

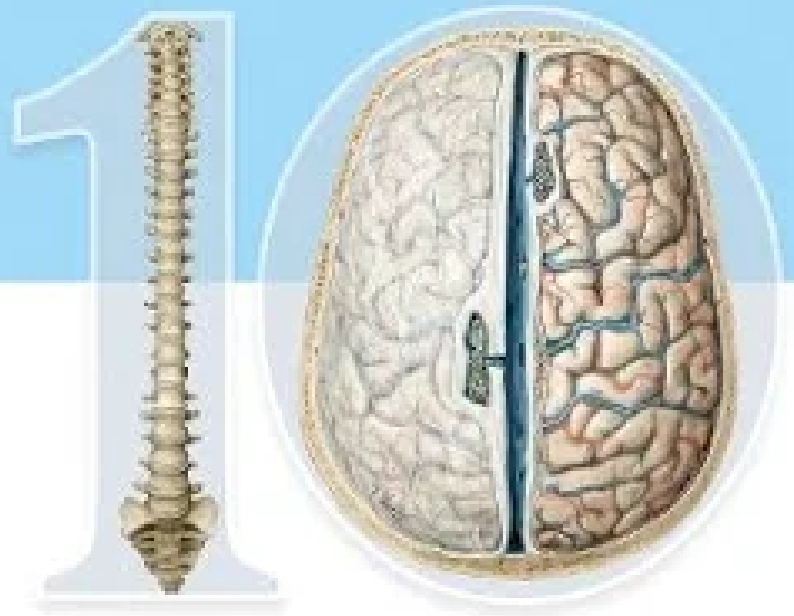
STEM-S

Last Minute Revision LMR NOTES

Greenberg's Handbook
of Neurosurgery

Mark S. Greenberg

Tenth Edition



 Thieme

INI-SS Neurosurgery

PRESENTED BY
Stem-S

Q-What is **complete** spinal cord injury ?

Completed loss of motor and sensory functions Elwood the Lovell of lesion including the perianal area (S3-S5)

Q- what is **incomplete** spinal cord injury ?

Partial loss of motor and sensory function

Below the level of lesion

- anterior cord syndrome
- posterior cord syndrome
- Central cord syndrome
- Brown sequards syndrome
- conus and cauda equine syndrome

Bulbocavernous Reflex

Contraction of anal sphincter after digital pressure on the penis or clitoris or pulling the Foley catheter.

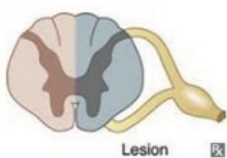
Return of this reflex means the end of spinal shock

*** DOPAMINE IS PRESSOR AGENT OF CHOICE FOR NEUROGENIC SHOCK ***

(NOT NOREPINEPHRINE)

Brown sequard syndrome (Most commonly after stab injury)

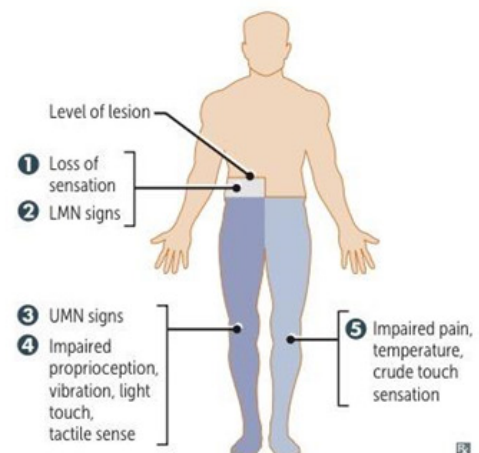
Brown-Séquard syndrome



Hemisection of spinal cord. Findings:

- ① Ipsilateral loss of all sensation **at** level of lesion
- ② Ipsilateral LMN signs (eg, flaccid paralysis) **at** level of lesion
- ③ Ipsilateral UMN signs **below** level of lesion (due to corticospinal tract damage)
- ④ Ipsilateral loss of proprioception, vibration, light (2-point discrimination) touch, and tactile sense **below** level of lesion (due to dorsal column damage)
- ⑤ Contralateral loss of pain, temperature, and crude (non-discriminative) touch **below** level of lesion (due to spinothalamic tract damage)

If lesion occurs above T1, patient may present with ipsilateral Horner syndrome due to damage of oculosympathetic pathway.



- Q-What are the types of fracture in cervical/ lumbar spine how do they look ? And how to grade if at all surgery is required?
- A- wedge compression (fracture of only the anterior column), burst fracture , Unilateral/ Bilateral facet locked (listhesis)



Burst fracture (two column injury (Anterior + Middle) , associated with retropulsion of bone fragment in canal)

Treatment - **Corpectomy** cage and screw fixation (below)



- Above is **Unilateral facet locked** , why ? Only 25% of the lower body is moved posterior in respect to the VB above !
- **Flexion + rotation injury** → unilateral inferior facet jumps over superior facet
- Leads to ~25% anterior subluxation of vertebral body
- Stable compared to bilateral, but neurologic deficit possible (radiculopathy > myelopathy)
- Most common at C5–C6, C6–C7

- Often missed on X-ray → CT mandatory
- Patient presents with neck pain and radiculopathy
- reduction is difficult to perform by tong traction
- Before Reduction ALWAYS PERFORM MRI to look for disc disruption !
- After reduction , Anterior Cervical discectomy and bony stabilisation may be done.

Q- what is the role of Methylprednisolone ?

A- No definitive role established (NASCIS 2), remember the dosage

- 30 mg/kg bolus over 15 minutes , Pause 45 minutes then 5.4 mg/kg/hour for the next 23 hours if started within <3 hours of injury , or for 47 hours (if started within <8 hours of injury)
- ONLY RECOMMENDED IF STARTED WITHIN <8 hours of injury -

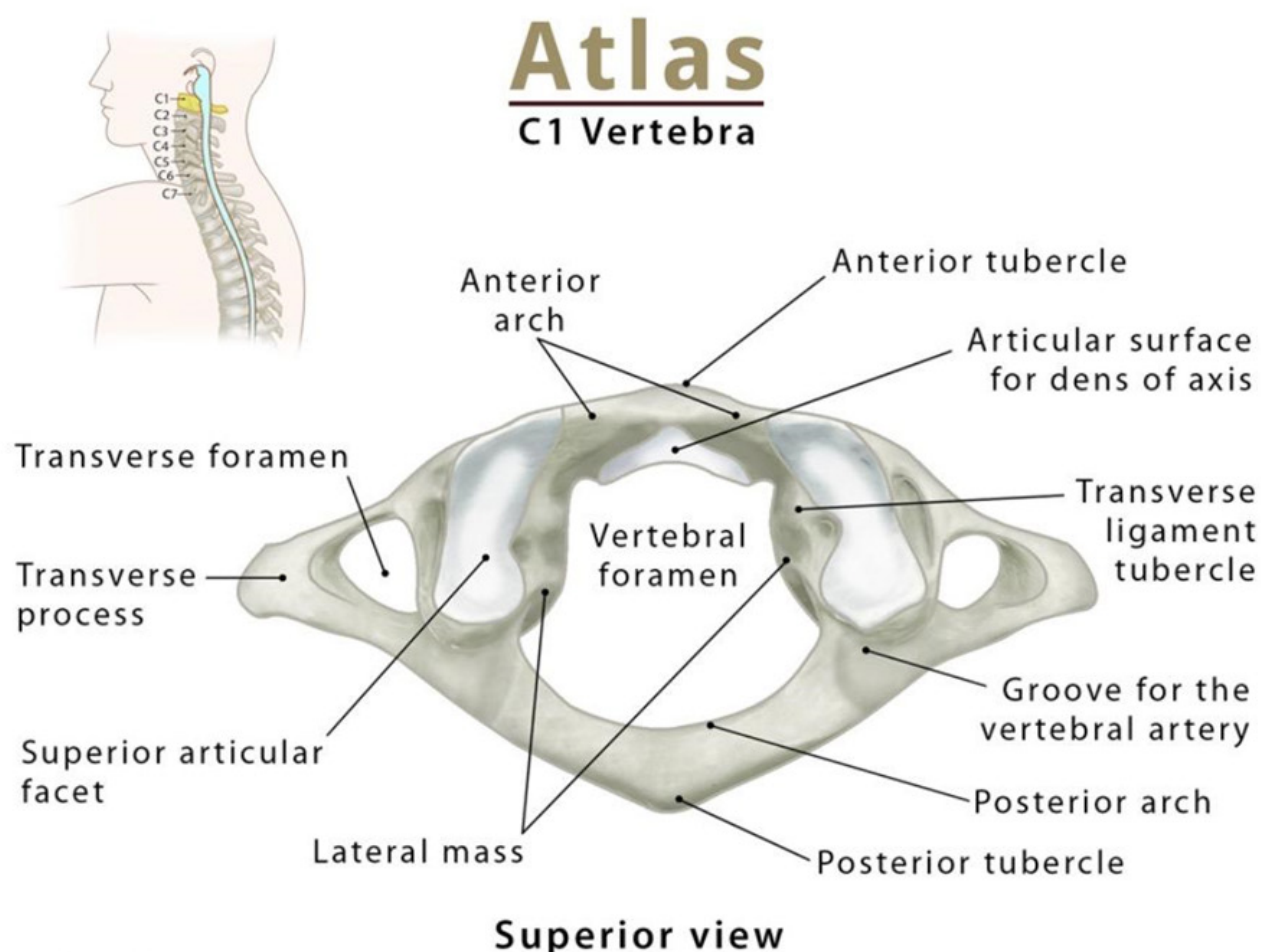
Methylprednisolone

Practice guideline: Methylprednisolone in SCI

Level I⁸

- Methylprednisolone (MP) for the treatment of acute SCI is not recommended.
- GM-1 ganglioside (Sygen) for the treatment of acute SCI is not recommended.

• ATLAS - Anatomy



- No body
- 2 arches - Anterior and Posterior Arch
- Lateral Mass with Two articular pillars.
- Superior articular process allows flexion/ Extension at O-C1 junction
- inferior articular process are important for rotation @ C1-C2 junction

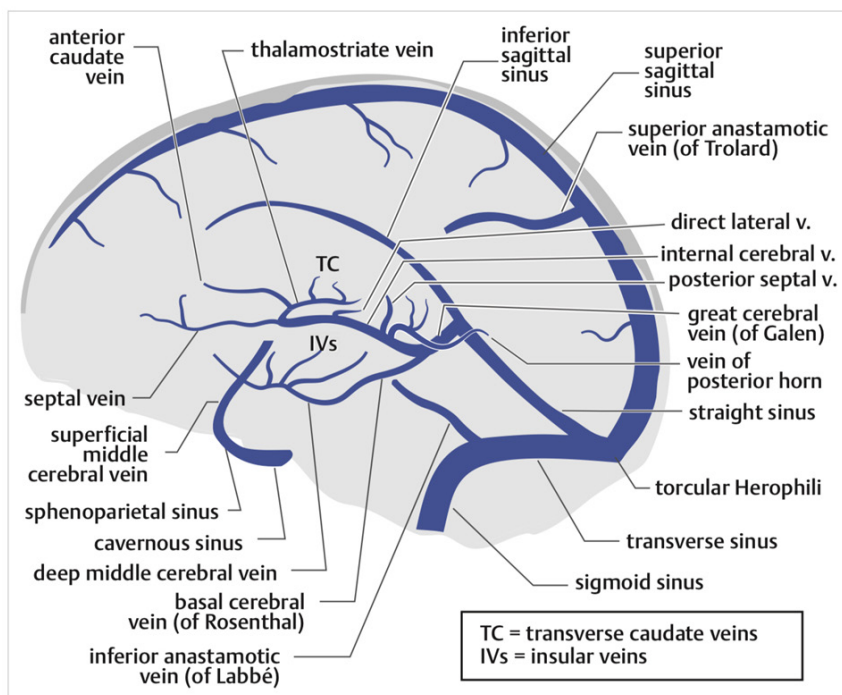


- Surgery Options- 1. Anterior odontoid screw (when the TAL is INTACT, minimally displaces TYPE 2 fracture , unable to tolerate Halo vest, Early displacement Despite Halo vest)
- Option 2. Posterior C1-C2 fixation (when TAL is injured , Grossly displaced fracture , old injury (> 6 months)

- **Hangmann Fracture - Levine Classification**

- Bilateral Pars interarticularis fracture occurring due to hyper extension and *compression* Vs. **JUDICIAL HANGING** where in fracture occurs due to hyperextension and *distraction* !

• VENOUS SYSTEM



- should be Able to identify the veins based on the diagram!
- **Vein of Trolard**- superior anastomotic vein , connecting the SSS to superficial middle cerebella vein
- **Vein of Labbu** - connecting the superficial middle cerebella vein to transverse sinus
- **GREAT OF GALEN**- Basal vein of Rosenthal + Internal cerebral Vein.

SPINAL CORD ARTERY

artery of adamkiewicz- supplies spinal cord from T8- conus , most commonly arises from T9 and L2, (second most common) T9-T12, most commonly located on the left side.

NEUROPHYSIOLOGY-

- The BBB is absent in the following areas:

(area postrema, median eminence of the hypothalamus, neurohypophysis (posterior pituitary), pineal gland, choroid plexus, tuber cinereum, and preoptic recess.

BABINSKI REFLEX- Cutaneous receptors carried via S1, afferent is Tibial nerve and reflex arc is Spinal Cord is L4- S2, efferent nerve is Peroneal nerve.

Represents lesion of upper motor neuron disease.

HOFFMANN sign- represent lesion above C8, indication of cervical myelopathy . done by flickering down the nail of middle finger of hand causes the thumb and adjacent finger to have involuntary flexion.

- **4 Above Pons Nerves: I, II, III, IV**
- **Midline (Medial) Lesions:** Cause "4M" symptoms (Motor, Medial lemniscus, MLF, Motor CN).
- **Lateral Lesions:** Cause "4S" symptoms (Spinocerebellar, Spinothalamic, Sensory CN5, Sympathetic).

Specific Syndrome Mnemonics:

- **Lateral Medullary (Wallenberg) Syndrome:** "Never pick a (PICA) horse (hoarseness) that cannot eat (dysphagia)".
- **Medial Pontine Syndrome:** "Branches off the base lead to problems in the face" (basilar artery branches, affects CN 6/7, internuclear ophthalmoplegia).
- **Medial Medullary Syndrome:** "M" structures: Motor (hemiplegia), Medial lemniscus (proprioception), Motor nerve (CN 12).
- **Millard-Gubler (Pons):** "Millard" has 7 letters (CN VII), "Gubler" has 6 (CN VI).

BRAINSTEM STROKE SYNDROMES

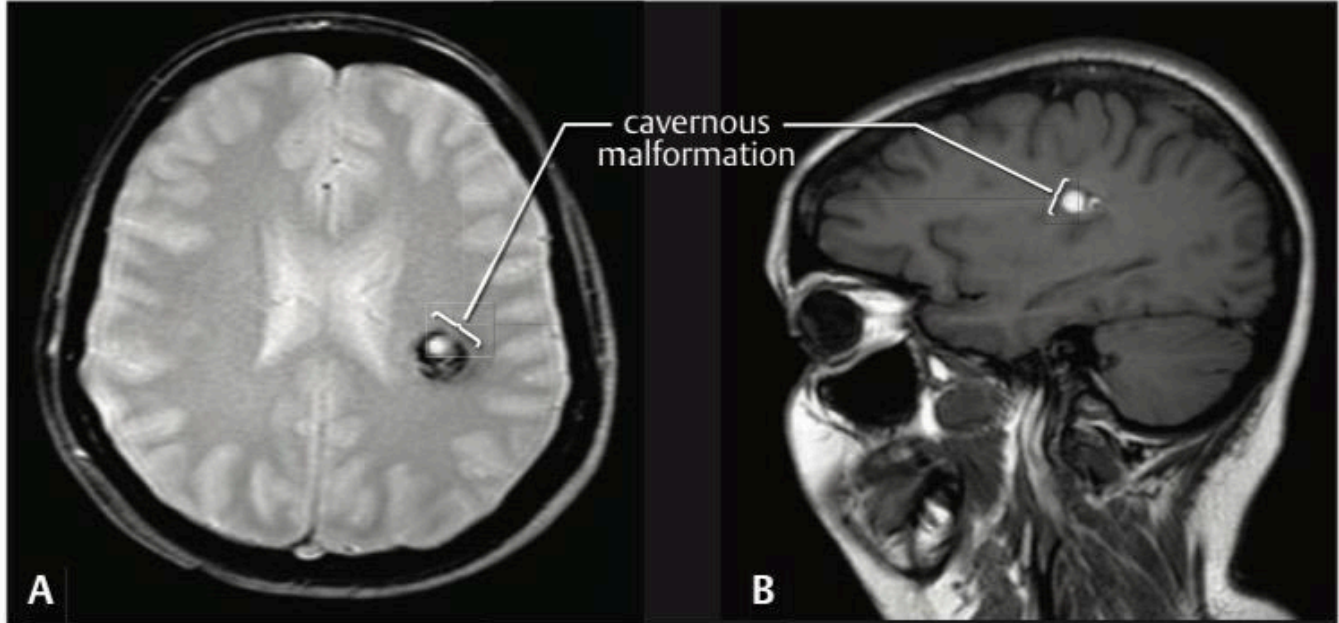
	Location	Ipsilateral	Contralateral
Medial Medullary Syndrome	Medial Medulla	Hypoglossal nerve palsy (tongue deviation towards lesion)	Hemiparesis, loss of proprioception and vibration sense
Lateral Medullary Syndrome (Wallenberg Syndrome)	Lateral Medulla	Ataxia, vertigo, dysphagia, Horner's syndrome	Loss of pain and temperature sensation
Medial Pontine Syndrome	Medial Pons	Abducens nerve palsy, facial weakness	Hemiparesis, loss of proprioception and vibration sense
Lateral Pontine Syndrome	Lateral Pons	Ataxia, vertigo, facial paralysis, hearing loss	Loss of pain and temperature sensation
Locked-In Syndrome	Ventral Pons	Quadriplegia, anarthria, preserved eye movements	
Weber's Syndrome	Midbrain	Oculomotor nerve palsy (ptosis, "down and out" eye position)	Hemiparesis
Benedikt's Syndrome	Midbrain	Oculomotor nerve palsy	Hemiparesis, ataxia, tremor
Claude's Syndrome	Midbrain	Oculomotor nerve palsy	Ataxia



Q- image may be shown and asked which anomaly is associated with it ,
go for klippel fiel syndrome !

Cavernous Malformation (Cavernoma) —

• Definition



Cluster of dilated, thin-walled vascular channels

- No intervening normal brain parenchyma
- Low-flow lesion

Unlike AVM:

- No feeding arteries / draining veins
- No arteriovenous shunt

Key Pathology Point

- Repeated microhemorrhages → hemosiderin deposition → causes seizures

Common Locations

- Supratentorial (most common)
- Brainstem (important: more symptomatic)
- Spinal cord

Clinical Features

Most Common Presentation

Seizures (especially supratentorial lesions)

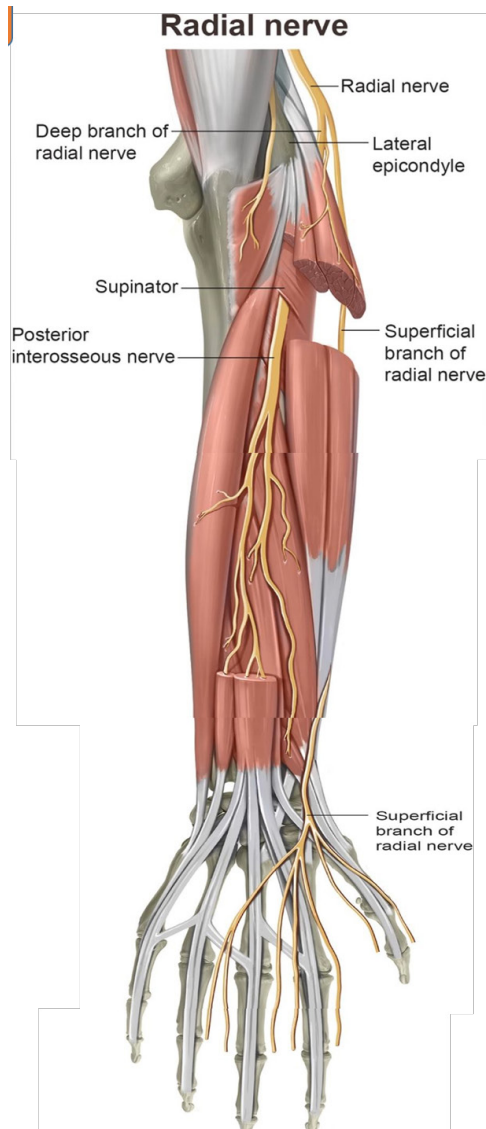
Others

Focal neurological deficit

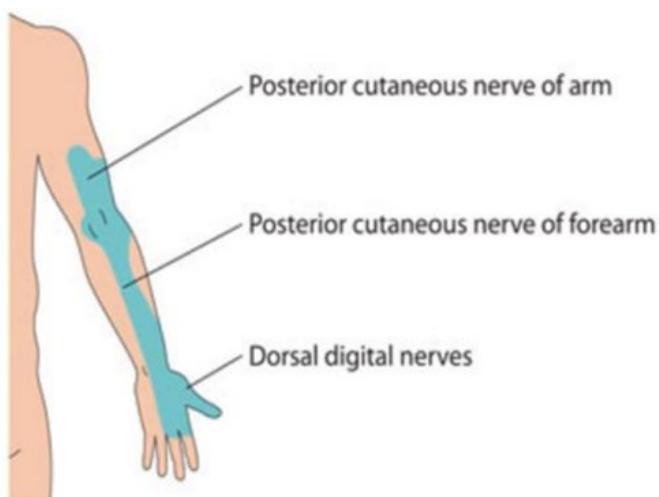
Headache

Hemorrhage (usually small, recurrent)

Radial (C5-T1)



- The radial nerve receives fibers from C5-C8 and T1. It is the largest branch of the brachial plexus.
- The radial nerve enters the forearm anterior to the lateral epicondyle (near the humeroradial articulation) and divides into superficial and deep branches.
- The superficial branch provides purely somatic sensory innervation to the radial half of the dorsal hand, and the deep branch innervates the extensor compartment muscles in the forearm.
- After passing through the supinator canal (between the superficial and deep parts of the supinator muscle), the deep branch continues to the wrist to become the posterior interosseous nerve, which innervates muscles involved in finger and thumb extension.
- **Innervation:**
 - Posterior compartment muscles of the arm and forearm (the extensor muscles of the upper limb).
 - It also supplies the skin of the posterior arm and forearm.



- **Presentation/“What Is the Most Likely Diagnosis?”**

- Look for a person over age 60 with back pain while walking, radiating into the buttocks and thighs bilaterally (compression of lumbar nerve roots).
- The onset of pain with walking is referred to as "neurogenic claudication" as it may resemble symptoms seen in vascular claudication. However, the symptoms of spinal stenosis are posture-dependent.
- Extension of the lumbar spine (standing, walking upright) further narrows the spinal canal and worsens the symptoms because the cord presses backwards against the ligamentum flavum, whereas lumbar flexion (leaning on a stroller/shopping cart) relieves the pain.
- Spinal stenosis can simulate peripheral arterial disease, but the vascular studies are normal. Vascular claudication causes pain with exertion and relief with rest, whereas neurogenic claudication is relieved by walking while leaning forward ("shopping cart sign"), and exercise with the spine flexed (cycling) does not incite symptoms.

Shopping cart sign

