

Introduction

Low back pain (LBP):

- ✓ One of the most common conditions in clinical medicine
- ✓ It affects the area between the lower rib cage and gluteal folds



Epidemiology

- LBP is common : 65% to 80% of the population
- One cause of disability
- Uncommon in the first decade of life
- Increases , until 60 and 69 yr , Gradually declines
- More common in women

Epidemiology

- Most Frequent Medical Visit after Cold
-
- Most Common Cause of Work Disability
-
- Prevalence
- US National Survey 25%
-
- Iran COPCORD Study 21%



Sciatica



**Lumbar spine
problems**



Herniated discs



Causes of LBP

Mechanical

Lumbar spondylosis^a
Disk herniation^a
Spondylolisthesis^a
Spinal stenosis^a
Fractures (mostly osteoporotic)
Nonspecific (idiopathic)

Neoplastic

Primary
Metastatic

Inflammatory

Spondyloarthritis

Infectious

Vertebral osteomyelitis
Epidural abscess
Septic diskitis
Herpes zoster

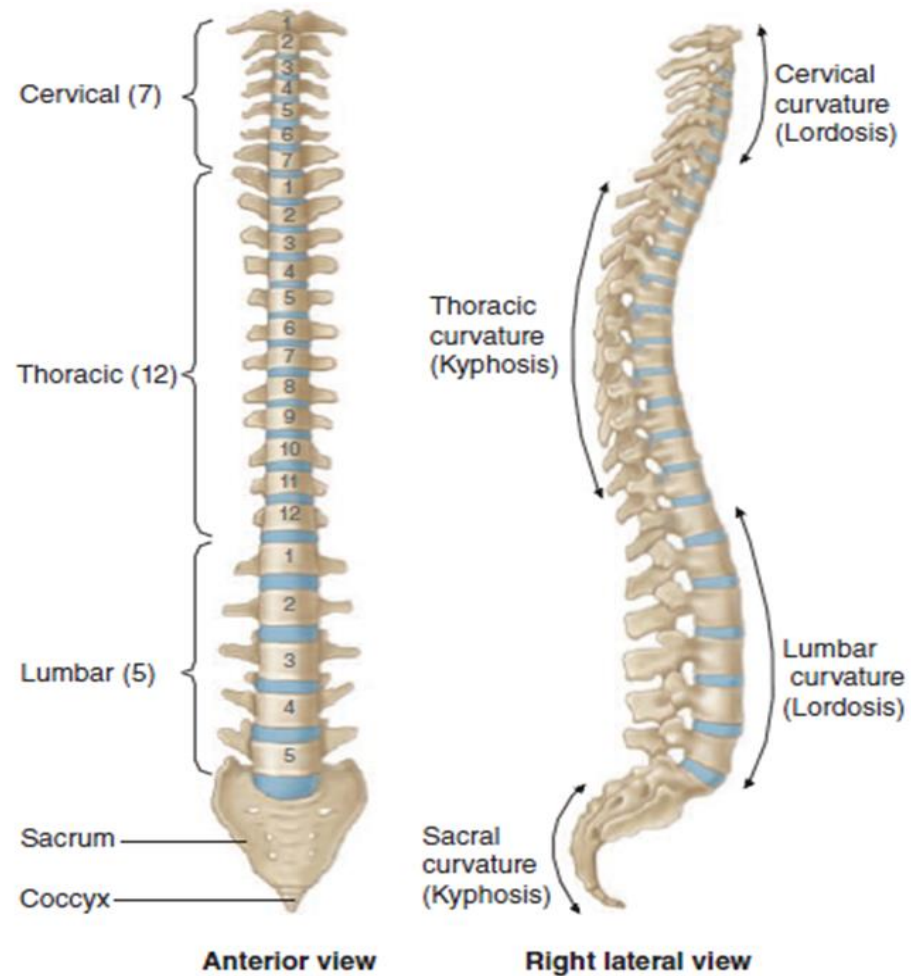
Metabolic

Osteoporotic compression fractures
Paget's disease

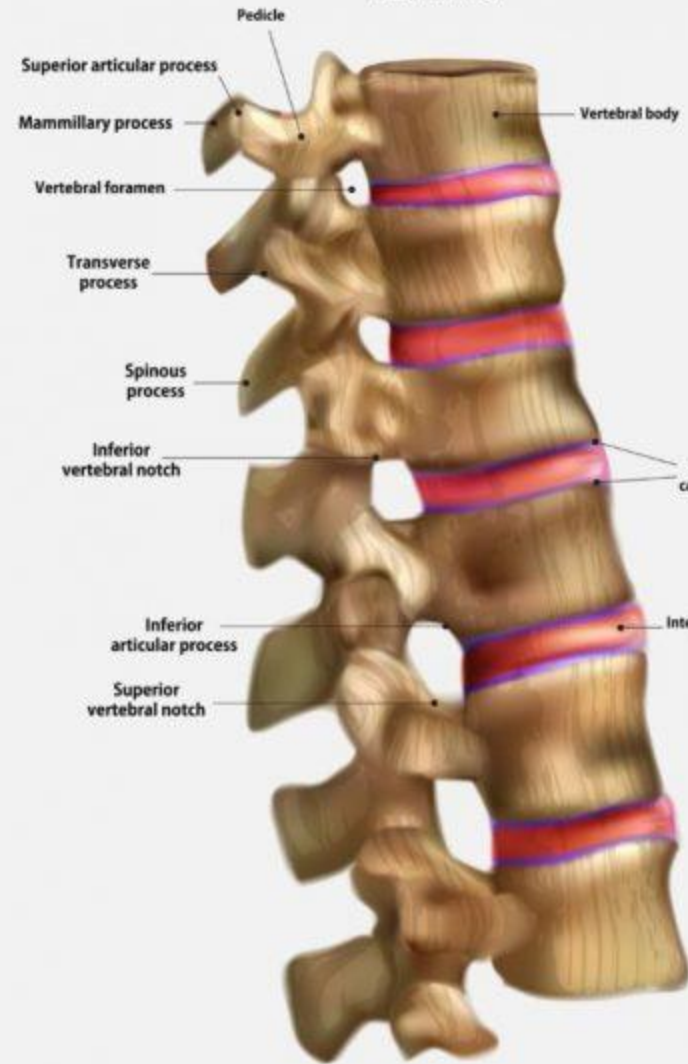
Referred Pain to Spine

From major viscera, retroperitoneal structures, urogenital system, aorta, or hip

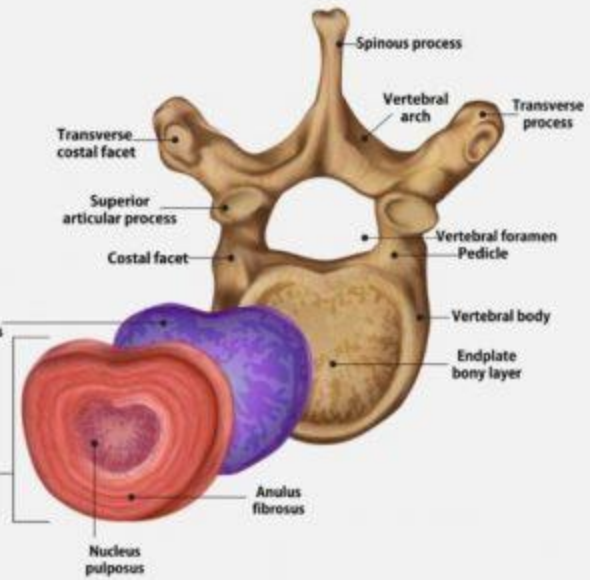
Anatomy

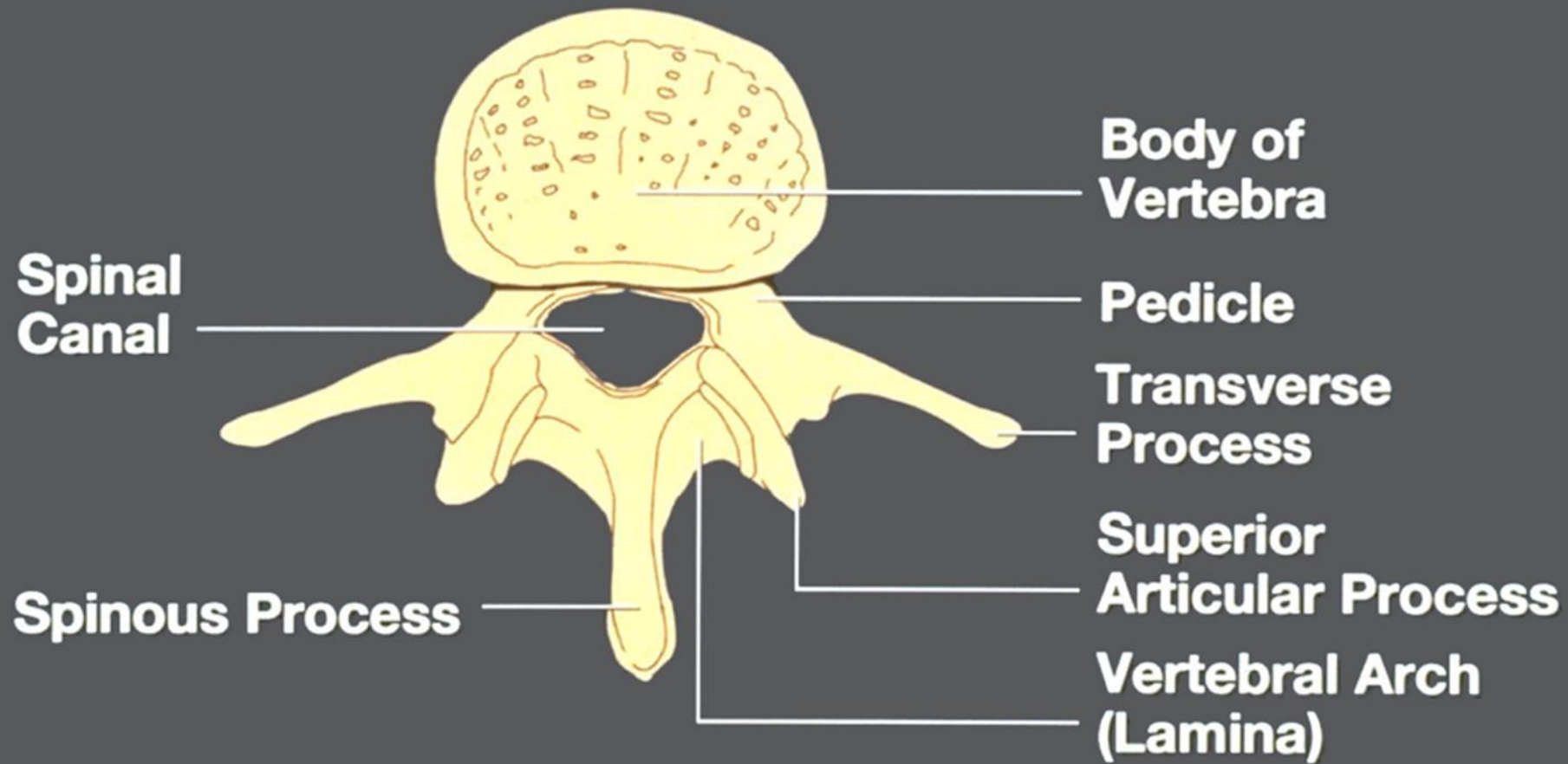


Lateral View

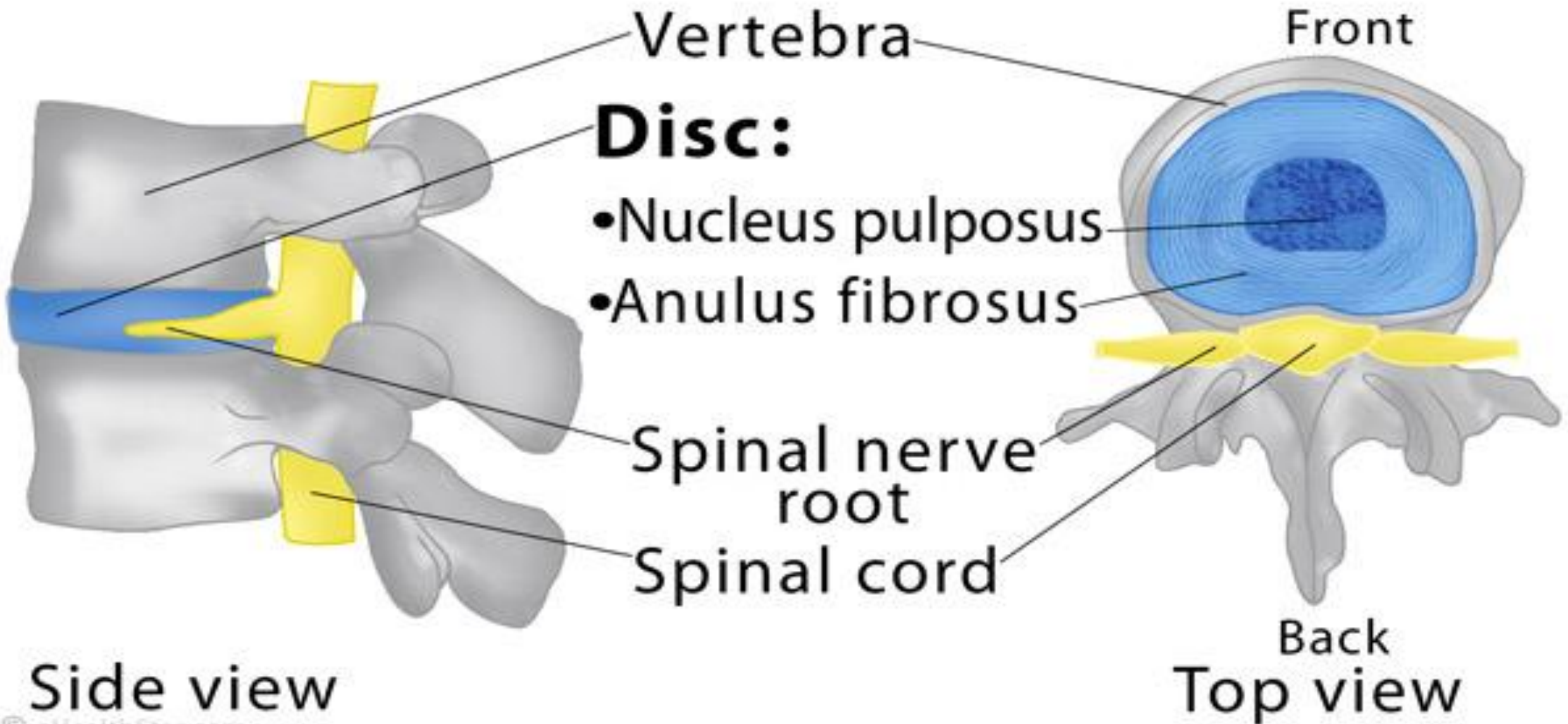


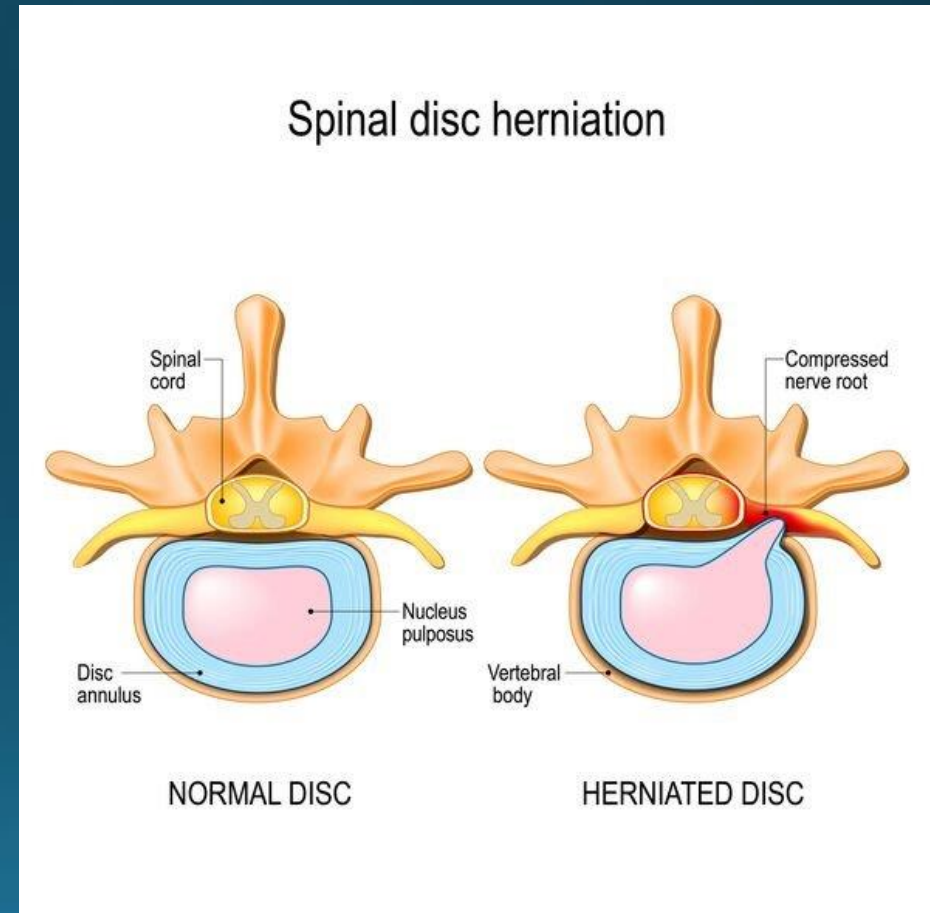
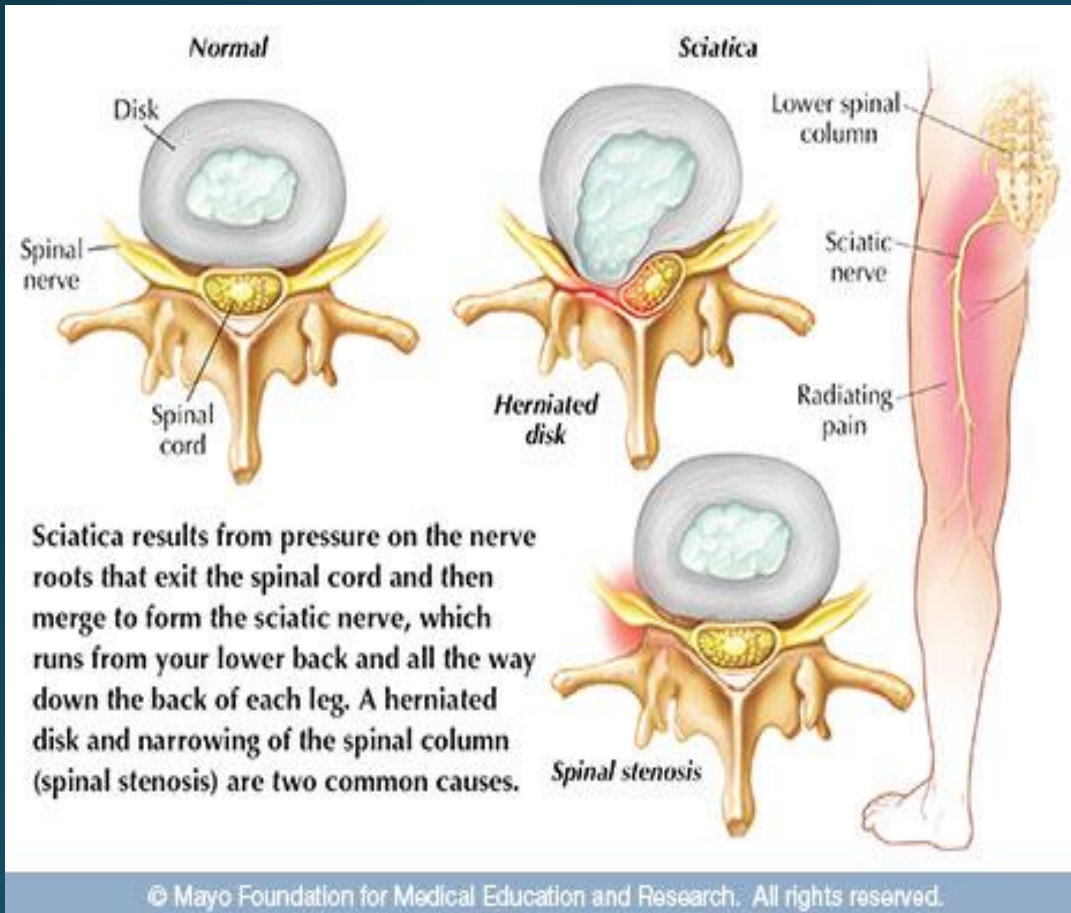
Axial View

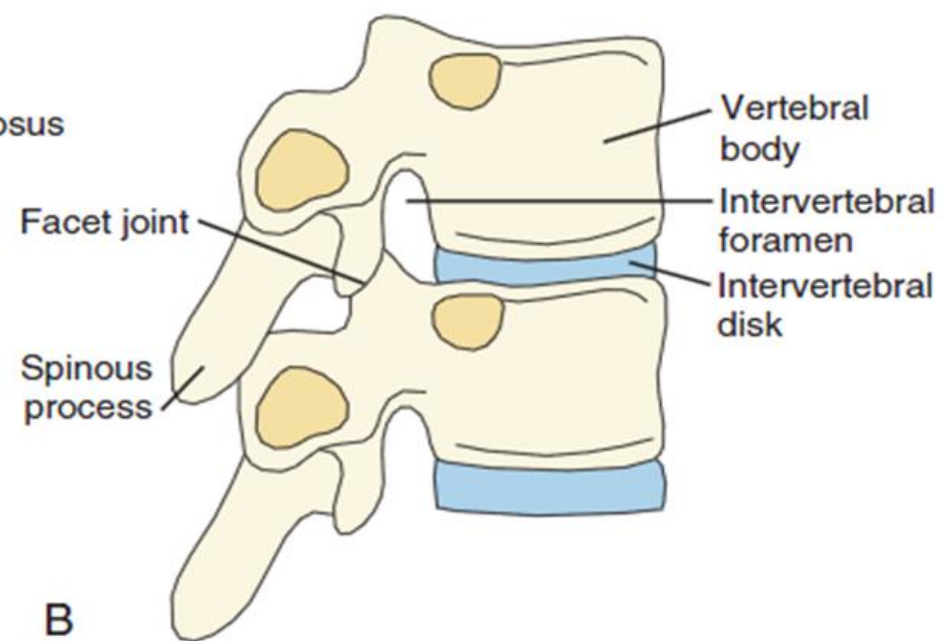
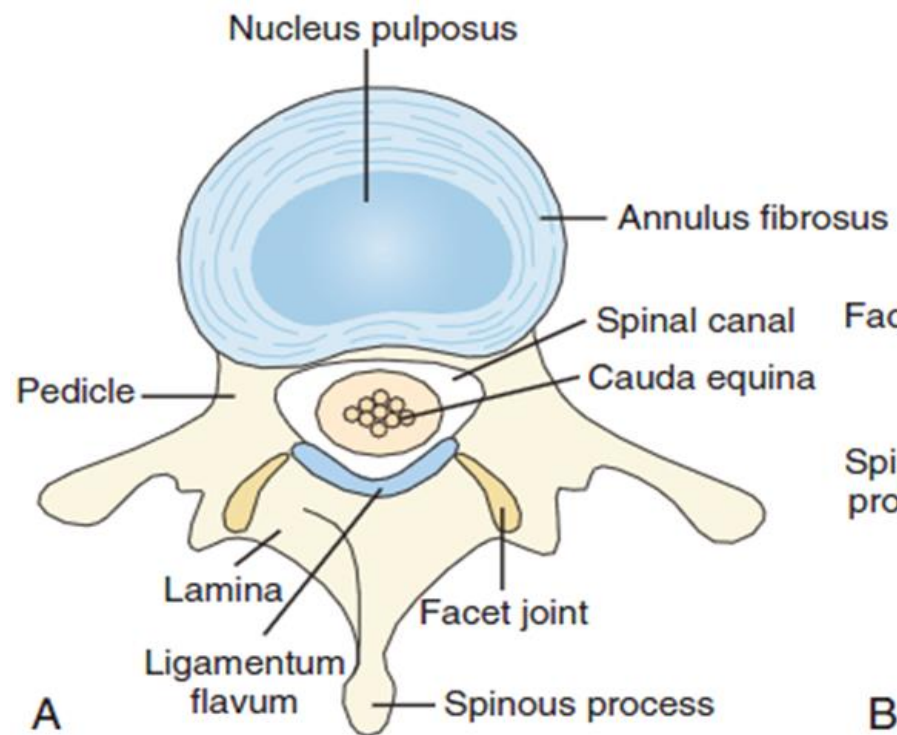


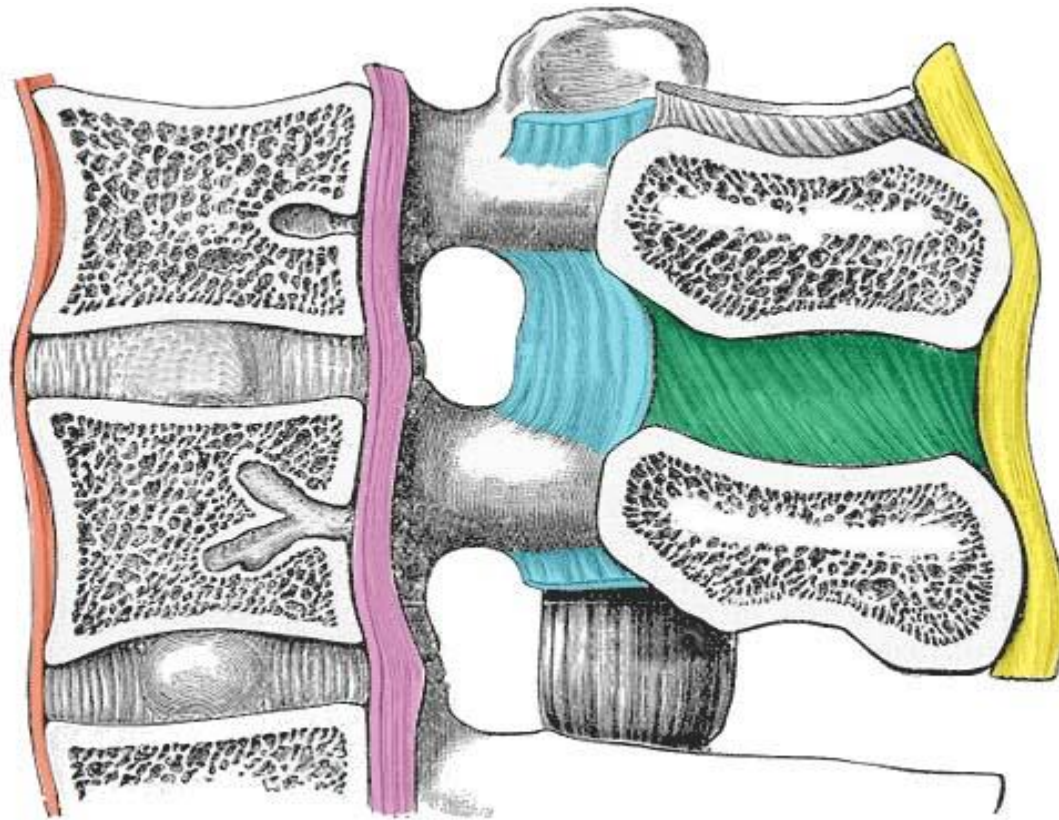


Intervertebral Disc

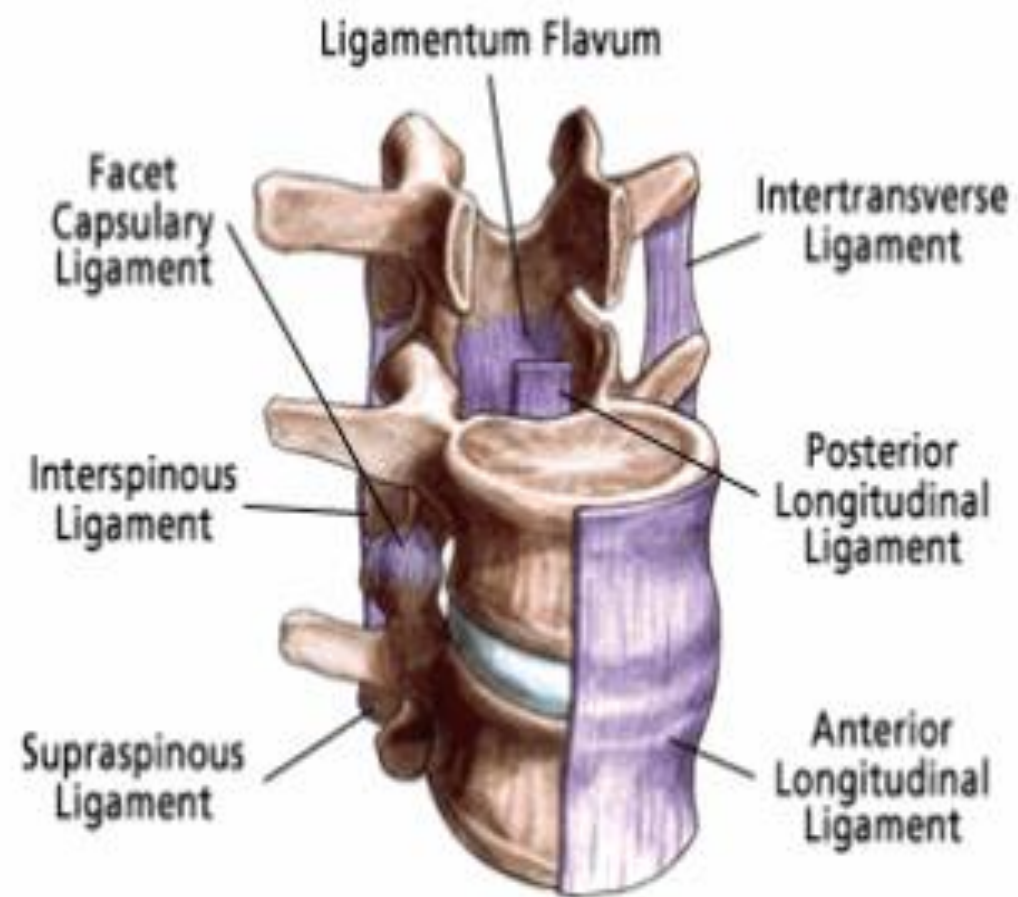








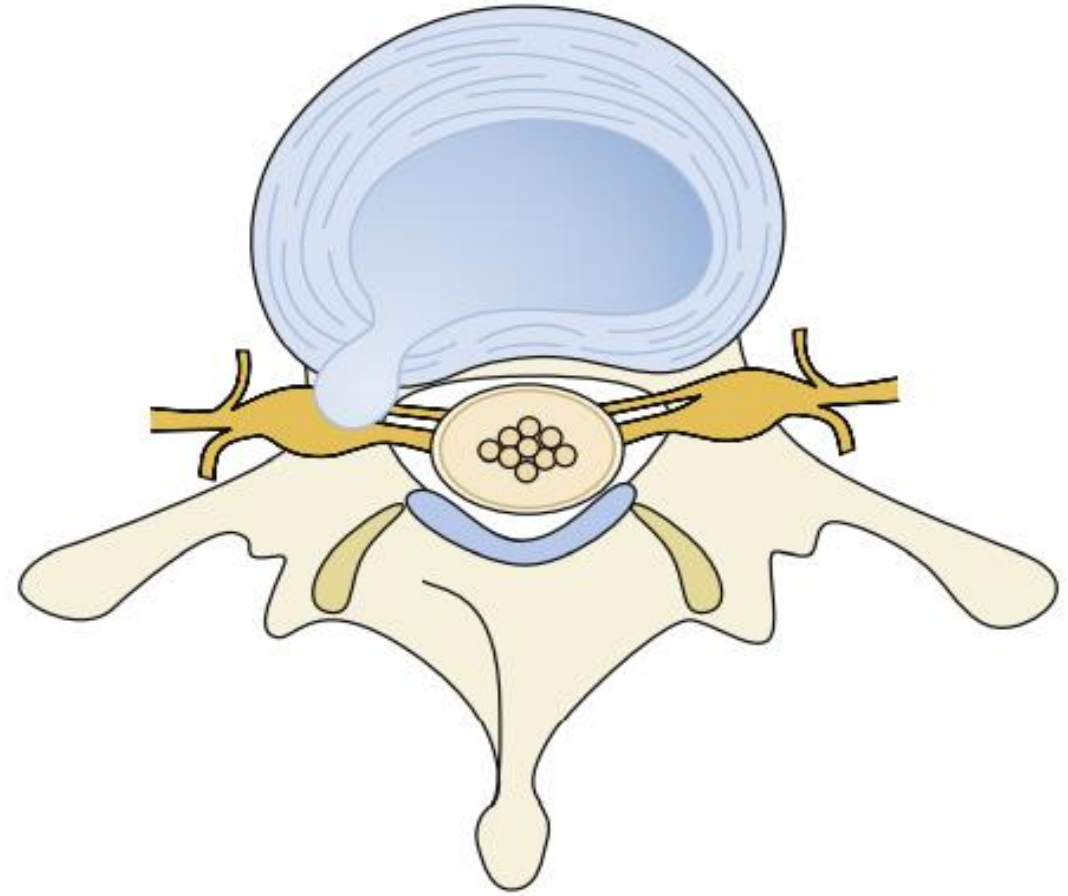
- Anterior longit. ligament
- Posterior longit. ligament
- Ligamentum flavum
- Interspinal ligament
- Supraspinous ligament

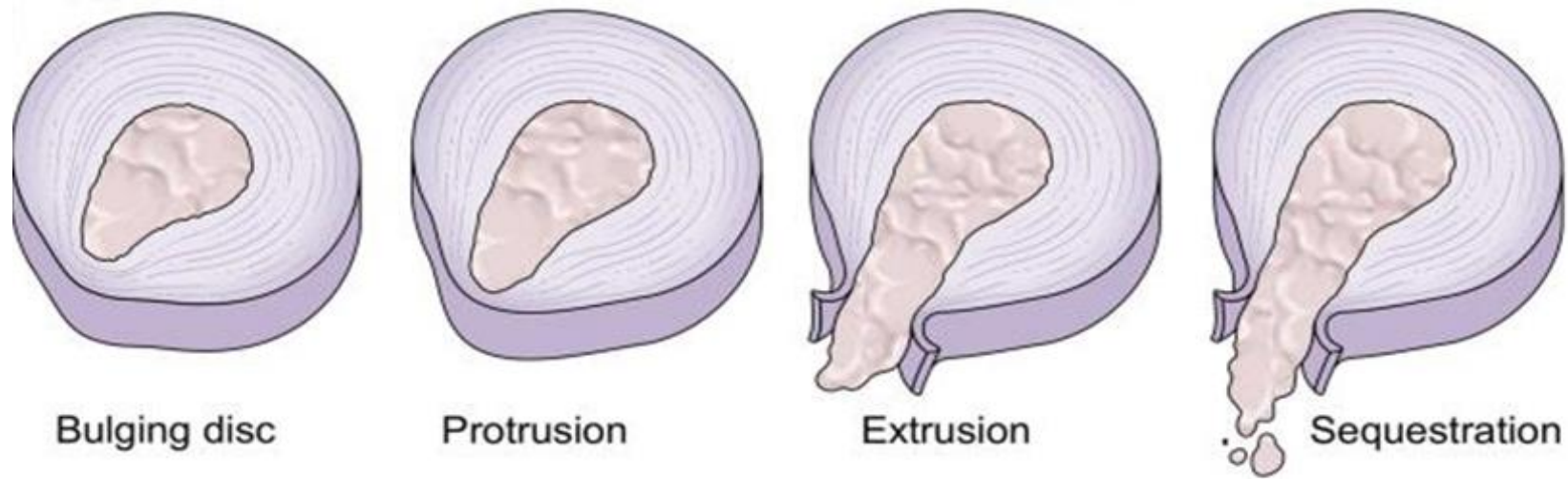


Disk Herniation

- Nucleus pulposus pushes out the weakened annulus
- Posterolateral
- Nerve root impingement= Radiculopathy
- The lumbosacral spine: L4-L5, L5-S1, 90% to 95%
- Increases with age
- Peak: 44-50 yr, progressive decline

Posterolateral disk herniation





Disk bulge:

Symmetric, Circumferential

Disk herniation:

Focal, Asymmetric extension

Protrusions and Extrusions

Protrusions: Broad-based

Extrusions: "Neck" = Base is narrower than the extruded material,
Rare

RED FLAGS

Spinal Fracture

Significant trauma
Prolonged glucocorticoid use
Age >50 yr

Infection or Cancer

History of cancer
Unexplained weight loss
Immunosuppression
Injection drug use
Nocturnal pain
Age >50 yr

Cauda Equina Syndrome

Urinary retention
Overflow incontinence
Fecal incontinence
Bilateral or progressive motor deficit
Saddle anesthesia

Spondyloarthritis

Severe morning stiffness
Pain improves with exercise, not rest
Pain during second half of night
Alternating buttock pain
Age <40 yr

Mechanical LBP

- >95% of LBP
- Degenerative change Most common
- Increases: Physical activity, Upright posture
- Relieved : Rest

MECHANICAL BACK PAIN

- ***Muscle, ligament, tendon strain***
- Discogenic disorders including herniated disc
- Apophyseal joint arthritis
- Spinal stenosis
- Spondylolysis, spondylolisthesis
- Scoliosis

Vertebrae are bones that protect your spinal cord. They can be forced or locked out of their proper positions (**mis-aligned**).

Ligaments and muscles are supportive tissues that can be stretched, torn, or weakened.

Discs are shock absorbers that can bulge, rupture, or wear down.

Nerves, which carry the body's messages, can get stretched, pinched, or irritated.



Inflammatory LBP

- Insidious onset , Common in <40 yr
- Morning stiffness >30 min
- Improves: Exercise
- Worse: The second half of the night
- Alternating buttock pain
- Nocturnal pain: Infection, Neoplasm
- AS
- Psoriasis
- IBD

Inflammatory LBP	Mechanical LBP
20–40 years	Any age
Males > Females	M = F
Subacute onset	Often acute
Morning stiffness present	No morning stiffness
Pain relieved by activity	Pain worsened by activity
Pain worsened by rest	Pain improves with rest
No neurodeficit	Neurodeficit may be present
Gluteal and hip pain often present	Absent
Seen in any profession	Commonly seen in sedentary sitting jobs

Clinical manifestation

Acute low back pain

Chronic back pain

Radicular

Cauda equina syndrom

Mechanical

Radicular vs. Referred Pain



Radicular Pain

Somatic Referred Pain

Leg > Back

Back > Leg

Shooting, Lancinating,
Cutaneous component

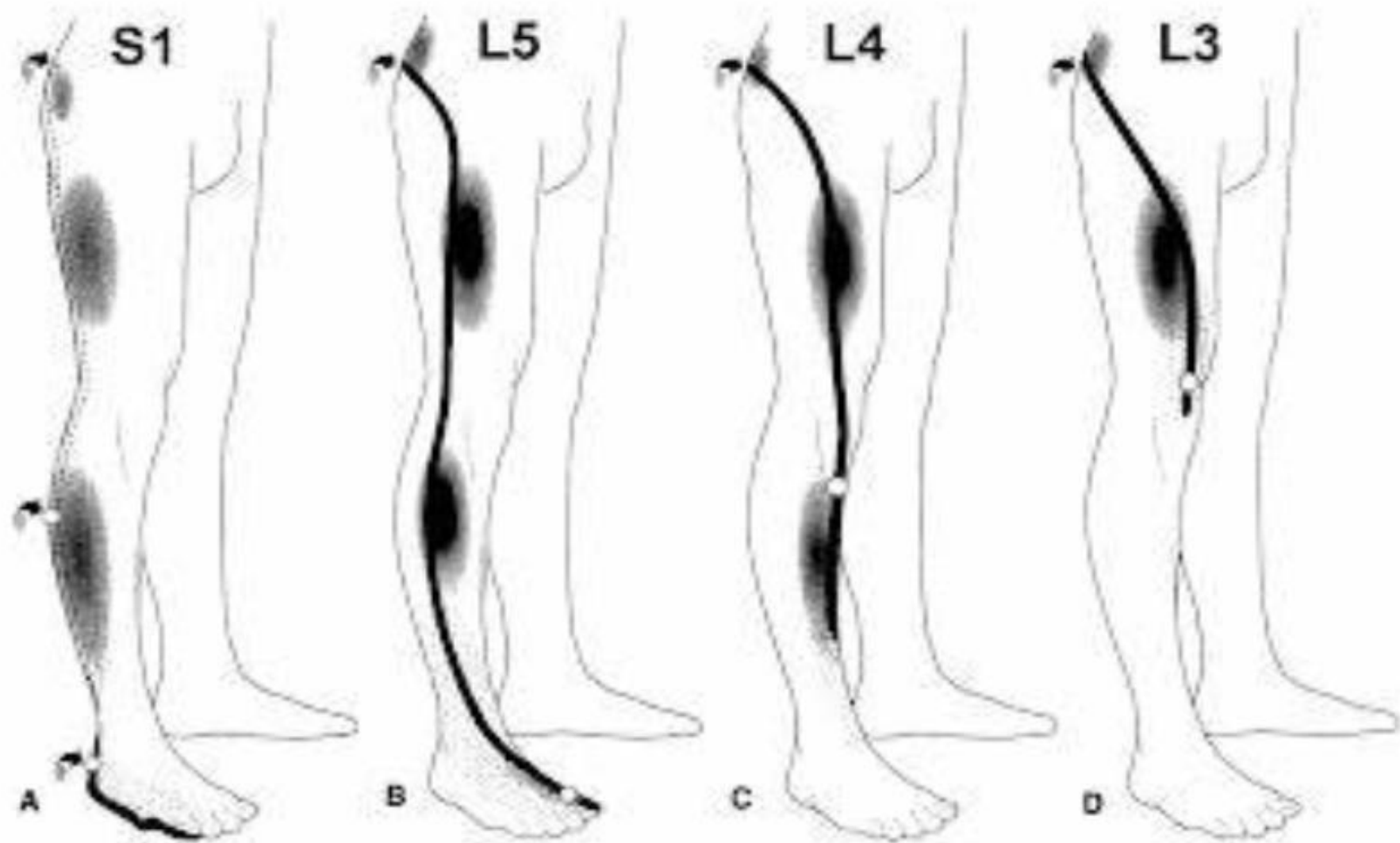
Dull, Pressure-like, Deep

Travels along the limb in a
narrow band

Extends into limbs across a
wide region

+/- neurologic deficit

- neurologic deficit





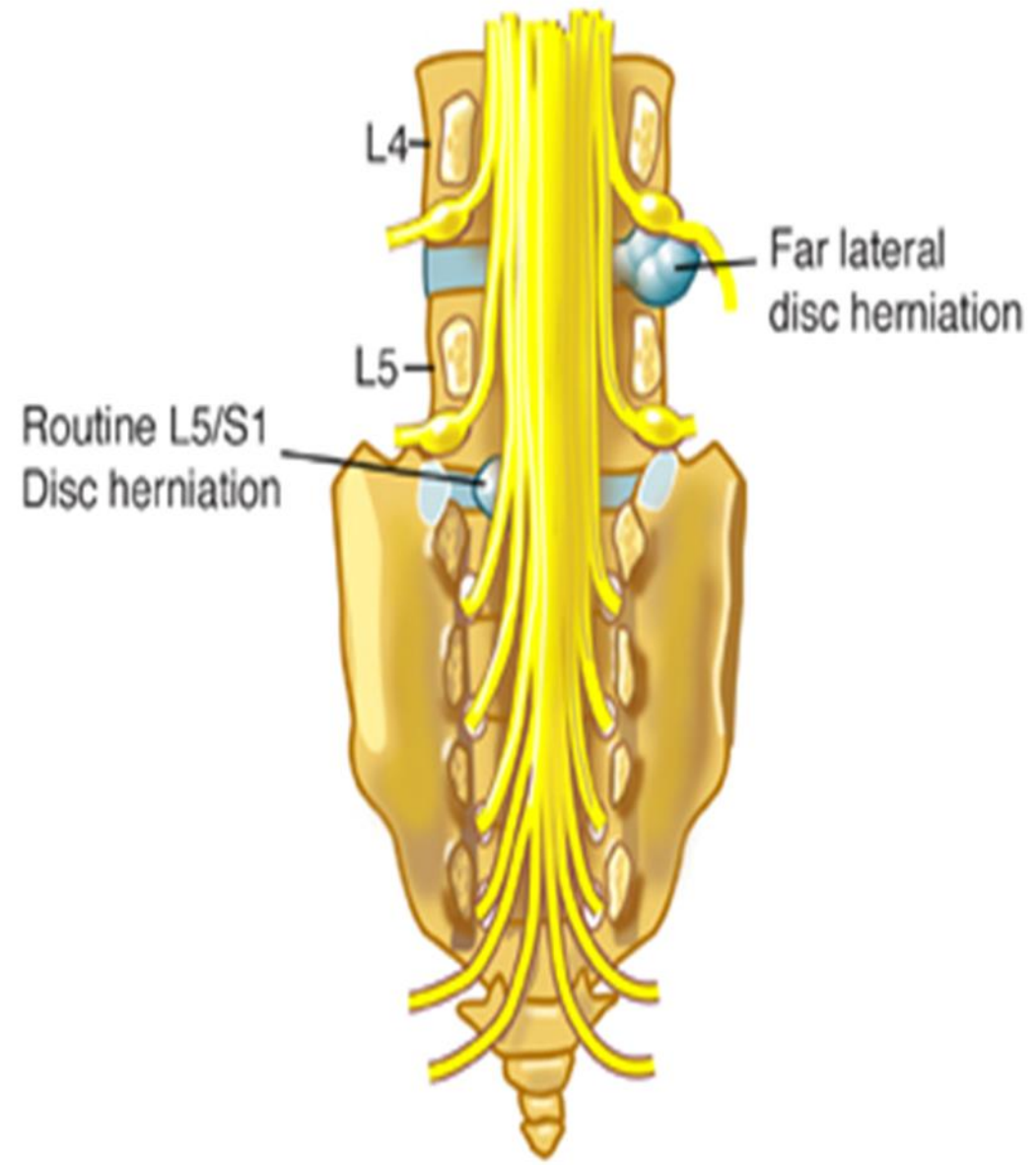
L4

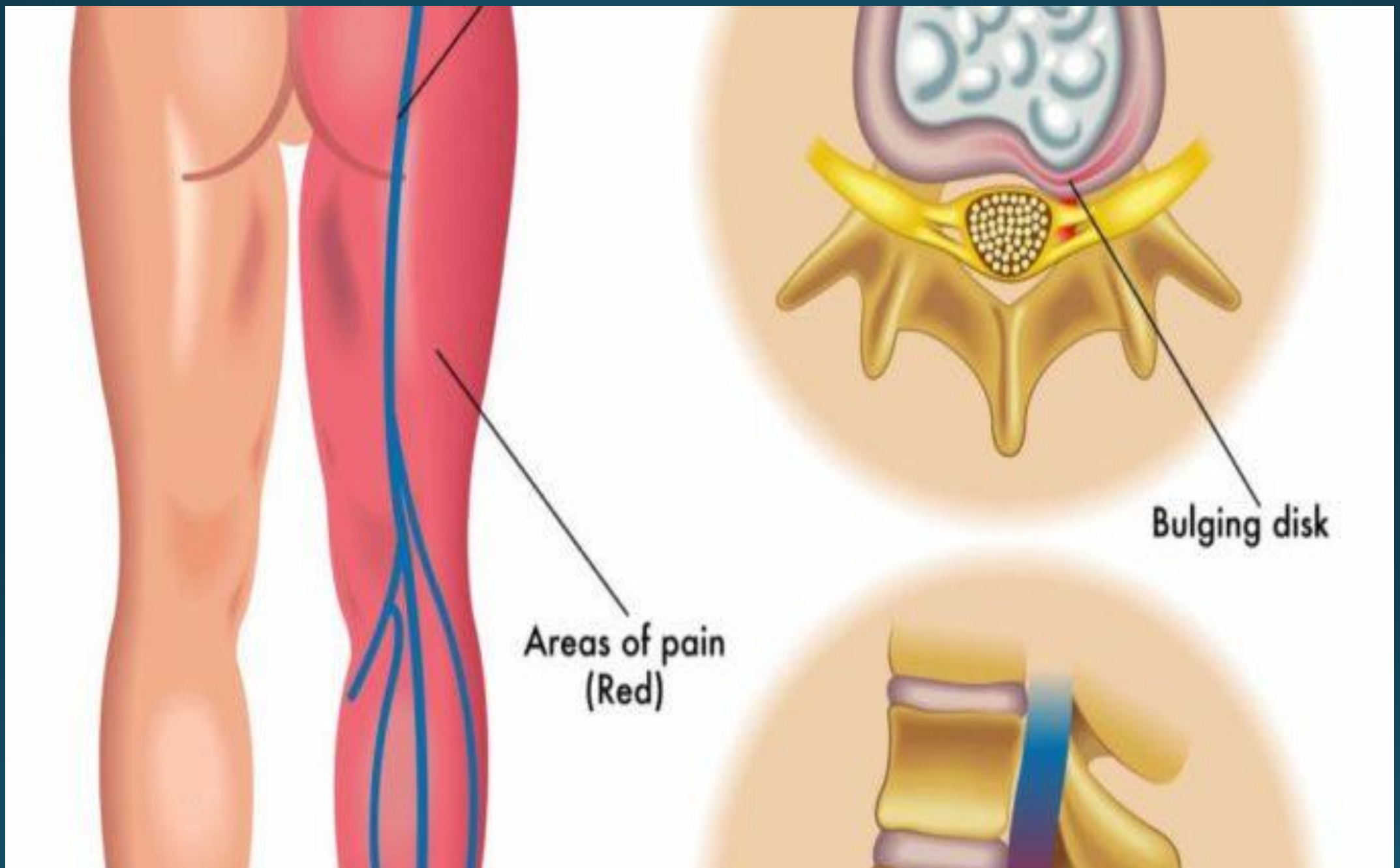


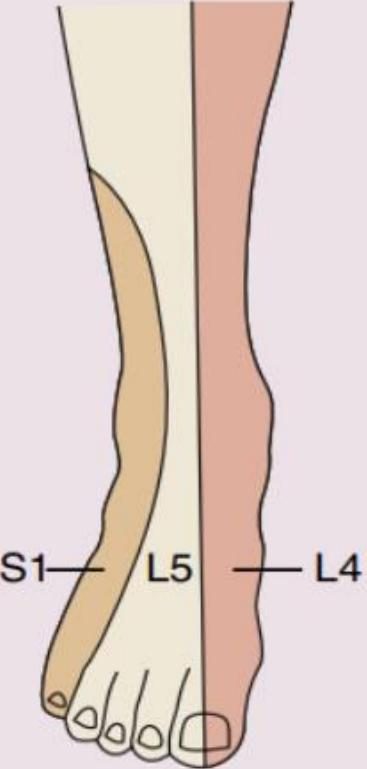
L5



S1



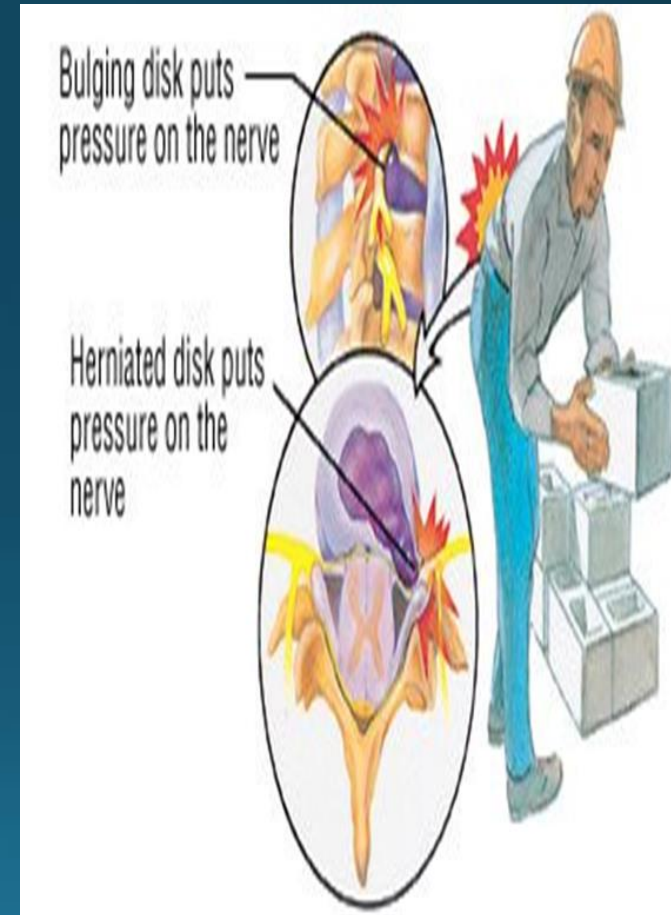


Lower extremity dermatome	Disk	Nerve root	Motor loss	Sensory loss	Reflex loss
 <p>S1 — L5 — L4</p>	L3-4	L4	Dorsiflexion of foot	Medial foot	Knee
	L4-5	L5	Dorsiflexion of great toe	Dorsal foot	None
	L5-S1	S1	Plantarflexion of foot	Lateral foot	Ankle

Risk factors

- Heredity (Genetic)
- Psychosocial
- Heavy lifting
- Obesity
- Pregnancy
- Weaker trunk strength
- Cigarette smoking
- Low income and Educational status

Dick herniation



herniation



- 16 kg/cm
- 48 kg/cm
- 120kg/cm

Clinical Evaluation

- **History:** Most important part of evaluation
- LBP is a symptom, not a disease
- **Acute LBP:** Self-limited
- **Chronic LBP:** Periods of acute exacerbation
- Imaging: Unnecessary

Clinical Evaluation

- **Major focus:** Initial evaluation, Focus on <5%
 - ✓ Neural compression
 - ✓ FX
 - ✓ Underlying systemic disease

RECOMMENDATION 1

- Take History
- Physical Examination
- No need for imaging except have red flags

Physical Examination

- **Inspection** : Loss of lordosis, Scoliosis (Functional, Structural)
- **Palpitation** : Paravertebral muscle spasm
Decrease in range of motion
Palpable step-off
Chest expansion <2.5 cm
- **In percussion**: Point tenderness : OM, Fibromyalgia
- Complete neurologic examination: Motor, DTR, Sensation
- **SLR , Crossed SLR , Reverse SLR**

Red flags in history

- Pain worse at rest or night
- Prior HX of cancer
- Hx of chronic infection(lung,urinary,skin)
- Hx of trauma
- Age>70
- Incontinence
- IDU
- Glucocorticoid use
- Hx of rapidly progressive neurologic deficit

Red flags in examination

- ✓ Unexplained fever
- ✓ Unexplained weight loss
- ✓ Tenderness over the spine
- ✓ Abdominal, rectal, pelvic mass
- ✓ Internal/external rotation of the leg at the hip
- ✓ Heel percussion sign
- ✓ SLR or reverse SLR sign
- ✓ Progressive focal neurologic deficit

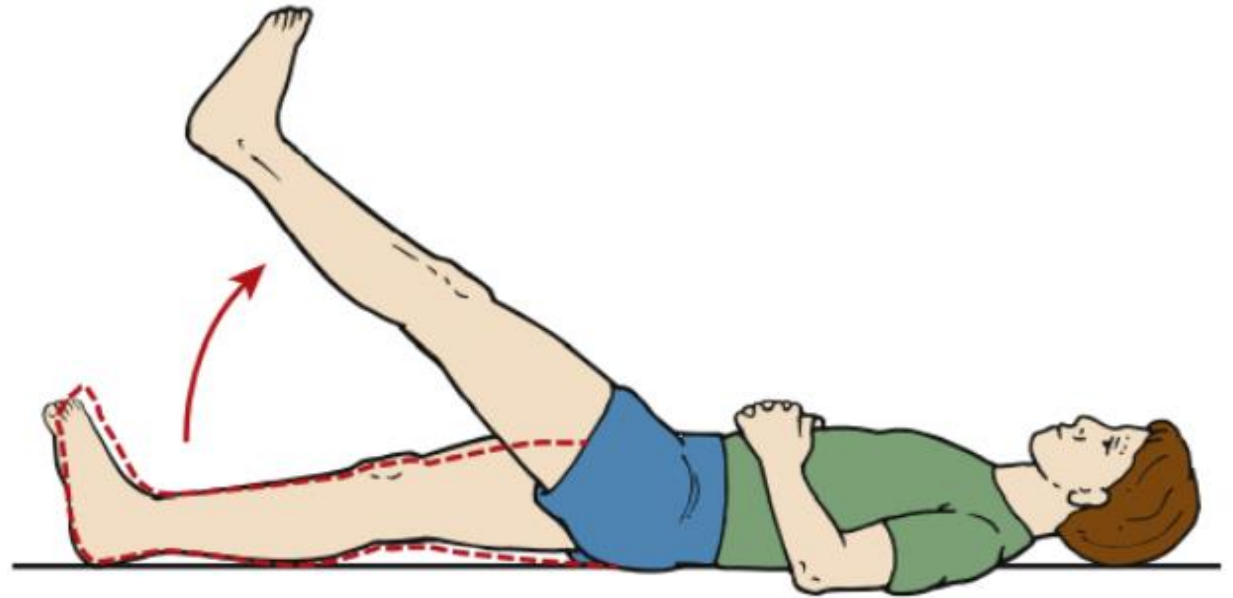
SLR: Stinchfield's test

Sciatic nerve (From L₄-S₃)

L₄-5 or L₅-S₁ level (95% herniation)

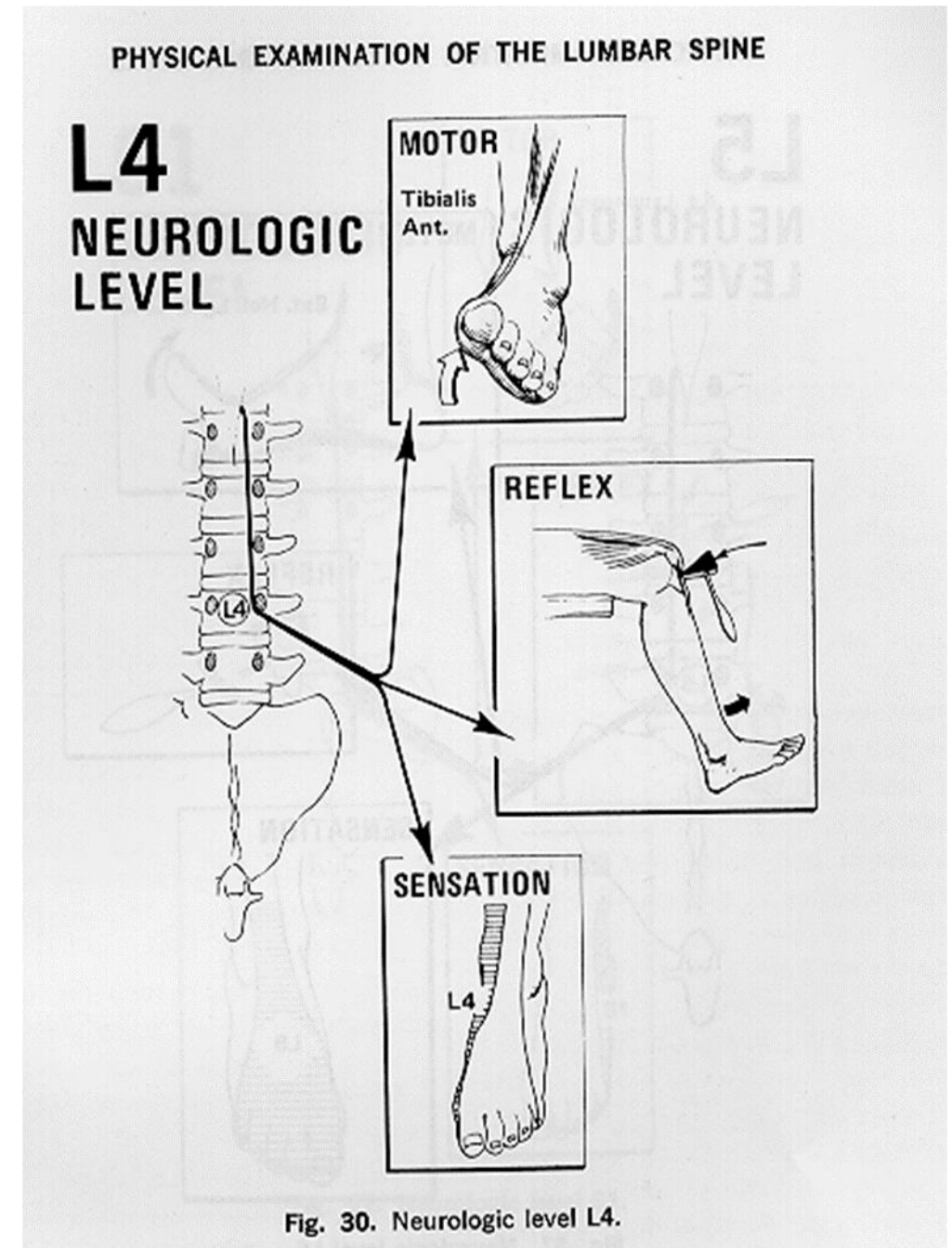
Dorsiflexion: Increases the sensitivity

False-negative tests

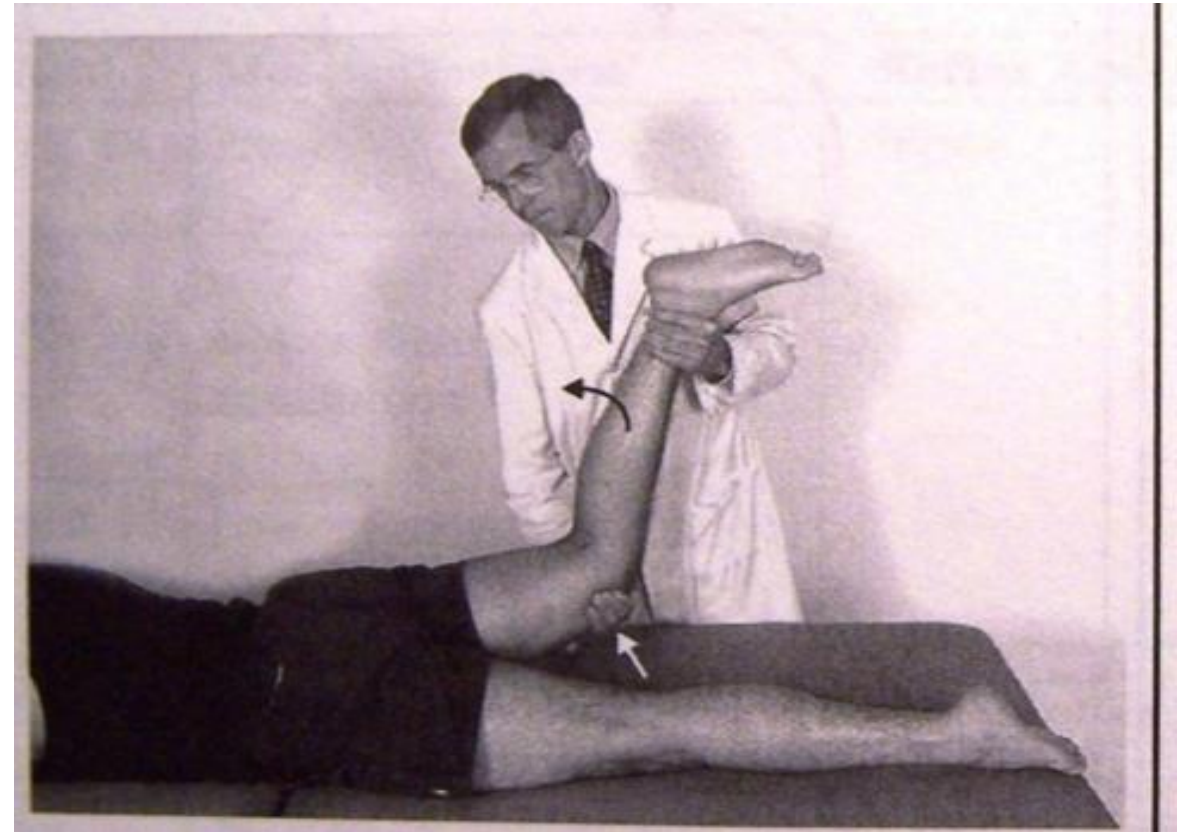


Cruralgia

- ✓ Sharp pain
- ✓ Compression of femoral nerve(L3-L4)
- ✓ Radicular pain: Ant aspect thigh, knee and Medial Leg
- ✓ Less common than sciatica
- ✓ More painful
- ✓ > 50 yr
- ✓ Reverse SLR



Reverse SLR (femoral stretch)



Diagnostic Tests

Imaging

Electrodiagnostic Studies

Laboratory Studies

Imaging

- Overuse, Radiation exposure, and Costs
- To rule out serious conditions, If symptoms persist >6-8 w
- Weak association between imaging abnormalities and symptoms
- Plain radiographs and MRI= Major modalities
- ✓ MRI : Preferred modality

- CT is superior: Bone anatomy
- Bone scanning with TC-99m= Detect infection, bony metastases, or occult FX
- Limited specificity, confirmatory imaging such as MRI needed

Electrodiagnostic Studies

- **MRI** : Anatomic information
- **Electrodiagnostic**: Physiologic information
- Evaluation Lumbosacral radiculopathy

Differential Diagnosis

Lumbar Spondylosis

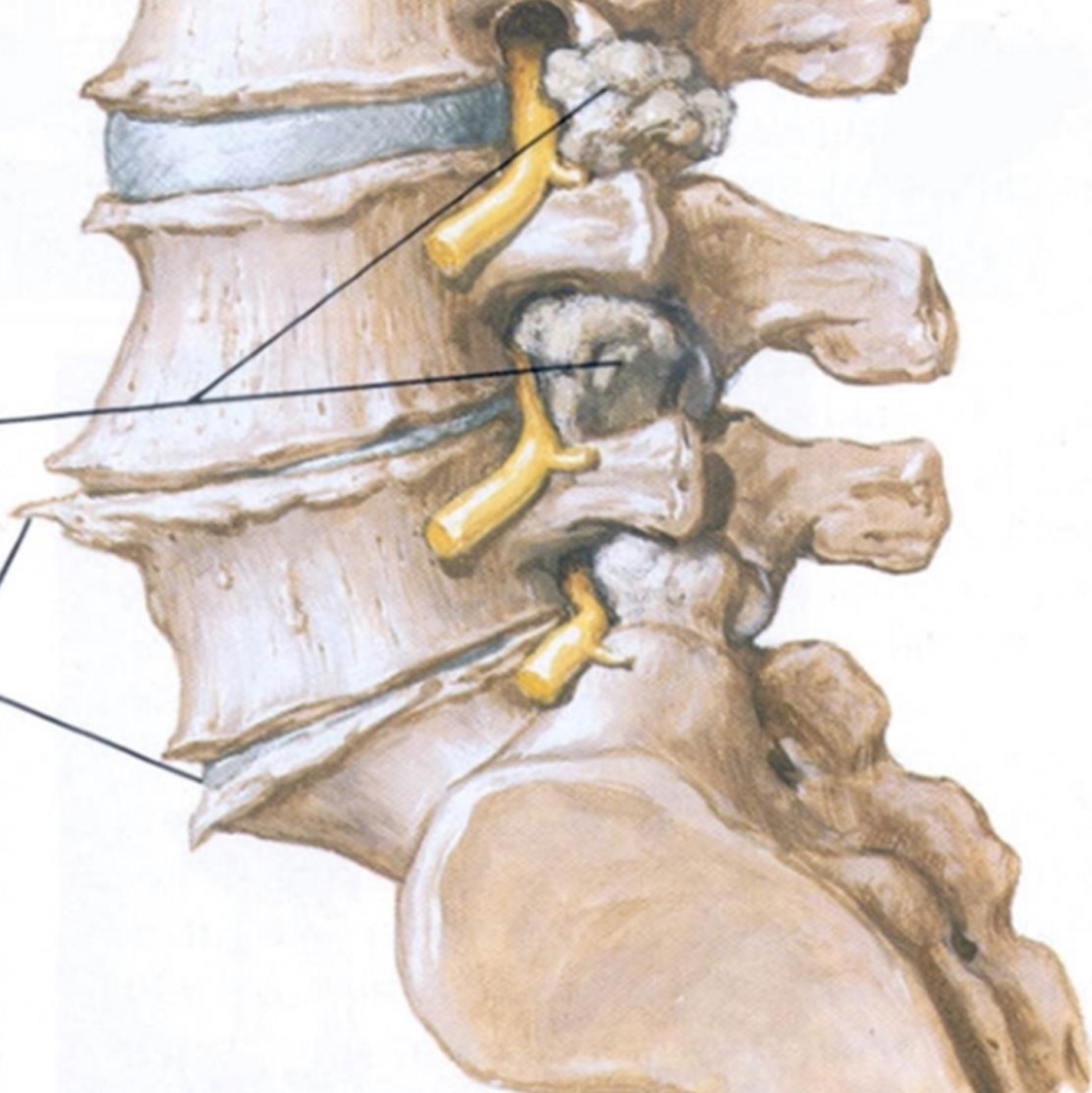
- Degenerative changes
- Ant placed diskovertebral joints and the posterolateral placed facet joints
- Lumbar spondylosis= Disk herniation, Spondylolisthesis, and Spinal stenosis
- Spinal instability

spondylosis

- Osteoarthritic spine disease
- Back pain increase with movement
- No association between radiography and symptoms
- DX: radiography

Osteoarthritic
facet joints

Spondylitic
arthritis

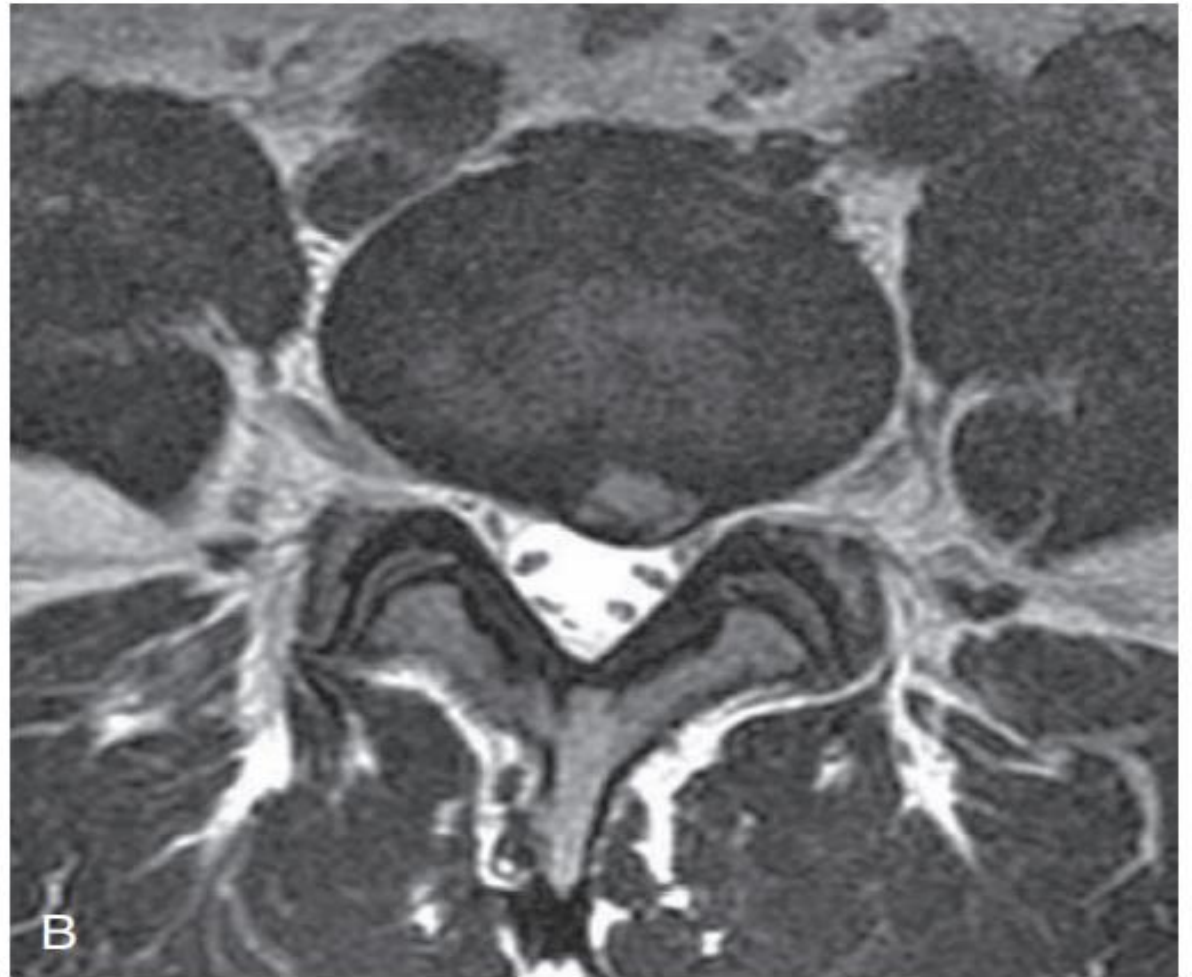


Spondylosis:

Disk-space narrowing
Subchondral sclerosis
Marginal osteophytes

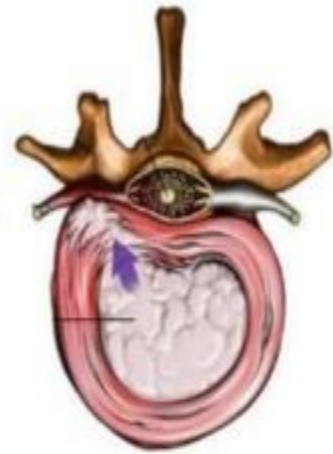


Sagittal and Axial T2-MRI:
Extruded disk , L4-5 level.

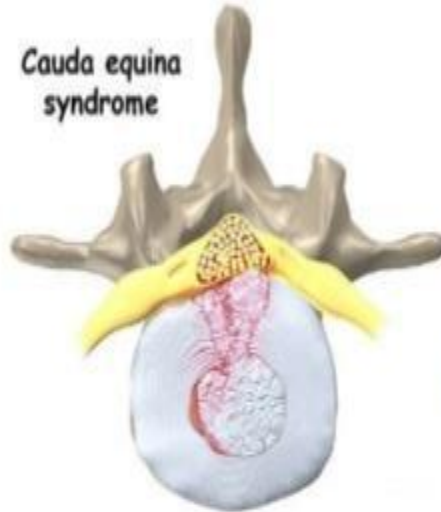


Cauda equina syndrome

- Large midline disk herniation, L4-5
- Rare
- LBP, bilateral radicular pain, Motor deficits with leg weakness
- Urinary retention, overflow & Fecal incontinence
- Sensory loss in the perineum (saddle anesthesia): Common
- Recognized before incontinence, the prognosis is worse
- Surgical emergency



Cauda equina syndrome



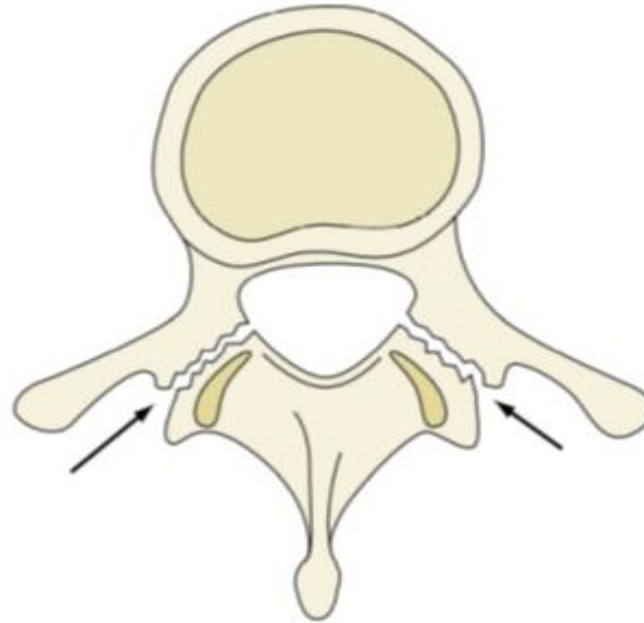
Spondylolisthesis

- Isthmic and Degenerative
- *Isthmic:*
- L5-S1 , Defect in the pars interarticularis
- *Degenerative :*
- SX at the facet joints
- >60 years, in women, in the L4-5 level, Rarely > 30% of vertebral width
- Traumatic and pathologic (lytic tumor)

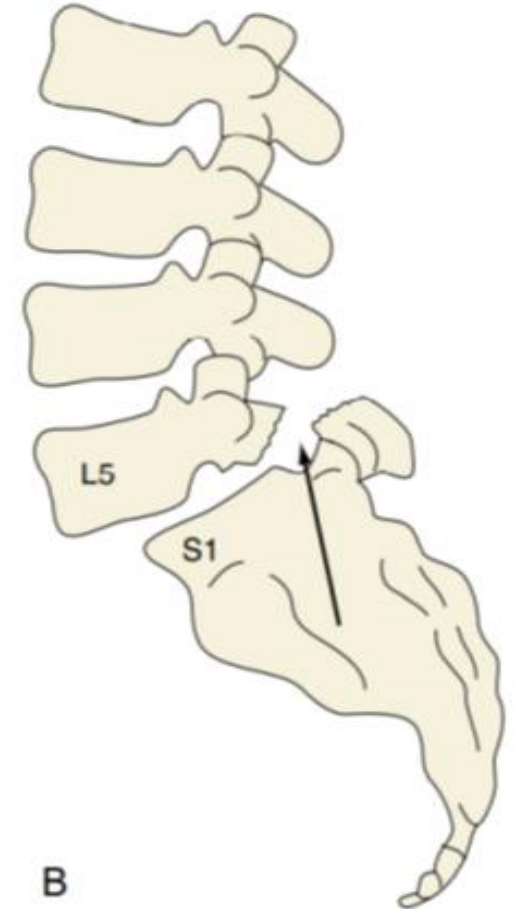
Ant displacement of a vertebra on
the one beneath it

Most patients : Asymptomatic

✓ Extreme slippage= Cauda equina
syndrome



A



B

Spondylolisthesis



Spinal Stenosis

- Indolent, Benign
- **Diagnosis:** Characteristic symptoms and signs+ Imaging
- Neurogenic claudication (pseudoclaudication)
- Multiple levels
- Confirmed: MRI
- Radiography : Narrowing= Spinal canal
- Most frequent indication for spinal surgery >65 yr

- ✓ Range of motion:
Normal or reduced
- ✓ SLR: Negative.
- ✓ Romberg test:
Abnormal
- ✓ DTR and Vibration:
Reduced.
- ✓ Forward flexion
Simian stance,
shopping cart sign.



Neurogenic vs. Vascular Claudication

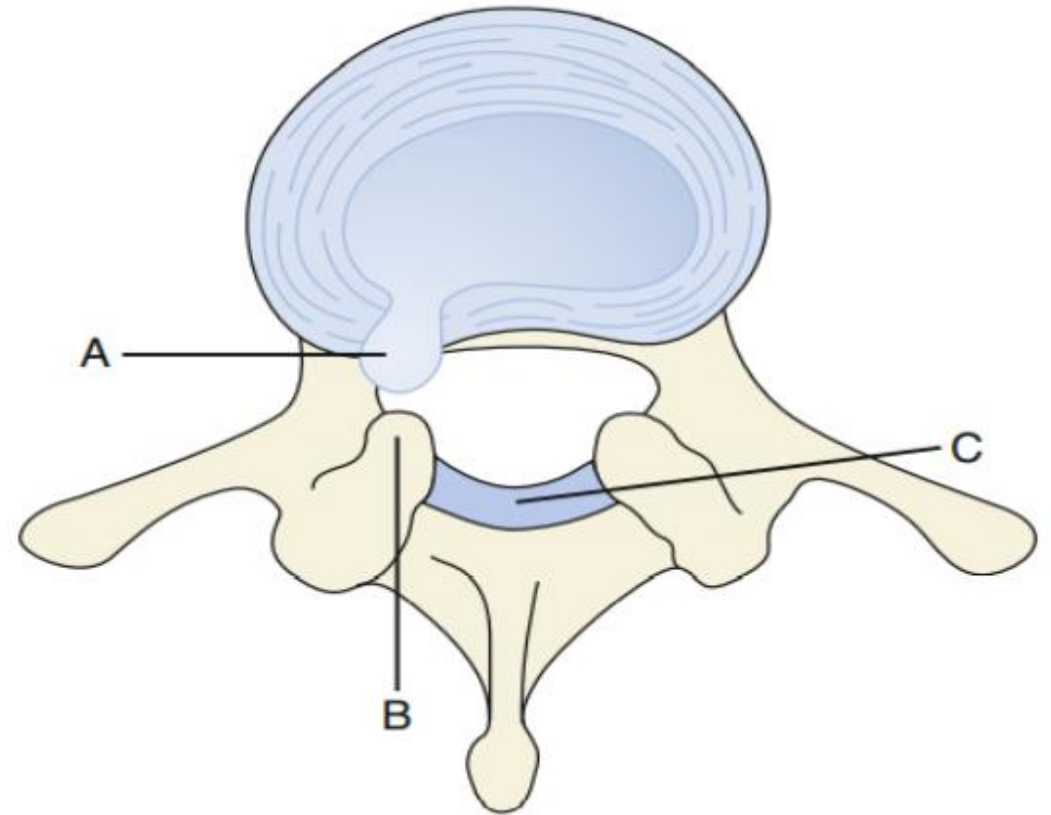
Symptoms	Neurogenic	Vascular
Back Pain	Common	Uncommon
Pain Relief	Sitting or flexed posture Standing and resting usually insufficient Often slow (>5 mins)	Not positional Pain relief while standing Almost immediate
Ambulatory tolerance	Variable	Fixed

- Neurogenic claudication versus vascular claudication:

- ✓ Preservation of pedal pulses
- ✓ Provocation of symptoms by standing erect
- ✓ Relieved by flexing forward
- ✓ Location of maximal discomfort: Thighs > calves

Spinal Stenosis:

- ✓ Disk Herniation
- ✓ Facet joint Hypertrophy
- ✓ Hypertrophy of Lig Flavum



Causes of Lumbar Spinal Stenosis

Congenital

Idiopathic
Achondroplastic

Acquired

Degenerative

Hypertrophy of facet joints
Hypertrophy of ligamentum flavum
Disk herniation
Spondylolisthesis
Scoliosis

Iatrogenic

Postlaminectomy
Postsurgical fusion

Miscellaneous

Paget's disease
Fluorosis
Diffuse idiopathic skeletal hyperostosis
Ankylosing spondylitis

Nonspecific Low Back Pain

- Acute mechanical LBP : No identifiable cause, Idiopathic LBP
- 85% of the patients
- Weak association of Symptoms with Imaging
- Strain and Sprain
- Severity of pain: Vary
- CLBP < 10%
- Self limited . Better 1 - 4 w, Managed conservative

Neoplasm

- Uncommon, Important
- History of cancer , Unexplained weight loss, failure to improve > 1 mo of conservative therapy, and age > 50 yr
- Persistent Pain, Not alleviated by rest and Worse at night
- Spinal mass= Lumbosacral radiculopathy or cauda equina syndrome

- ***Vertebral metastases***

- ✓ < 1% LBP
- ✓ Prostate, Lung, Breast, Thyroid, GI Kidney or Multiple myeloma.
- ✓ 3% - 5% of people with cancer
- ✓ 97% of spinal tumors , metastatic disease
- ✓ Thoracic spine



• *Osteoid Osteoma*

- ✓ Benign, 2-3 th decade of life
- ✓ Pain , Functional scoliosis
- ✓ Post elements
- ✓ Pathognomonic: A sclerotic lesion <1.5 cm+ lucent nidus
- ✓ NSAIDs
- ✓ Surgical resection: Intolerable pain
- ✓ Spontaneously resolve



Infection

- Vertebral OM : Acute or Chronic
- Hematogenous , Direct inoculation or contiguous
- Lumbar spine
- Staphylococcus aureus: Most common (> 50%), E.coli
- Coagulase-negative staphylococci and Propionibacterium acnes : almost always: After spinal surgery (Internal fixation devices)

Tb



© ACR

- Common sites : Urinary tract, skin, soft tissue, vascular access
- Complicated by an epidural or paravertebral abscess:
Neurologic complications

- Back pain: Initial symptom
- Persistent, at rest, exacerbated by activity, well localized
- Point tenderness on percussion
- Fever: 50 %
- ESR & CRP : All
- CRP: Best correlating with clinical response to therapy

- Radiography: Loss of disk height and bony lysis
- MRI: Most sensitive and specific
- Empiric AB therapy
- IV therapy: 4 to 6 weeks, and oral AB therapy
- Surgery: Drain abscess or debridement:
Required, Spinal implant, Removal it

Lumbar vertebral osteomyelitis

- ✓ Destruction endplates
- ✓ Fluid in the disk space
- ✓ Epidural extension
- ✓ Bone marrow edema



Treatment

Treatment

- Natural history : Favorable
- Conservative Management
- **Specific treatment** : For small fraction of LBP
 - ✓ Neural compression
 - ✓ Underlying systemic disease
- Goal: Relief of pain and Restoration of function.
- Surgery: Rarely necessary

Acute LBP

- Stay active, Bed rest < 1 or 2 d
- **NSAIDs**: First line
- **Acetaminophen**: Ineffective
- **Opioids**: Severe disabling LBP or complications of NSAIDs.
- **Muscle relaxants**: Cyclobenzaprine and Tizanidine: Second line
- **Benzodiazepines**: Similar to relaxants for short-term pain relief
- **Systemic corticosteroids**: No efficacy

- ***Back exercises:***

- Unnecessary in the first month
- Focuses on core strengthening, stretching , aerobic , loss of weight
Prevent recurrences
- The purpose : **Stabilize the spine**



Butterfly Pose

While doing this exercise make sure to keep your spine erect. Butterfly pose can reduce back pain by stretching groin, hips, knees, and inner thighs.



Bridge Pose

This pose helps to relieve your back pain by stretching the front part of your thigh and creating a balance between strength and flexibility in your hip.



Cat Pose

This pose is usually used in conjunction with cow pose. It's a great exercise for warming up the muscles around your spine and reducing lower back pain.



Cow Pose

This pose which usually is used with cat pose alleviates back pain by massaging and loosening the muscles around your spine.



Cobra Pose

This pose, if performed correctly, is an excellent exercise for strengthening and improving the flexibility of your spine. It reduces back pain by relieving compression of the disk on the nerve root.



Downward Facing Dog Pose

This simple and easy yoga pose can benefit both beginners and advanced yoga practitioners. It reduces back pain by reversing the forces of gravity on your spine.



Locust Pose

This simple yoga pose alleviates back pain by stretching and strengthening your lower back muscles and correcting your posture.



Pigeon Pose

This pose relieves lower back and sciatic pain by stretching and loosening spine, hips, and inner thighs.



Triangle Pose

This standing yoga pose alleviates lower back pain by strengthening the legs and stretching groins, hamstrings and hips.

Chronic Low Back Pain

- Complex condition
- Exacerbations, managed according to ALBP
- Results of treatment: Unsatisfactory
- First: Education, Exercise
- Cognitive-behavioral therapy

Chronic Low Back Pain

- NSAIDs: No long-term efficacy
- Acetaminophen: Ineffective
- Opioids: In severe disabling pain
- Opioids and benzodiazepines: Avoided
- Tramadol and Duloxetine : Second line
- Muscle relaxants: Not recommended
- Low-dose TCAs : Inconsistent benefits , adverse side effect

Indications For Surgery

Disk Herniation

Cauda equina syndrome (emergency)

Serious neurologic deficit

Progressive neurologic deficit

Longer than 6 weeks of disabling radiculopathy (elective)

Spinal Stenosis

Serious neurologic deficit

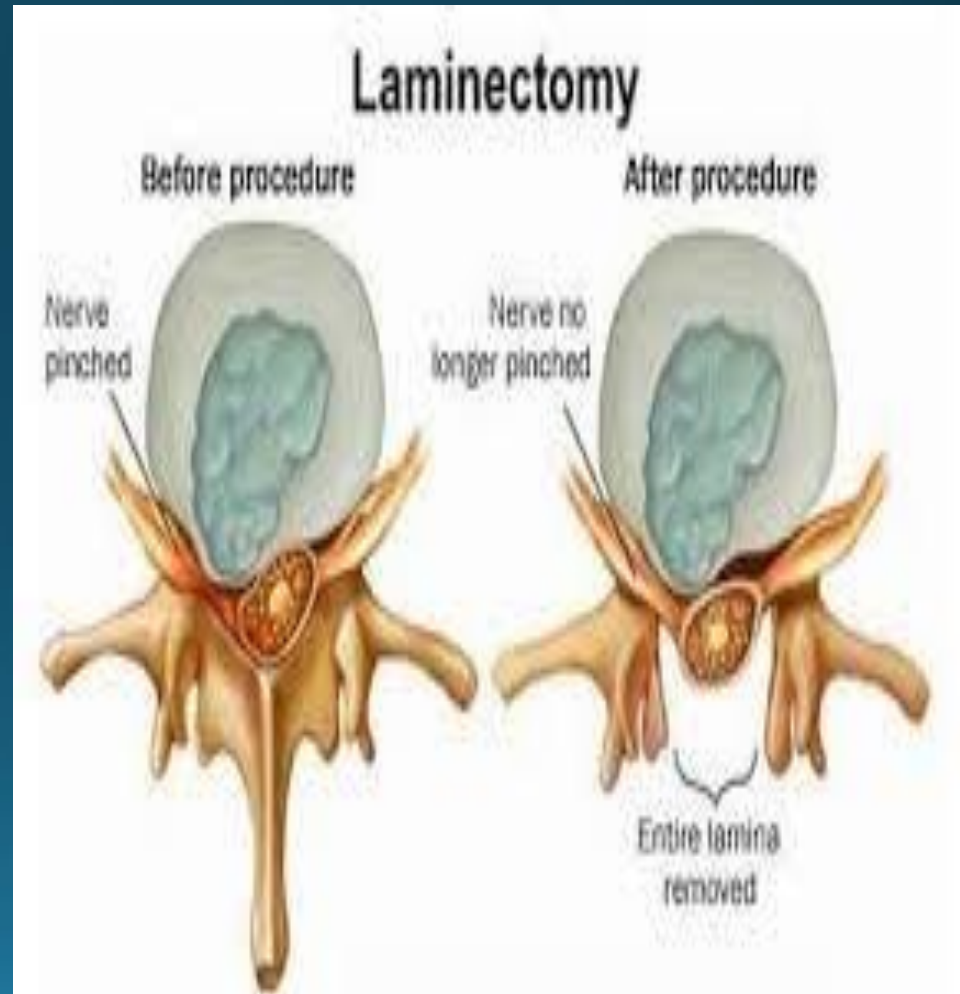
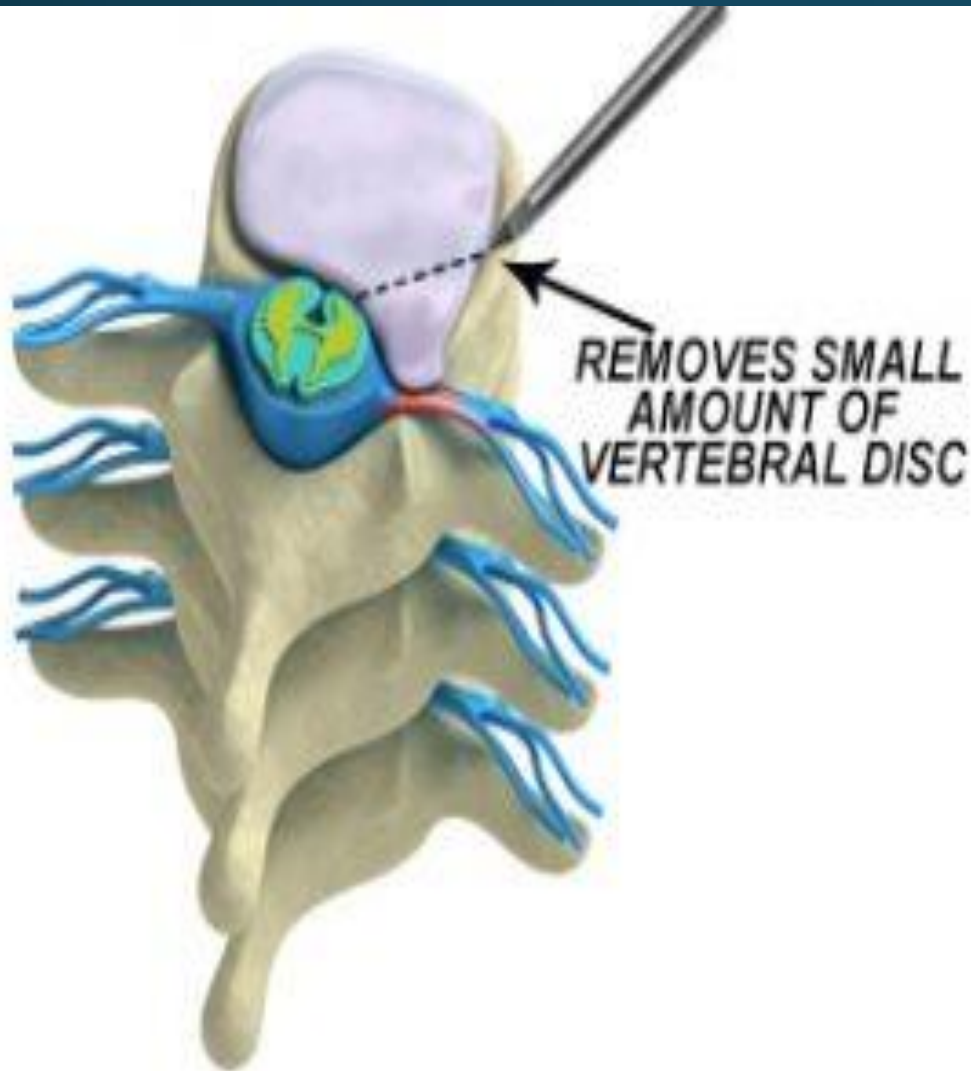
Progressive neurologic deficit

Persistent and disabling pseudoclaudication (elective)

Spondylolisthesis

Serious or progressive neurologic deficit

surgery



Disk Herniation

- Conservative care
- Surgery : 10%
- Epidural corticosteroid injections: Small benefit
- Anti-TNF : Conflicting results

Spinal Stenosis

- Conservative: Prefer
- Physical therapy: Mainstay, Exercises and Education
- Lumbar corset: Symptomatic relief
- NSAIDs and Tramadol: Symptomatic relief
- Epidural corticosteroid injections: Used but not Routine
- Surgery

Outcome

- Natural history LBP: Favorable
- > 90% are better at 8 w
- 2/3 : Low grade discomfort at 3 and 12 mo
- Chronic persistent, and disabling, LBP : 7% to 10%
- Responsible for the high costs



Thanks For Your Attention