SPINAL CORD DISORDERS

ANATOMY

- Two bulges in cord = more prone injury
  - Neck at C5-T1: origin of the brachial plexus
  - Back at L2-S3: origin of the lumbar plexus
- Arterial Supply
  - Anterior spinal artery: arises from vertebrae and descends all the way down the cord; supplies the anterior 2/3 portion
  - Paired posterior spinal arteries
  - Both are supplied by the radicular arteries
    - Artery of Adamkowitz is the largest radicular artery
    - Originates at about T10 and is commonly picked off with aortic dissection and sometimes AAA

INCOMPLETE SPINAL CORD INJURY SYNDROMES

- Central Cord Syndrome
  - MC syndrome
  - Mechanism of injury
    - Common in elderly patients w/ cervical OA and stenosis
    - Trauma = forced hyperextension causes compression of cord b/w hypertrophied ligamentum flavum (posteriorly) and osteophytes and prominent bony ridge (anteriorly)
  - Classical findings below lesion ....
    - Motor loss in upper extremities >> lower extremities
    - Sensory loss variable; burning in finger tips is MC
    - Bowel/Bladder dysfunction is variable

- Anterior Cord Syndrome
  - Mechanism of injury
    - Compression of anterior aspect of cord by cervical flexion
    - Trauma: bone fragment or disc protrusion compressing the anterior aspect of the cord
    - Anterior spinal artery: trauma, embolism, dissection, severe hypotension, aortic surgery, vasospasm, aortic
      - Aortic sugery is the MCC
  - Classical findings below lesion ....
    - Bilateral paralysis (CSTs)
    - Bilateral loss of pain and temp (STTs)
    - Preservation of JPS and vibratory sensation (post columns)
    - Bowel/Bladder control variable

- Brown - Sequard Syndrome (rare)
  - Hemisection of spinal cord
  - Penetrating trauma or lateral mass # compression (33 - 23)
  - Other causes: tumors, epidural abscess, epidural hematomas, radiation injury, vascular malforamtions, cervical spondylosis, spinal instrumentation
  - Classical findings below lesion ....
    - Ipsilateral motor loss (CST)
- Contralateral loss of pain and temp (STT)
- Ipsilateral loss of JPS and vibration (post column)
- Bowel/Bladder control is variable

- **Conus Medullary Syndrome**
  - Anatomy: lumbar cord segments originate at T12 vertebral body level; sacral cord segments originate at L1 vertebral body level; cord ends at L1-2 level
  - Common injury because of mobility b/w T12 and L1 junction
  - Findings variable with mixture of UMN signs and LMN signs
  - Acute: LMN signs + flaccid paralysis of legs/sphincter, areflexia, no Babinski
  - Chronic: UMN signs w/ spastic paralysis of legs, hyperreflexia, Babinski's
  - Look for saddle region anesthesia (S3-5)
  - Loss of bowel/bladder and bladder sphincter control

- **Cauda Equina Syndrome**
  - Injury at or below L1-2 which involve the roots of the cauda equina; may be combined with conus medullary syndrome
  - Motor and sensory deficits, areflexia, bladder and bowel incontinence
  - Complete or incomplete
  - Flaccid paralysis of lower limbs, areflexia, no Babinski's in pure cauda equina
  - Saddle region anesthesia
  - Loss of bowel and bladder sphincter control

- **Posterior Cord Syndrome**: rare
  - Classical findings ...
    - Loss of JPS and vibration below lesion
    - Preservation of motor and pain/temp function

- **Other**
  - Dhune Onion Skin: analgesia of face secondary to damage of trigeminal nerve fibers in high cervical spine
  - Posteriorinferior cerebellar artery syndrome: dysphagia, dysphonia, ataxia, N/V/vertigo, hiccups
  - Horner's syndrome: cervical sympathetic chain passes near the cervical cord at C7-T2 (ptosis, miosis, anhydrosis)

**COMPLETE SPINAL CORD SYNDROMES**
- Trauma: MCC
- Infarction
- Hemorrhages
- Extrinsic compression: disc herniation, abscess, tumors
- Findings
  - Complete motor loss
  - Complete sensory loss
  - B/B control loss
  - Autonomic dysfunction: shock, priapism, etc
CLINICAL FEATURES

- Post void residual can help determine true presence of urinary retention
- Any spinal cord syndrome
  - Approach is to r/o a reversible cause
  - Get a STAT MRI no matter what you think the cause is (when you think it’s an infarct it could be a spontaneous epidural which could be drained)
- SC syndrome vs GBS
  - Rapidly ascending GBS can look like SC syndrome
  - GBS has areflexia
  - SC syndrome can have areflexia too in the acute phase

ETIOLOGY OF SPINAL CORD SYNDROMES

- Trauma
- Multiple sclerosis
- Transverse myelitis
- Tumors
- Epidural abscess
- Epidural hematoma
- Spinal AVM
- Spinal cord infarct
- Syringomyelia
- Diskitis/abscess
- HIV myelopathy
INTRINSIC CORD LESIONS

MULTIPLE SCLEROSIS
- Demyelination of the SC (partial or complete)
- Wide variety of findings depending on the plaque location
- Patch motor and sensory findings
- B/B dysfunction, tremor, partial cord synrome
- May be a preceeding hx of optic neuritis
- Motor dysfunction is the MC Spinal cord manifestation
- Exam will show SC findings
- MRI is diagnostic
- Tx = high dose steriods

TRANSVERSE MYELITIS
- Acute or subacute spinal cord dysfunction characterized by paraplegia, sensory level, and B/B disturbance
- Exact pathogenesis unknown
- Follows viral illness in 30%; may be autoimmune
- Rapid progression: maximal deficit within 24 hours
- Can progress a bit slower (days to weeks)
- Thoracic cord is the MC location (70%)
- May have back pain, low grade fever
- MR to exclude compression
- CSF is non-specific increase in protein or cells
- Role of steroids is unclear
- Only 30% have full recovery 25% with partial recovery

SPINAL SUBARACHNOID HEMORRHAGE
- Usually caused by spinal AVMs, Rare
- Other causes: anticoagulation, tumor bleeding, cavernous angiomas
- Back pain + neurological symptoms (you may be thinking Ao dissection)
- Headache and neck pain as blood tracks up to the neck
- Numbness, weakness, B/B dysfunction
- MRI confirmst dz; tx may include surgery or angio embolization

SYRINGOMYELIA
- Syringomyelia = cavitary lesion within the substance of the SC
- Syrinx = chronic progressive lesion; location within the cord determine neuro function
- Headache and neck pain are common along with sensosry change, gait ataxia, CN dysfunction
- Disassociative anesthesia: Loss of pain and temp in upper extremities with the preservation of JPS and light touch
- Cape-like distribution of sensory loss over the shoulders and arms
- Findings based on central location of cavity in the cord
- MCC is arnold - chiari I malformation (cerebellar tonsils pressing on cord)
- MRI for dx
- Refer to neurosurgeon
MISCELLANEOUS

- Idiopathic Spastic Paraparesis
  - Progressive weakness and spasticity of the lower extremities
  - Also called primary lateral sclerosis (demyelination in lateral cord)
- HIV Myelopathy
  - Advanced AIDS
  - Must rule out toxo, lymphoma, zoster, CMV
  - Antiretroviral treatment
- Spinal Cord Infarction
  - Uncommon, dx of exclusion
  - Aortic dissection, aortic surgery, global ischemia from hypotension are the most common causes
  - Can occur in vasculitis

EXTRINSIC CORD LESIONS

SPINAL EPIDURAL HEMATOMA

- Can be spontaneous: AVM, hemangioma, warfarin, LMWH
- Can be post LP, post traumatic, post spinal surgery
- Sudden, severe, constant back pain with radicular complaints
- Pain before neurologic deficits develop which may take hours to days to show up
- MRI is diagnostic
- Surgery is indicated usually

SPINAL EPIDURAL ABSCESS

- Adipose tissue of the dorsal epidural space has a rich venous plexus
- Risk factors: IVDA, immunosuppression, renal failure, alcoholism, diabetes
- T/L spine are more common than C spine
- Infection extends over 4-5 psinal levels
- Infection usually remains extradural but can compress the cord from abscess formation
- Staph aureus cause the majority (others include Ecoli, pseudomonas)
- Back pain, fever, tenderness, progressive neurologic deficits
- Triad is often NOT present
- Cord symptoms begin as B/B dysfunction
- 10% present with encephalopathy
- MRI is test of choice
- Urgent surgery and Vancomycin + Ceftriaxone

DISKITIS

- Infection of the nucleus pulposis of the disc
- Can be spontaneous or secondary to infection or procedures
- Spontaneous is common in kids
- More common in immunosuppressed patients
- Moderate to severe spine pain; Lumbar spine is the most common location
- Elevated temp in 90%
- Usually do not have neurologic deficits
- MRI shows diskitis and r/o compressive lesion, epidural abscess
• Staph aureus is the MC bug but can be polymicrobial
• Mx = cloxacillin, usually do not require OR

**TUMORS**
• Compression, infiltration, or destruction of the spinal cord
• 5% of CNS tumors
• Most are mets: lung, breast, lymphoma
• Most mets occur in the T spine but 20% have multiple levels
• Back pain is initial complaint
• Pain is dull, constant, aching and is often worse with lying
• Worse at night and with vasmalva are clues
• 70% will have plain film abnormalities
• MRI is diagnostic
• Tx is surgery, radiation, or steroids