

Diseases of the Spinal Cord

Stacy Rudnicki, MD

Department of Neurology

Upper vs. Lower Motor Neuron

- **Upper motor neuron lesion**

- Motor cortex → internal capsule → brainstem → spinal cord

- **Lower motor neuron lesion**

- Anterior horn cell → nerve root → plexus → peripheral nerve → *neuromuscular junction* → *muscle*

Basic Features of Spinal Cord Disease

- **UMN findings below the lesion**
 - **Hyperreflexia and Babinski's**
- **Sensory and motor involvement that localizes to a spinal cord level**
- **Bowel and Bladder dysfunction common**
- **Remember that the spinal cord ends at about T12-L1**

History

- **Onset**
 - **Acute, subacute, chronic**
- **Symptoms**
 - **Pain**
 - **Weakness**
 - **Sensory**
 - **Autonomic**
- **Past history**
- **Family history**

Tempo of Spinal Cord Disease

	<u>Acute</u>	<u>Subacute</u>	<u>Chronic</u>
Trauma	X		
Mass lesion	X	X	
Infectious	X	X	X
Inherited			X
Vascular	X	X	X
Autoimmune	X	X	
Nutritional			X

Motor Exam

- **Strength - helps to localize the lesion**
 - **Upper cervical**
 - **Quadriplegia with impaired respiration**
 - **Lower cervical**
 - **Proximal arm strength preserved**
 - **Hand weakness and leg weakness**
 - **Thoracic**
 - **Paraplegia**
 - **Can also see paraplegia with a midline lesion in the brain**
- **Tone**
 - **Increased distal to the lesion**

Sensory Exam

- **Establish a sensory level**
 - **Dermatomes**
 - **Nipples: T4-5**
 - **Umbilicus: T8-9**
- **Posterior columns**
 - **Vibration**
 - **Joint position sense (proprioception)**
- **Spinothalamic tracts**
 - **Pain**
 - **Temperature**

Autonomic disturbances

- **Neurogenic bladder**
 - Urgency, incontinence, retention
- **Bowel dysfunction**
 - Constipation more frequent than incontinence
- **With a high cord lesion, loss of blood pressure control**
- **Alteration in sweating**

Investigation of Spinal Cord Disease

- **Radiographic exams**
 - Plain films
 - Myelography
 - CT scan with myelography
 - MRI
- **Spinal tap**
 - If you suspect: inflammation, MS, rupture of a vascular malformation

Etiology of Spinal Cord Disease

Traumatic Spinal Cord Disease

- 10,000 new spinal cord injuries per year
- MVA, sports injuries the most common
- Victims under 30 yrs old, male>>females
- Fx/dislocation of vertabrae most likely to occur at:
 - C5,6
 - T12, L1
 - C1,2

Tumors

- **Metastatic or primary**
- **Extramedullary**
 - **Extradural - most common**
 - **Bony - breast, prostate**
 - **Intradural - very rare**
 - **Meninges - meningioma**
 - **Nerve root - schwannoma**
 - **Intramedullary - very rare**
 - **Metastatic**
 - **Primary - astrocytoma or ependymoma**

B12 Deficiency

- **Subacute combined degeneration of the cord**
- **B12 deficiency**
 - malabsorption of B12 secondary to pernicious anemia or surgery
 - insufficient dietary intake - vegan
- **Posterior columns and CST involvement with a superimposed peripheral neuropathy**

Transverse myelitis

- **Inflammation of the spinal cord**
 - **Post-infectious**
 - **Post-vaccinial**
 - **Multiple sclerosis**
- **Pain at level of lesion may precede onset of weakness/sensory change/b&b disturbance**
- **Spinal tap may help with diagnosis**

Infections Involving the Spinal Cord

- **Polio**
 - only the anterior horn cells are infected
- **Tabes dorsalis**
 - dorsal root ganglia and dorsal columns are involved
 - tertiary syphilis
 - sensory ataxia, “lightning pains”
- **HIV myelopathy**
 - mimics B12 deficiency
- **HTLV-1 myelopathy -**
 - tropical spastic paraparesis

Multiple Sclerosis

- **Demyelination is the underlying pathology**
- **Cord disease can be presenting feature of MS or occur at any time during the course of the disease**
- **Lesion can be at any level of the cord**
 - Patchy
 - Transverse
- **Devic's syndrome or myelitis optica**
 - Transverse myelitis with optic neuritis

Vascular Diseases of the Spinal Cord

- **Infarcts**

- **Anterior spinal artery infarct**

- **from atherosclerosis, during surgery in which the aorta is clamped, dissecting aortic aneurysm**

- **less often, chronic meningitis or following trauma**

- **posterior columns preserved (JPS, vib)**

- **weakness (CST) and pain/temperature loss (spinothalamic tracts)**

- **Artery of Adamkiewicz at T10-11**

- **Watershed area**

- **upper thoracic**

Vascular Diseases of the Spinal Cord, *cont*

- **Arteriovenous malformation (AVM) and venous angiomas**
 - Both occur in primarily the thoracic cord
 - May present either acutely, subacutely or chronically (act as a compressive lesion)
 - Can cause recurrent symptoms
 - If they bleed
 - Associated with pain and bloody CSF
 - Notoriously difficult to diagnose
- **Hematoma - trauma, occasionally tumor**

Other Disease of the Spinal Cord

- **Hereditary spastic paraparesis**
 - Usually autosomal dominant
- **Infectious process of the vertebrae**
 - TB, bacterial
- **Herniated disc with cord compression**
 - Most herniated discs are lateral and only compress a nerve root
- **Degenerative disease of the vertebrae**
 - Cervical spondylosis with a myelopathy
 - Spinal stenosis

Classical spinal cord syndromes

- **Anterior spinal artery infarct**
- **Brown Sequard syndrome**
- **Syringomyelia**
- **Conus medullaris/cauda equina lesions**

Brown Sequard Syndrome

- **Cord hemisection**
- **Trauma or tumor**
- **Dissociated sensory loss**
 - **loss of pain and temperature contralateral to lesion, one or 2 levels below**
 - **crossing of spinothalamic tracts 1-2 segments above where they enter**
 - **loss of vibration/proprioception ipsilateral to the lesion**
 - **these pathways cross at the level of the brainstem**
- **Weakness and UMN findings ipsilateral to lesion**

Syringomyelia

- **Fluid filled cavitation in the center of the cord**
- **Cervical cord most common site**
 - **Loss of pain and temperature related to the crossing fibers occurs early**
 - **cape like sensory loss**
 - **Weakness of muscles in arms with atrophy and hyporeflexia (AHC)**
 - **Later - CST involvement with brisk reflexes in the legs, spasticity, and weakness**
- **May occur as a late sequelae to trauma**
- **Can see in association with Arnold Chiari malformation**

Conus Medullaris vs. Cauda Equina Lesion

<u>Finding</u>	<u>Conus</u>	<u>CE</u>
Motor	Symmetric	Asymmetric
Sensory loss	Saddle	Saddle
Pain	Uncommon	Common
Reflexes	Increased	Decreased
Bowel/bladder	Common	Uncommon