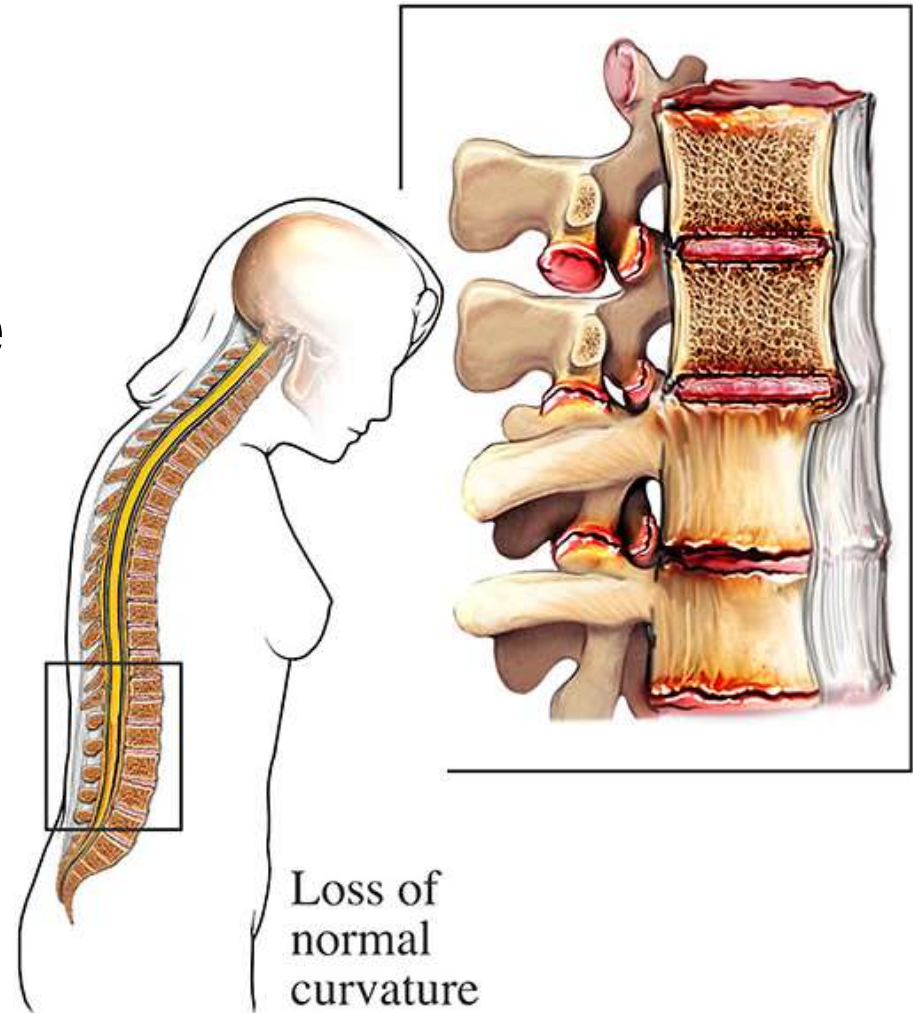
Cauda Equina Syndrome

- Caused by massive midline disc herniation or mass compressing cord or cauda equina.
 - Rare (<.04% of LBP patients).
 - Needs emergent surgical referral.
- Symptoms: sudden bilateral lower extremity weakness, numbness, or progressive neurological deficit.
- Ask about:
 - Recent urinary retention (most common) or incontinence?
 - Saddle anesthesia?
 - Fecal incontinence?



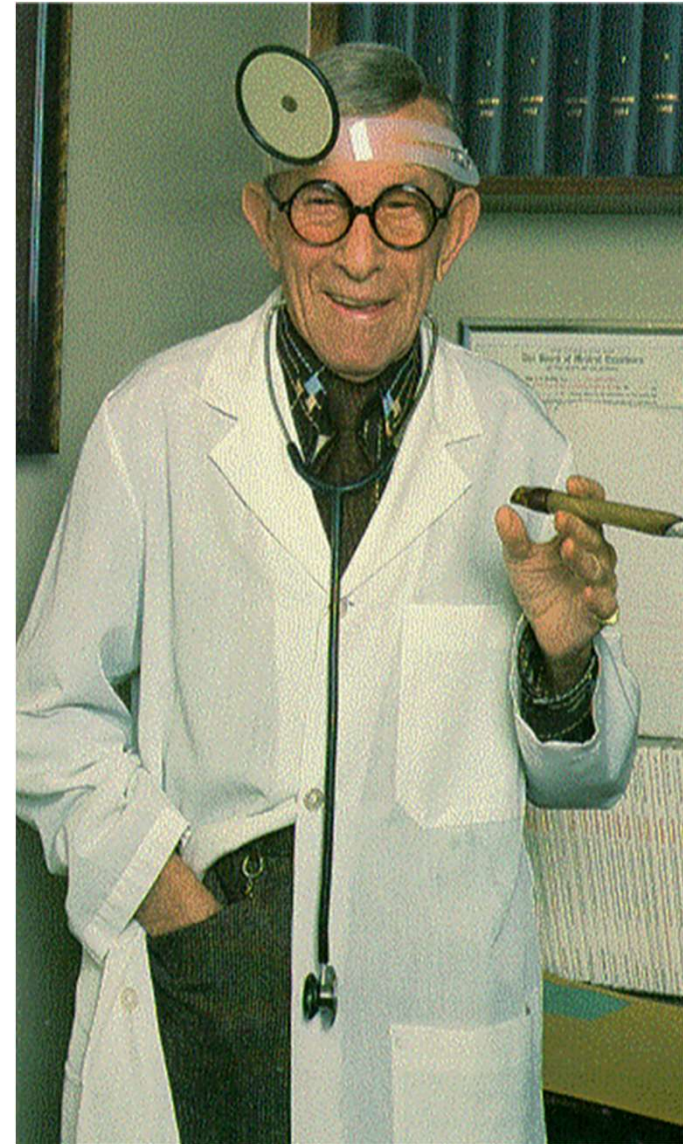
Ankylosing Spondylitis

- Rare: ~.5 to 5 per 1000 white males.
 - Less in females or blacks
- Onset usually before age 40 years.
- Pain begins slowly and persists (≥ 3 months).
- Ask about:
 - Morning stiffness?
 - Does pain improve with exercise?



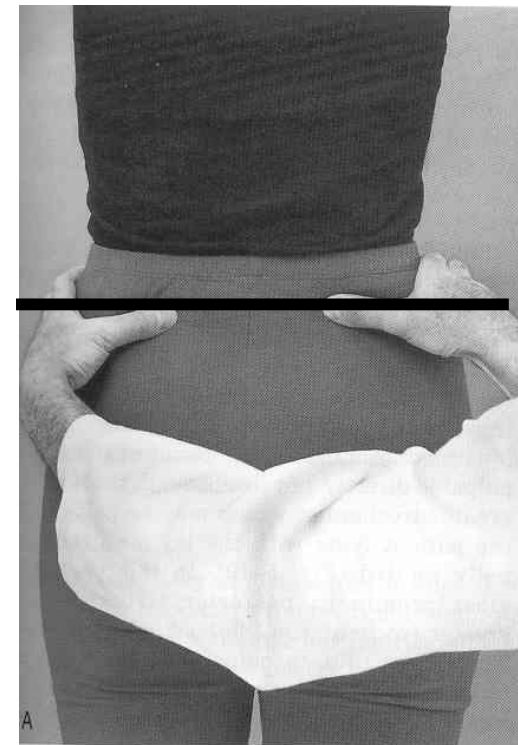
Physical Exam for LBP

- Important that you:
 - Confirm what you suspect from history.
 - Assess severity.
 - Reassure patient when there is nothing serious.
- Start with patient standing for inspection, palpation and ROM.
- Have patient sitting for strength and neurologic exam.



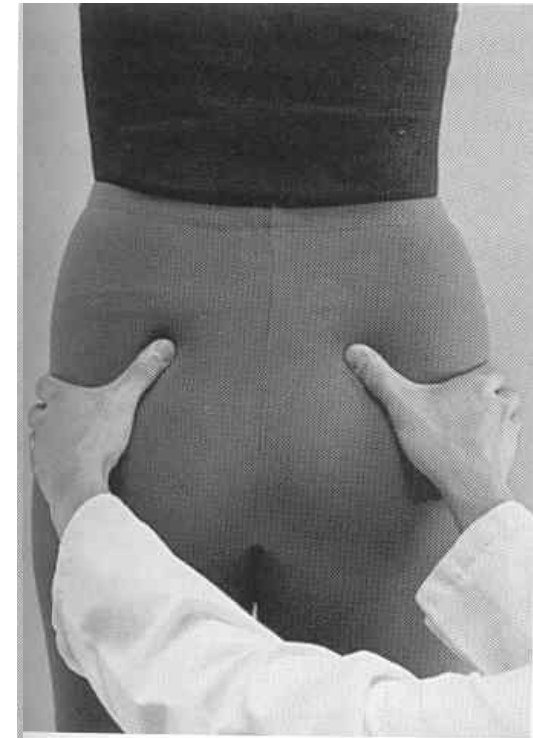
Inspection

- Lift shirt and lower pants to expose back.
- Inspect back for symmetry; Look for:
 - List, scoliosis or other deformity.
 - Redness (infx), Lipoma or hair growth (spina bifida).
- From the side, observe lumbar lordosis.
- Check pelvic obliquity:
 - *Line* between PSIS should be parallel to floor.
 - Affected by leg length or scoliosis.
- Ask patient to point to area of maximal pain.



Palpation

- Spinous processes and ligaments:
 - Feel for step-off at L4-L5-S1 (spondylolisthesis).
 - Tender with ligament sprains, fracture, etc.
- Facet joints: deep and lateral to processes; Tender with OA
- Paraspinous muscles: for tenderness or spasm.
- Top of Iliac crests @ L4-L5 disc space;
Follow around to *PSIS*:
 - Sacroiliac joints: below and lateral to PSIS.
 - Sciatic notch: mid way btw PSIS and ischial tuberosity; Aggravates sciatica.

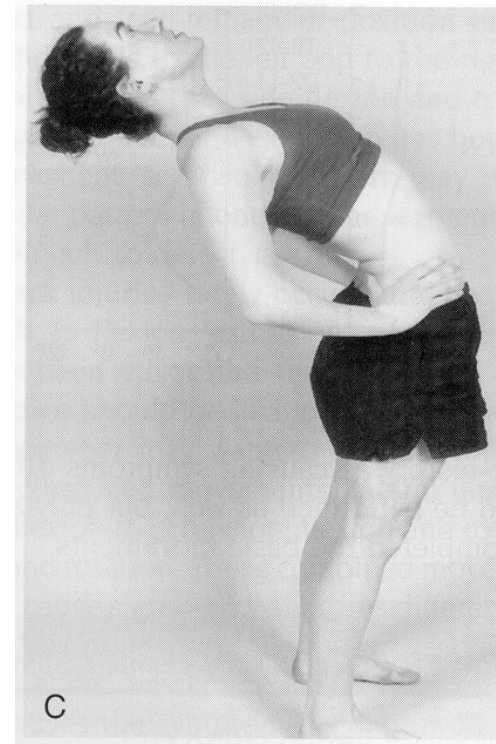


Palpation



Range of Motion

- Forward flexion (80-90°):
 - Loads discs and stretches sciatic nerve; More likely to increase disc pain.
 - *Observe from behind bending forward for asymmetry, suggestive of scoliosis.*
- Extension (20-30°): more likely to increase pain from facets or spinal stenosis.
- Lateral bending (20-30°): loads muscle and discs.
- Twisting (30-40°): loads muscle.

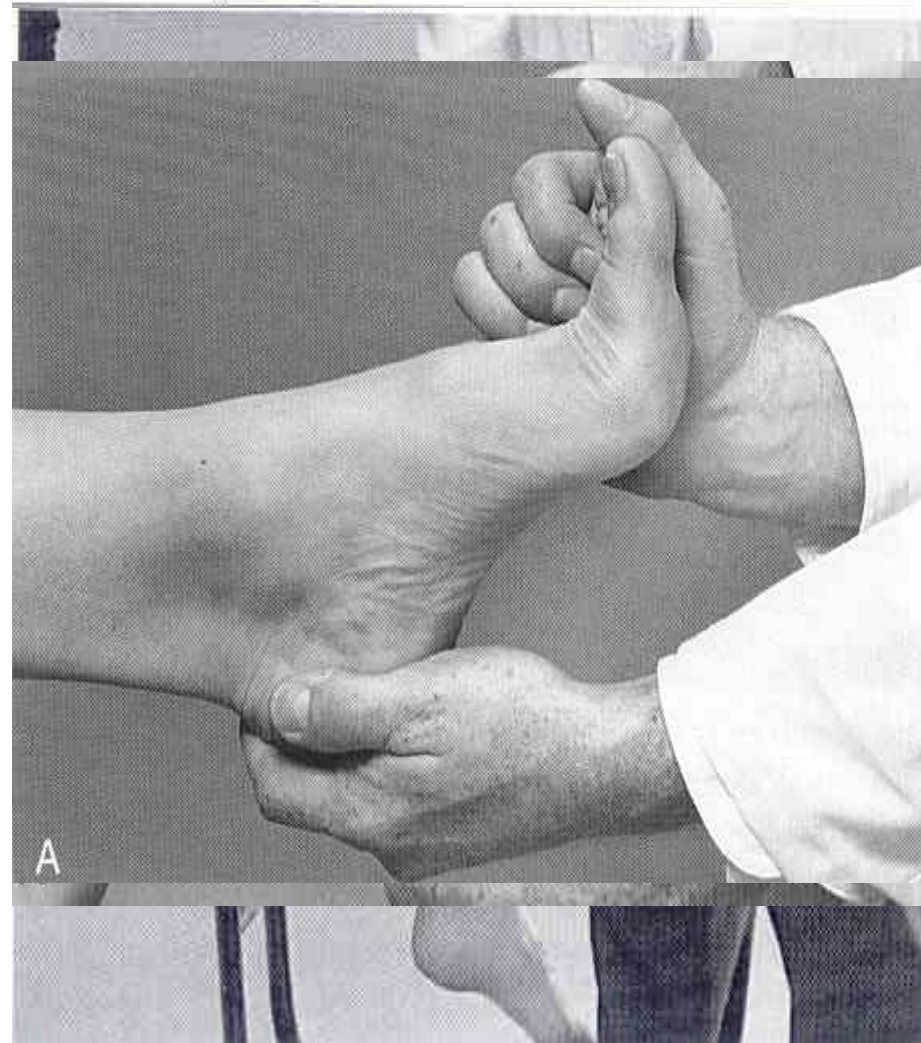


Assessing ROM



Neuro: Strength Testing

- Resisted hip flexion (iliopsoas muscle) tests L1 and L2.
- Resisted knee extension (quad muscle) tests L3.
- Resisted ankle dorsiflexion tests L4.
- Resisted dorsiflexion of great toe tests L5.
- Resisted ankle plantar-flexion test S1.
- S2-4 anal sphincter tone.



Strength Testing



Neuro: Strength Testing

- Heel walking
 - Ankle dorsiflexors (Tibialis anterior)
 - L4.
- Toe walking
 - Gastroc-soleus muscle group.
 - L5 and S1.

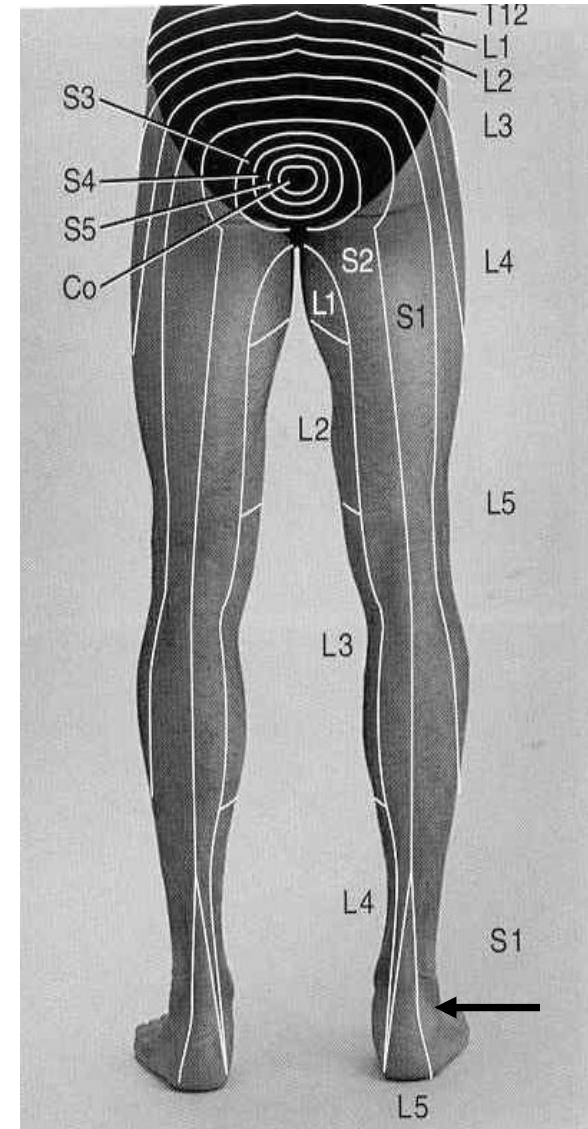
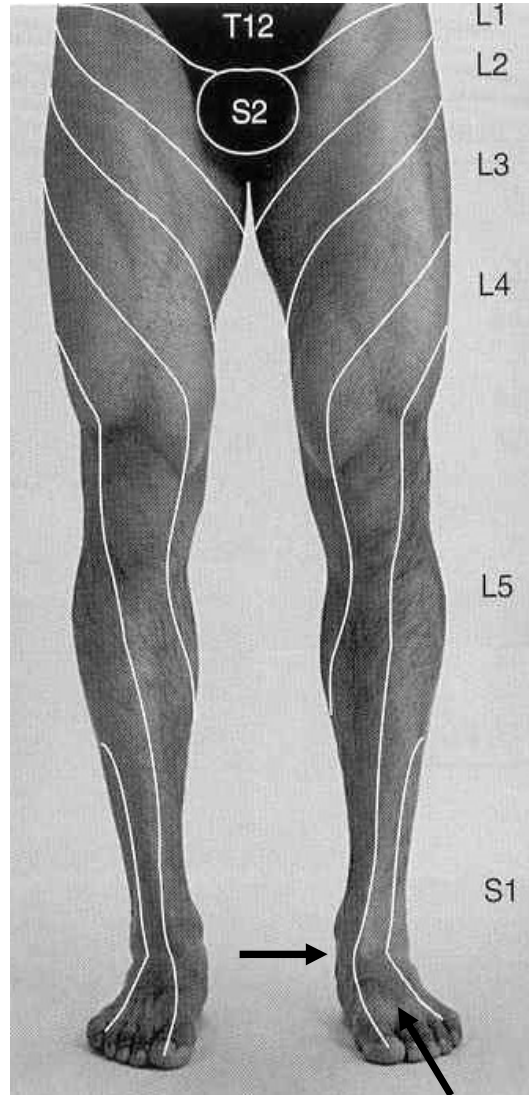


Heel / Toe Walking



Neuro: Sensory Testing

- Check light touch and sharp/dull.
 - *L4*: medial leg and ankle.
 - *L5*: dorsum of foot.
 - *S1*: lateral ankle and foot



Sensory Testing



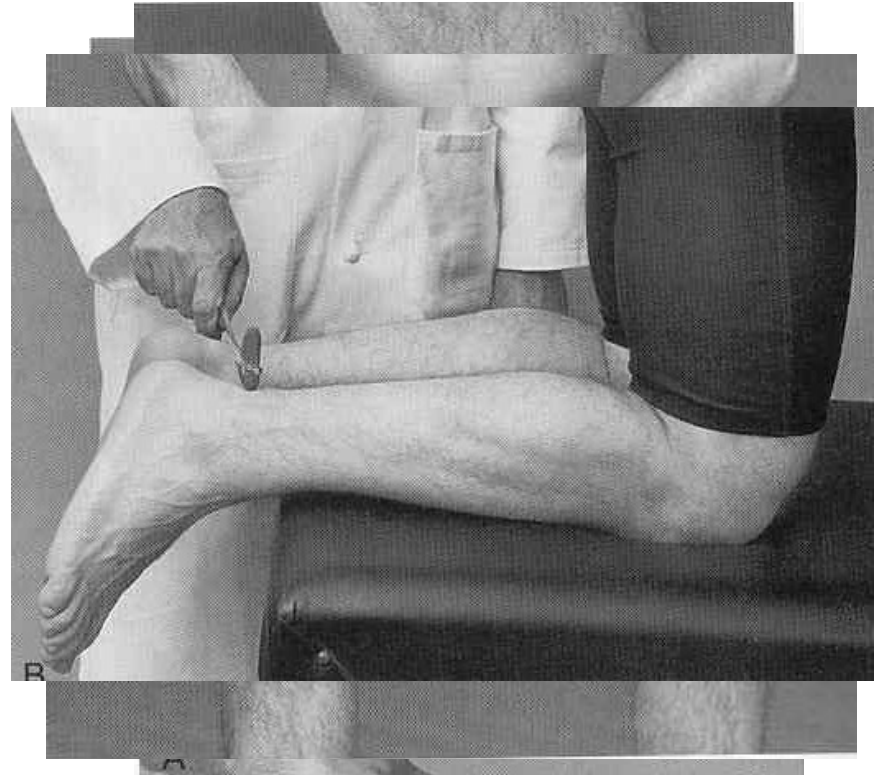
Neuro: DTR's and Clonus

- Deep tendon reflexes

- Knee jerk: L4.
- *Ankle* jerk: S1.
- *Reinforce* if *weak*.

- Ankle clonus

- Check if DTR's excessively brisk.
- Elicit with sudden ankle dorsiflexion.
- Suggests upper motor neuron lesion (L1 or higher).



Deep Tendon Reflexes



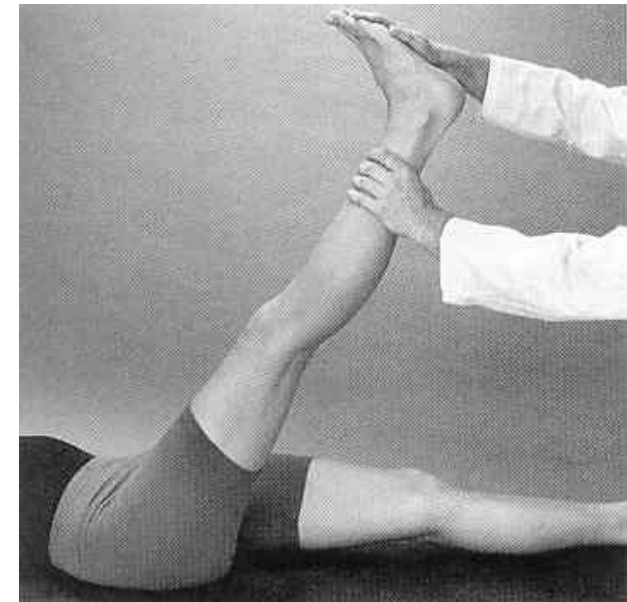
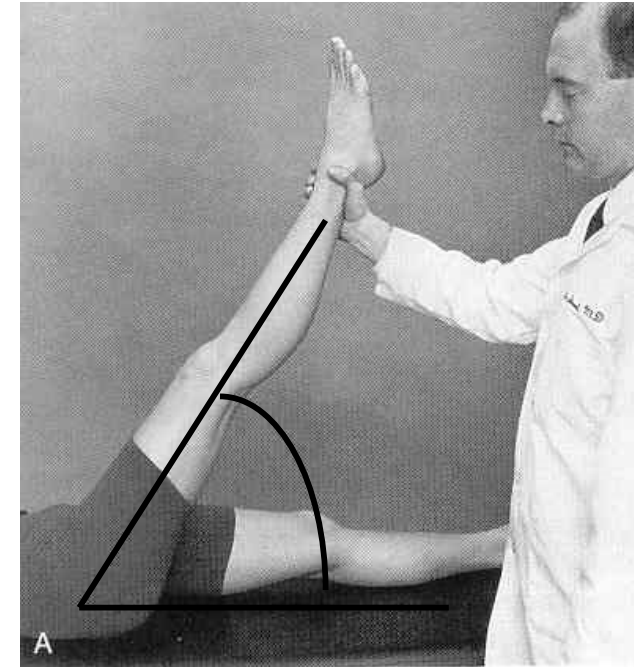
Neuro: Nerve Tension Tests

- Test for nerve root compression.
- Suggested when stretching a peripheral nerve reproduces pain in the distribution of that nerve.
- Key nerves for lumbar and sacral roots:
 - Sciatic nerve (L4, L5, S1, S2, S3) runs down posterior thigh.
 - Femoral nerve (L2, L3, L4) runs down antero-medial thigh.



Straight Leg Raise (SLR)

- With patient supine or sitting, flex hip and extend knee.
 - *Note* angle at which pain or tightness occurs (normal 70-90°).
 - Pain radiating past knee suggests sciatica and lesion at L5 or S1 roots.
 - Dorsiflexion of ankle increases sciatic tension and pain (Lasegue's test).
 - Plantar flexion of ankle or flexion of knee relieves sciatic tension and pain.



Straight Leg Raise - supine

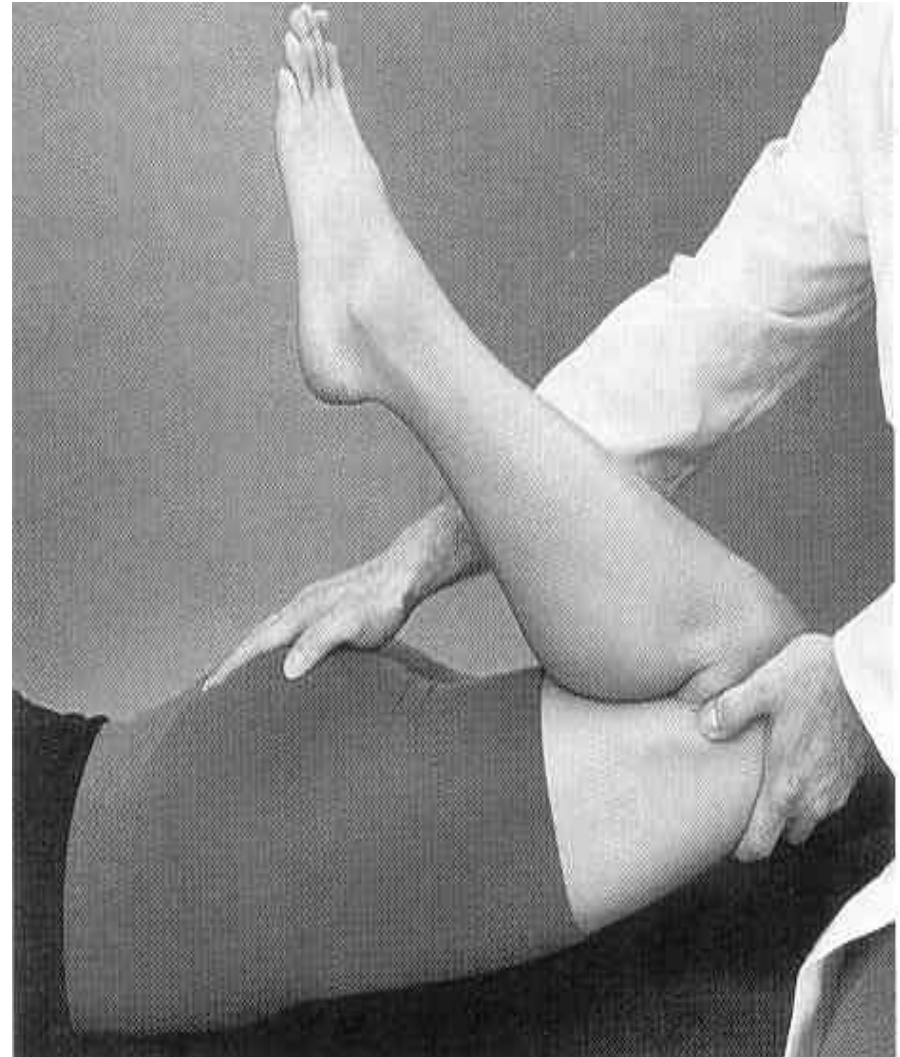


Straight Leg Raise - sitting



Femoral Nerve Stretch Test

- Used to assess compression at L2-3-4 nerves roots.
- With patient prone on exam table and knee flexed, extend hip by lifting thigh off table.
 - Positive with high lumbar disc herniation.
 - Reproduces radicular pain to anterior thigh.

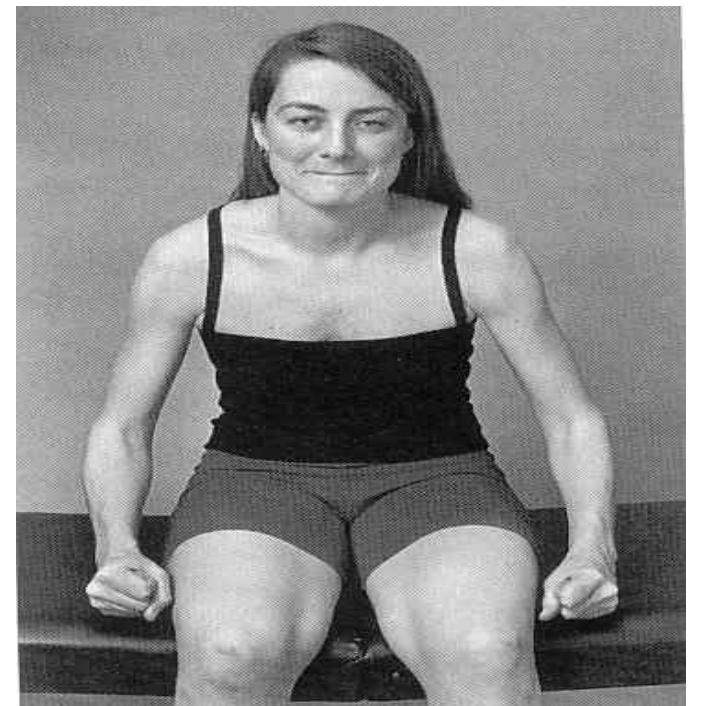
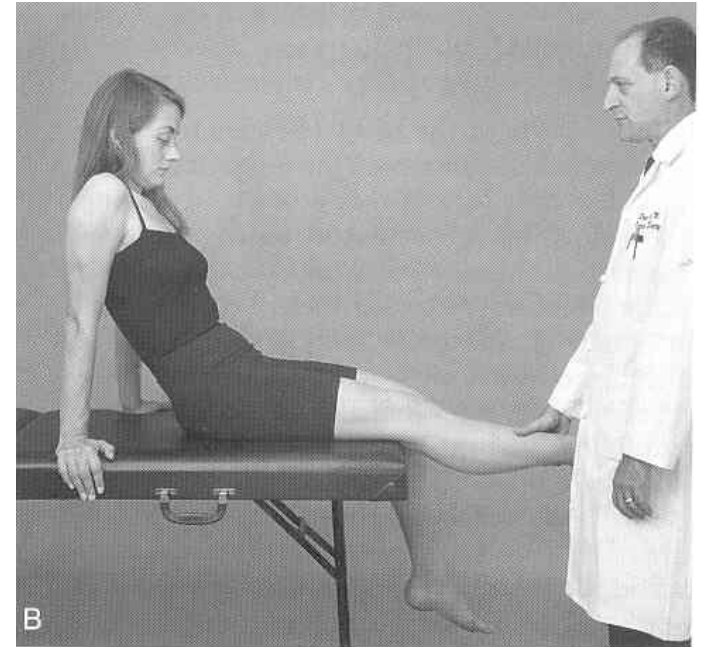


Femoral Nerve Stretch Test



Other Tests for Disc Herniation

- Crossed SLR Test: pain radiating down opposite leg highly suggestive of HNP.
- Tripod sign: leans back during SLR due to discomfort.
- Valsalva Maneuver:
 - increases intrathecal pressure
 - Aggravates pain caused by pressure on cord or roots (HNP, tumor, etc).

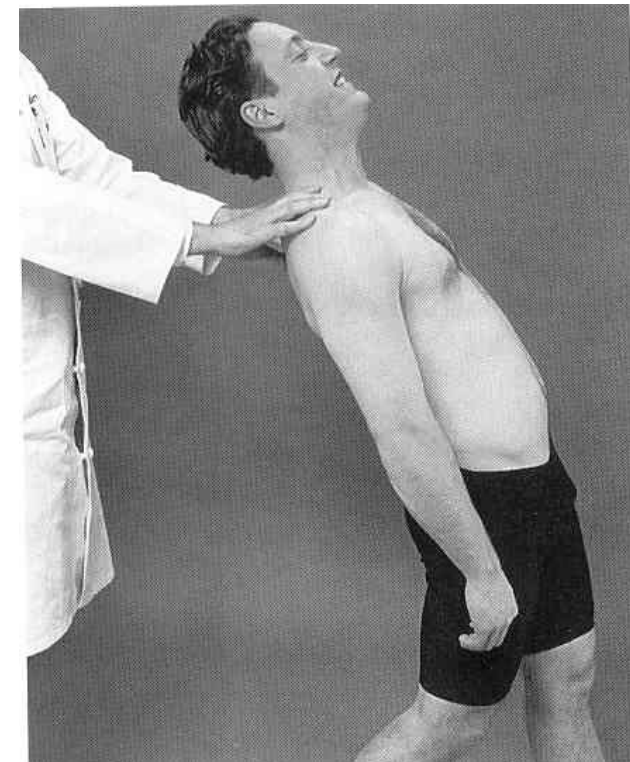
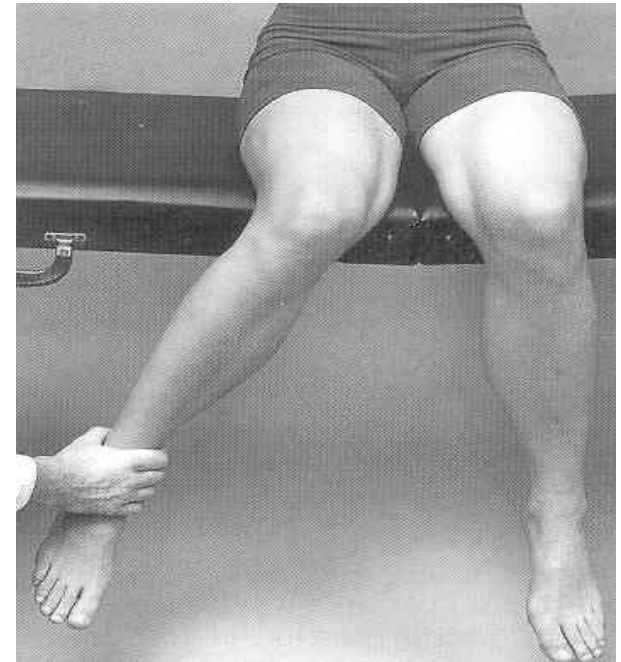


SLR with Tripoding



Other Exams

- Check ROM at hips: especially internal rotation (may cause buttock or thigh pain).
- Single Leg Hyperextension Test (Stork Test): standing on 1 leg and hyperextending back aggravates pain from unilateral spondylolysis.



Stork Test



Optional Exams (Depending on History)

- Ankylosing Spondylitis?: measure maximal chest expansion (<4cm abnormal).
- Cauda Equina?: check *perianal* sensation and rectal exam (for tone).
- Spinal Stenosis ?:
 - Claudication; ? Neurogenic vs Vascular.
- Palpate abdomen for aneurysm.



Waddell's Signs

- Helpful to assess non-organic nature of LBP.
- 3 or more predict treatment failure:
 - Distraction test: SLR diminished when distracted.
 - Give way or cogwheel weakness.
 - Stocking sensation loss (rather than dermatomal)
 - Axial load on head causes LBP.
 - Superficial tenderness on skin in large or multiple areas.
 - Overreaction to pain (grimace, moan).
 - Anger or frustration toward patient

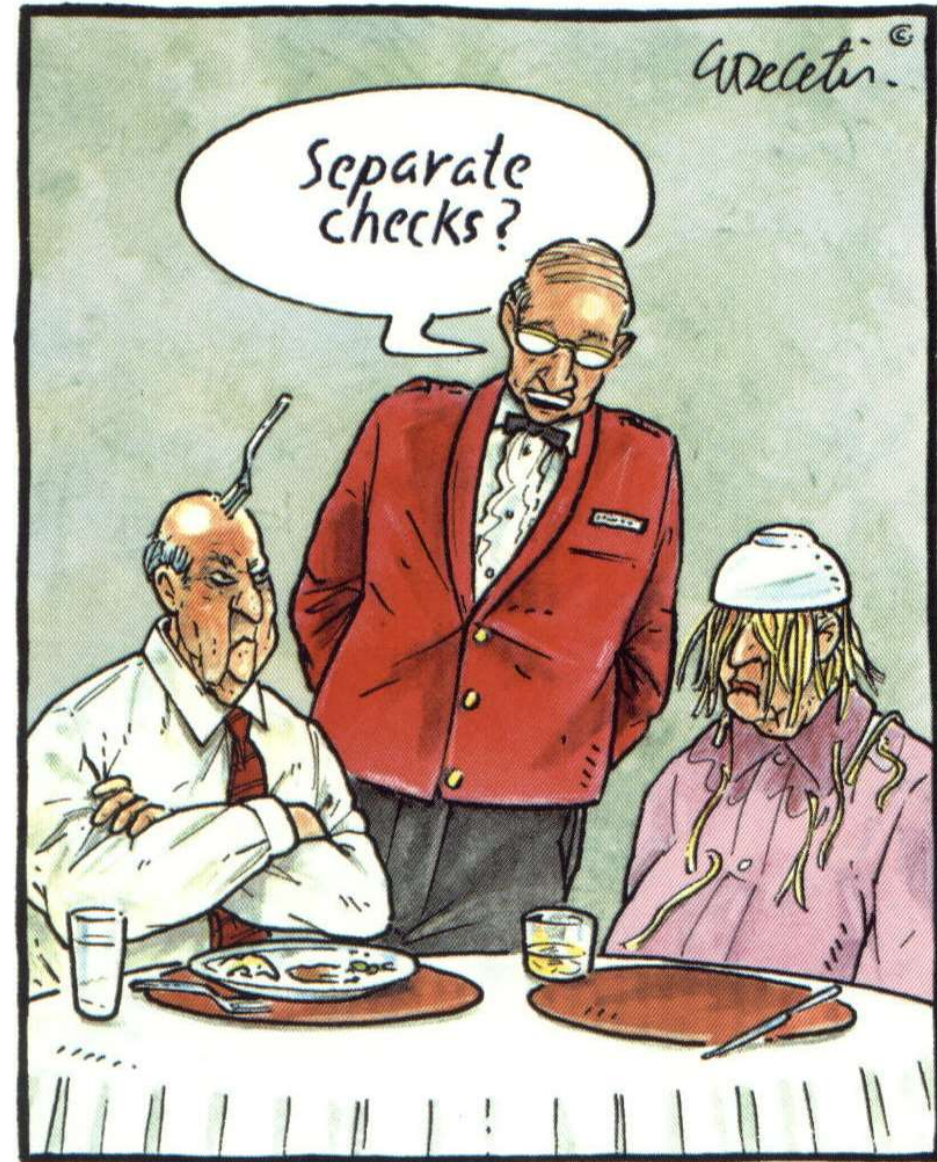
Visceral Diseases Mimicking LBP

- Abdominal aortic aneurysm.
- Renal origin (Pyelo, stone).
- Peptic ulcer disease.
- Pancreatic origin (pancreatitis, cancer).
- Pelvic origin (ovary, ectopic, fibroid, endometriosis).



Psycho-social Assessment

- Social, economic and psych factors often play role in LBP symptoms and response to treatment.
- Need to consider:
 - Affect on work.
 - Disability issues.
 - Pending legal issues.
 - Family and job stress.
 - Depression (30-40% of LBP patients).



X-rays

- If symptoms present <4-6 wks and no red flags; x-rays not recommended.
 - Boney spondylitic changes correlate poorly with symptoms.
 - Don't show acute disc abnormalities.
 - Relatively high gonadal radiation.
- Consider LS spine xrays:
 - Cancer, infection or fracture “red flags”.
 - Symptoms not improved after 4-6 weeks.



MRI

- In absence of “red flags” or serious findings, MRI rarely indicated before 4-6 wks to evaluate sciatica.
 - 40-60% healthy pts have abnormal MRI.
 - MRI changes may not correlate with symptoms.
- Consider MRI after 4-6 wks when:
 - Evidence of nerve root compromise.
 - Hx of neurogenic claudication (spinal stenosis).
 - Would consider surgery.
- MRI best choice for advanced imaging.
 - No radiation and non-invasive.
 - Better soft tissue contrast than CT.



Other Imaging

- CT scan: may help show boney detail for fracture or OA.
- Bone scan: rarely useful for acute LBP.
 - Sensitive, but non-specific.
 - May help if occult fracture (spondy), infection or tumor mets suspected.
- Electrophysiologic testing (EMG, NCS): rarely helpful to evaluate acute LBP and sciatica.



Laboratory Testing

- ESR: often elevated with infection or systemic neoplasia.
- CBC: anemia with cancer.
- Serum protein electrophoresis: if myeloma suspected.
- Calcium and alkaline phosphatase: often elevated with bones mets.
- PSA: prostate cancer.
- UA: hematuria with stone or tumor.
- Blood cultures and TB for suspected infx.

Conclusion

- Lower back pain extremely common in primary care.
- 90% improve with simple supportive care and PT.
- History is key – should focus on the “red flags” that may indicate more serious etiology.
- A focused physical exam is useful to confirm a suspected diagnosis.
- Imaging should be guided by findings on the H&P in patients who are not improving.