

## AAP BRS Podcast: SCI Part 1-Pathophysiology, Classification, and Epidemiology

### Epidemiology:

#### Etiology:

- Motor vehicle crashes (MVC) > Falls > Violence > Sports
- Recent trends: Increase in falls
- Falls are the leading cause in elderly (age >65 yrs.)

#### Type of injury:

- C5 – Overall most common level of injury
- T12 – Most common level of paraplegia
- Complete injuries (AIS A):
  - C5 – Highest that can DRIVE
  - C6 – Highest level that can live INDEPENDENTLY
  - C7 – most common complete injury
- Incomplete tetraplegia > Incomplete paraplegia > Complete paraplegia > Complete tetraplegia
- Tetra-para-para-tetra, incomplete before complete

#### Causes of death:

- Respiratory disorders (pneumonia most common)
- Cardiovascular events
- Septicemia
- Urinary complications (eg, renal failure – leading cause in the past)

## Spine Pathology

### Cervical stenosis and myelopathy

#### Epidemiology:

Age > 55 years  
Degenerative cervical spine/disc → Canal stenosis → Cord compression

#### Manifestations:

- Gait dysfunction (usually first)
- Extreme weakness and numbness
- LMN signs – muscle atrophy, hyporeflexia
- UMN signs – positive Babinski, Hoffman, hyperreflexia
- Decreased proprioception, vibration, pain sensation

#### Diagnosis:

- Clinical exam and MRI of cervical spine

#### Treatment:

- Milder case – Conservative management with therapy
- Moderate/severe or progressive neurological deterioration – Surgery

### Central cord syndrome

- Most common incomplete spinal cord syndrome
- More common in older adults
- Caused by hyperextension injuries

#### Presentation:

- Motor weakness in upper extremity > lower extremity
- Variable sensory loss
- Bowel/bladder dysfunction

#### Pattern of recovery:

- Lower extremity →
- Bowel/Bladder →
- Proximal upper extremity →
- Intrinsic hand function
  - Bottom to top, then in to out

## International Standards Neurological Classification of Spinal Cord Injury (ISNCSCI):

[https://asia-spinalinjury.org/wp-content/uploads/2019/04/ASIA-ISNCSCI-Int'lWorksheet\\_2019.pdf](https://asia-spinalinjury.org/wp-content/uploads/2019/04/ASIA-ISNCSCI-Int'lWorksheet_2019.pdf)

### ASIA Impairment Scale (AIS)

Class	Description
A.	Complete: No motor or sensory function preserved in sacral segments
B.	Incomplete: Sensation preserved, but no motor function preserved below the neurological level
C.	Incomplete: Motor function preserved below the neurological level (> 1/2 of key muscles have a muscle grade <3)
D.	Incomplete: Motor function preserved below the neurological level (>1/2 of key muscles have a muscle grade ≥3)
E.	Normal: Normal sensory and motor function but deficits existed in the past

### Ambulation likelihood at 1 year

AIS A = 3%, AIS B = 50%, AIS C = 75%, AIS D = 95%

### Tips for ASIA exam

- Start with sensory testing, (light touch and pinprick). Compared to forehead.
  - Light touch graded 0-2
  - 2 = normal, 1= any change to sensation, 0 = nothing felt
  - Pinprick graded 0-2
  - 2 = normal, 1= less sharp than face, 0 = can't distinguish b/t sharp vs dull
- Next is motor testing
  - 5 = full strength to resistance
  - 4 = full antigravity strength and against some resistance
  - 3 = full ROM against gravity
  - 2 = full ROM with gravity eliminated
  - 1 = muscle activation
  - 0 = no muscle twitch
- Then determine sensory and motor levels. These are the lowest level where everything is NORMAL.
  - For motor, a 3 or 4 is considered normal only if ALL levels above are 5
  - If sensory level has no corresponding myotome, assume motor score is same
- Then determine the neurologic level of injury. Higher of the two levels above (i.e., if motor level is C4 and sensory level is C5, the NLI is C4)
- Then determine AIS (A to E)
- Other tips: Check S3-5 with light touch/pinprick, deep anal pressure (DAP), and voluntary anal contraction (VAC). If ANY of these are present, the patient has incomplete injury.