Spinal Emergencies: Recognition and Management in the Outpatient Setting

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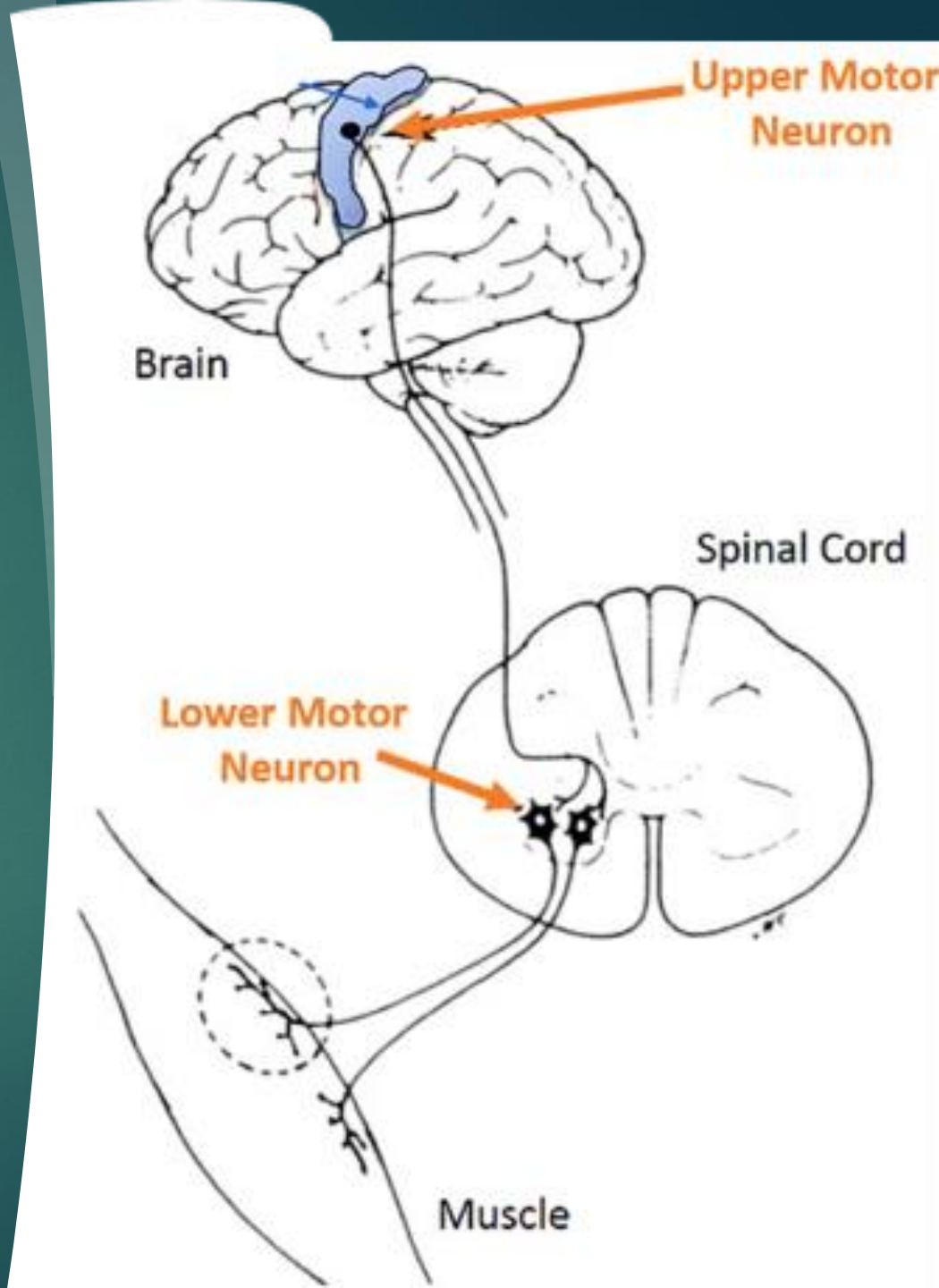
Outline

- Anatomy
- Myelopathy
- Cauda Equina Syndrome
- Infection
- Tumor
- Fractures
- Syringomyelia

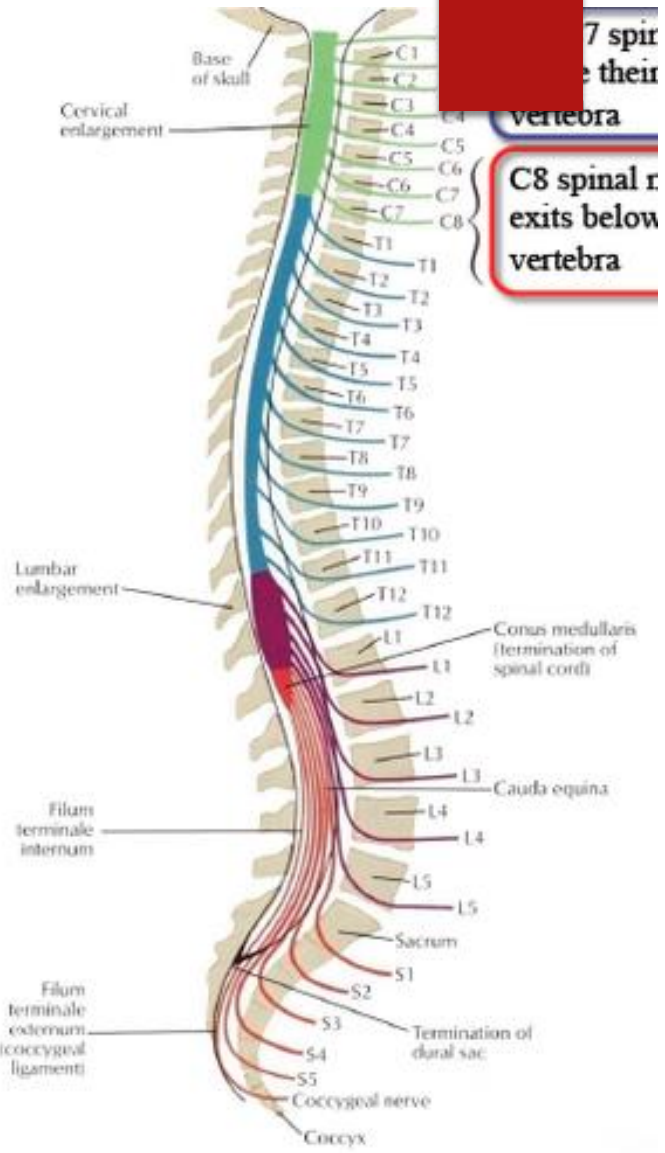
Anatomy

- Voluntary movement
  - Accomplished via a two-**neuron** circuit
  - **Upper motor neurons (UMN)**
    - Originates in motor cortex
    - Travels down to the spinal cord
  - **Lower motor neurons** (LMN)
    - Originates at anterior horn cell (AHC) in spinal cord
    - Travels down to innervate skeletal muscle



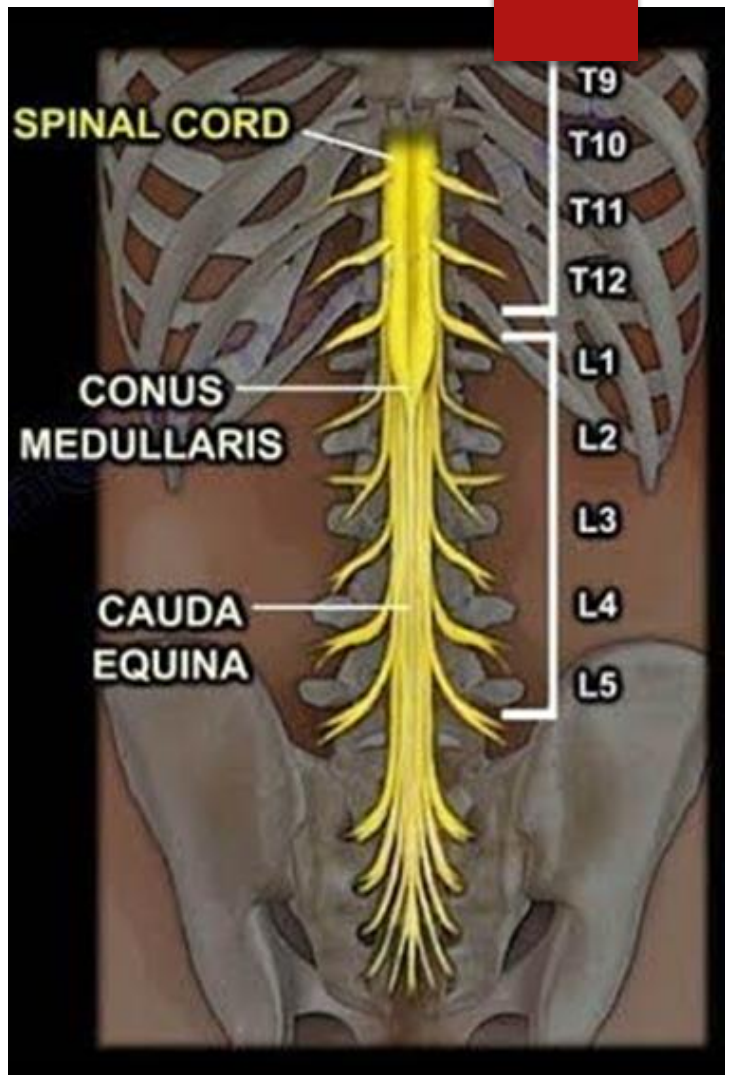
Anatomy

- Cervical and Thoracic spine
  - Each AHC/LMN located at respective spinal level
  - Immediately exits the spinal canal
- Lumbosacral Spine
  - Each AHC/LMN located at **conus medullaris**
  - Stays within spinal canal until they exit at respective level



Anatomy

- Conus Medullaris
  - Distal aspect of the spinal cord
  - Located L1-L2
  - Contains anterior horn cells of lumbosacral spine
- Cauda Equina
  - "Horse's tail"
  - Describes lumbosacral spinal nerves within spinal canal, prior to exiting out foramen



Myelopathy

- Neurological deficit(s) related to compression and dysfunction of spinal cord
  - Cervical, thoracic, upper lumbar spine
- **UMN dysfunction**
  - Weakness below level of lesion
  - Loss of hand dexterity, gait dysfunction/falls, bowel and bladder dysfunction
  - Examination
    - Hyperreflexia, positive UMN signs (Hoffman, Babinski, clonus)

Cauda Equina Syndrome

- Neurological deficit(s) related to compression of lumbosacral nerves within spinal canal

- **LMN dysfunction**
  - Pain, often asymmetric
  - Lower extremity weakness, gait dysfunction/falls, bowel and bladder dysfunction, saddle anesthesia
  - Examination
    - Hyporeflexia, negative UMN reflexes

Myelopathy and Cauda Equina Syndrome: Etiologies

- Degenerative
- Infection
  - Epidural Abscess
- Trauma
  - Central Cord Syndrome
  - Fractures
- Tumor
  - Primary
  - Metastasis
- Syrinx

Myelopathy and Cauda Equina

- MRI is diagnostic modality of choice
- Mainstay of treatment is **surgical decompression**
  - Progressive neurological deficits
  - Intractable pain
- Clinical features mild and non-progressive:
  - Recommend at least a surgical consultation
  - If surgery is deferred, need close follow up to assess neurologic status for any progression
- If no neurologic impairments, surgery not recommended

Degenerative

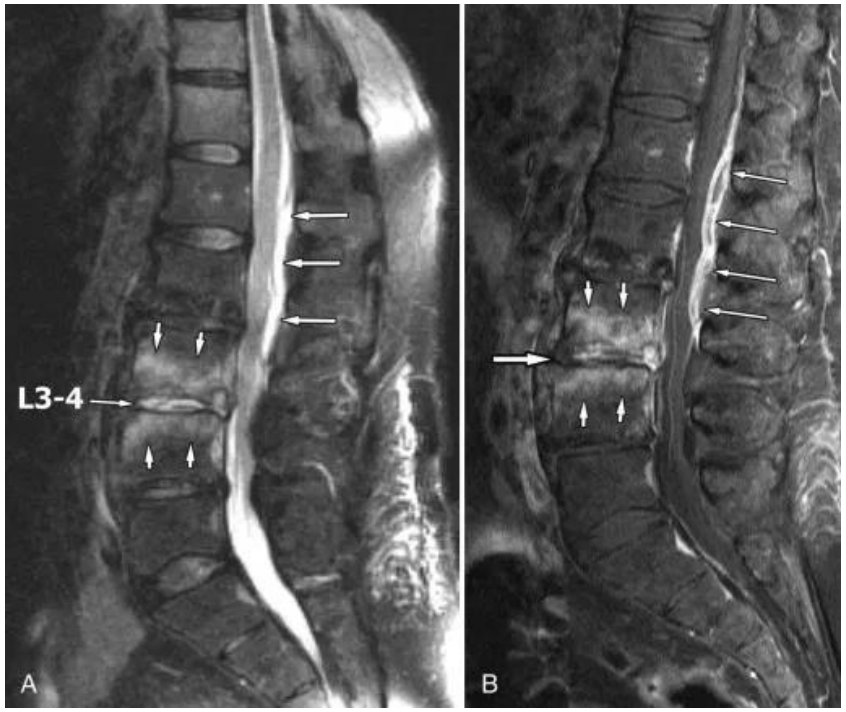
- Spondylosis, facet joint arthropathy, joints of luschka, osteophytes of vertebral body, ligamentous hypertrophy
  - Most common
  - Insidious onset
- Disc Herniation
  - Acute presentation
  - Radiculopathy often present

Epidural Abscess, Discitis, Osteomyelitis

- Risk Factors
  - IVDU
  - Spinal procedure (surgery, catheter, steroid injection)
  - Diabetes
  - 30% idiopathic
- Clinical Presentation
- Classic triad of fever, back pain, and neurologic deficits
  - Rare
- Back pain
  - Most common, acute and insidious onset
- Fever
  - 1/3 of cases
- Neurologic deficits
  - More common with epidural abscess
- Focal tenderness on palpation of spine

Epidural Abscess, Discitis, Osteomyelitis

- Work Up
  - Serologic : ESR, CRP, CBC with differential
  - Imaging: MRI with and without contrast
    - Findings suggestive of infection: Increased T2 signal involving disc, endplate destruction, epidural or paraspinal enhancement
  - Cultures: Epidural aspiration, bone biopsy if osteomyelitis
- Management
  - Infectious Disease
  - Surgical consult
    - If neurologic deficits present



Traumatic

- Central Cord Syndrome
- Compression Fractures

Central Cord Syndrome

- Myelopathy affecting cervical spinal cord
  - Hyperextension Injury
  - Older individuals
  - Pre-existing cervical spondylosis
  - Weakness
    - Affects upper extremities greater than lower extremities
    - Distal extremity > proximal
  - Bowel and bladder dysfunction
    - Variable
- Clinical Scenario
  - Subtle hand weakness in setting of recent fall

Compression Fracture

- Clinical Presentation
  - Back pain
    - Post-traumatic
      - Most common scenario
      - Fall, cough, lifting heavier objects
    - Atraumatic
      - Pathologic?
  - Neurologic deficits?
- Risk Factors
  - Osteoporosis
  - Advanced age
  - Chronic steroid use

Compression Fracture

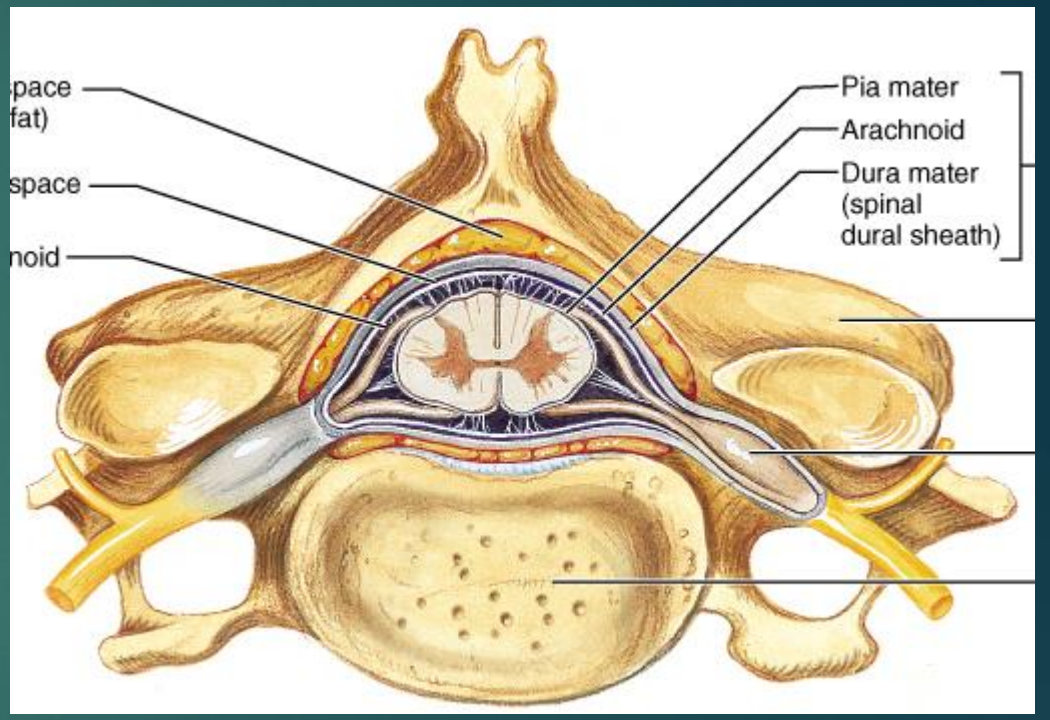
- Radiographic Features
  - Wedge shaped deformity affecting anterior vertebral body wall
  - Collapse of superior endplate
  - Posterior cortex
    - Posterior displaced?
    - If retropulsion, higher likelihood of neurologic deficit
- Most commonly in thoracolumbar junction

Compression Fracture: Management

- Advanced imaging?
  - Neurologic deficits
  - Retropulsion of posterior vertebral body
  - Intractable pain
- Pain control
  - NSAIDS, opioids (short term)
  - Bracing (Lumbar support orthoses)
  - Augmentation procedures (kyphoplasty, vertebroplasty)
- Physical Therapy
  - Neutral and extension-based protocol
  - Fall prevention
- Optimization of osteoporosis

Spinal Cord Tumors

- Intramedullary
  - Arise within spinal cord itself
  - Gliomas (astrocytoma, ependymoma)
- Extramedullary, Intradural
  - Meningioma
  - Peripheral nerve sheath tumor
- Extradural (Metastatic)
  - Most commonly seen in vertebral body
  - External compression of spinal cord

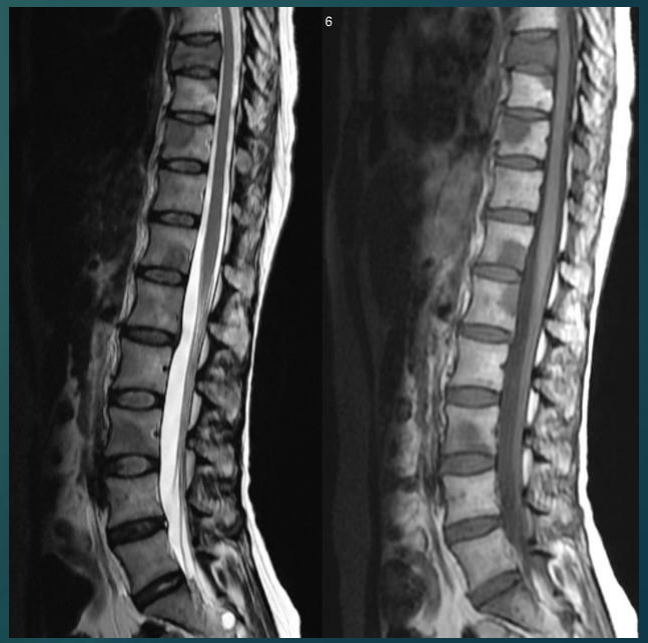


Spinal Cord Tumors: Metastatic

- Presentation
  - Back pain
    - Nocturnal awakening
    - Supine position
    - Thoracic spine most common location (70%)
  - Late Findings
    - Neurological deficits
    - Bowel or bladder dysfunction
- Risk Factors
  - Prior history of cancer
  - Prostate, lung, breast
    - Back pain initial presenting symptom in 20% of patients
  - History of smoking, unintentional weight loss

Spinal Cord Tumors: Management

- Imaging
  - MRI with and without contrast, entire spine (cervical, thoracic, lumbar)
    - Diagnostic modality of choice
- Features
  - Multiple lesions, hypointense on T2
  - Round, lobulated
  - Vertebral Body: Intact
    - Height preserved
    - Endplates and discs preserved

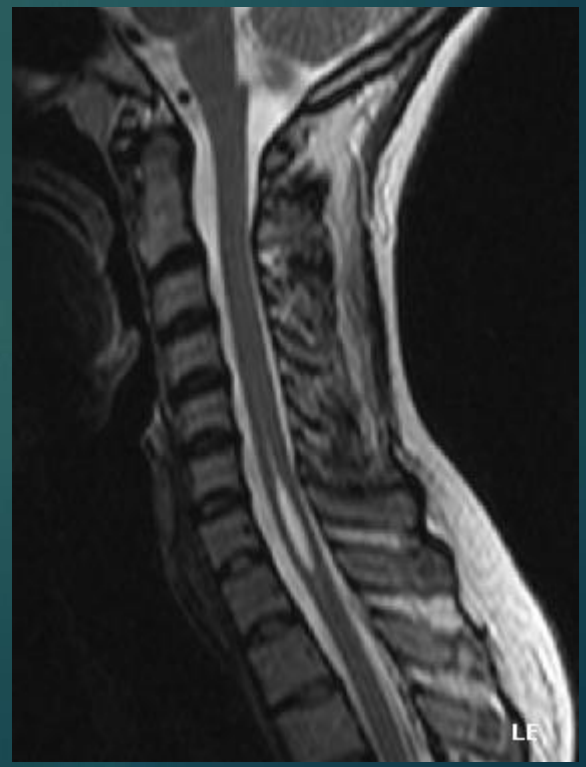


Spinal Cord Metastases

- Consultation
  - Oncology
    - Further diagnostic evaluation
- If neurological deficits and/or pain
  - Surgical referral
    - Resection
  - Radiation oncology

Syringomyelia

- Fluid filled cystic cavity within spinal cord
  - Cervicothoracic junction
    - Most common location
- Risk Factors
  - History of Chiari malformation
  - Post-inflammatory (transverse, multiple sclerosis)
  - History of spina cord tumors
  - History of traumatic spinal cord injury
- Imaging
  - Often found incidentally
  - MRI with contrast most sensitive
  - Resect if intractable pain or neurological deficits



Take Home Points

- Symptoms of Myelopathy and Cauda Equina
- Emphasis on Neurological Exam
  - UMN vs LMN findings
- Rule out red flag diagnoses
  - Cancer
  - Infection
- Appropriate diagnostic work-up and referral

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