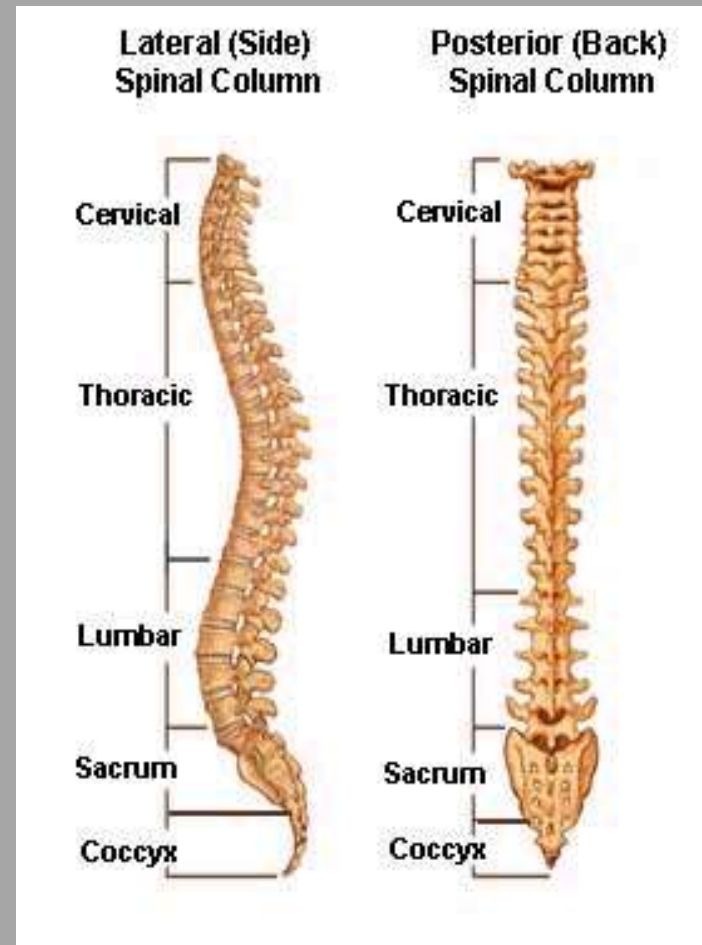


Back pain, radiculopathies,
cervical myelopathy, lumbar
stenosis

Spinal anatomy

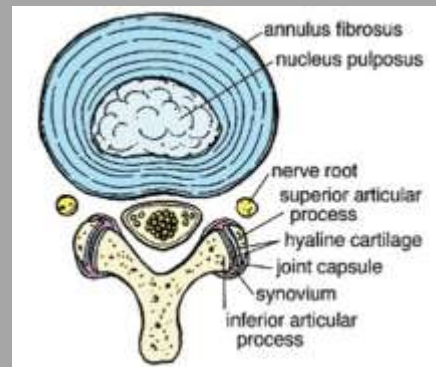
- 4 anatomical parts
 - Cervical
 - Thoracic
 - Lumbar
 - Sacral+Coccyx
- 3 physiological curves
 - C lordosis
 - T kyphosis
 - L lordosis



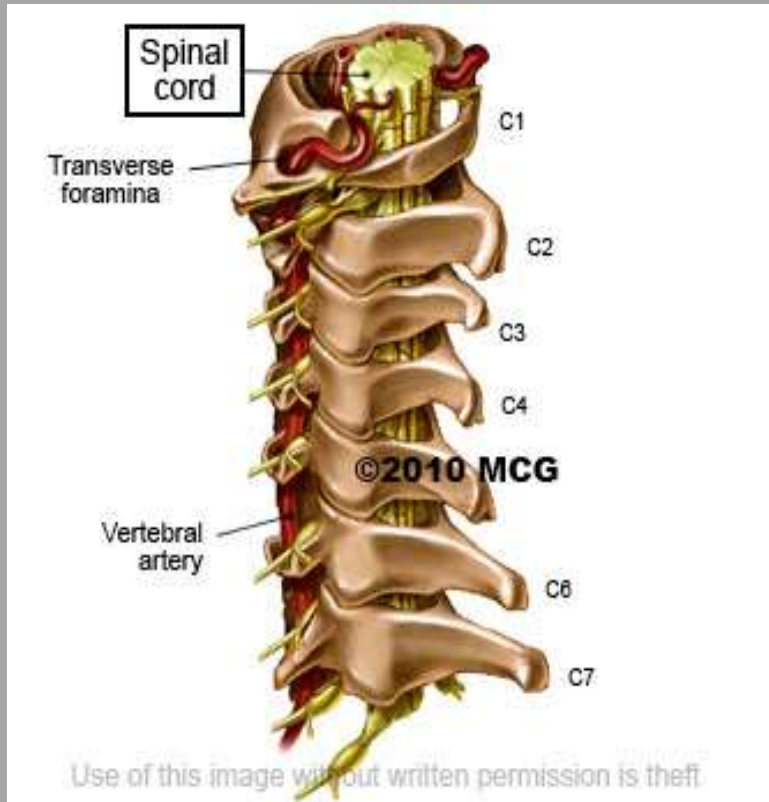
Spinal anatomy

spinal column is made up of

- Vertebra
- Intervertebral discs
- Ligaments



Spinal column (vertebral columns, spine)



- Spinal canal
 - Medulla spinalis (spinal cord)
- Foramen intervertebrale
 - Between two vertebra bodies
 - Nerve roots
- Facet joints

Non traumatic disorders of spine

- Radiculopathies
- Cauda equina syndrome
- Cervical compressive myelopathy
- Lumbar stenosis

Segmental pain syndromes

- **Definition:** ache, tension or stiffness in the neck/back without irradiation of pain to extremities
- Pain of lower back is called **lumbago**
- By **its duration:** acute (up to 6 weeks), chronic (more than 6 weeks)
- **Pseudoradiculopathies**
 - Cervicocranial syndrome
 - Cervicobrachial syndrome

Segmental pain syndromes

- Etiology:

- Non-specific (without evident cause)
- Mechanical triggers:
 - bad posture while sitting or standing, sudden movements with too much stress on spine
 - Over-stretching and tears of muscle and ligaments
 - Blockage of the spinal segment with paravertebral muscle spasms
- Medical conditions:
 - pain originated from disc herniations, joints, spondylolisthesis, pathological changes in vertebra (fracture, tumor, infection, osteoporosis)

Segmental pain syndromes

- **Diagnosis:**
 - if the pain continues worsen: X-ray, CT or MRI of spine
- **Treatment:**
 - Usually it is self-limited condition
 - Heat therapy- dry heat
 - Short-term treatment antiinflammatory (NSAD) drugs, myorelaxants, physiotherapy

Radiculopathies

- **Definiton:** peripheral nerve syndrome that is caused by mechanical compression or irritation or spinal nerve roots
- May involve single or multiple nerve roots



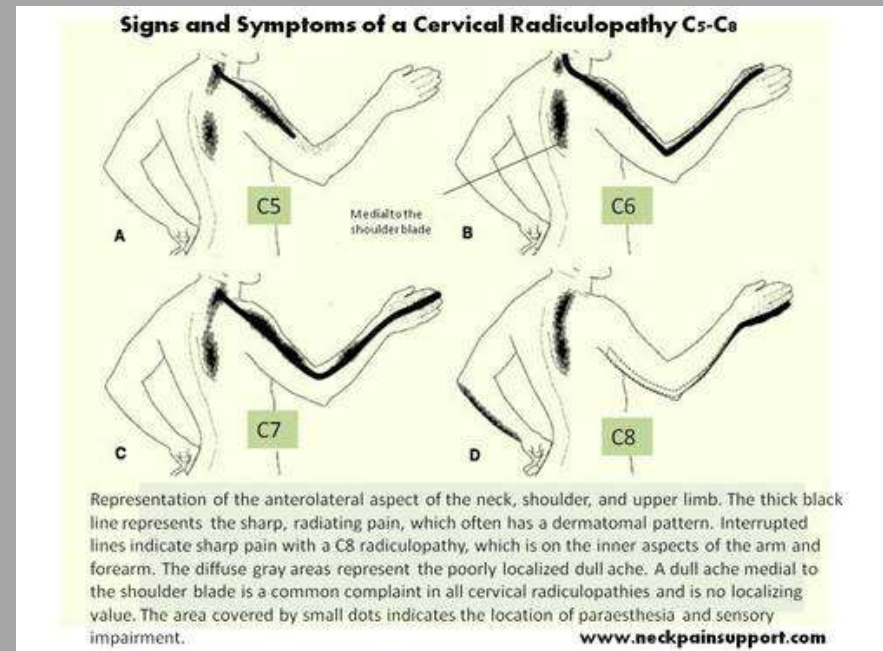
Radiculopathies

- **Clinical symptoms:**
- **Pain** irradiating from neck/back to extremities or along the trunk (dermatomas- area of the skin innervated by one nerve root)
 - Cervical radiculopathies: pain irradiating from neck to upper extremities
 - Thoracic radiculopathies: pain irradiating from back along the trunk
 - Lumbar radiculopathies: pain irradiating from neck to upper extremities
- **Sensitive changes:** numbness, parestesias, hypestesia
- **Hyporeflexia or areflexia**
 - of tendon reflexes supplied by compressed nerve root
- **Weakness of muscles of myotoma**
 - innervated by compressed nerve root

Cervical radiculopathies

C5

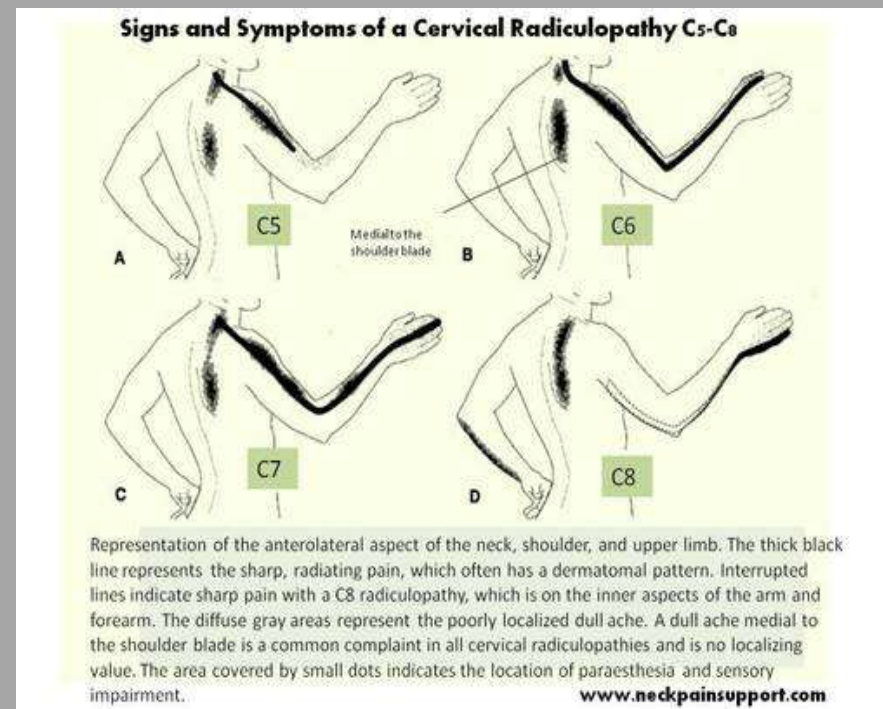
- **Pain**
 - from neck to upper arm
- **Sensitive changes**
 - upper arm
- **Hyporeflexia/ areflexia**
 - bicipital reflex
- **Muscle weakness**
 - Deltoid muscle



Cervical radiculopathies

C6

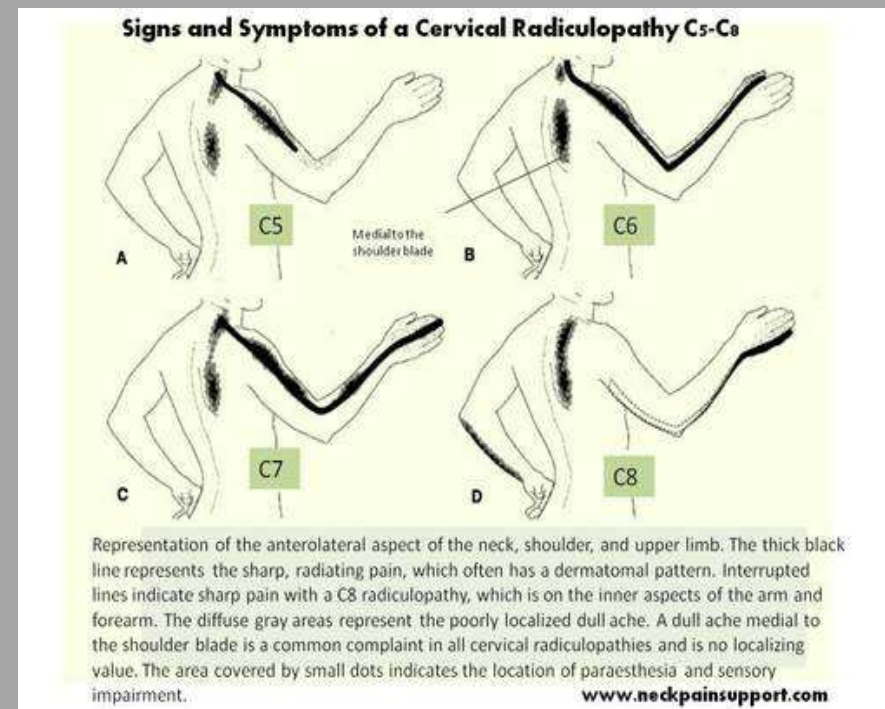
- **Pain**
 - from neck to lateral side of arm, forearm, I-II. finger
- **Sensitive changes**
 - lateral side of forearm, I.-II. finger
- **Hyporeflexia/ areflexia**
 - bicipital and stylo-radial reflex
- **Muscle weakness**
 - m. biceps brachii, m. brachioradialis



Cervical radiculopathies

C7

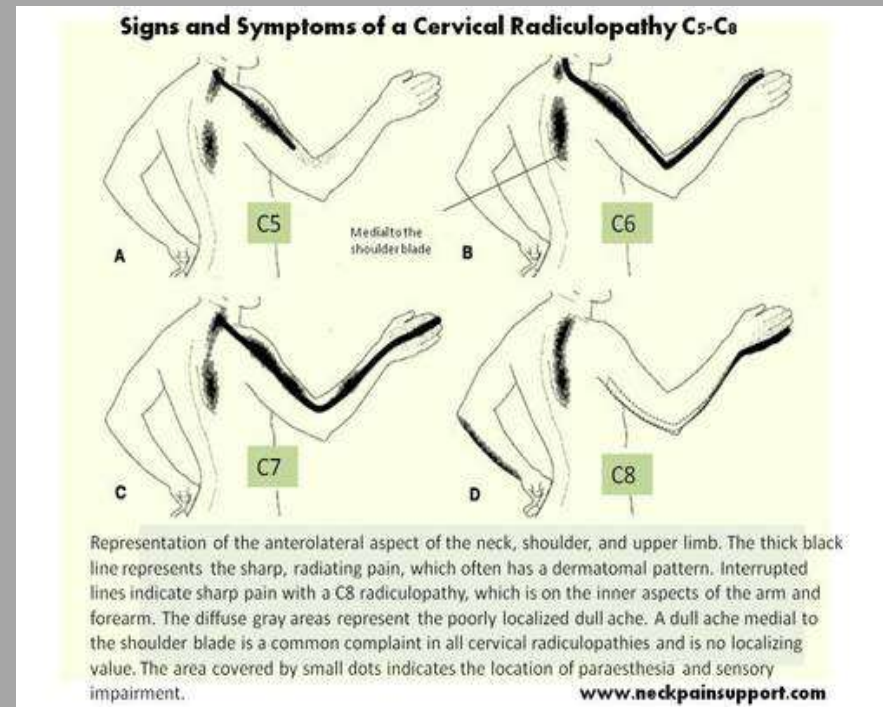
- **Pain**
 - from neck to dorsal side of arm, forearm, II-IV finger
- **Sensitive changes**
 - lateral side of arm, forearm, III.-IV. finger
- **Hyporeflexia/ areflexia**
 - tricipital reflex
- **Muscle weakness**
 - m. triceps brachii



Cervical radiculopathies

C8

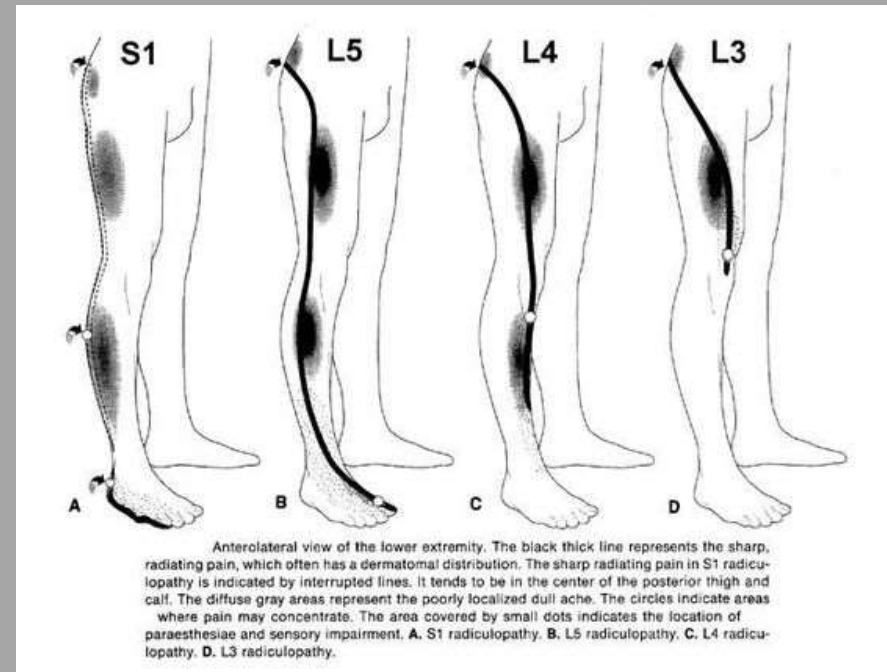
- **Pain**
 - from neck to medial side of arm, forearm, V. finger
- **Sensitive changes**
 - medial side of arm, forearm, V. finger
- **Hyporeflexia/ areflexia**
 - Flexor finger reflex
- **Muscle weakness**
 - hand muscles and flexors of fingers



Lumbar radiculopathies

L4

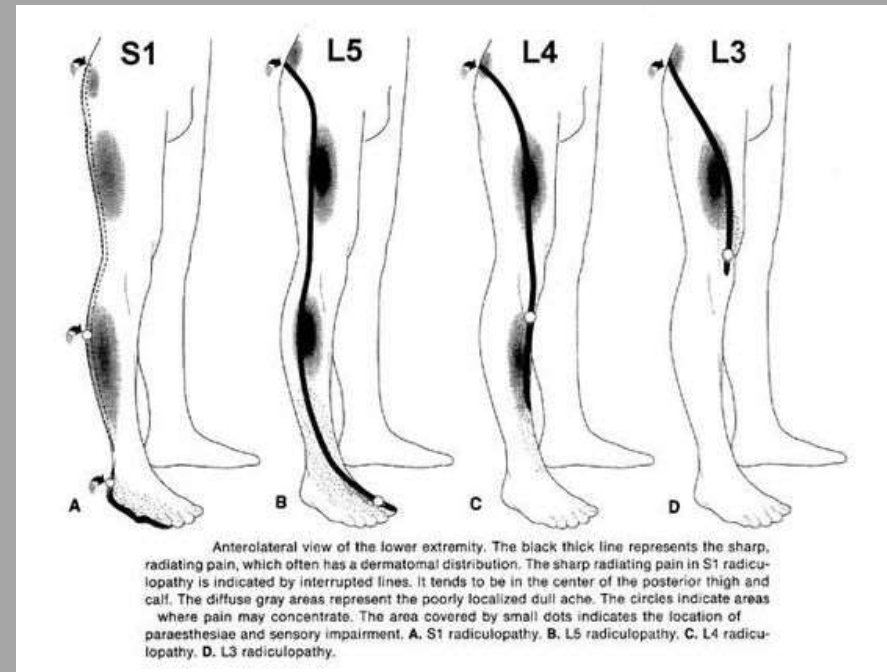
- **Pain**
 - from low back to anterior part of thigh, medial part of shin to internal malleolus
- **Sensitive changes**
 - anterior part of thigh, medial part of shin to internal malleolus
- **Hyporeflexia/ areflexia**
 - patellar reflex
- **Muscle weakness**
 - Quadriceps femoris, hip adductors



Lumbar radiculopathies

L5

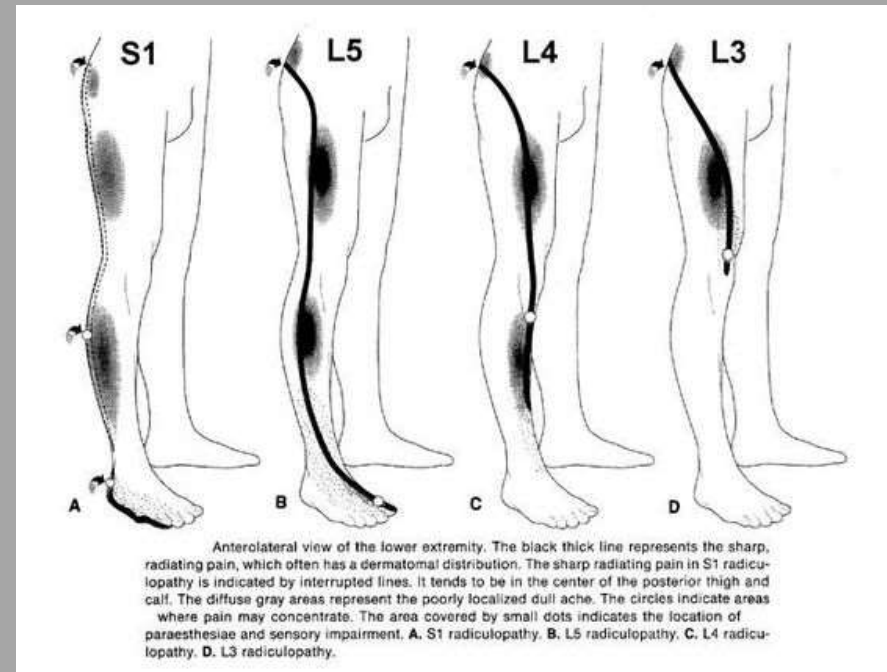
- **Pain**
 - from low back to lateral part of leg, dorsal foot, thumb
- **Sensitive changes**
 - lateral part of leg, dorsal foot, thumb
- **Hyporeflexia/ areflexia**
 - none
- **Muscle weakness**
 - Extensor hallucis longus muscle, m. tibialis anterior, m. gluteus medius



Lumbar radiculopathies

S1

- **Pain**
 - from low back to posterior part of leg, lateral foot, planta pedis, fingers
- **Sensitive changes**
 - posterior part of leg, lateral foot, fingers
- **Hyporeflexia/ areflexia**
 - Mediolplantar, achilles tendon r.
- **Muscle weakness**
 - gluteus maximus, biceps femoris, medial gastrocnemius, lateral gastrocnemius and extensor digitorum brevis



Radiculopathies

- **Diagnosis:**
- Anamnesis
- Clinical findings
- Neuroimaging of spine
 - Plain X- ray (exclude structural bone changes)
 - MRI of spine is a gold standard

X-ray



Spine MRI

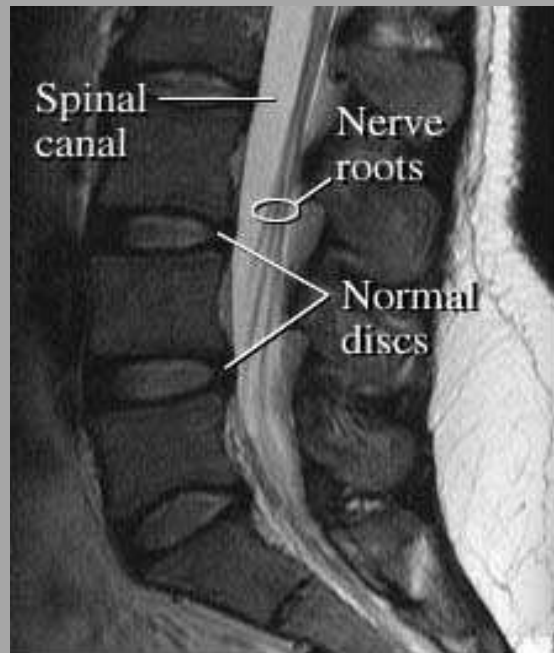


Figure 1



Figure 2



The four stages to a herniated disc include:

Disc Degeneration:

chemical changes associated with aging causes discs to weaken, but without a herniation.

Prolapse/protrusion:

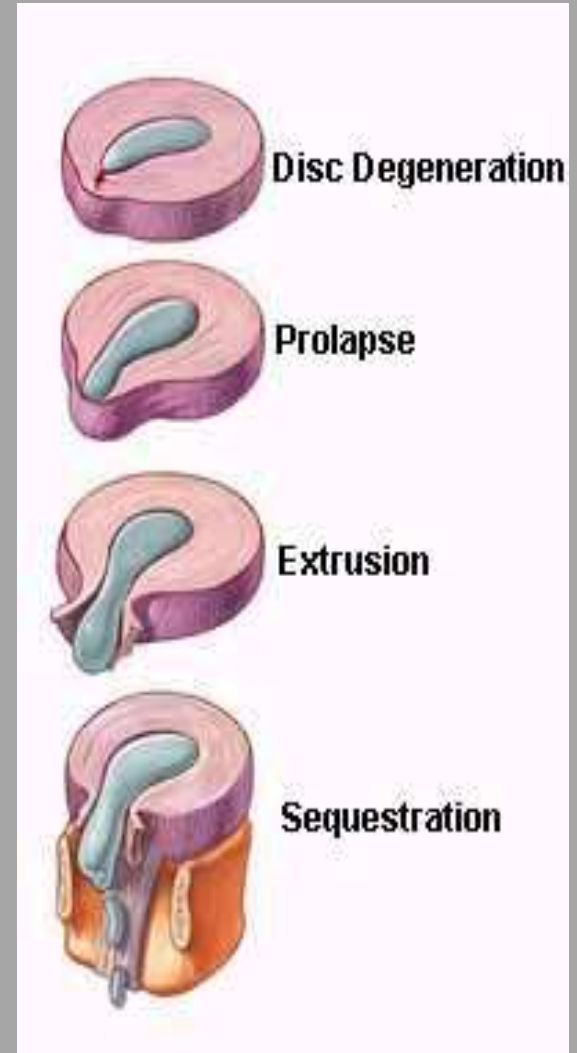
disc changes with some slight protrusion of disc into the spinal canal. Disc is consistent

Extrusion:

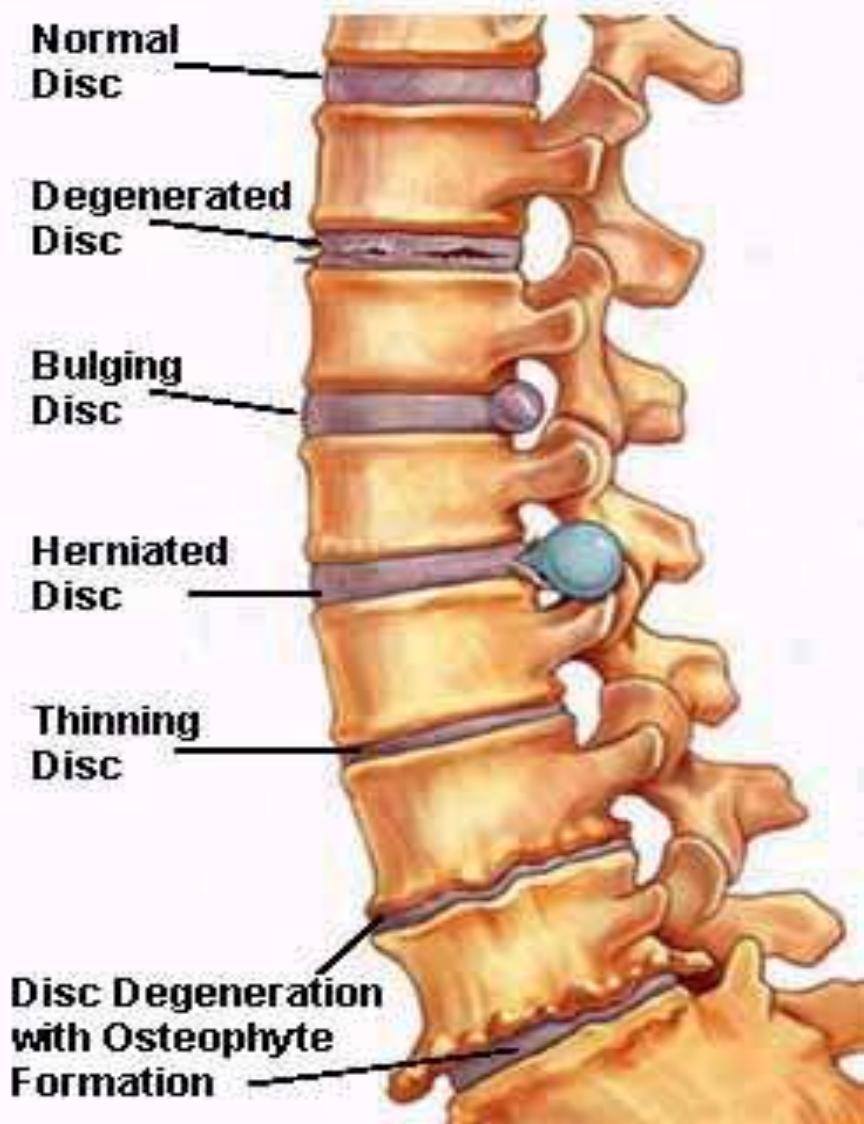
the gel-like nucleus pulposus breaks through the annulus fibrosus but remains within the disc.

Sequestration:

the nucleus pulposus breaks through the annulus fibrosus and lies outside the disc in the spinal canal.



Examples of Disc Problems



Radiculopathies

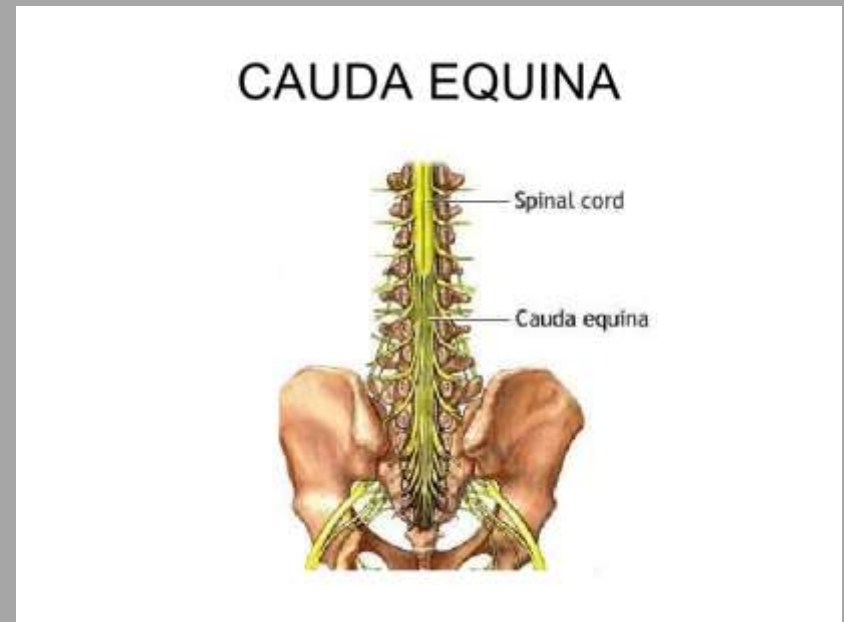
- Treatment:
- Pharmacological:
 - NSAID, muscle relaxants, opioids, local periradicular steroid injection, anticonvulsants for neuropathic pain
- Physiotherapy
 - after acute condition
- Surgical
 - noneffective drug treatment
 - progressive motor deficit due to radiculopathy

Dif. dg. radiculopathy

- **Vertebrate MTS**
- **Boreliosis**
- **Pelvic tumors (LS), lungs (Th, C) and others**
- **Intraspinal tumors**
- **Inflammatory diseases**

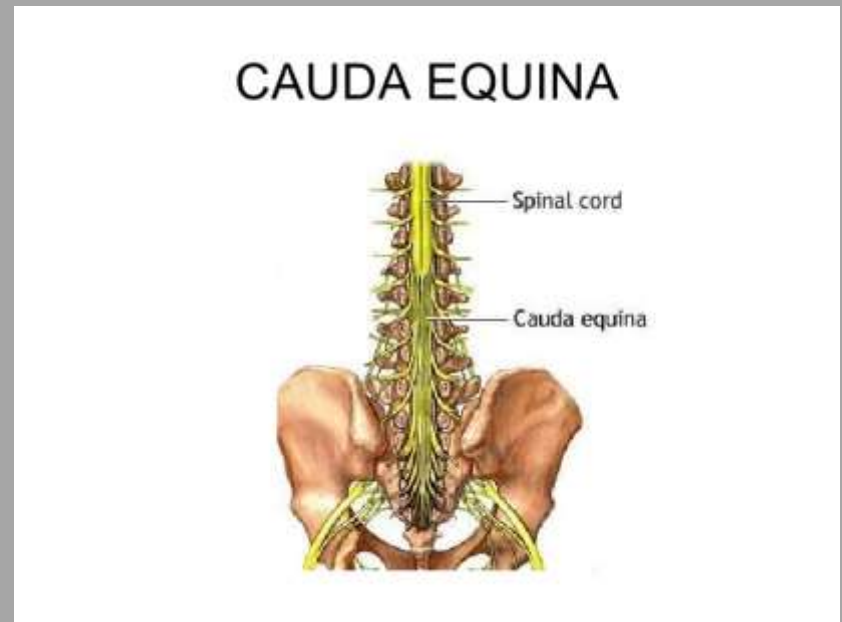
Cauda equina syndrome

- syndrome with characteristic pattern of neuromuscular and urogenital symptoms resulting from the simultaneous compression of multiple lumbosacral nerve roots (L1-5, S1-5) below the level of the conus medullaris



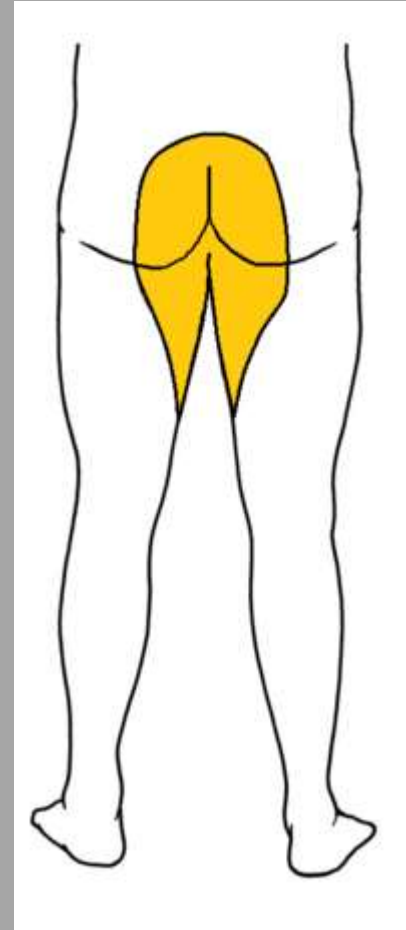
Cauda equina syndrome

- Etiology:
- Any condition narrowing spinal canal and compressing multiple nerve roots
 - **Disc herniation (acute)**
 - Neoplasms
 - Abscess



Cauda equina syndrome

- **symptoms**
 - Areflexic and flaccid paraparesis of lower extremities
 - Sharp or stabbing pain that radiates down to of both legs
 - Altered sensation in the “saddle region,” or saddle anesthesia
 - Urinary and fecal incontinence (loss of bladder and bowel function)



Acute cauda equina syndrom

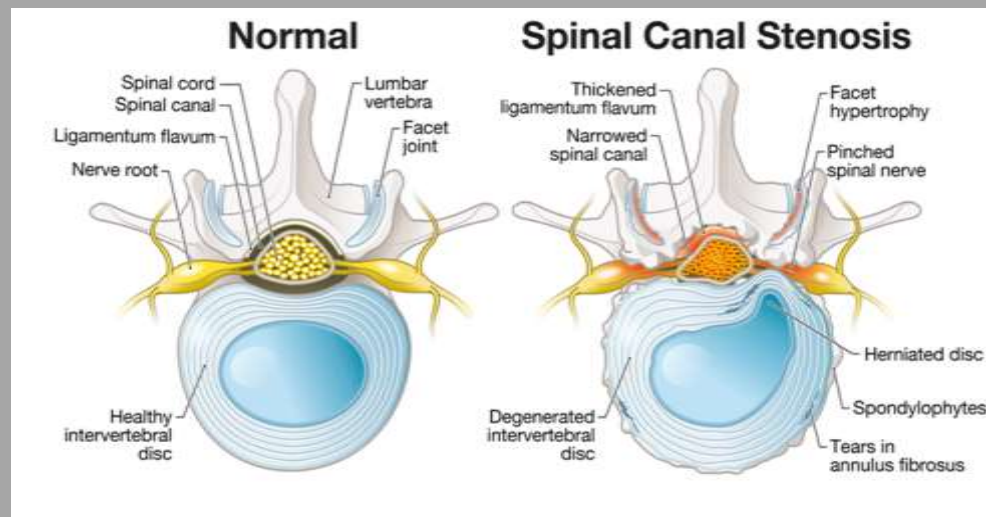
- **Diagnosis:**
- Urgent CT or MRI of spine

Acute cauda equina syndrom

- Treatment:
- Urgent surgical decompression of the roots

Lumbar stenosis

- Narrowing of the spinal canal or neural foramina that produces root compression
- Most common – L4-L5, L3-L4
- **Etiology:** congenitally or degenerative disease (disk degeneration, facet joints arthritis, pedicles hypertrophy, ligaments)
- Single segment or multiple segments



Lumbar stenosis

- Leg pain
- Numbness
- Weakness of lower extremities exacerbated by standing or walking and relieved with lumbar flexion.

Lumbar stenosis

- Pain killers
- NSAID
- Surgery: disabling pain, significant neurological deficit

Cervical spondylotic myelopathy

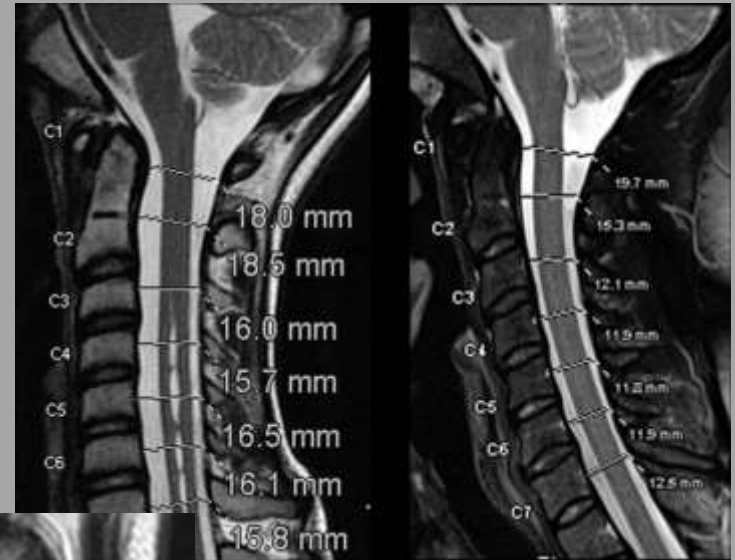
- **Definition:**
- **Cervical myelopathy** is the compression of the cervical spinal cord as a result of spinal stenosis.
- **Spinal stenosis** is narrowing of the spinal canal that produces root or spinal cord compression
- Generally, it is more common in the elderly population and is a slow process.

Cervical myelopathy

- Symptoms:
- Heavy feeling in legs
- Spastic paraparesis or quadriparesis
- Difficulties with gait and balance
- Deterioration in fine motor skills (such as handwriting or buttoning a shirt)
- Spasticity – lower extremities
- Radicular symptoms – upper extremities

Cervical myelopathy

- MRI of cervical spine



Spinal canal stenosis

- Borderline antero-posterior diameter for spinal canal
- Cervical – 11 mm
- Lumbar – 11-13 mm