

## **Spine and spinal cord trauma**

- 5% of patients with brain injury also have a spinal injury
- 25% of patients with spinal injury also have at least a mild brain injury
- 55% of spinal injuries are in the C-spine
- 1%% are thoracolumbar, 15% are lumbar and 15% are lumbosacral
- As long as the spine is immobilized, you safely defer the exclusion of a spinal injury until the patient is stable and worked up

In a neurologically intact patient, absence of pain along the spinal column virtually excludes the presence of a significant spinal injury

Sensory and Motor examination can be carried out in the secondary survey

### **CLASSIFICATION of spinal injury:**

- LEVEL:
  - The most caudal segment with NORMAL function
- SEVERITY:
  - Complete or incomplete? Incomplete means some motor function below the level of injury remains preserved
  - Paraplegia or quadriplegia? Count the moving limbs

### **SPINAL CORD SYNDROMES:**

- CENTRAL CORD SYNDROME
  - Power is lost in the UPPER limbs more than in the lower limbs
  - Usually after a hyper-extension injury
  - Usually in a patient with an existing C-spine stenosis
  - Usually a forward fall with a facial impact
  - Usually due to compromise of the anterior spinal artery, which supplies the central cord; and the central cord is where the upper limb fibers are arranged
  - Prognosis is better than that of other incomplete spinal injuries
- ANTERIOR CORD SYNDROME
  - Paraplegia
  - Loss of pain and temperature sensation, but not proprioception
  - Usually due to a complete infarction of the anterior spinal artery territory
  - Poorest prognosis of all the incomplete spinal injuries
- BROWN-SEQUARD SYNDROME
  - Hemisection of the cord, usually due to a penetrating injury
  - On one side, you lose all power and proprioception
  - On the other side, you lose all pain and temperature sensation
  - Some recovery is ...usually seen
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## **SPECIFIC SPINAL INJURIES:**

- **ATLANTO-OCCIPITAL DISLOCATION**
  - Traumatic flexion and distraction
  - 19% of fatal C-spine injuries
  - Usually they die on scene
- **ATLAS FRACTURE**
  - 5% of acute C-spine fractures
  - In 40%, the axis is also broken
  - Most frequently, a burst fracture (Jefferson fracture)
    - disruption of both the anterior and the posterior rings, with lateral displacement of the lateral masses
  - Most frequently the mechanism is axial loading
  - On open-mouth views, the lateral masses are too far from the peg
- **C1 ROTARY SUBLUXATION**
  - Most often seen in children
  - Presents with persistent torticollis
  - On open mouth views, one of the lateral masses is too far from the peg
  - The patient should be immobilized in the rotated position; don't try to turn their head the right way
- **C2 FRACTURE: ODONTOID**
  - C2 fractures in general are 18% of C-spine fractures
  - 60% of axis fractures are through the peg
  - TYPE 1: involve the tip of odontoid only, the rarest
  - TYPE 2: through the base of the dens; most common
  - TYPE 3: start at the base of the dens and then progress through the body of the axis
- **C2 FRACTURE: POSTERIOR BODY**
  - These are the "hangman" fractures
  - 20% of all axis injuries
  - Usually an extension-type injury
  - There are also 20% of non-odontoid, non-hangman fractures
- **C3-C7 FRACTURES AND DISLOCATIONS**
  - C3 fractures are very uncommon
  - C5 and 6 are where the money is
  - Usually the fracture is through the vertebral body
  - Facet dislocations = more severe spinal cord injury
  - Unilateral facet dislocation = 80% have neurological injuries
  - Bilateral facet dislocation = AT LEAST an incomplete injury (84% have complete spinal cord transection)
- **THORACIC SPINE FRACTURES – DOWN TO T10**
  - 4 flavours:
    - Anterior wedge compression fractures
      - Axial load injury
      - Amount of wedging is usually small
      - This is a STABLE FRACTURE; all the others are not
    - Burst fractures
      - Axial load injury

- **Chance fractures**
  - **Transverse fracture through the vertebral body**
  - **Usually a flexion injury, eg. lapbelt-restrained passenger in the middle rear seat**
  - **Usually associated with severe visceral and abdominal injuries**
- **Fracture-dislocations**
  - **Rare**
  - **Extreme flexion and severe blunt trauma**
  - **Usually produce complete cord transection**
- **THORACOLUMBAR FRACTURES – T11 TO L1**
  - **Usually from a combination of acute hyperflexion and rotation**
  - **Usually unstable**
  - **Usually in falls from height or unrestrained drivers**
  - **These people are particularly vulnerable to rotational movement. LOG ROLLING SHOULD BE VERY CAREFUL**
  - **Tend to cause bladder and bowel dysfunction as well as motor paralysis of the lower limbs**
- **LUMBAR FRACTURES**
  - **Same as thoracolumbar**
  - **Tend not to have complete deficits, because only the cauda equina is injured**
- **PENETRATING INJURIES**
  - **USUALLY STABLE INJURIES**
  - **Unless the bullet destroys a large part of the vertebral body**
- **BLUNT CAROTID AND VERTEBRAL VASCULAR INJURIES**
  - **Usually associated with**
    - **C1-C3 fractures**
    - **Cervical spine fracture with subluxation**
    - **Fractures involving the foramen transversarium**
  - **Of the above patients, 1/3<sup>rd</sup> will have some evidence of carotid or vertebrovascular injury on CT or angiogram**

## **General Management**

- **IMMOBILIZATION**
  - **Spinal board is more effective and less comfortable than the collar**
  - **The board is removed as a part of the secondary survey, when you do the log roll**
- **SPINAL SHOCK**
  - **Typically, hypotension with bradycardia**
  - **Typically thoracic injury (that's where the sympathetic chain is)**
  - **Typically there is limited response to fluid challenges**
  - **This is a sort of shock where you might consider the use of vasopressors, because if you try to use fluids to bring them back to normotension, you may cause pulmonary oedema**