Imaging in Trauma
The Basics

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Objectives

• Learn about basic imaging algorithms in trauma
• Learn about different imaging modalities used in trauma imaging and associated risks
• Learn to spot a few basic, critical findings on imaging
Evaluate the patient! Xrays don’t take care of patients, you do.

**Stable Patient**
- Determine mechanism of injury
- Survey the patient
- Examine the patient
- Use appropriate scoring systems
  - GCS
  - NEXUS/CCR

**Unstable Patient**
- Emphasis on stabilizing patient
- Little emphasis on imaging
  - Fast scan
  - Xray Chest and pelvis
Mechanism of Injury

**Blunt Trauma**
- High velocity - usually use CT and x-rays of deformed extremities, chest and pelvis
- Low velocity (fall <3 ft or <5 stairs), x-rays may be more appropriate, especially in kids, CT spine and body often not needed

**Penetrating Trauma**
- If to chest/Head usually CT.
- If to abdomen/extremity might explore wound first.
Imaging of Head-blunt trauma

- New Orleans criteria (NOC) – Imaging not required if all are true:
  - Age <60
  - GSC=15
  - No vomiting, headache, seizure
  - No visible injury above clavicles
  - No persistent anterograde amnesia
  - No intoxication
Imaging of the Torso in blunt trauma

- Stable patient (don’t send unstable patients to the scanner)
- Use IV contrast, no enteric contrast
- No need to image if patient needs to go to OR first
- Image with significant mechanism: MVC > 35 mph, fall > 15 feet, PHBC and thrown > 10 feet, assault with decreased LOC
Spine Imaging - blunt trauma

Cervical Spine
- Patients with low risk criteria by NEXUS or CCR don’t need imaging
- Low velocity (fall <3ft or <5 stairs), xrays may be more appropriate, especially in kids, CT spine and body often not needed
- Flex/ext xray not useful in acute injury period due to spasm
- If complex fx or through foramen transversarium then do Neck CTA
- May use MRI for suspected ligament or cord injury

Thoracic/lumbar spine
- Low velocity – xray often sufficient.
- High velocity image if: midline back pain, neurologic deficit, GCS<15, cervical fx, major distracting injury, intoxication
- Image the whole spine
- Can reconstruct spine off of torso CT
- May use MRI for suspected ligament or cord injury
Types of Thoracolumbar fractures

Compression (axial load)
- Impaction (wedge)
- Split
- Burst
  - Incomplete
  - Complete

Distraction (opened like a book)
- Extension
- Flexion
  - Ligamentous
  - Osseus

Torsion (twisting)
- Includes shear fx
Cervical spine- Image with high risk

High risk = AMS, multiple fxs, drowning/diving accident, significant head or facial injury, age>65, dangerous mechanism, paresthesias, rigid spine disease.
Dangerous mechanism= Fall >3ft/5stairs, axial load to head, MVC >60mph, rollover/ejection, bicycle, MCC, ATV

**NEXUS**
- Low risk= no midline tenderness, no focal deficits, no intoxication or indication of brain injury, no distracting injury, normal alertness

**CCR (Canadian C-spine rules)**
- Low risk= no paresthesias, age<65, simple rear-end MVC, sitting up in ED, ambulatory, delayed onset neck pain, no midline tenderness, able to rotate neck 45 degrees left and right
Complete Burst