# 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):
  - o C5 Highest that can DRIVE
  - o C6 Highest level that can live INDEPENDENTLY
  - o C7 most common complete injury
- Incomplete tetraplegia > Incomplete paraplegia > Complete paraplegia > Complete tetraplegia
- Tetra-para-para-tetra, incomplete before complete

#### Causes of death:

- 1. Respiratory disorders (pneumonia most common)
- 2. Cardiovascular events
- 3. Septicemia
- 4. 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

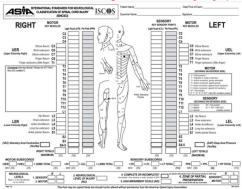
#### Presentation:

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

## Pattern of recovery:

- 1. Lower extremity →
- 2. Bowel/Bladder →
- 3. Proximal upper extremity →
- 4. 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-ISCOS-IntfWorksheet\_2019.pdf

#### ASIA Impairment Scale (AIS)

Class	Description
A.	Complete: No motor or sensory function
	preserved in sacral segments
В.	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

A. 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

## B. 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
- C. Then determine sensory and motor levels. These are the lowest level where everything is NORMAL.
- o For motor, a 3 or 4 is considered normal only if ALL levels above are 5
- o If sensory level has no corresponding myotome, assume motor score is
- D. 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)
- E. Then determine AIS (A to E)
- F. Other tips: Check **\$3-5** with light touch/pinprick, deep anal pressure (DAP), and voluntary anal contraction (VAC). If ANY of these are present, the patient has incomplete injury.
- 1. Yu T, Pyne M, Mendelson S, Wilhelm M. Neurological Examination and Classification of SCI. PM&R Knowledge Now. https://now.aapmr.org/neurological-examination-and-classification-of-sci/. Published February 15, 2018.
- 2. John J, Willenberg R, Sabharwal S. Cervical Spondylotic Myelopathy (Degenerative Cervical Myelopathy). PM&R Knowledge Now. https://now.aapmr.org/cervical-spondylotic-myelopathy/. Published November 10, 2011