So what do you expect with a cervical lesion?

- Quadriplegia or quadriparesis
- Bowel/bladder retention (spastic)
- Various degrees of breathing difficulties
- Neurogenic and/or spinal shock
Case scenario

• 22 y/o female
• Motor vehicle accident (hit a pole at 60mph)
• Short term loss of consciousness (10’)
• Not able to move or feel her legs
• No bladder / bowel control or sensation
• Sensory level at the umbilicus
Thoracic injuries (T2-L1)

- Paraparesis or paraplegia
- UMN (upper motor neuron) signs
Case scenario

- 22 y/o female
- Motor vehicle accident
- Not able to move or feel her legs below the knee
- Could flex thighs against gravity
- No bladder / bowel control or sensation
- Sensory level above the knee on L, below the knee on R
Cauda equina injuries (L2 or below)

- Paraparesis or paraplegia
- LMN (lower motor neuron) signs
- Thigh flexion is almost always preserved to some degree
What is the difference between cauda equina and conus medullaris syndrome?
Goal of spine trauma care

- **Protect further injury** during evaluation and management
- **Identify spine injury** or document absence of spine injury
- Optimize conditions for maximal neurologic recovery
Suspected Spinal Injury

- High speed crash
- Unconscious
- Multiple injuries
- Neurological deficit
- Spinal pain/tenderness
- Up to 15% of spinal injuries have a second (possibly non adjacent) fracture elsewhere in the spine
Initial Management

- Immobilization
  - Rigid collar
  - Sandbags and straps
  - Spine board
  - Log-roll to turn
- Prevent hypotension
  - Pressors: Dopamine, not Neosynephrine
  - Fluids to replace losses; do not overhydrate
- Maintain oxygenation
  - O2 per nasal canula
- If intubation is needed, do NOT move the neck

Advance Trauma Life Support (ATLS) guidelines
Management in the hospital

- NGT to suction
  - Prevents aspiration
  - Decompresses the abdomen (paralytic ileus is common in the first days)
- Foley
  - Urinary retention is common
- Methylprednisolone (Solu-Medrol)
  - Only if started within 8 hours of injury
  - Exclusion criteria
    - Cauda equina syndrome
    - GSW
    - Pregnancy
    - Age <13 years
    - Patient on maintenance steroids
Radiographic evaluation

X-ray Guidelines (cervical)

AABBCDS

- Adequacy, Alignment
- Bone abnormality, Base of skull
- Cartilage
- Disc space
- Soft tissue
Adequacy

- Must visualize entire C-spine
- A film that does not show the upper border of T1 is inadequate
- Caudal traction on the arms may help
- If can not, get swimmer’s view or CT
Alignment

- The anterior vertebral line, posterior vertebral line, and spinolaminar line should have a smooth curve with no steps or discontinuities.

- Malalignment of the posterior vertebral bodies is more significant than that anteriorly, which may be due to rotation.

- A step-off of >3.5mm is significant anywhere.
Lateral Cervical Spine X-Ray

- Anterior subluxation of one vertebra on another indicates facet dislocation
  - < 50% of the width of a vertebral body → unilateral facet dislocation
  - > 50% → bilateral facet dislocation
Bones
Disc

- Disc Spaces
  - Should be uniform
- Assess spaces between the spinous processes
Soft tissue

- **Nasopharyngeal space (C1)**
  - 10 mm (adult)

- **Retropharyngeal space (C2-C4)**
  - 5-7 mm

- **Retrotracheal space (C5-C7)**
  - 14 mm (children)
  - 22 mm (adults)
AP C-spine Films

- **Spinous processes** should line up
- **Disc space** should be uniform
- **Vertebral body** height should be uniform. Check for oblique fractures.
Open mouth view

- **Adequacy**: all of the dens and lateral borders of C1 & C2
- **Alignment**: lateral masses of C1 and C2
- **Bone**: Inspect dens for lucent fracture lines
CT scan

- Good in acute situations
- Shows bone very well
- Sagittal reconstruction is mandatory
- Soft tissues (discs, spinal cord) are poorly visualized
- Do NOT give contrast in trauma patients (contrast is bright, mimicking blood)
MRI

- Almost never an emergency
  - Exception: cauda equina syndrome
- Shows tumors and soft tissues (e.g., herniated discs) much better than CT scan
- May be used to clear c-spine in comatose patients
Lumbar Puncture

- Sedate the patient and make your life easier
- Measure opening pressure with legs *straight*
- Always get head CT prior to LP to r/o increased ICP or brain tumor
Cervical Spine Clearance

- Occiput to T1 need to be cleared
- ER, Neurosurgery or Orthopedics physician
- If the patient
  - Is awake and oriented
  - Has no distracting injuries
  - Has no drugs on board
  - Has no neck pain
  - Is neurologically intact
  then the cervical spine can be cleared clinically, without any need for X-rays
- CT and/or MRI is necessary if the patient is comatose or has neck pain
- Subluxation >3.5mm is usually unstable
Gardner-Wells tongs
Cervical Traction

- Gardner-Wells tongs
- Provides temporary stability of the cervical spine
  - Contraindicated in unstable hyperextension injuries
- Weight depends on the level (usually 5lb/level, start with 3lb/level, do not exceed 10lb/level)
- Cervical collar can be removed while patient is in traction
- Pin care: clean q shift with appropriate solution, then apply povidone-iodine ointment
- Take Xrays at regular intervals and after every move from bed
Soft and hard collars
Minerva vest and halo-vest
Jefferson Fracture

• Burst fracture of C1 ring

• Unstable fracture

• Increased lateral ADI on lateral film if ruptured transverse ligament and displacement of C1 lateral masses on open mouth view

• Need CT scan
Burst Fracture

• Fracture of C3-C7 from axial loading

• Spinal cord injury is common from posterior displacement of fragments into the spinal canal

• Unstable
Clay Shoveler’s Fracture

- Flexion fracture of spinous process
- C7>C6>T1
- Stable fracture
Flexion Teardrop Fracture

- Flexion injury causing a fracture of the anteroinferior portion of the vertebral body
- Unstable because usually associated with posterior ligamentous injury
Bilateral Facet Dislocation

- Flexion injury
- Subluxation of dislocated vertebra of greater than ½ the AP diameter of the vertebral body below it
- High incidence of spinal cord injury
- Extremely unstable
Hangman’s Fracture

- Extension injury
- Bilateral fractures of C2 pedicles (white arrow)
- Anterior dislocation of C2 vertebral body (red arrow)
- Unstable
Odontoid Fractures

- Complex mechanism of injury
- Generally unstable
- Type 1 fracture through the tip
  - Rare
- Type 2 fracture through the base
  - Most common
- Type 3 fracture through the base and body of axis
  - Best prognosis
Odontoid Fracture  Type II
Odontoid Fracture  Type III
Surgical Decompression and/or Fusion

• Indications
  • Decompression of the neural elements (spinal cord/nerves)
  • Stabilization of the bony elements (spine)

• Timing
  • Emergent
    • Incomplete lesions with progressive neurologic deficit
  • Elective
    • Complete lesions (3-7 days post injury)
    • Central cord syndrome (2-3 weeks post injury)
Long term care

- Rehab for maximizing motor function
- Bladder/bowel training
- Psychological and social support