LOW BACK PAIN

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NEUROSURGERY
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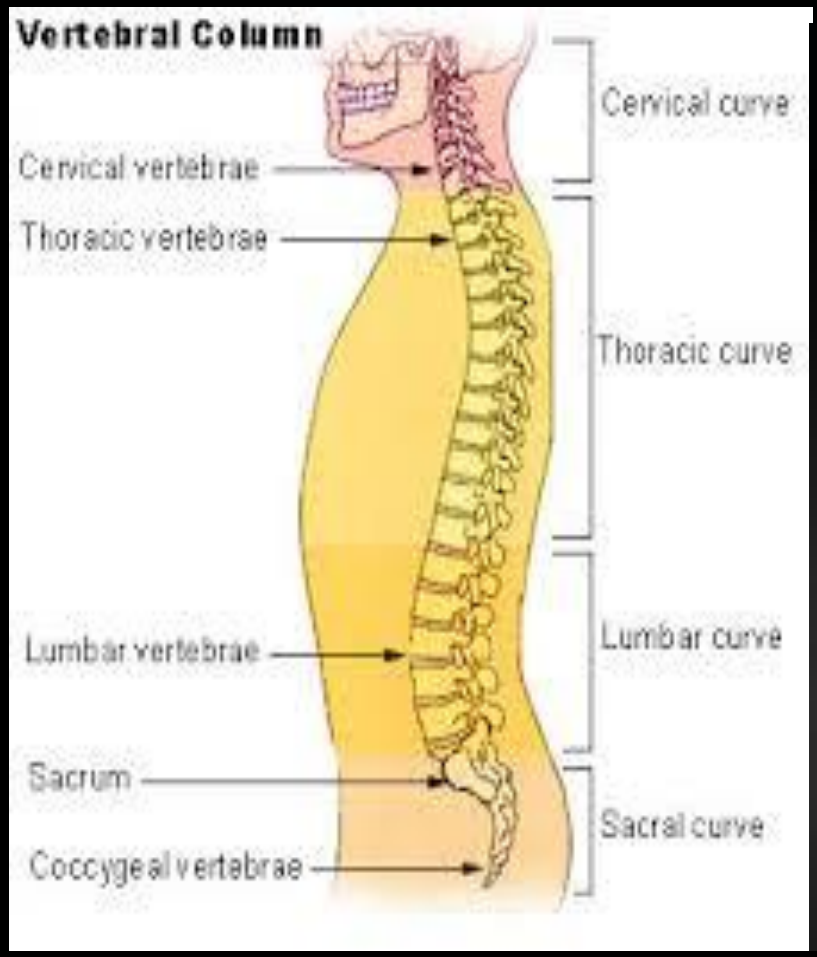
Outline

- Introduction
- Anatomy .
- Diffrential diagnosis .
- Red Flags .
- Common pathological causes .
- Pathophysiology .
- Clinical presentation .
- Investigations .
- Management .
- Outcome .
- Key points .

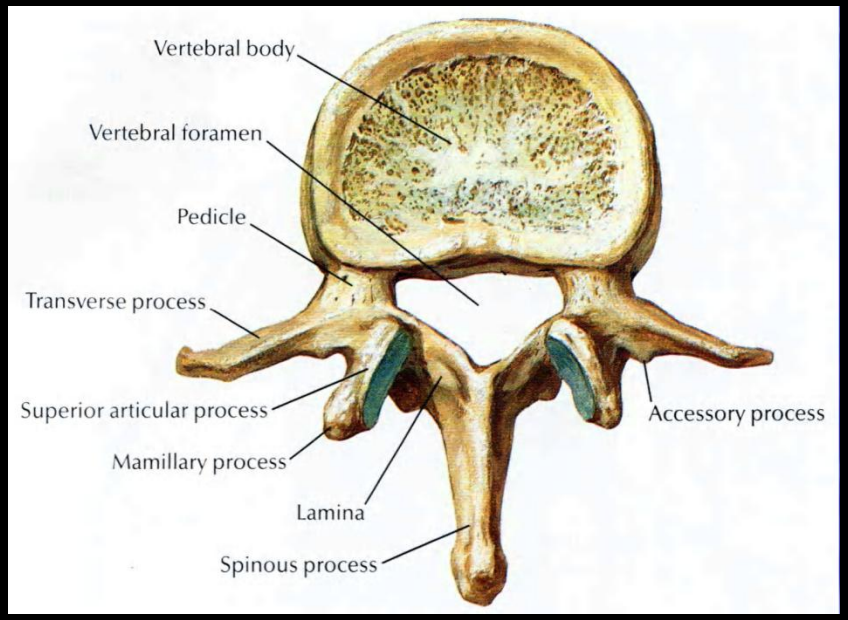
INTRODUCTION

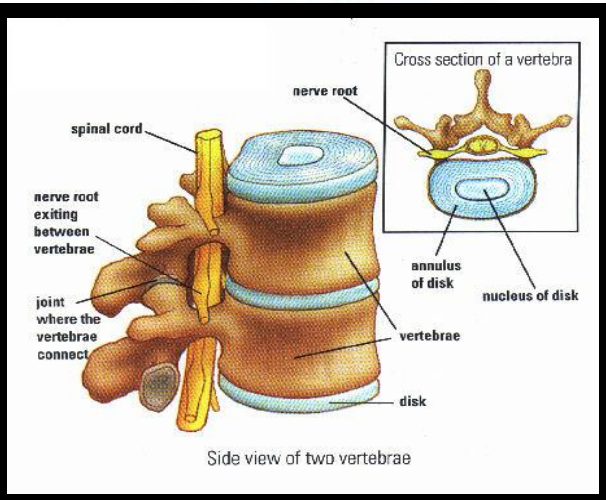
- Low back pain is one of the most common causes for patients to seek medical care.
- Prevalence is almost 100 % in a life time.
- Only 1% of patients will have nerve root compression.
- 1-3% have lumbar disc herniation.
- Most common site L4-L5 , L5-S1.

ANATOMY


Vertebral Column
Cervical vertebrae
Thoracic vertebrae
Lumbar vertebrae
Sacrum
Coccygeal vertebrae
Cervical curve
Thoracic curve
Lumbar curve
Sacral curve

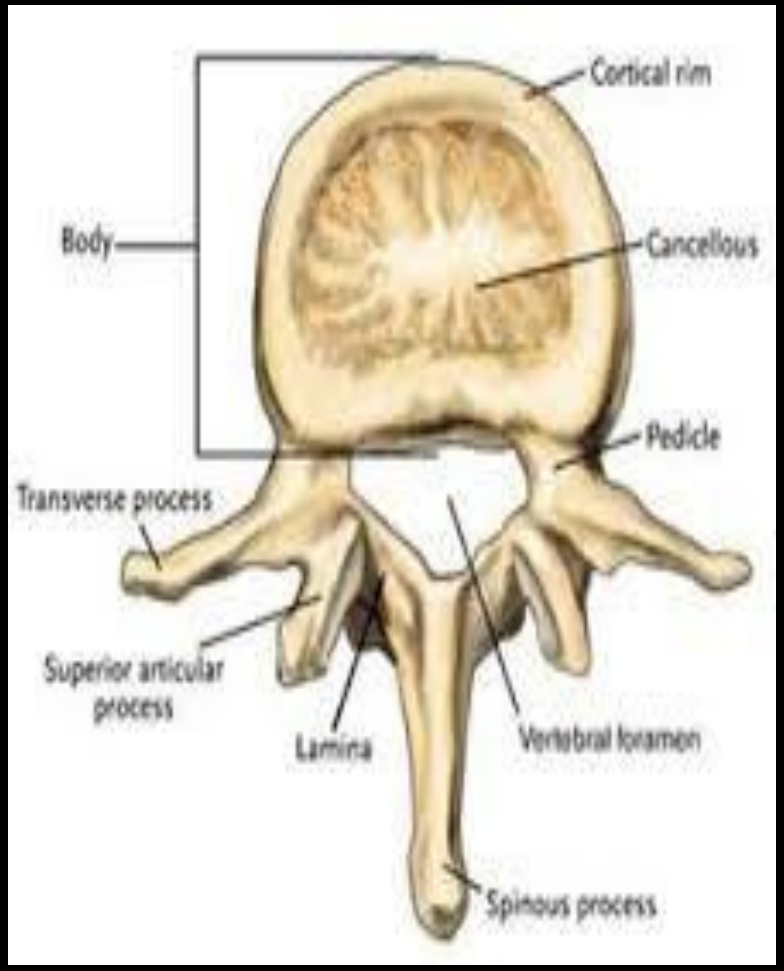
BONY ANATOMY



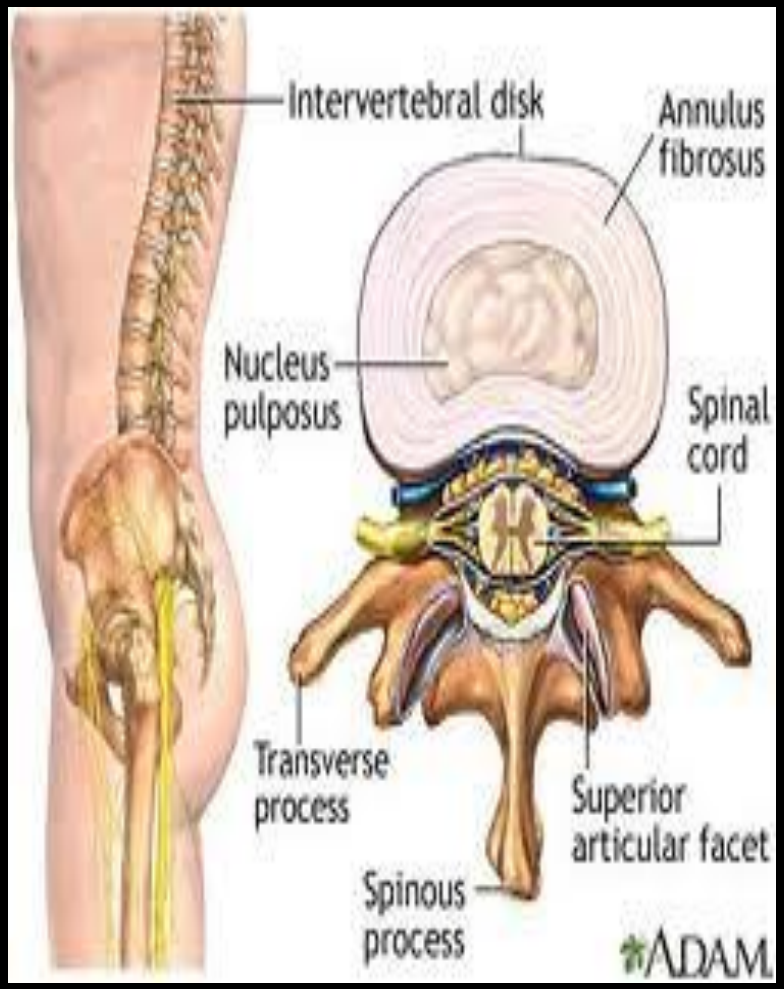


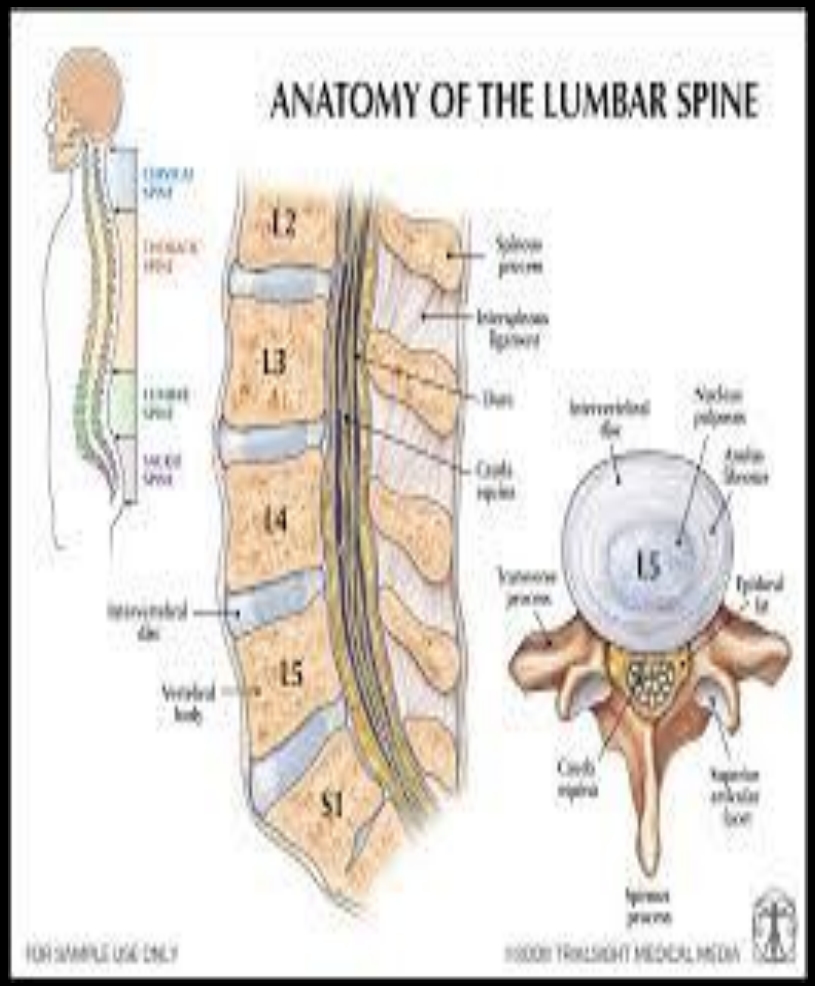
- Vertebral body
- Pedicles
- Articular processes
- Lamina
- Spinous process

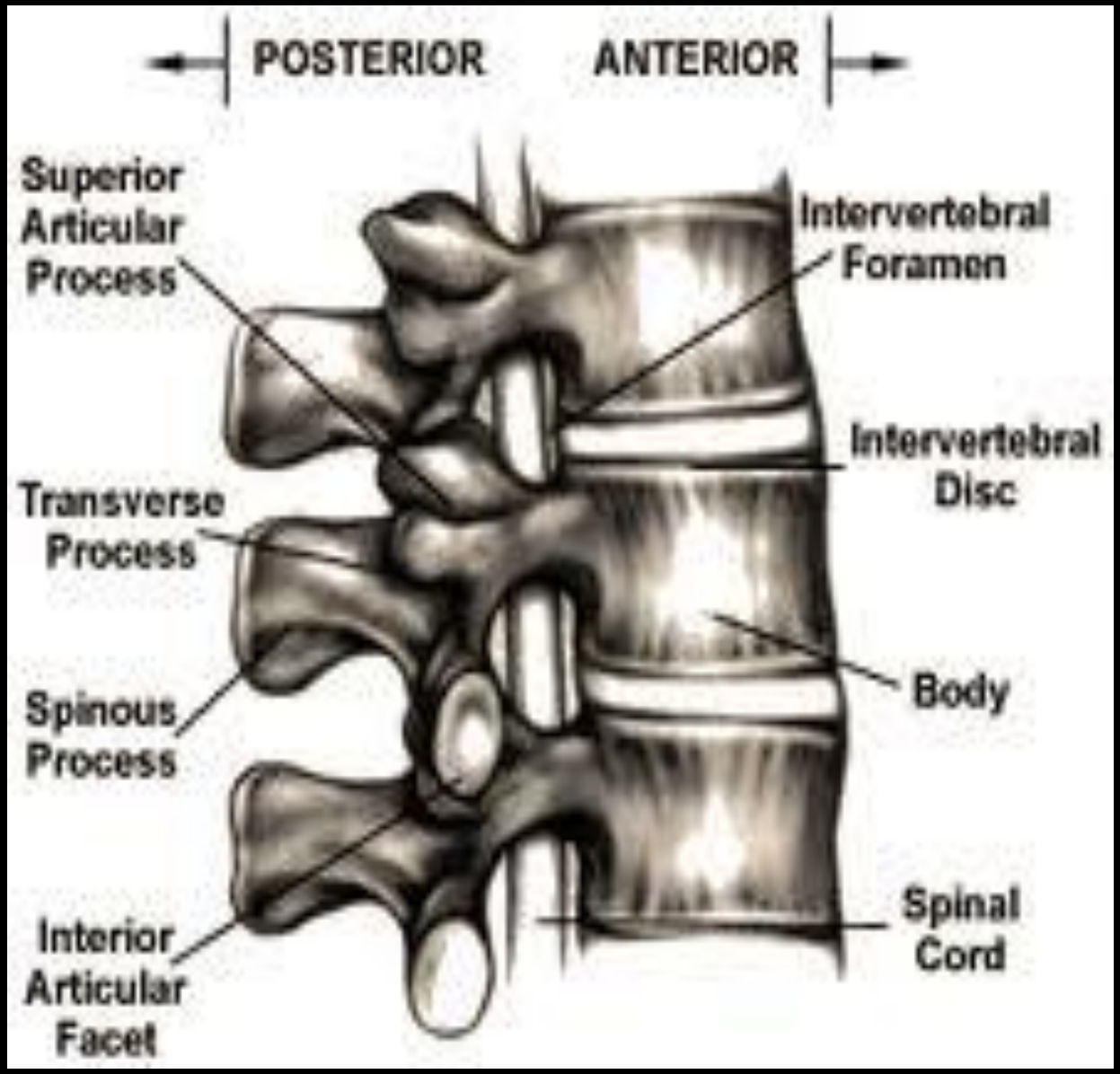
LIGAMENTS OF THE SPINE



NEURAL ANATOMY






POSTERIOR
ANTERIOR
Superior Articular Process
Intervertebral Foramen
Intervertebral Disc
Transverse Process
Body
Spinous Process
Spinal Cord
Interior Articular Facet

Disc consist of

- 1)- cartilaginous end plate : structure covering the bone of adjacent vertebra,
- 2)- nucleus puplosus : semigelatinous centre of the disc.
- 3)- annulus fibrosus : circular fibrous structure composed largely of collagen that restrains the lateral forces produced by compressed nucleus

Nerve supply : recurrent nerve of luschka
sensory supply of annulus fibrosis,PLL and dura.

Arterial supply : lumbar arteries.
major supply by Adamkiewicz.

Venous supply : internal venous plexus.

Disc itself is avascular; contain chondrocyte that produce collagen and proteoglycan.
nutrients derived to it by diffusion from the plasma.

Diffrential Diagnosis of LBP

1. Musculoskeletal pain .
2. Degenrative spine : Disc , LCS .
3. Infection : Discitis , Osteomyelitis , Epidural abscess.
4. Inflammation : Osteoarthritis , Sacroiliitis , Ankylosing spondylitis , Arachnoiditis .
5. Spinal Tumours : Metastasis , primary spinal tumours .
6. Trauma : ligamentous , disc and bony injuries .
7. Pathological Fractures : Osteoporosis , steroids , infection or tumour .
8. Intra abdominal and vascular causes.

Sciatica

- Definition .
- Sciatic Nerve .
- Course .
- Most common cause is Herniated disc .
- Can be very disabeling .

Diffrential Diagnosis of LBP + Sciatica

1. Within the spinal canal :
   - Herniated disc
   - Degenrative Spine or Spinal stenosis or collapsed disc
   - Spondylolesthesis
   - Conjoint root
   - Synovial cyst
   - Meningeal cyst
   - Spinal tumours
   - Spinal Epidural abscess
   - Spinal fracture causing foraminal stenosis
2. Within the intervertebral foramen :
   - Nerve sheeth tumours
   - Foraminal disc

…cont. D.Dx

3. Distal to Foramen :
   - Injection injury
   - Sacroiliitis
   - Hip Pathology
   - Bursitis
   - Piriformis Syndrome
4. Vascular
   - Aortic dissection
   - aneurysm
   - Ischemic pain (claudication)
5. Neuropathy
6. Referred pain
   - Pyelonephritis
   - Renolethiasis

LOW BACK PAIN when to investigate..??

- Chronic back pain > 4 wks at presentation .
- persistant pain despite analgesics & muscle relaxants .
- Low back pain with neurological deficit at presentation .
- Red flags .

Red Flags of Back Pain

- Cancer & infection :
  - 20 > Age > 50
  - History of cancer
  - UTI , Drug abuse , fever or chills
  - immunosupressed patient
- Spinal fracture :
  - Significant trauma
  - Steroids
  - Age > 70 , menopause in females .
- Cauda Equina Syndrome :
  - Acute urine retention or overflow incontinence
  - Saddle parasthesia
  - Progressive lower limb weakness

Spine degenration

- Includes : wide spectrum of changes

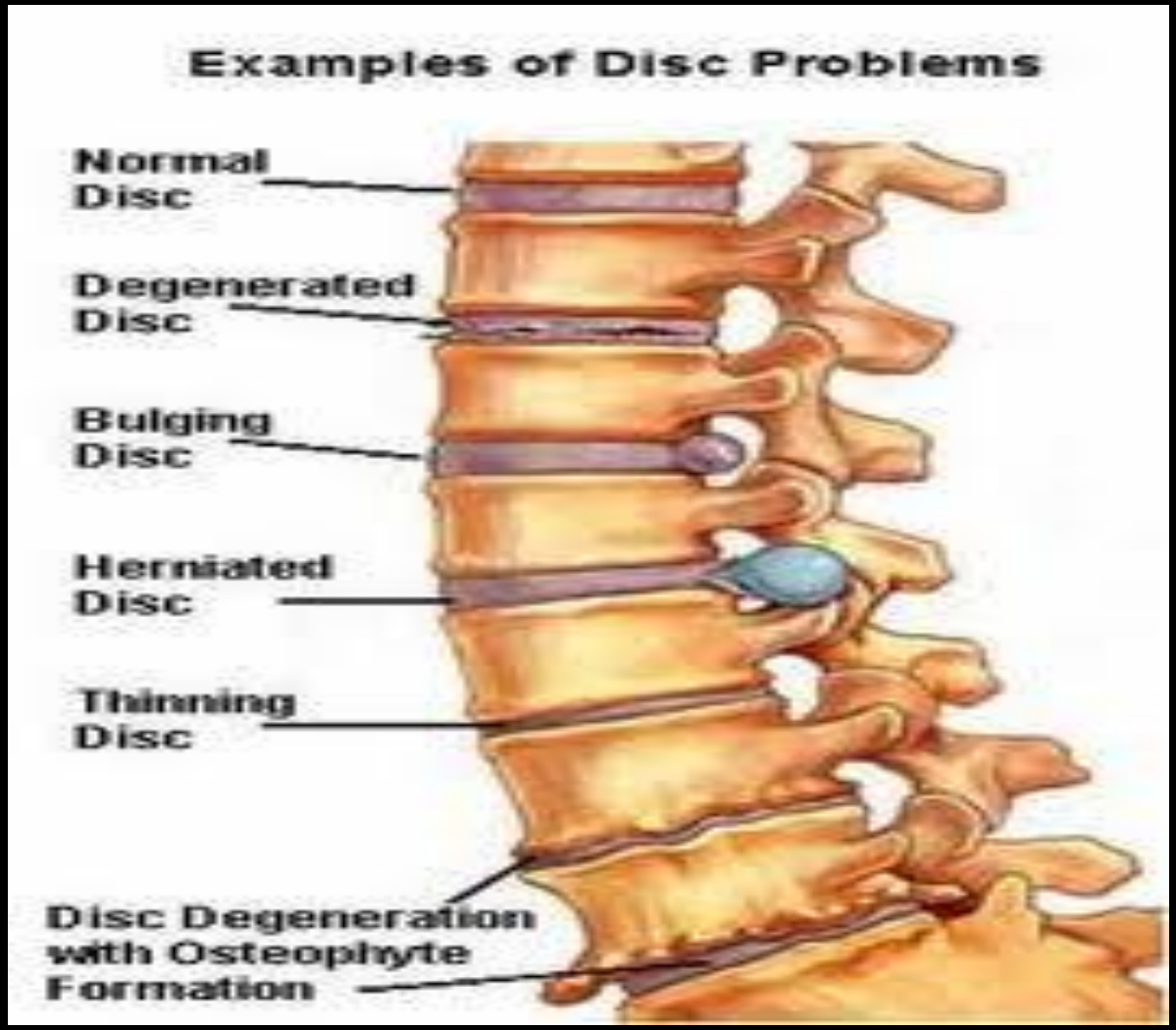
Disc degenration : dehydration , decreased hieght , annular tears , disc bulg , disc herniation .

Ligamentous degenration : hypertrophy , calcification , tears .

Bony degenration : end plate sclerosis , facet joint hypertrophy , osteophyte formation , spondylolesthesis or retrolesthesis .

Lumbar canal stenosis : congenital or acquired .

Degenrative spine



LUMBAR DISC

- Lumbar disc degeneration occurs because of a variety of factors:

1- Alterations in the vertebral endplate cause loss of disc nutrition and disc degeneration.

2- apoptosis.

3- abnormalities in collagen, vascular ingrowths,

4- loads placed on the disc,

5- abnormal proteoglycan.

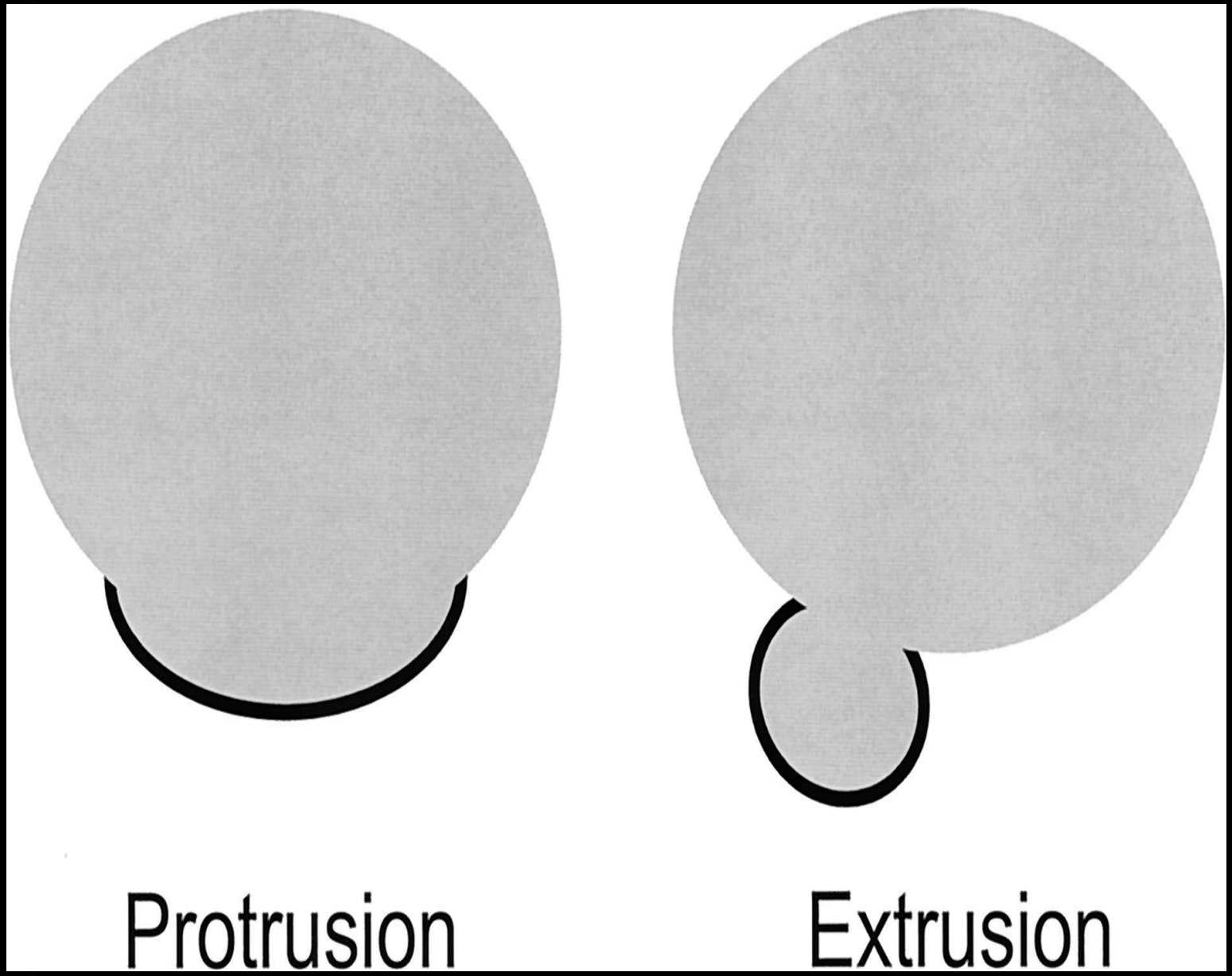
Nomenclature of disc pathology

- Disc degenration : dehydraion , decreased hight , end plate sclerosis , osteophytes , annulus fissures.
- Disc bulge : generalized displacement of disc material through an annulus fissure pushing the peripheral annulus fibers into the canal.
- Disc Herniation : Herniation of disc material through a full thickness tear of the annulus fibrosus.

1) Focal : < 25 % of disc circumference.
2) Broad based : > 25 % of disc circumference.

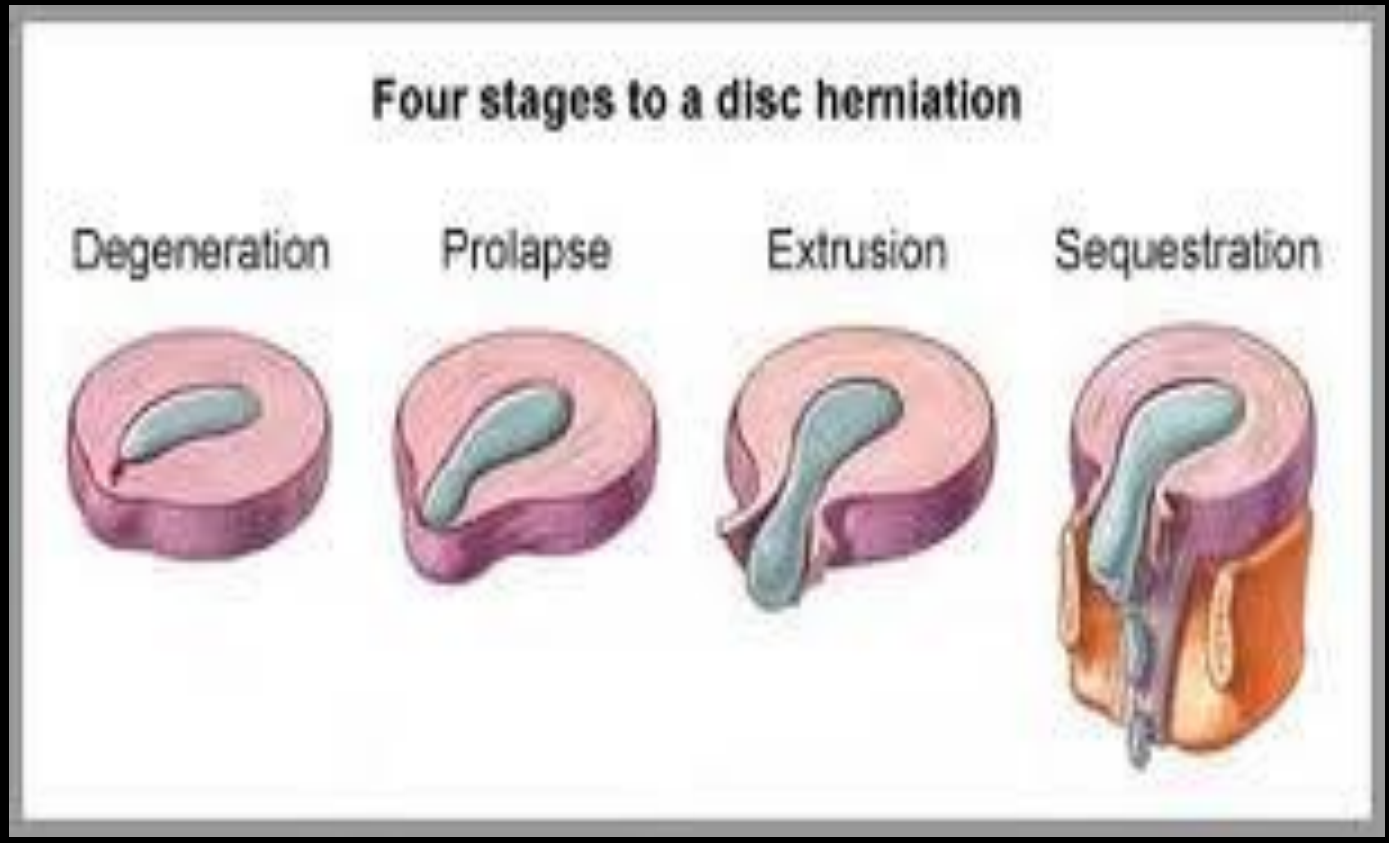
- Disc herniation : devided into

1) protrusion : Herniated fragment doesn't have a neck.
2) Extrusion : herniated fragment has a neck.
3) Sequestration or migration.

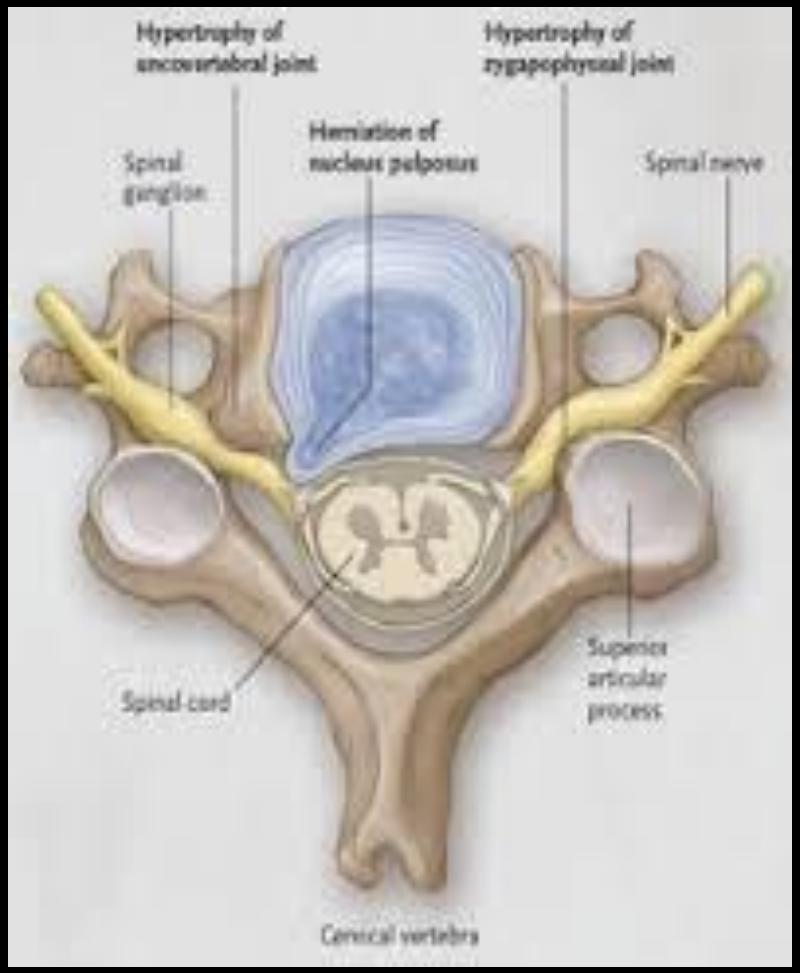

Protrusion
Extrusion

- **Protruded Discs** A disc is "protruded," if the greatest plane, in any direction, between the edges of the disc material beyond the disc space is less than the distance between the edges of the base, when measured in the same plane.

- **Extruded Discs** distance between the edges of the disc material beyond the disc space is greater than the distance between the edges of the base measured in the same plane


Four stages to a disc herniation
Degeneration
Prolapse
Extrusion
Sequestration


Radiating pain


Hypertrophy of uncovertebral joint
Hypertrophy of zygapophyseal joint
Herniation of nucleus pulposus
Spinal ganglion
Spinal nerve
Spinal cord
Superior articular process
Cervical vertebra

Clinical presentation

- Symptom:

1) back pain

   increase : standing and walking.

   decrease : flexing knee and thigh.

   positive cough effect: 87%

2) Sciatica : radiation of pain into the leg.
3) Dermatomal parasethesia and numbness.
4) Myotomal weakness.
5) Bladder symptom : voiding dysfunction 1-18%

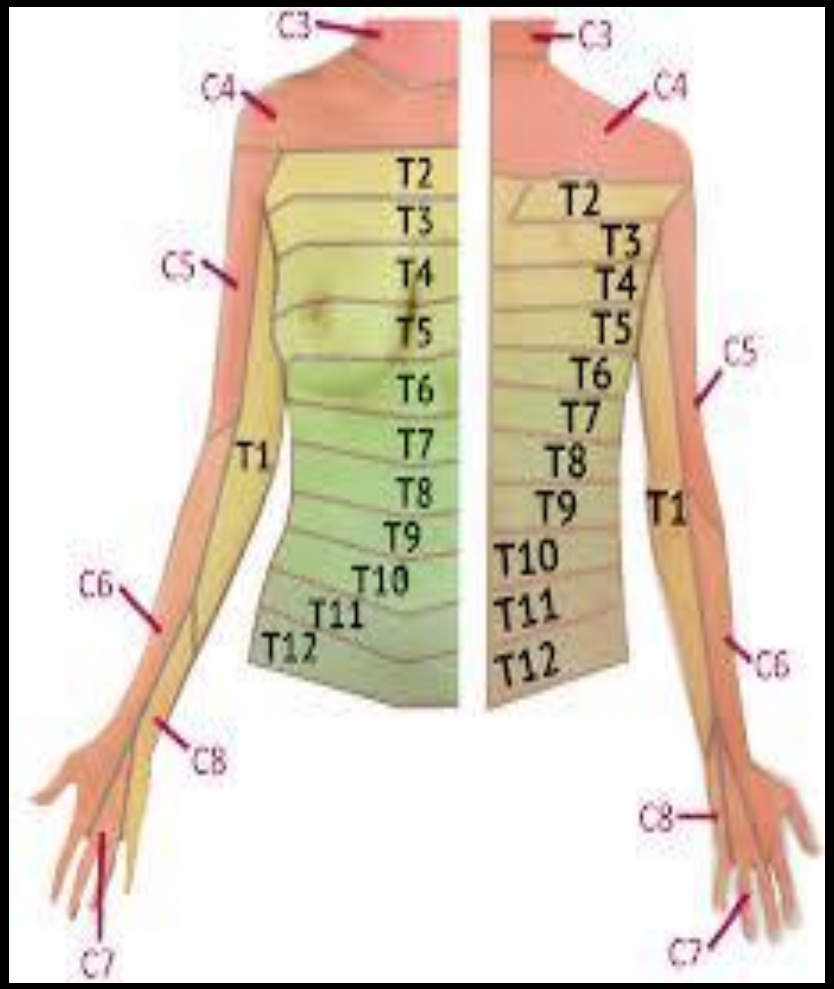
Earliest finding: reduced bladder sensation.

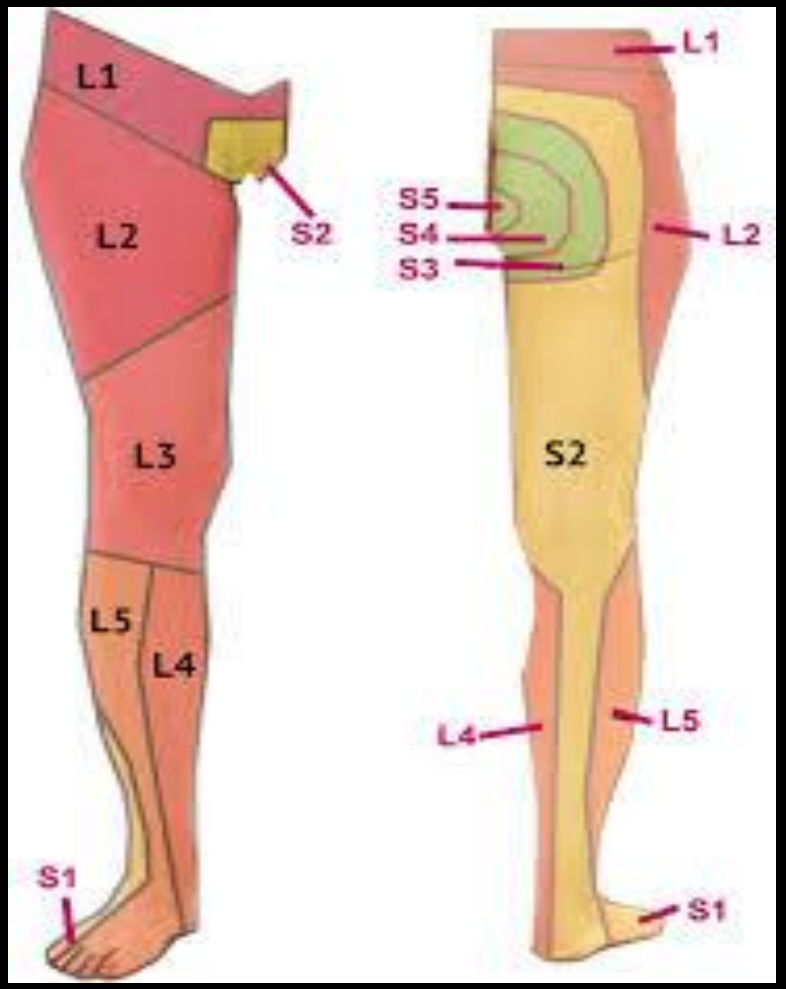
Later may advance into retention and overflow incontinence.

Physical finding

	L3-L4(L4)	L4-L5(L5)	L5-S1(S1)
%lumbar disc	3-10%	40-45%	45-50%
Reflex diminished	Knee jerk		Ankle jerk
Motor weakness	Knee extension	Tibial ant & EHL	Plantar flexion & EHL
Decease sensation	Medial foot	Large toe web +dorsum of foot	Lateral foot

Dermatome Map





Lumbar canal stenosis

- Congenital : primary canal stenosis.
- Acquired : multifactorial

  collapsed level puckling of ligamentum flavum

  ligamentous hypertrophy

  facet joint hypertrophy

  disc herniation

  osteophyte formation

  spondylolesthesis.
- classical presentation is : neurogenic claudication .
- needs to be differentiated from vascular claudication .
- Treated by surgical decompression with or without fixation depending on the stability of the spine .

Spondylolesthesis

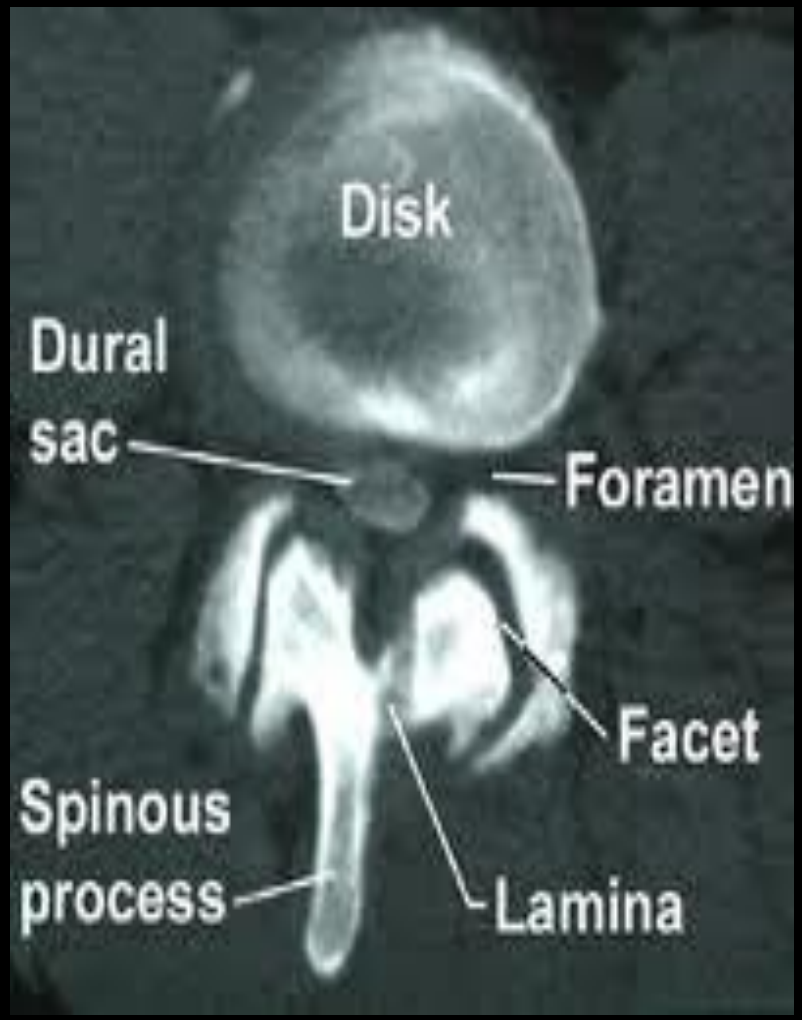
- Slippage of one vertebral body forward over the lower vertebral body.
- can be congenital or acquired.
- Slippage posteriorly is called Retrolesthesis .
- it can cause what is called (pseudo – disc) .
- Causes back pain mainly but may cause sciatica or claudication due to the narrowing of the canal or the intervertebral foramina.
- Devided into 4 grades according to severity of slippage.
- Treated conservatively with bracing (lumbosacral built)
- Treated surgically by fixation.

Cauda Equina Syndrome

- Acute compression of the cauda equina .
- Causes weakness in one or both lower limbs with incontinence .
- They classically present with lower limb weakness and urine retention.
- On examination they have saddle paraesthesia or perineal numbness .
- Top emergency and surgery best be done within the 1st 6 hours , up to 48 hours , beyond which no patients retain function .
- Post surgery need rehabilitation including urodynamics and bladder exercises .
- Incontinence tend to improve last .

Imaging

- X Rays : AP & LATERAL
- CT scan : superior in showing bone
  - Trauma
    - fractures
  - Bony changes
    - decreased hieght
    - end plate irregularity
    - facet joint hypertrophy
    - osteophytes
    - spondylolesthesis
  - Soft tissue
    - less sensitive than MRI and much lower specificity

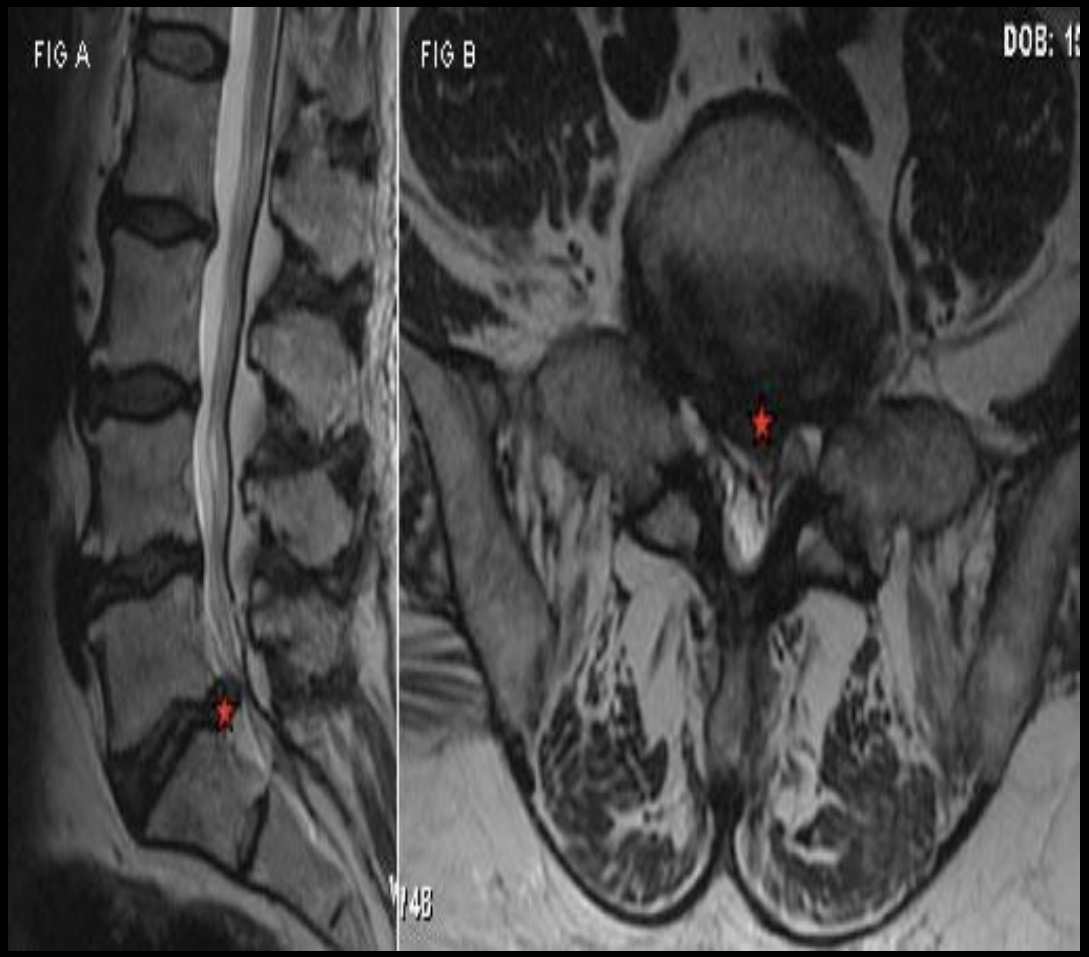

Disk
Dural sac
Foramen
Facet
Spinous process
Lamina


Burst Fracture at L2
L1
Fracture
L2
L3
L4
L5
Sacrum
VirtualMedStudent.com


35 %

Imaging

- MRI:
  - Axial view:demonstrate the relationship of the disc herniation to the midline and the neural foramen
  - Saggital view: demonstrate extension of disc upward or downward
  - Visualization of conus and cauda equina to exclude of neoplasma.




T12
L1
L2
L3
L4
L5
S1
Spinal Canal
(nerves with spinal fluid)
Discs
Spinous Processes
(the bumps you feel down the middle of your back)


TSE1
TR 4000
TE 91
Pos


normal
disc
bulging
degenerative
disc
vertebra
herniated
disc
© Mayfield Clinic

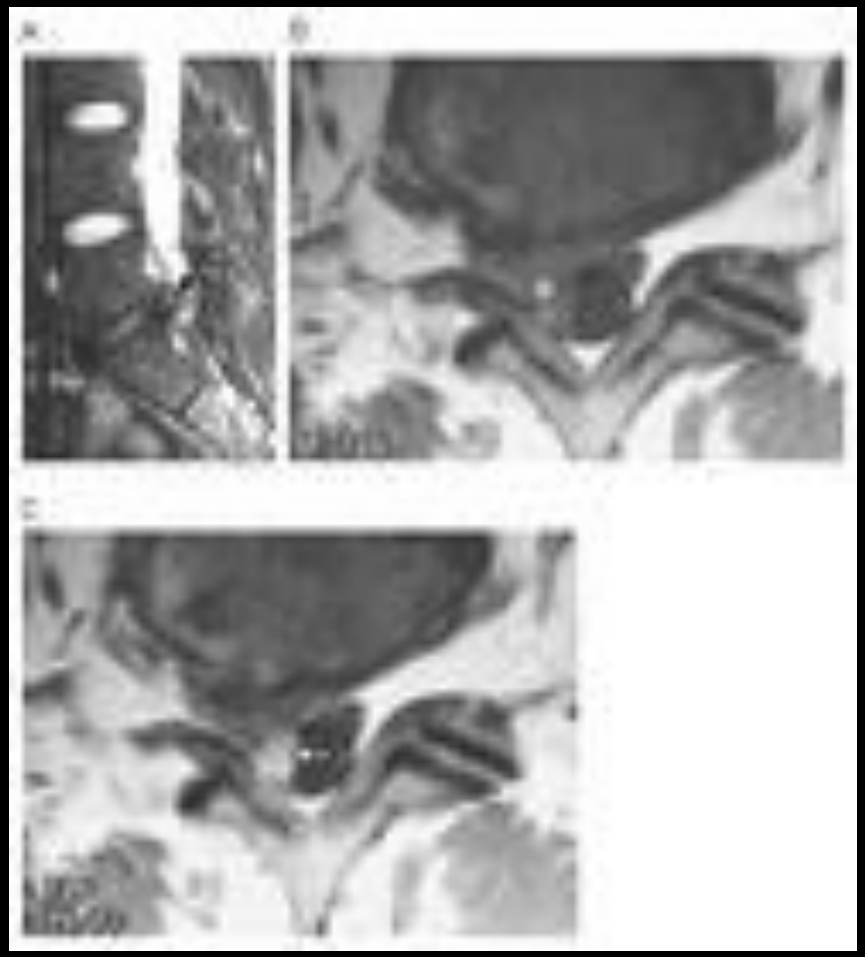
Lumbar MRI showing Spondylolysthesis at L4-5 level.

- **Myelography :**

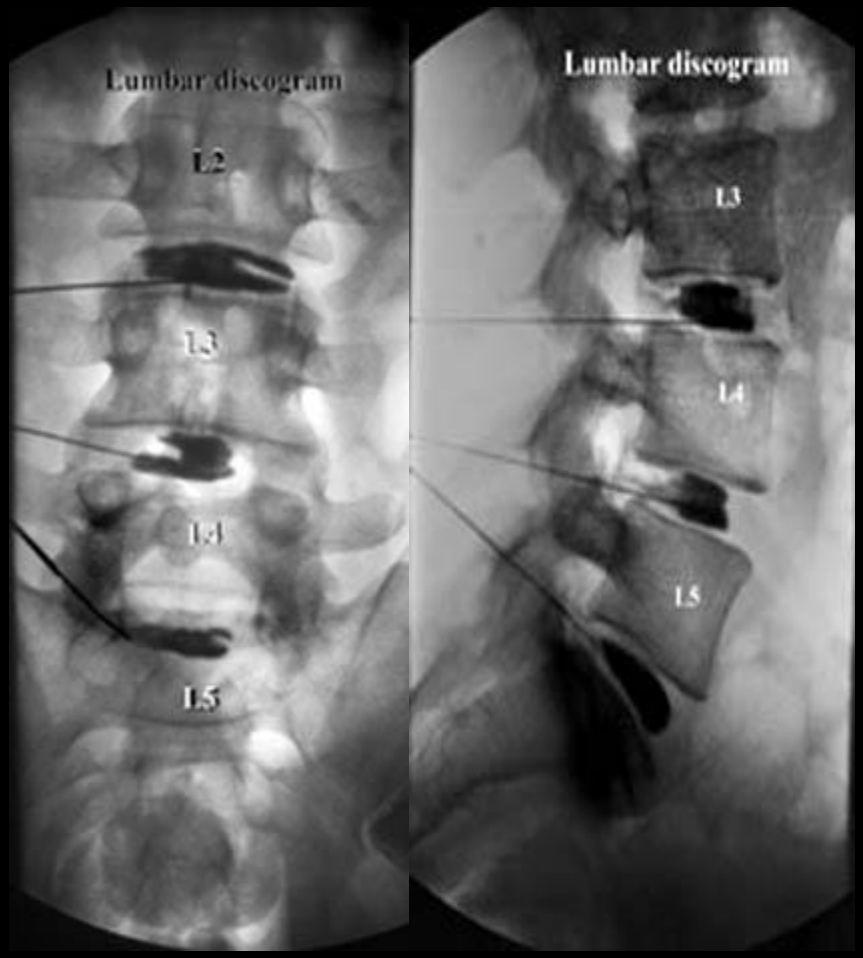
1-used in patient with equivocal findings on MRI or

2-in whom there may be a significant element of lateral recess stenosis.

3- to better define the anatomy.



- **Discography** :
- Doesn't provide better information than MRI in case of nerve root compromise.



Management

- Non surgical management

1) Bed rest for 2 to 4 days.

2) Analgesia , muscle relaxants , NSAIDs

3) Physiotherapy

4) Injections

Epidural

Foraminal

Facet

Surgical treatment

- Indication for surgery;

1) in patient with < 4-8 wk duration of symptom:

A- cauda equina syndrome or progressive weakness.

B- intractable pain.

2) in patient with > 4-8 wk duration of sciatica that are both sever and disabling and are not improving with time with radiolological finding that correlate with clinical pictures.

Surgical and non surgical management

- 85% of patient with lumbar disc will improve in average of 6 wk.
- 70% within 4 wk.
- Most advise conservative management for 5 to 8 wk before considering surgery.

Surgical option

I) trans-canal approaches;

A) Standard open lumbar laminectomy and disectomy. 65-85% no sciatica after one year compare to 36% for conservative management.

B) Microdisectomy.

2) Intradiscal procedures;

A) chemonucleolysis.

B) automated percutaneous lumbar disectomy.

C) percutaneous endocopic disectomy.

D) intradiscalendothermal therapy.

E) laser disc decompression.

Outcome

- 85 % of patients have satisfactory improvement .
- Laminectomy is widely abandoned unless specifically indicated .
- Interlaminar microscopic discectomy is nowadays predominating the surgical options for disc surgery .
- Open microscopic approach has proven less recurrence .

Key points

- Back pain is the most common cause of disability in patients < 45 yrs of age .
- 85 % of patients with back pain , no specific diagnosis .
- 80 – 90 % of patients with back pain improve within one month without surgery .
- 80 % of sciatica improve without surgery .
- Bed rest more than 4 days can be harmful to the patient rather than helpful .
- NSAIDs are not only analgesics they have a curative role .
- Microscopic surgery nowadays has made disc surgery very safe with excellent outcome .
- Special attention to the Red Flags of the spine.
- Cauda equina is an emergency .

Thank you