

Lumbar Disc Prolapse

By

**Dr. Ahmed Salah Eldin
Hassan**

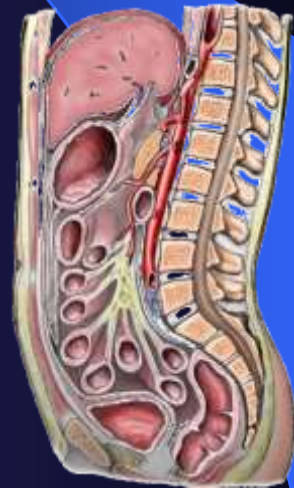
Professor of Neurosurgery

&

Consultant spinal surgeon

1-What are the Functions of the Spine

- **Structural support for upright posture**
- Protection of Spinal cord and nerve roots

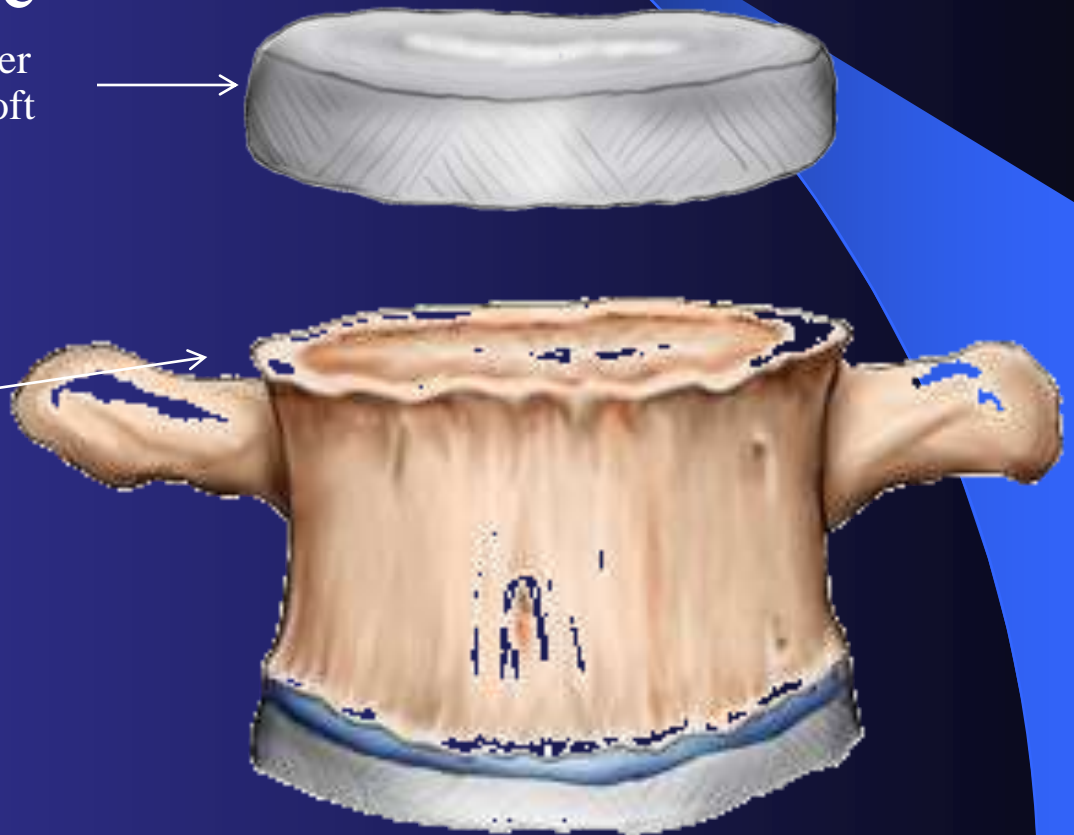


2-What is the structure of the disc

- Intervertebral Disc

- Consists of outer strong fibrous layer **ANNULUS FIBROUS** and inner soft content **NUCLEUS PULPOSUS**

— **Bony**



Intervertebral Disc Explained

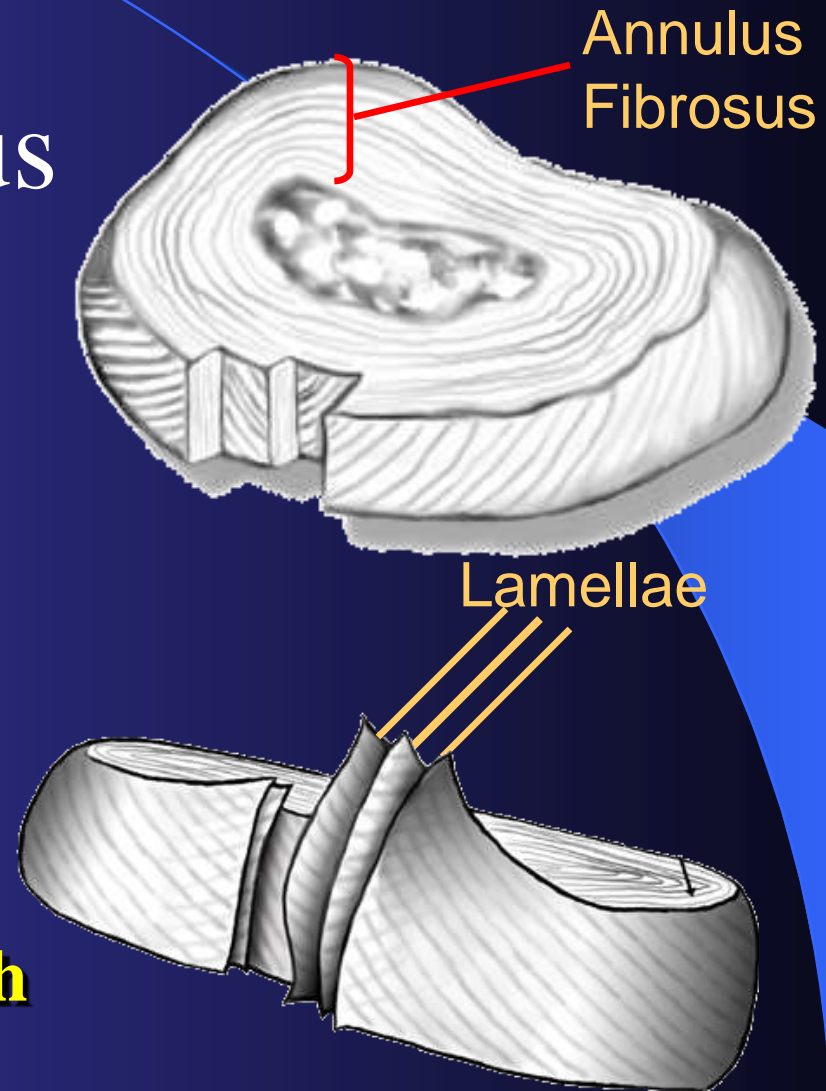
- **Annulus Fibrosus**

It is the Outer portion of the disc

- Made up of lamellae of collagen fibers

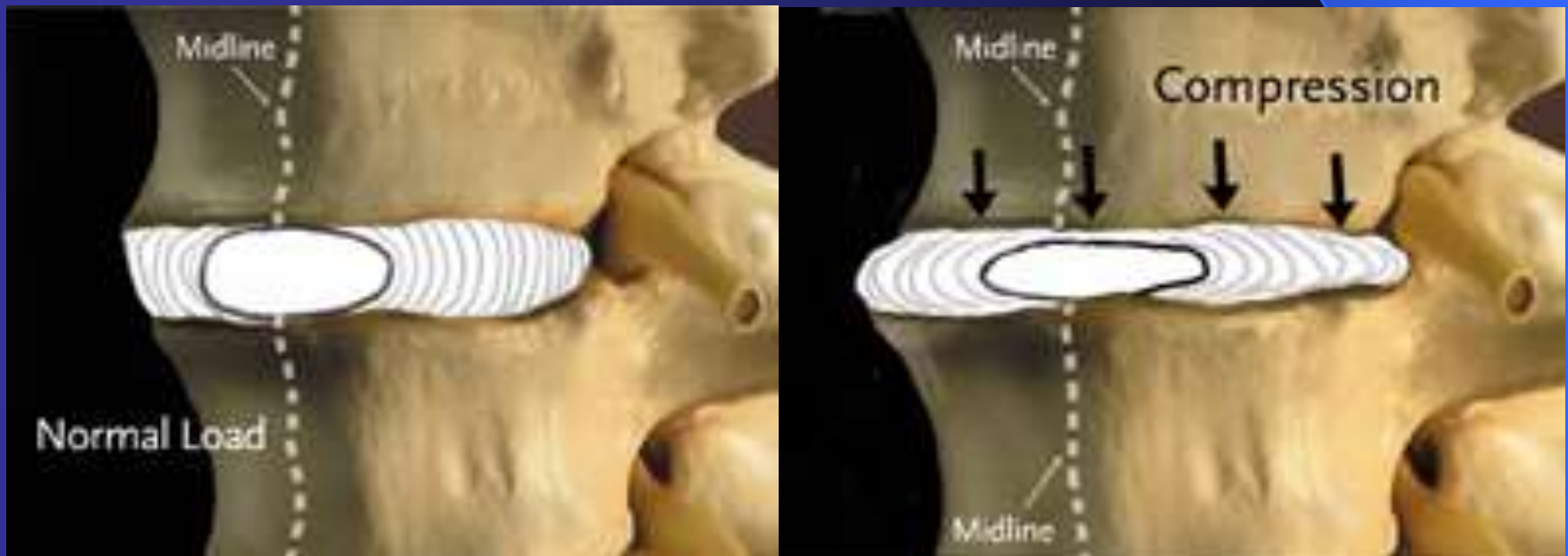
- Arranged obliquely 30°
- Reversed contiguous layers

- **Has great tensile strength**



3-What is the function of the disc

- Strongly attaches the vertebra above to vertebra below
- Evenly distributes the pressure exerted by body weight all over the vertebra below



What happens when Intervertebral Disc Degenerative Change occur (natural process with time)

With age:

- 95% of people show lumbar disc degeneration
- Not all have symptoms

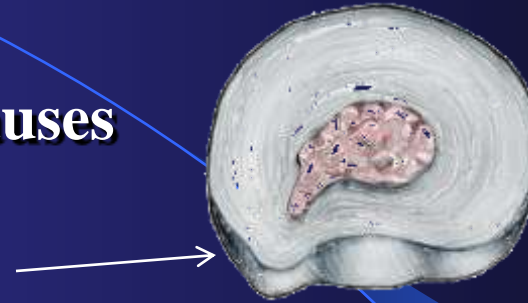
● Degeneration results in :

- Tears in the annulus fibrosus
- Disc bulges * herniation * sequestration

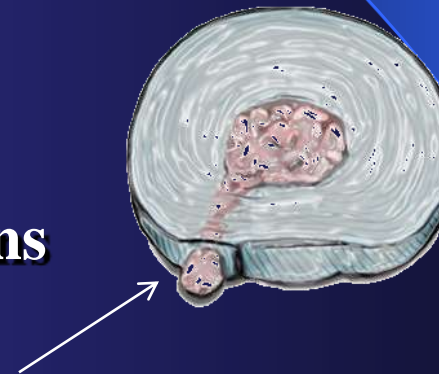
See figure next slide

Herniated Disc: 3 degrees

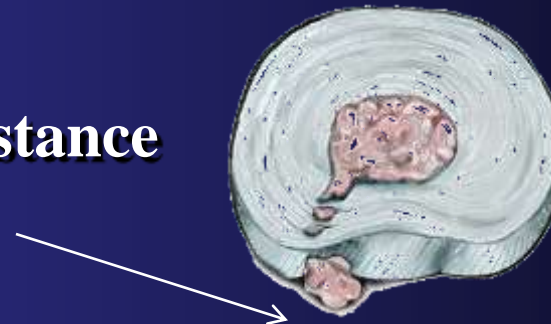
- **Disc bulge:** ruptured nucleus causes outer fibers to bulge



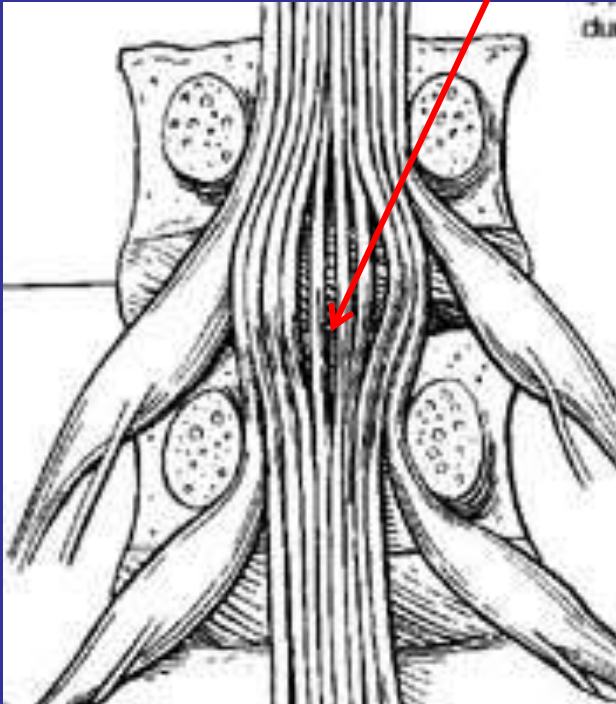
- **Disc herniation:** Complete split in annulus. Material leaks but remains attached to nucleus



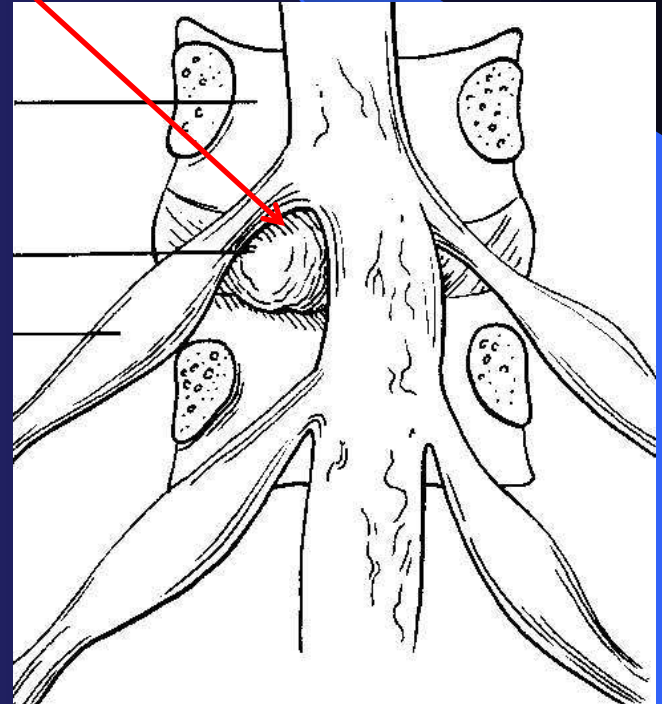
- **Disc Sequesterion:** Leaked substance no longer attached to nucleus



Central



posterolateral



5- What is the Clinical Presentation

Back symptoms

Neurological symptoms and signs

spasm of the spinal muscles
tenderness over the lower
lumbar spine The
spasm may produce a scoliosis.
Limitation of

Sensory- Motor - sphincters

See next slides for details

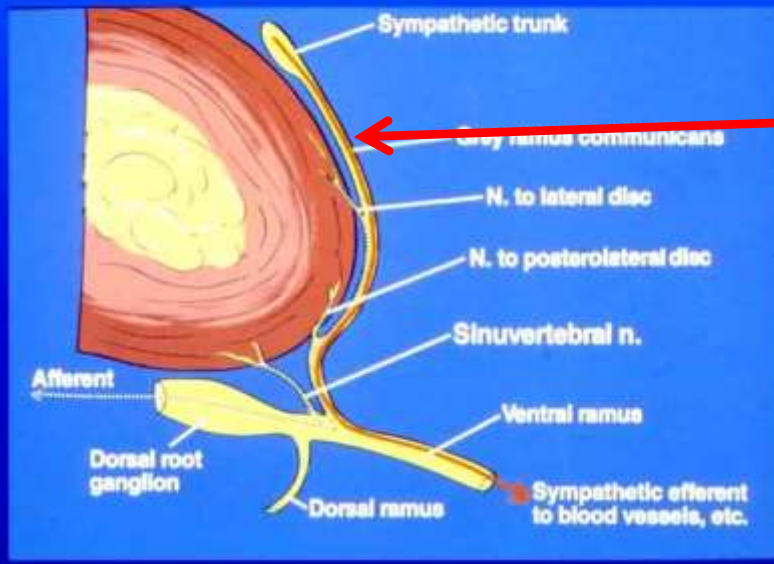
5-Clinical Presentation Cont.

Back pain

caused by:

- stimulation of the **pain fibers** in the outer layers of the annulus fibrosus.
- stretch of the posterior longitudinal ligament, which is richly innervated by pain fibers, may result in back pain

But is it painful?



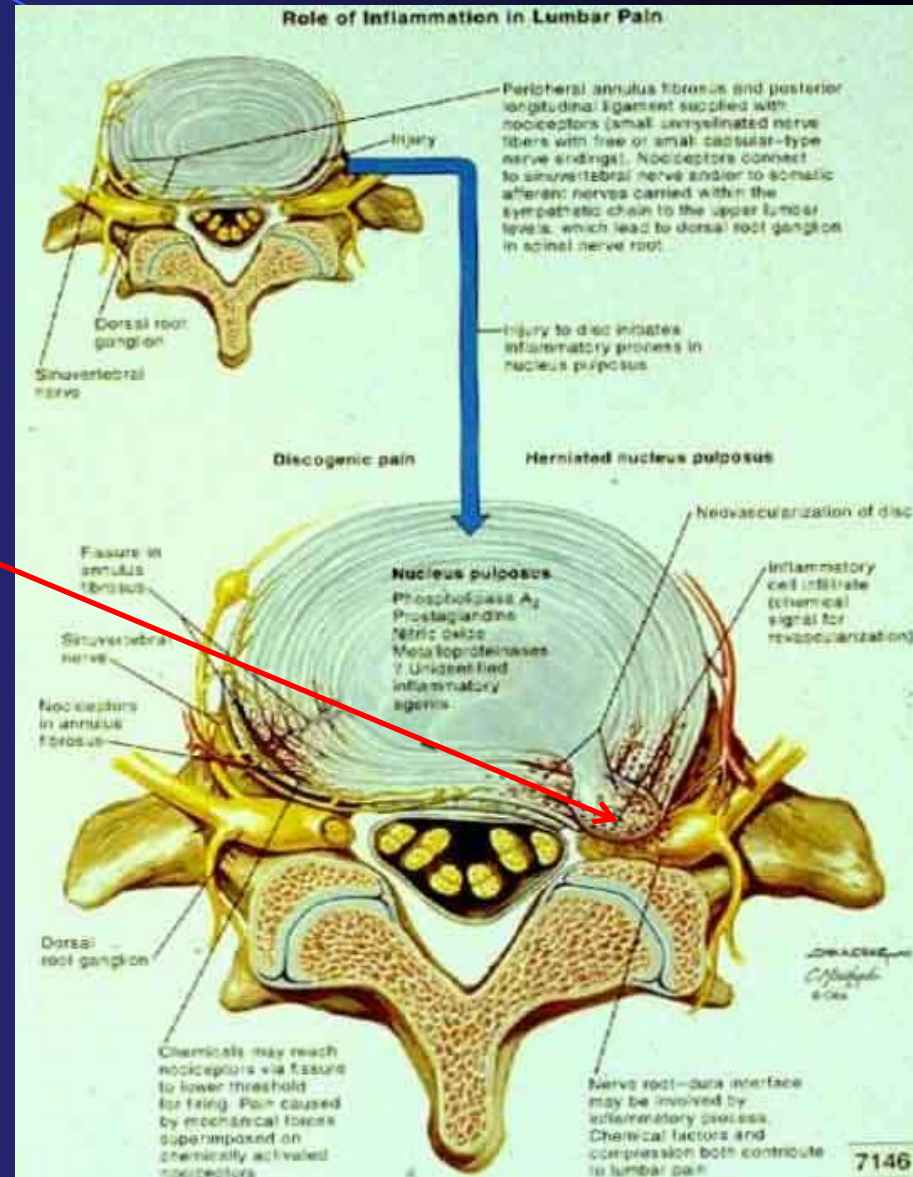
5-Clinical Presentation (cont.)

Neurological symptoms

A- Sensory

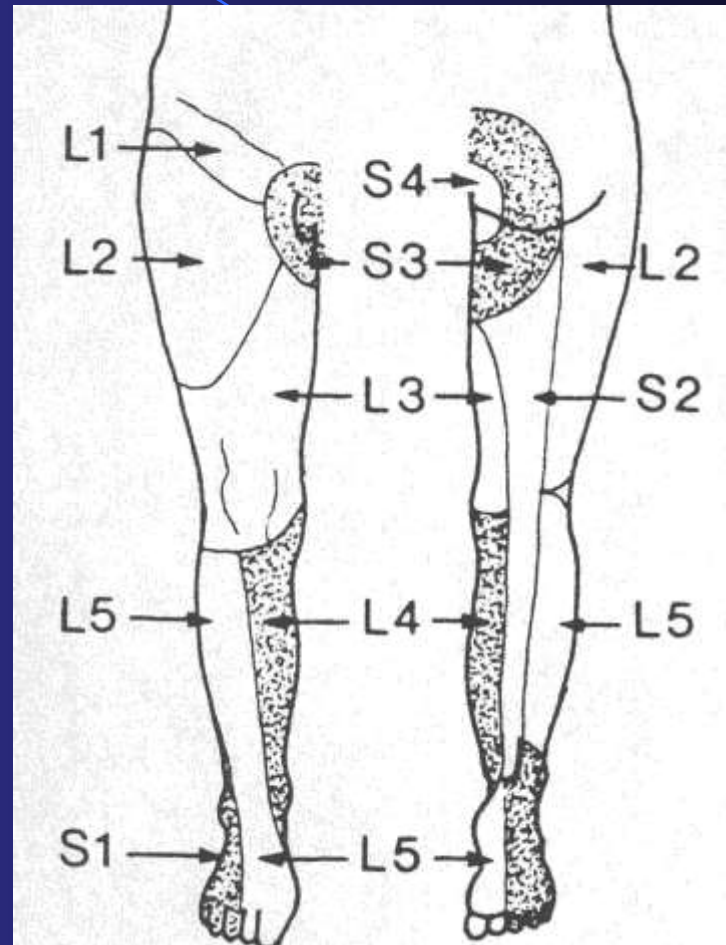
Leg pain (sciatica)

- Results from compression of a nerve root
- Sharp electric like pain
- Parasthesia , eg numbness
- Hyposthesia, anasthesia



5-Clinical Presentation cont.

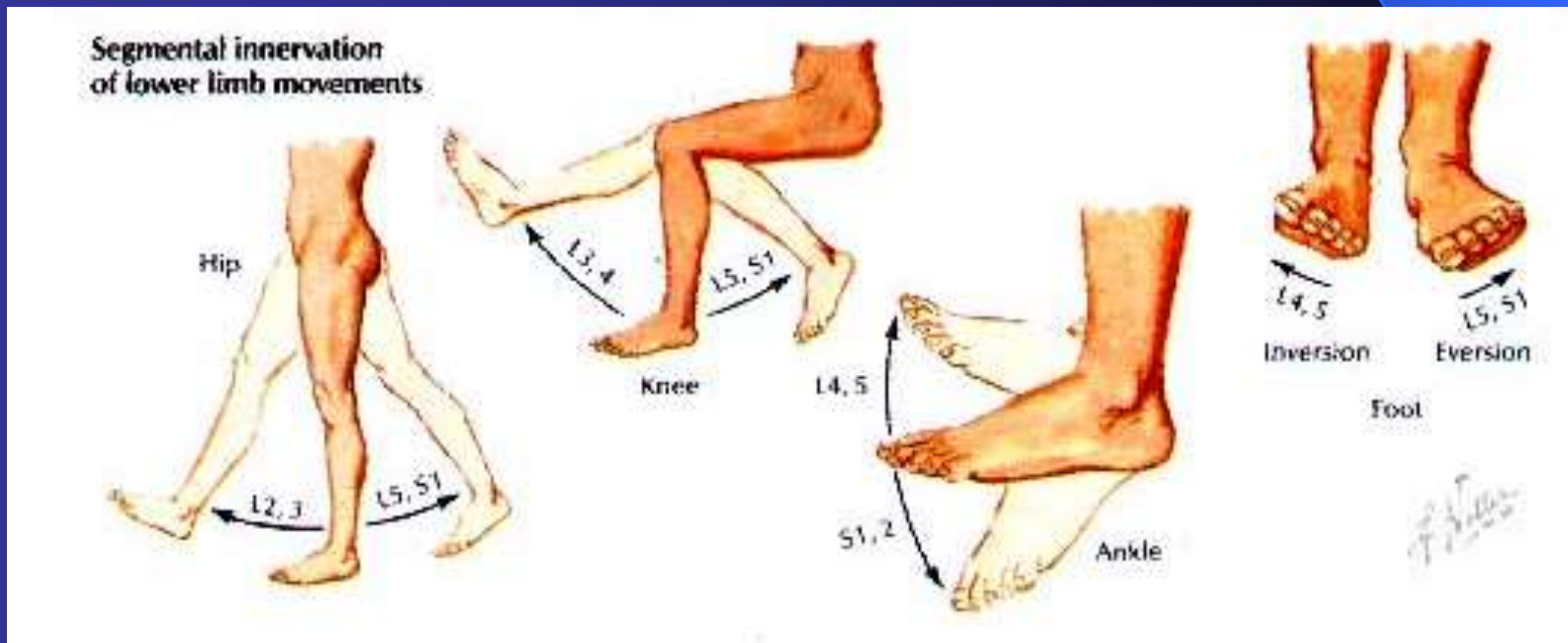
- **Sciatica has specific dermatomes based on which root is compressed**



5-Clinical Presentation (cont)

2- Motor affection:

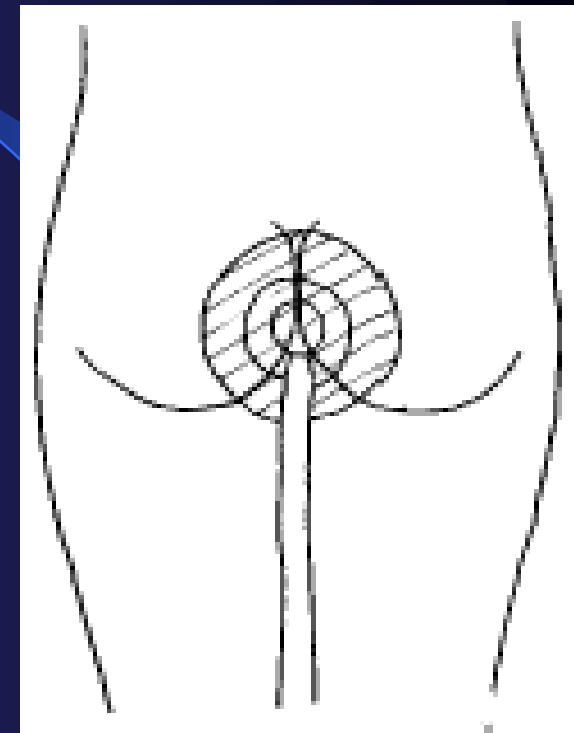
- Weakness of affected muscle
- It may be associated with neurological signs such as waisting, hypotonia and hyporeflexia.



5-Clinical Presentation (cont)

3- Sphincteric affection (cauda equina) see next slide

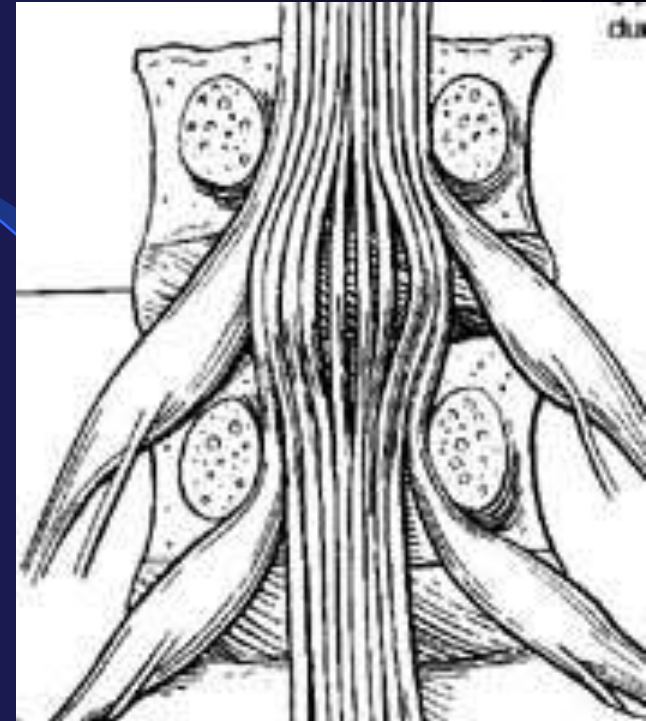
- It can occur due to compression on the cauda equina by large central discs at any level
- leads to urinary retention.
- On examination there is usually perianal numbness and a patulous anus.
- Emergency decompression is essential to avoid permanent damage to sphincter innervation.



Central disc
protrusion

Central disc protrusion

- Following a central disc protrusion, which can occur without an antecedent history of back pain, **cauda equina compression** occurs, often in an abrupt fashion.
- Severe pain results, with paravertebral localization or with radiation into both lower limbs.
- Typically, there is **severe distal lower limb weakness** with foot drop, depression of the ankle reflexes and **impaired sphincter function**. **Saddle anaesthesia** is common.



6- special clinical tests and examinations to confirm diagnosis

- Reflex examination (ankle jerk and knee jerk)
- Straight leg raising test
- Femoral stretch test

Straight-leg raising

Straight-leg raising is performed by gently elevating the outstretched leg from the horizontal with the patient lying supine. The degree of movement is recorded.

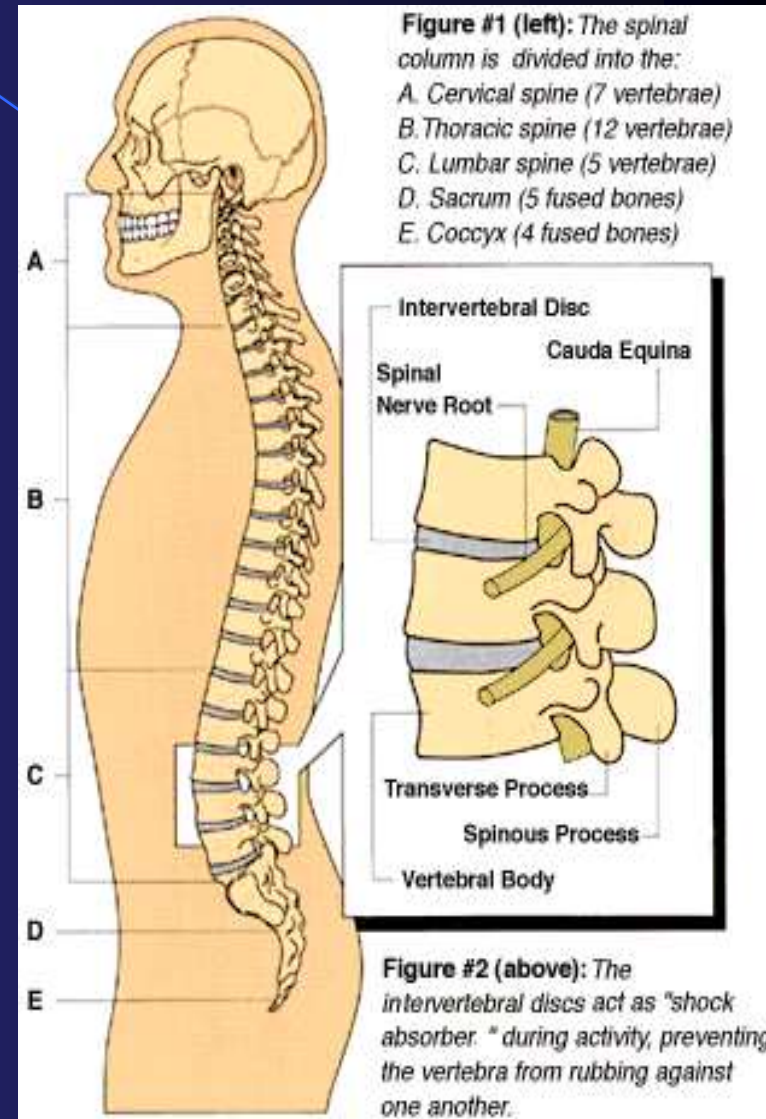
The most specific sign for lumbar disc herniation is a contralaterally positive straight leg raising examination, also called cross-leg test.

A **femoral stretch test** usually indicates a disc herniation at the L3--L4 level or above.

7- Examples of different levels of lumbar disc prolapse

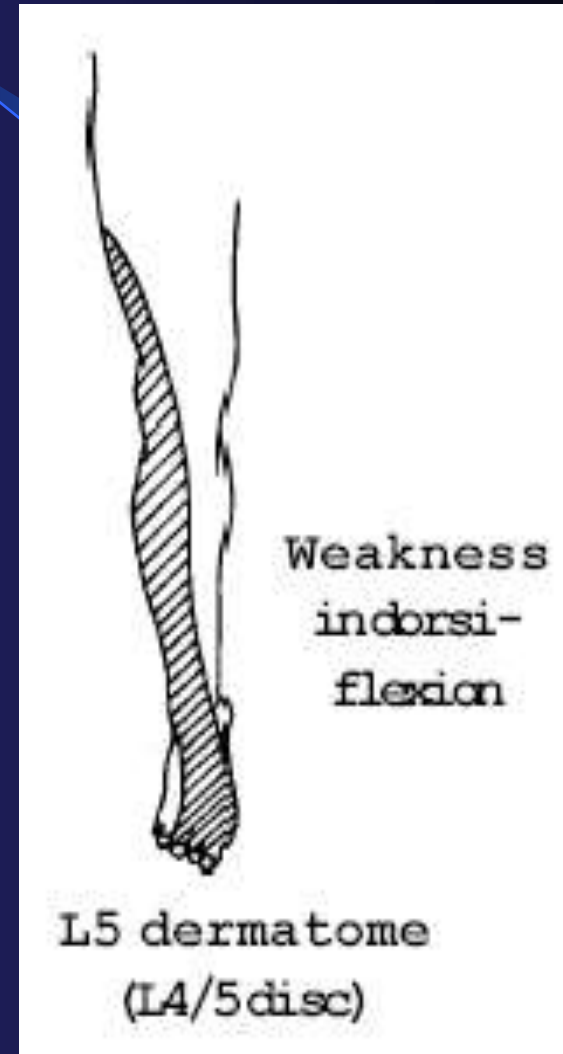
The most common levels are:

L4--L5
&
L5--S1.

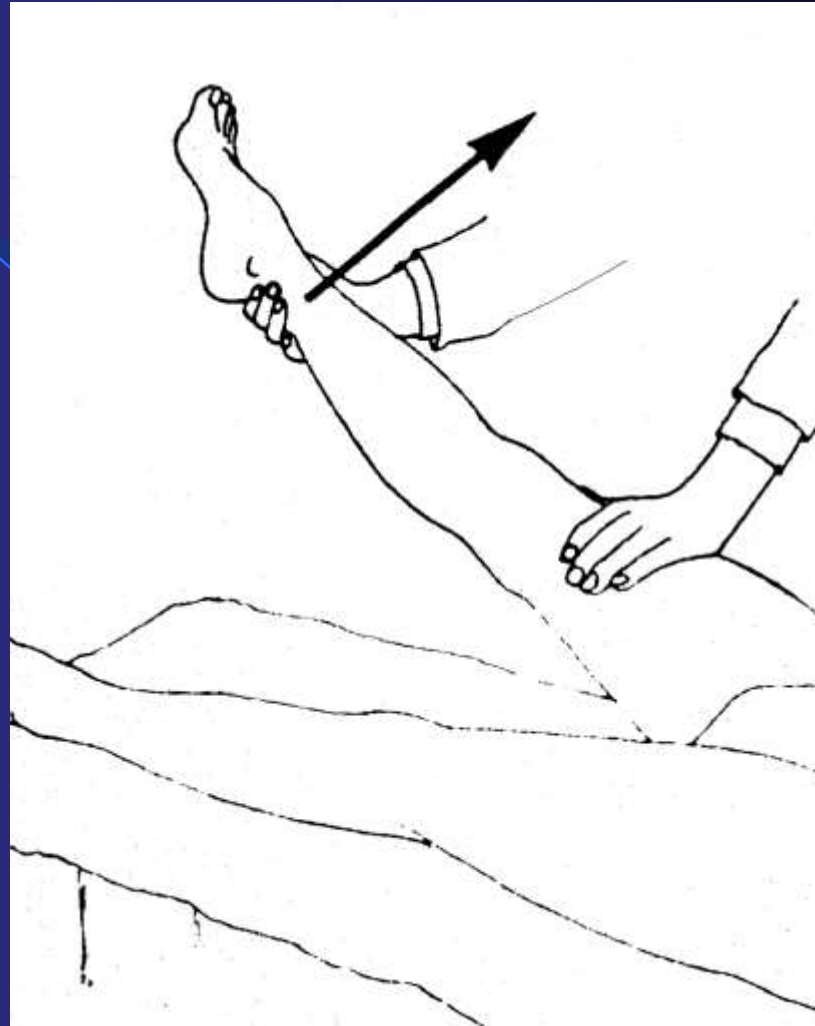


Example : Protrusion of the L4/5 disc

- **cause L5 root compression**
- **pain radiating down the leg to the dorsum of the foot.**
- **There may be numbness on the outer side of the calf and medial two-thirds of the dorsum of the foot**
- **Weakness if present affects of dorsiflexion, particularly of the foot and toes.**

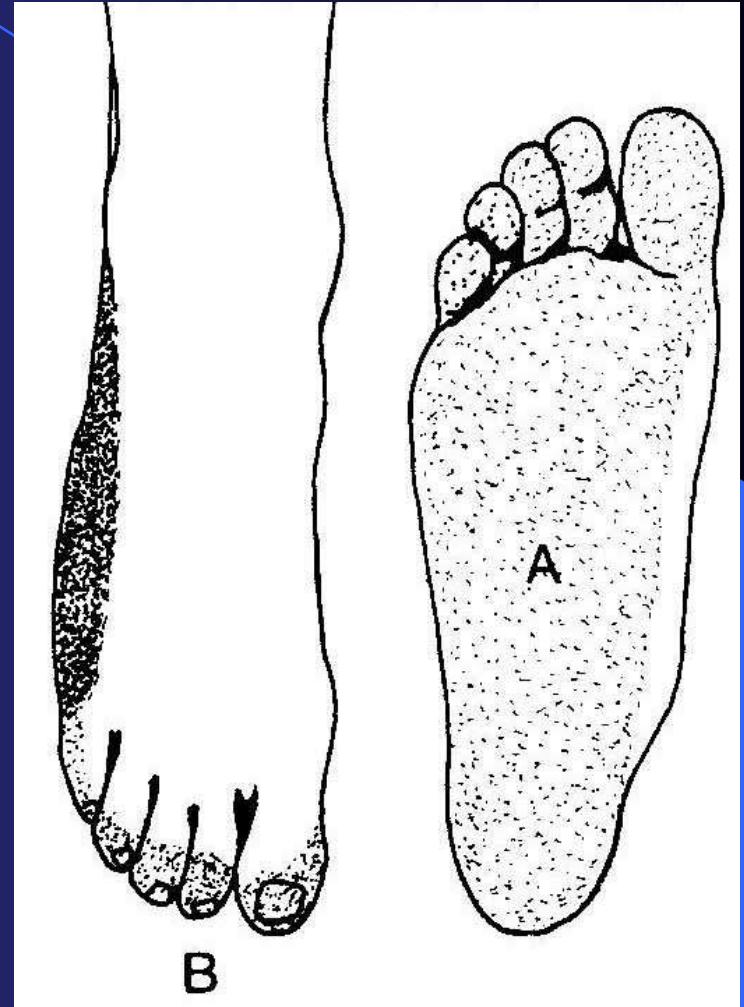


- Straight leg raising: +ve



Example Protrusion of the L5/S1 disc

- It will press on the **S1 nerve root**
- lead to pain and numbness *on the outer side of the foot and under side of the heel.*



Protrusion of the L5/S1 disc

- There may be **weakness** of both eversion and plantarflexion of the foot with a diminished or
- absent **ankle jerk**.



8- Investigations (see illustrations in following slides)

- Plain X-rays: not diagnostic (excludes other pathology)
- Myelography (not performed recently except if MRI contraindicated)
- Ct scan (not performed)
- **MRI (gold standard of diagnosis)**
- Bone scan (in suspected tumors or infection)

Plain X-rays

- of **very limited value.**
- **Can rule out** the bony disorders of the lumbar spine, eg. TB, Tumor.
- But cannot diagnose disc problems



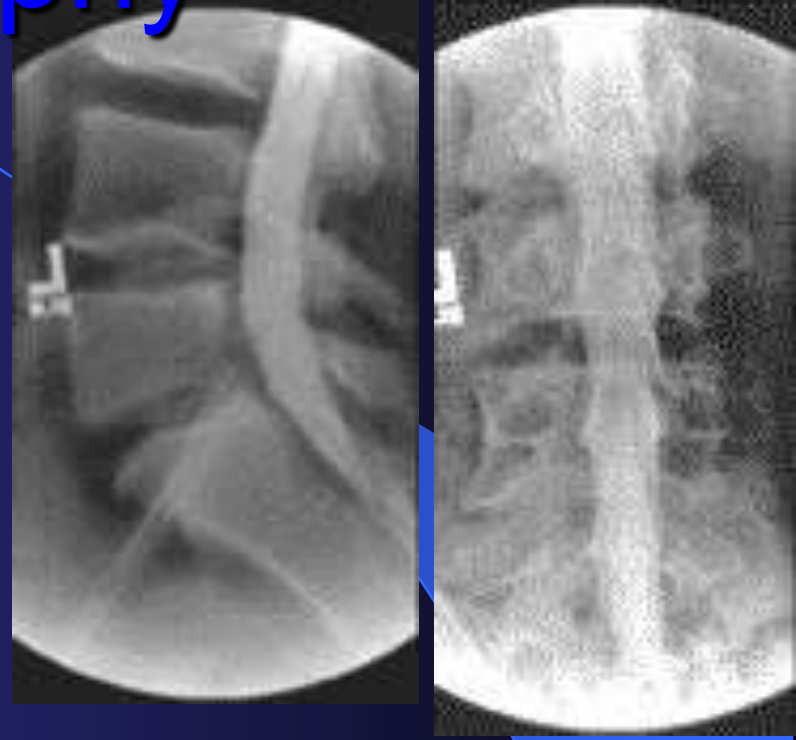
Myelography

Myelography

Rarely used.

Shows filling defect with contrast injection in the spine

- Not used routinely because invasive and MRI has replaced it



Computed Tomography (CT)

Computed Tomography (CT/CAT)

- Not used except if bony details is required eg. In fractures
- Dose not diagnose disc problems accurately



Magnetic Resonance Imaging (MRI)

Magnetic Resonance Imaging (MRI) is gold standard diagnosis

Detect soft tissue pathologies

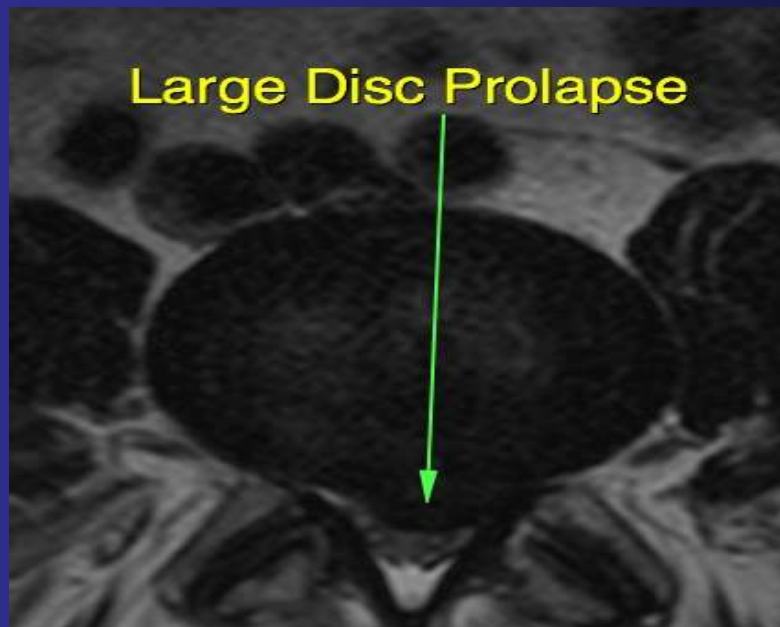
- Coronal, sagittal or axial views
- No radiation



MRI sagittal



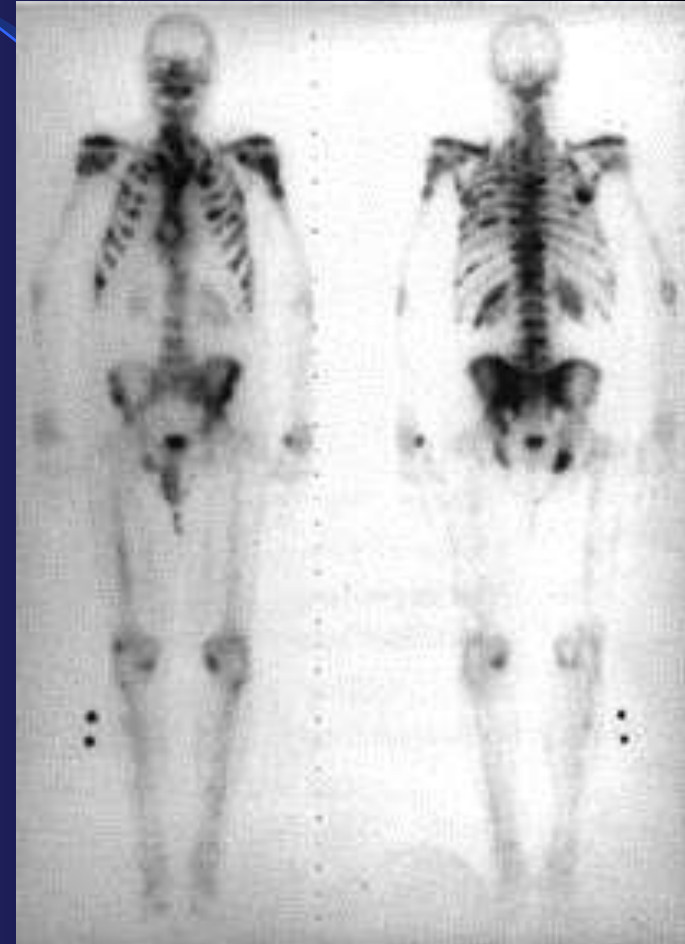
MRI axial



Bone Scan

Bone Scan

- Purpose:
 - Detect inflammation, infection, tumor perfectly
- Not used for detection of lumbar disc problems
- Used if there is doubt or fear of other pathology



Treatment

● Conservative TTT

- Suppress pain until tolerance to pain occurs
- 3-4 weeks
- For all patients except those with weakness or cauda equina syndrome

Surgical TTT

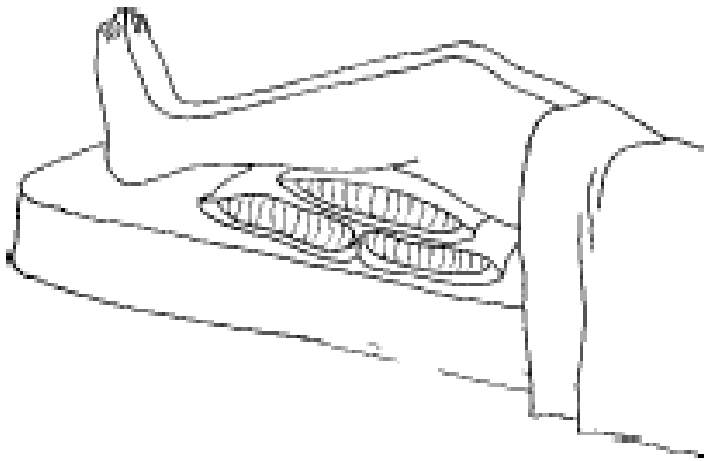
- For Patients with cauda equina or profound weakness from the start
- Failed conservative treatment

Treatment

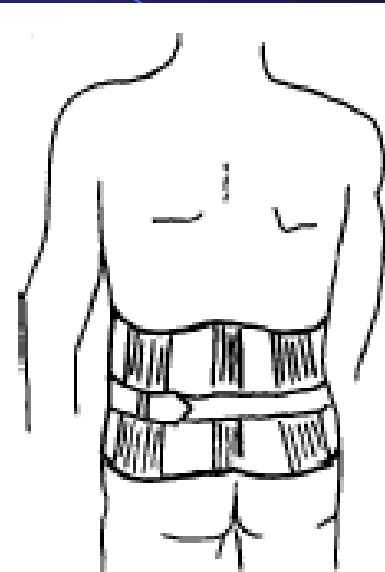
Conservative treatment

- Analgesics
- Muscle relaxants
- Antiepileptics
- and non-steroidal anti-inflammatory medication,
- bed rest 3-4
- Weight reduction
- Physiotherapy
- Lumbar support
- exercise program to strengthen the back muscles after improvement.

Conservative treatment (summary)



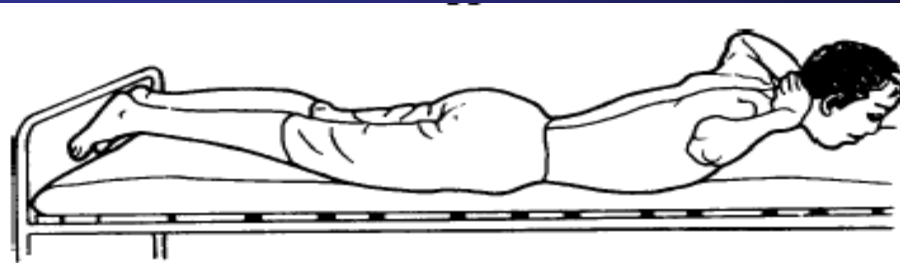
Bed rest and
supports



Lumbar corset



Heat



Spinal exercises

Surgical intervention

- **The key to good results in disc surgery is appropriate patient selection.**
- **This should allow a thorough evaluation to confirm the diagnosis, level of involvement, and the physical and psychological status of patient.**

Indications of surgery:

1. Failed conservative treatment
2. Cauda equina syndrome
3. Profound weakness
4. Recurrence of pain after successful treatment



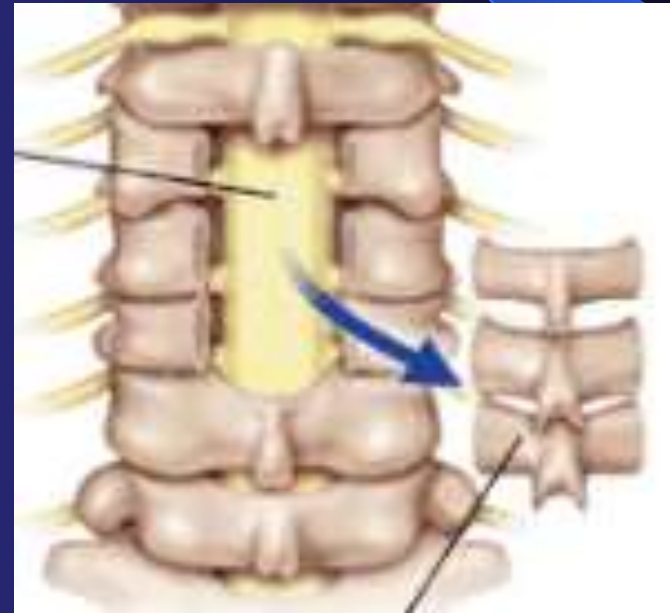
Surgical treatment (types illustrated in further slides)

- Aim of surgery is: decompression of the pinched nerve root
- Types of surgery only varies in amount of exposure, however with the same aim.
 - Open surgery : laminectomy
 - Microscopic aided : microdiscectomy
 - Endoscopic aided: endoscopic discectomy
 - Procedure done from inbetween lamin : interlaminar
 - Procedure done by partial laminectomy: hemilaminectomy

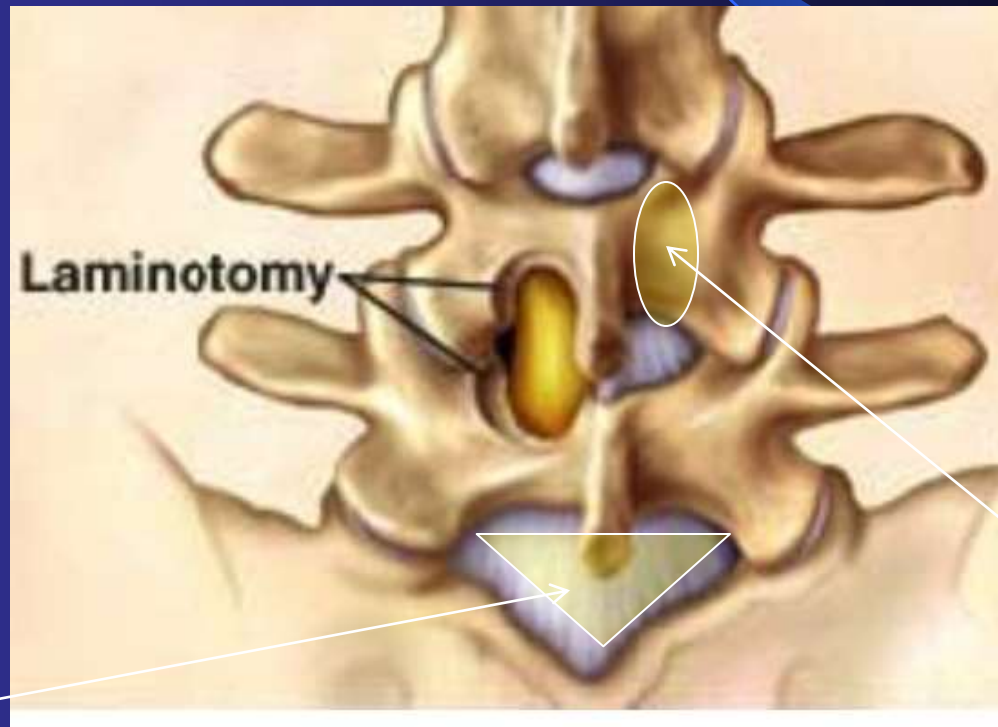
Lumbar laminectomy

Laminectomy:

- involves complete removal of lamina
- More suitable for patients associated with canal stenosis.
- May be important in migrated disc fragments.



- **Hemilaminectomy**: if full lamina on one side is removed
- **Laminar Fenestration** : if part of lamina on one side is removed as shown in diagram



Lamina

Interlaminar: if no lamina is removed but only the ligamentum flavum is removed between the laminae

MicroEndoscopic Discectomy (MED)

**"Midline Endoscopic Device for Spinal
Surgery"** by Dr. Kevin Foley in 4th
INTERNATIONAL MEETING ON
ADVANCED SPINE TECHNIQUES
held at the Sonesta Beach Resort in
Bermuda on July 10-13, 1997.

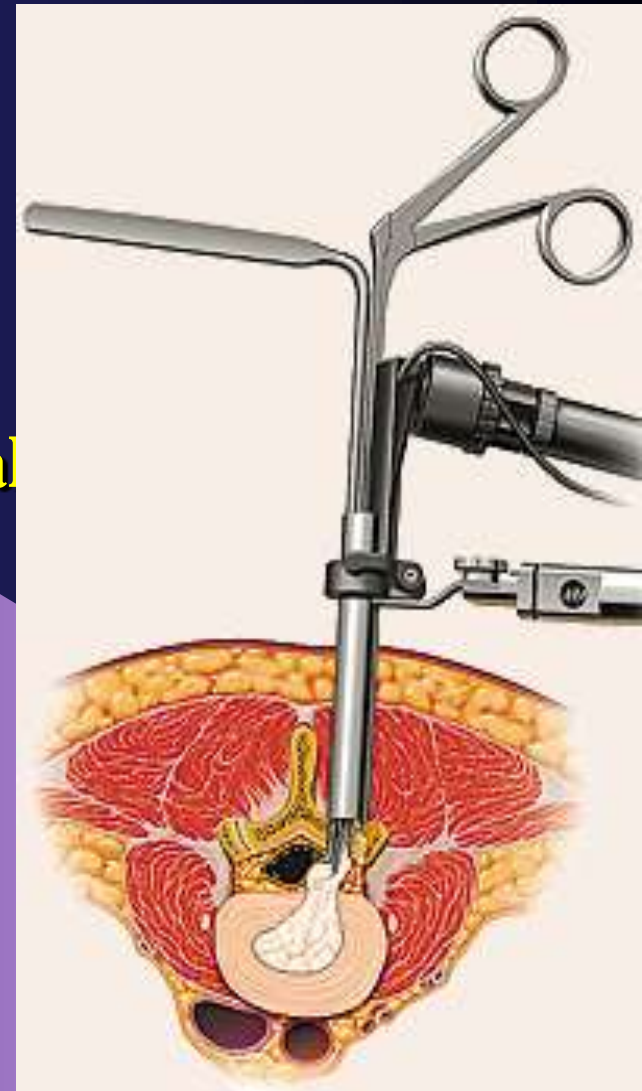


Illustration for endoscopic discectomy

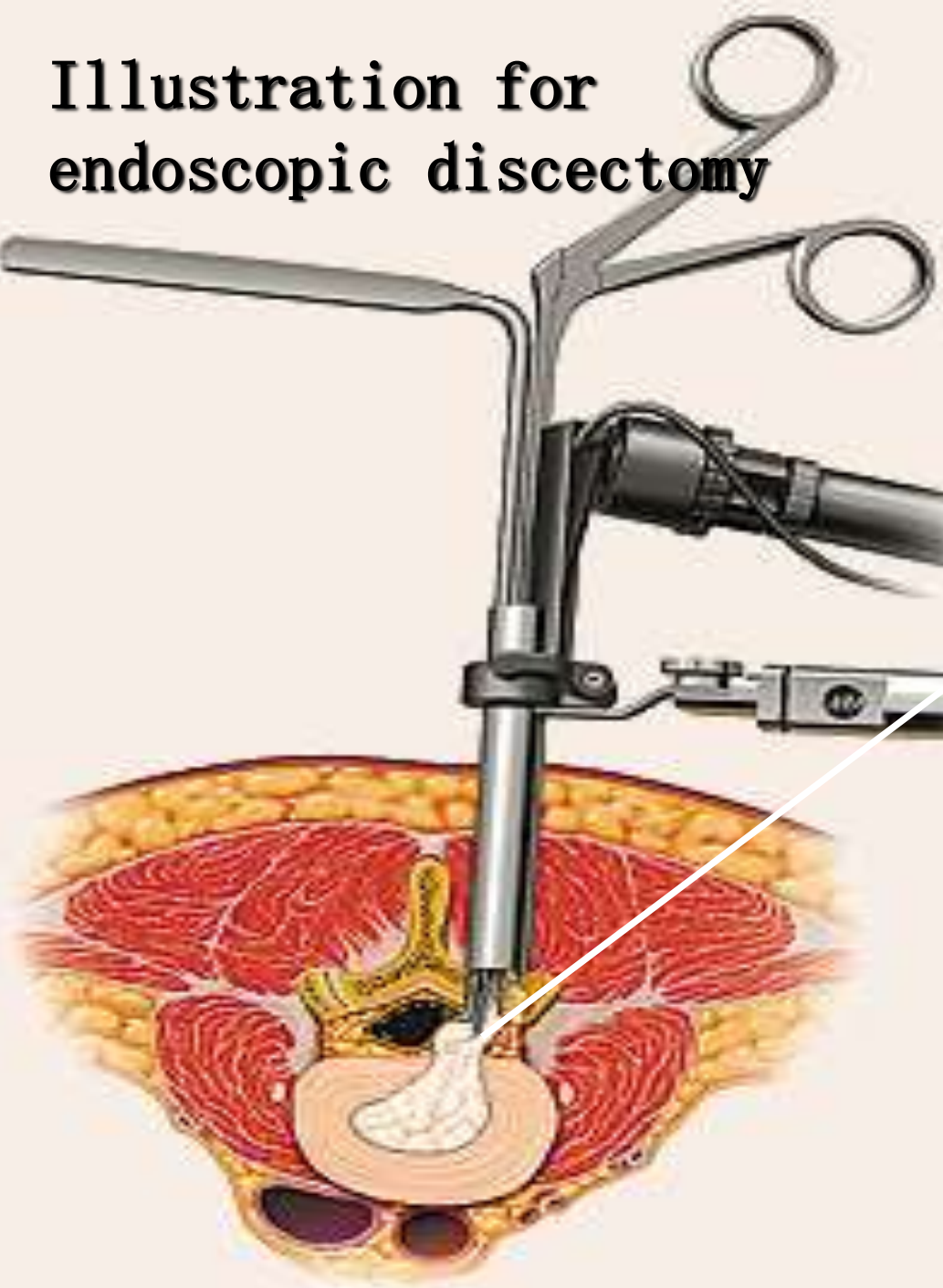
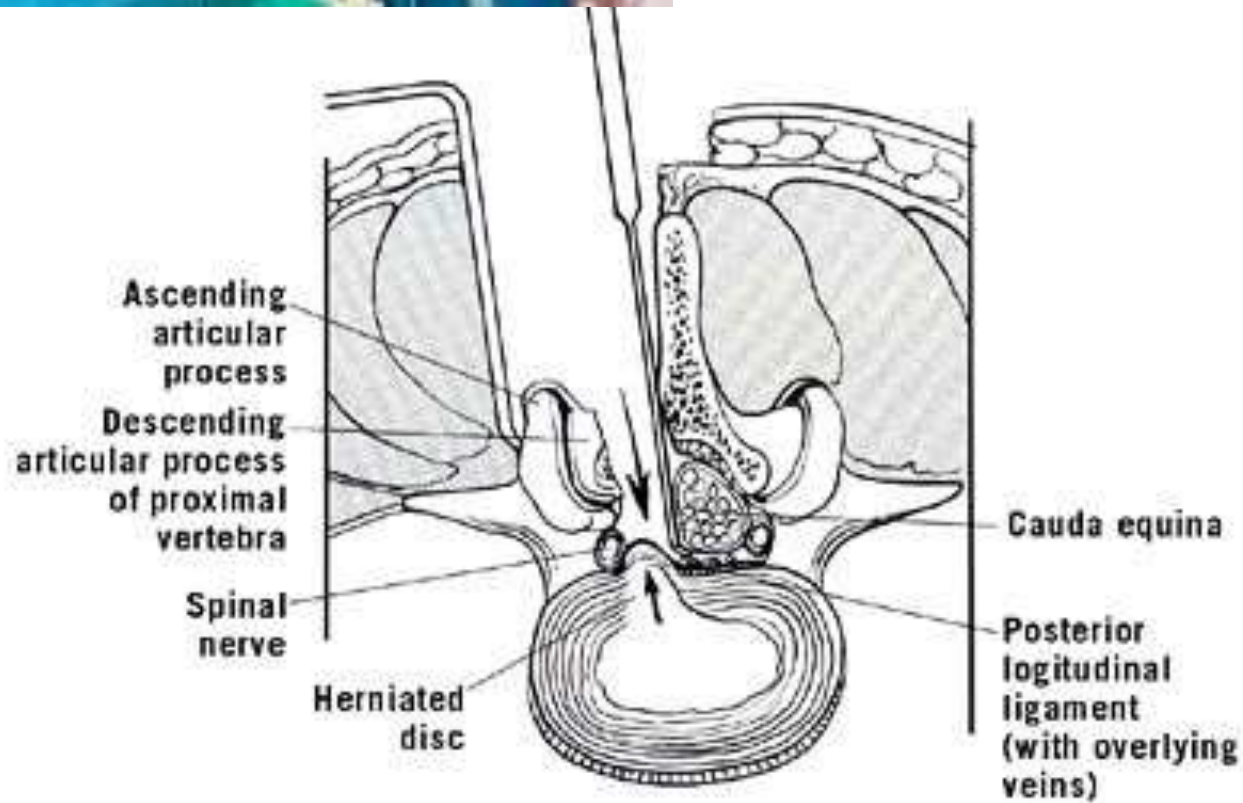


Illustration for microscopic discectomy



Chemoneuclolysis:

- Injection of *chemopapain*, a chemical substance able of desolving the nucleus puplposus followed by aspiration.
- Procedure not safe, not done



The background is a dark blue gradient. A thin, light blue curved line starts from the top left and curves towards the center. A larger, bright blue triangular shape is positioned in the bottom right corner, pointing towards the center.

Thank You!