

# Lumbar Disc Herniations

- 90-95% at L4/5 and L5/S1
  - L5/S1 50-54%
  - L4/5 38-45%
  - L3/4 5-8%

# Lumbar Disc Herniations

- The posterior longitudinal ligament in the lumbar region is stronger in its central portion, protruded discs tend to occur in a posterolateral direction

Disc: L3/4

Nerve root: L4

Foot dorsiflexion weakness

Decreased patellar reflex

Dermatomal pain in the lateral thigh, crossing the knee, to medial foot

Motor loss: Knee (quadriceps) extension

Dorsiflexion of foot

Squat and rise

Sensory loss: Medial foot (Medial malleolus)

Reflex loss: Knee (Patellar)

Disc: L4/5

Nerve root: L5

Extensor hallucis longus weakness (big toe extension)

Foot dorsiflexion weakness, test by having patient walk on heels

Ankle inversion weakness

Hip abduction weakness, have patient lie on side and abduct leg against resistance

Dermatomal pain in anterolateral leg and dorsum of foot

Motor loss: Dorsiflexion of great toe and foot

Heel walking

Sensory loss: Dorsal foot (Dorsal third metatarsophalangeal joint)

Reflex loss: None

Disc: L5/S1

Nerve root: S1

Foot plantar flexion weakness, have patient do 10 single leg toes stands

Decreased Achilles reflex

Dermatomal pain in posterior calf and lateral foot

Motor loss: Plantar flexion of foot

Walking on toes

Sensory loss: Lateral foot (Lateral heel)

Reflex loss: Ankle (Achilles)

# Cervical Disc Herniations

- C3/4      C4 NR      10%
- C4/5      C5 NR      10%
- C5/6      C6 NR      20-25%
- C6/7      C7 NR      45-60%
- C7/T1      C8 NR      10%

# Cervical Disc Herniations

- The cervical posterior longitudinal ligament is weaker in its central portion, so the herniations may be midline, compressing the cord or posterolateral, with root compression

- **C5 Nerve** - neck, shoulder, and scapula pain, lateral arm numbness, and weakness during shoulder abduction, external rotation, elbow flexion, and forearm supination. The reflexes affected are the biceps and brachioradialis.
- **C6 Nerve** - neck, shoulder, scapula, and lateral arm, forearm, and hand pain, along with lateral forearm, thumb, and index finger numbness. Weakness during shoulder abduction, external rotation, elbow flexion, and forearm supination and pronation is common. The reflexes affected are the biceps and brachioradialis.
- **C7 Nerve** - neck, shoulder, middle finger pain are standard, along with the index, middle finger, and palm numbness. Weakness on the elbow and wrist are common, along with weakness during radial extension, forearm pronation, and wrist flexion may occur. The reflex affected is the triceps.
- **C8 Nerve** - neck, shoulder, and medial forearm pain, with numbness on the medial forearm and medial hand. Weakness is common during finger extension, wrist (ulnar) extension, distal finger flexion, extension, abduction, and adduction, along with distal thumb flexion. No reflexes are affected.
- **T1 Nerve** - pain is common in the neck, medial arm, and forearm, whereas numbness is common on the anterior arm and medial forearm. Weakness can occur during thumb abduction, distal thumb flexion, finger abduction, and adduction. No reflexes are affected.



# Thoracic Disc Herniations

- 75% involve the lower four thoracic interspaces
- T11-12 most common level of involvement
- Because the extradural space is narrower in the thoracic region than in other areas of the spine, cord compression is more likely to occur

# Thoracic Disc Herniations

- 75% occur below T8
- T11-12 most common level

	Lower Motor Neuron	Upper Motor Neuron
Structures involved	Anterior horn cell, root, nerve, neuromuscular junction, muscle	Cerebrum, brain stem, spinal cord
Muscles affected	Individual muscles	Groups of muscles
Wasting	Present, often marked	Absent
Fasciculations	Present	Absent
Tone	Flaccidity	Spasticity
Tendon reflexes	Decreased or absent	Hyperactive
Clonus	Absent	Present
Plantar responses	Flexor	Extensor (Babinski sign)
Superficial abdominal and cremasteric reflexes	Present	Absent
Electromyography (EMG)	Abnormal	Normal

# Upper Motor Neuron (UMN) (Increases)

- Increased tone
  - Spasticity
  - Clasp-Knife reaction
- Increased reflexes
- Pyramidal pattern of weakness
  - Weak extensors in the arm
  - Weak flexors in the leg
- Positive Babinski (Plantar reflex)

# Lower Motor Neuron (LMN) (Decreases)

- Wasting
- Fasciculations
- Decreased tone
- Absent or decreased reflexes
- Negative Babinski

# LMN

- Weakness - limited to focal or root innervated pattern
- Muscle wasting – prominent in a focal pattern
- Reflexes - absent or reduced
- Fasciculations present in the associated muscle group
- Babinski sign absent - downward going digits

# UMN

- Weakness
  - Weak extensors arm
  - Weak flexors leg
- Muscle wasting is absent or slight
- Hyperreflexia with clonus
- Spasticity
- No fasciculations
- Babinski sign positive – extended hallux and flaring of remaining digits
- Hoffmann's sign is positive
  - It is positive in, but not specific to, UMN lesions
- Pronator drift

# Hoffmann's Sign

## Hoffmann's Reflex

### Finger Flexor Reflex

- Hoffmann's sign
  - It is positive in, but not specific to, UMN lesions
- A positive sign suggests hypertonia
- Corticospinal tract dysfunction localized to the cervical segments of the spinal cord
- Found in 3% of population



NR	Movements	Reflexes
C5	Shoulder abduction Elbow flexion	Biceps
C6	Elbow flexion (Semipronated)	Supinator
C7	Finger extension Elbow extension	Triceps
C8	Finger flexors	Finger
T1	Small muscles of the hand	No reflex

NR	Movement	Reflex
L1, L2	Hip flexion	No reflex
L3, L4	Knee extension	Knee reflex
L5	Extension of the great toe (extensor digitorum brevis)	No reflex
S1	Hip extension Knee flexion Plantar flexion	Ankle reflex

# Modic Changes

- Modic Type I
  - T1 low signal
  - T2 high signal
  - Represents bone marrow edema and inflammation
  - Enhancement with contrast
- Modic Type II
  - T1 high signal
  - T2 isointense to high signal
  - Represents normal red hemopoietic bone marrow conversion into yellow fatty marrow as a result of marrow ischemia

# Modic Changes

- Modic Type III
  - T1 low signal
  - T2 low signal
  - Represents subchondral bony sclerosis

# Most Common sites of Metastatic Cancer

- 1. Lung
- 2. Liver
- 3. Bone
- 4. Brain

# Main Sites of Metastasis

- Bladder- Bone, liver, lung
- Breast- Bone, brain, liver, lung
- Colon- Liver, lung, peritoneum
- Kidney- Adrenal gland, bone, brain, liver, lung
- Lung- Adrenal gland, bone, brain, liver, other lung
- Melanoma- Bone, brain, liver, lung, skin, muscle
- Ovary- Liver, lung, peritoneum
- Pancreas- Liver, lung, peritoneum
- Prostate- Adrenal gland, bone, liver, lung
- Rectal- Liver, lung, peritoneum
- Stomach- Liver, lung, peritoneum
- Thyroid- Bone, liver, lung
- Uterus- Bone, liver, peritoneum, vagina