

Spine Trauma

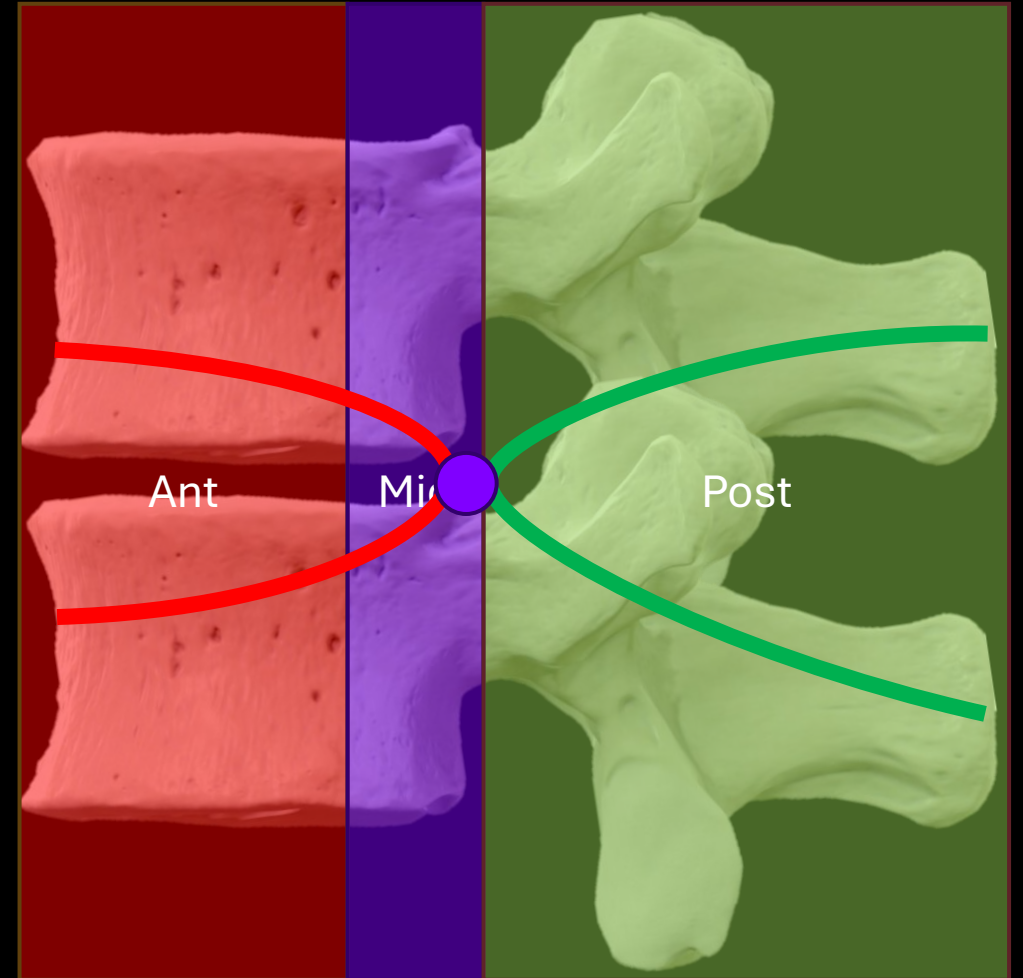
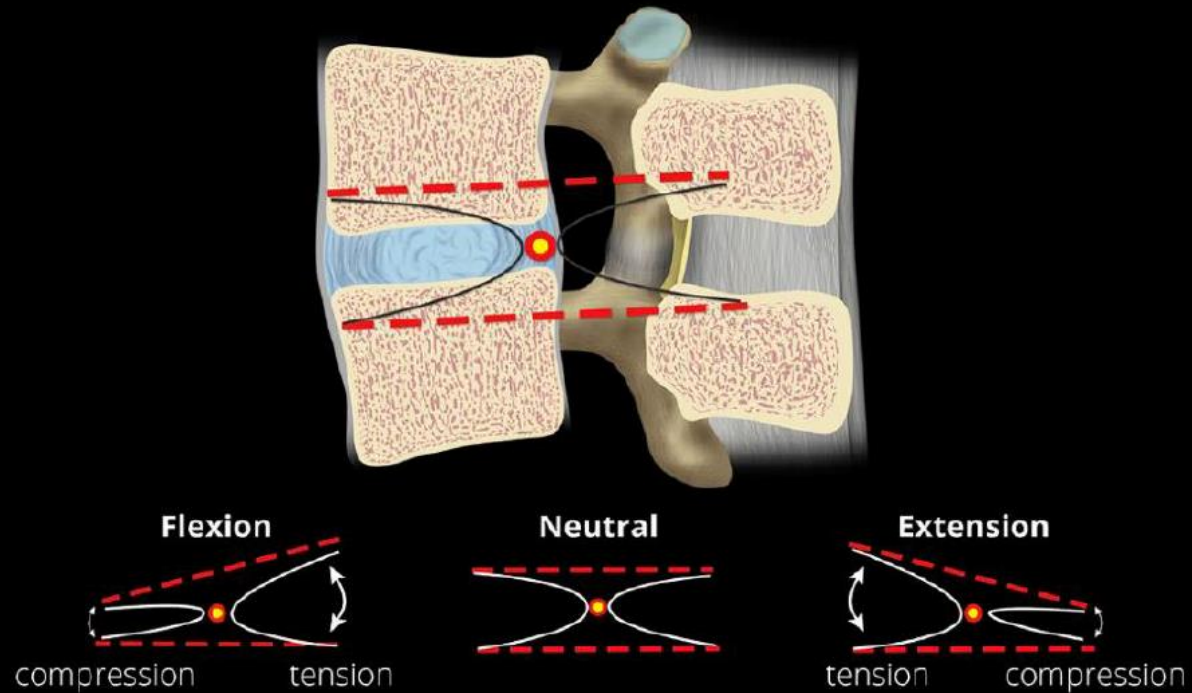
Matthew Breen MD

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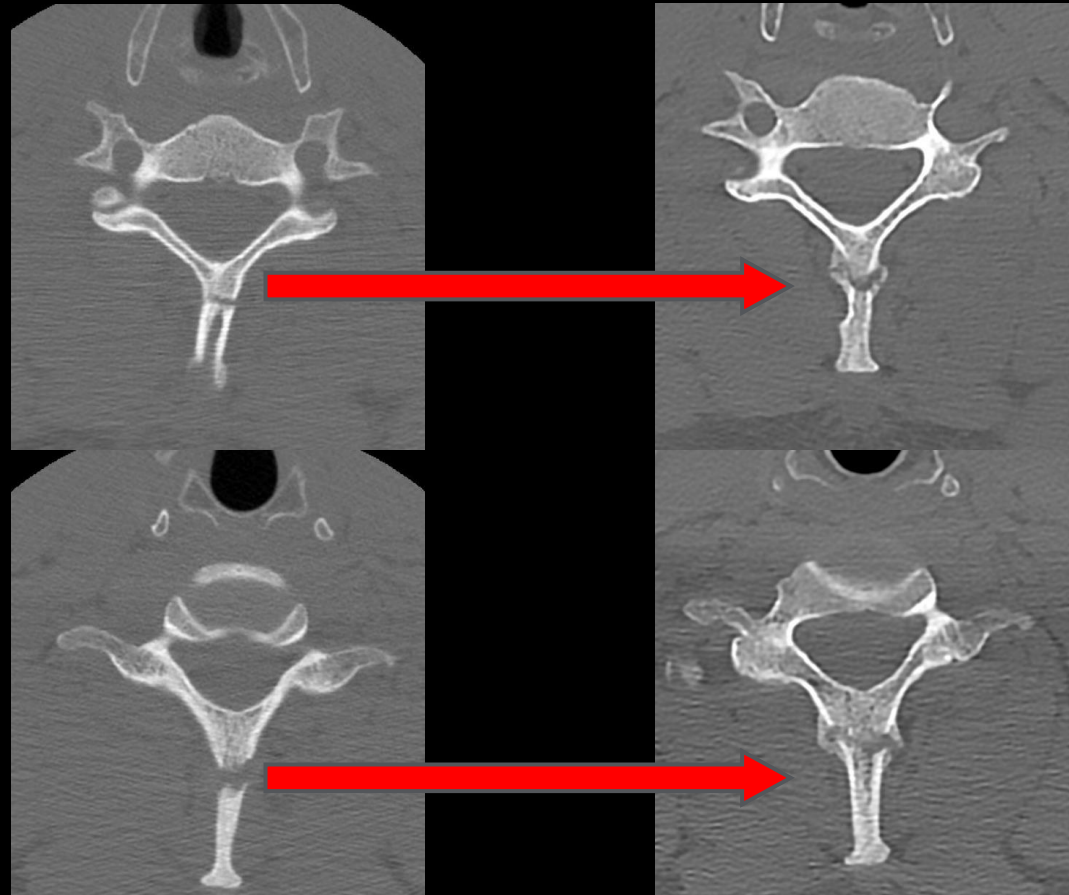
NYU Grossman School of Medicine

New York, NY

Spine biomechanics



48 year old man, shoulder and neck pain

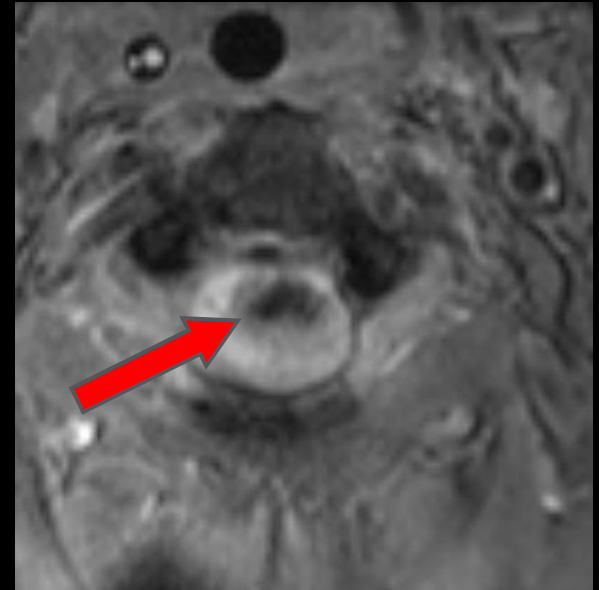
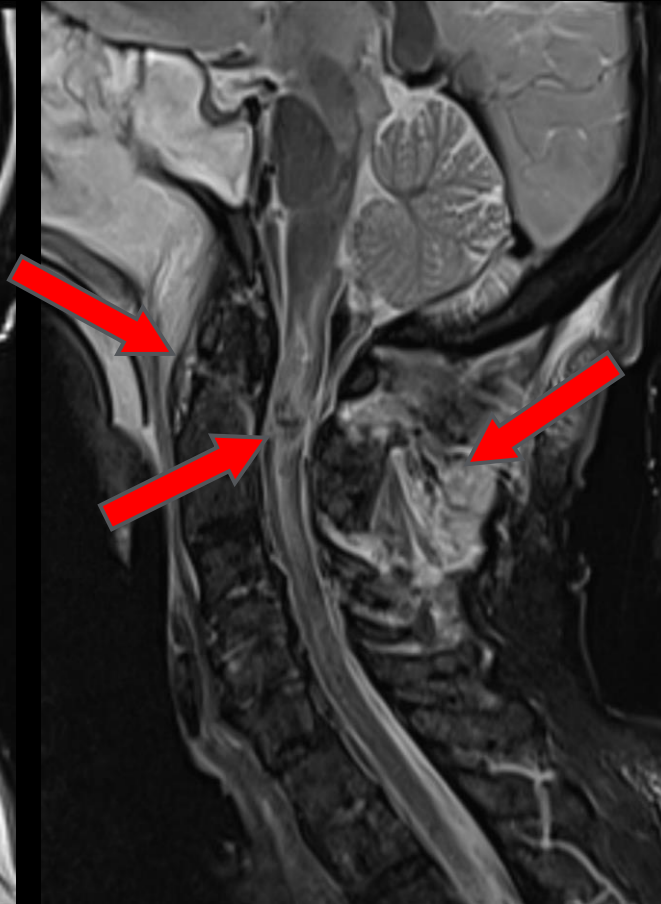


Clay shoveler's fracture

- Avulsion of lower C spine spinous process(es)
- C7 most common
- Abrupt neck flexion (shoveling), or direct trauma
- Laborers, athletes, car accidents
- Conservative treatment, no neurologic deficit

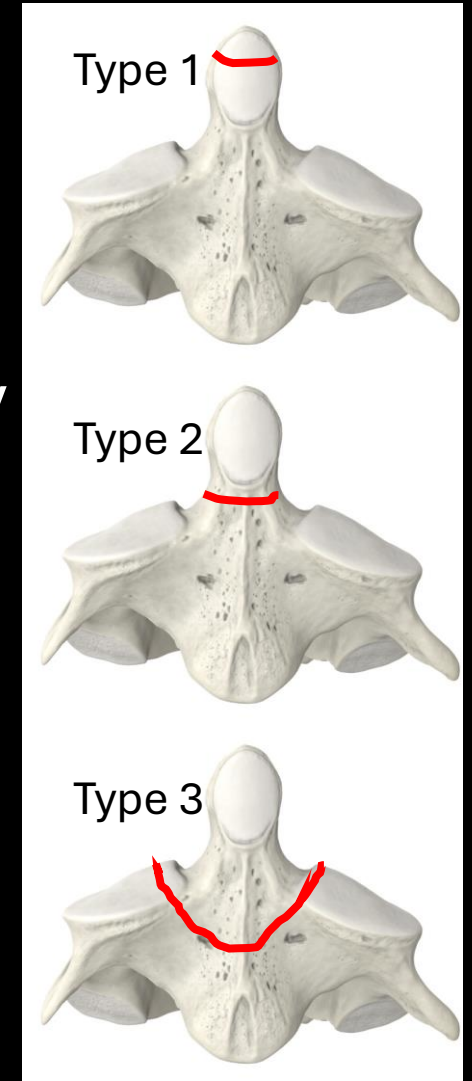
62 year old woman, MVA



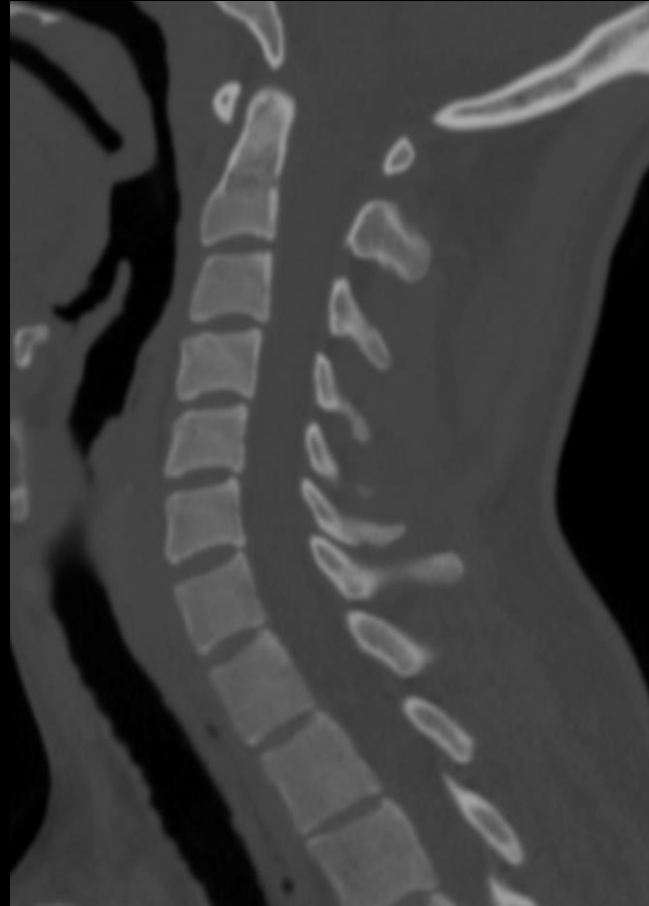


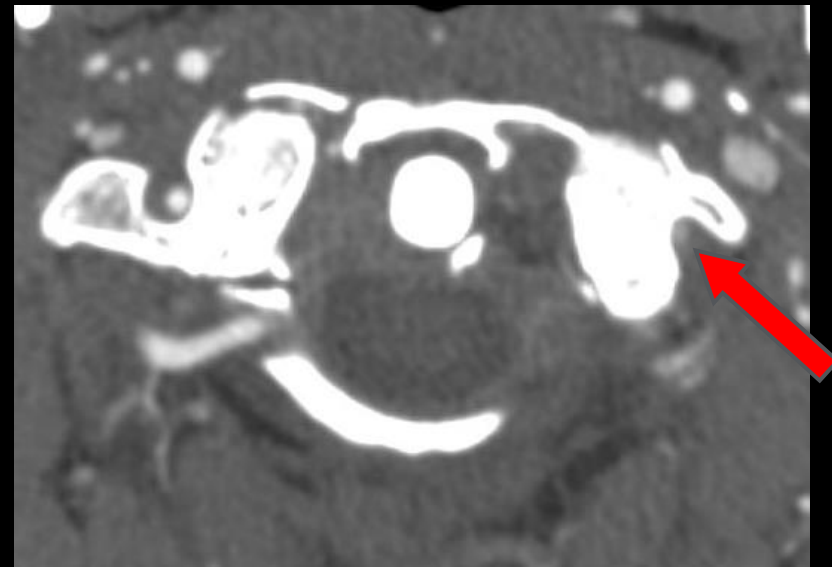
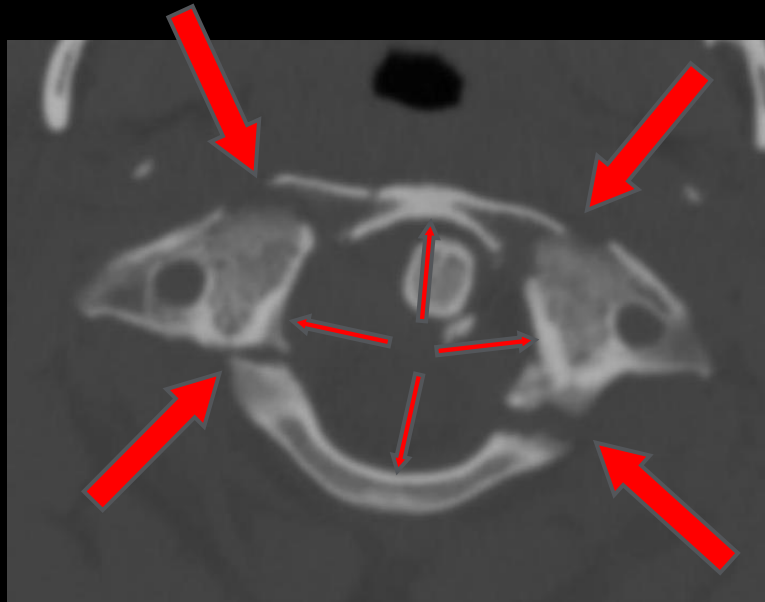
Odontoid fractures

- Type 1 – Stable, uncommon, alar ligament avulsion
- Type 2 – Unstable, most common, may require surgery
- Type 3 – Usually stable



26 year old woman, struck by falling heavy object

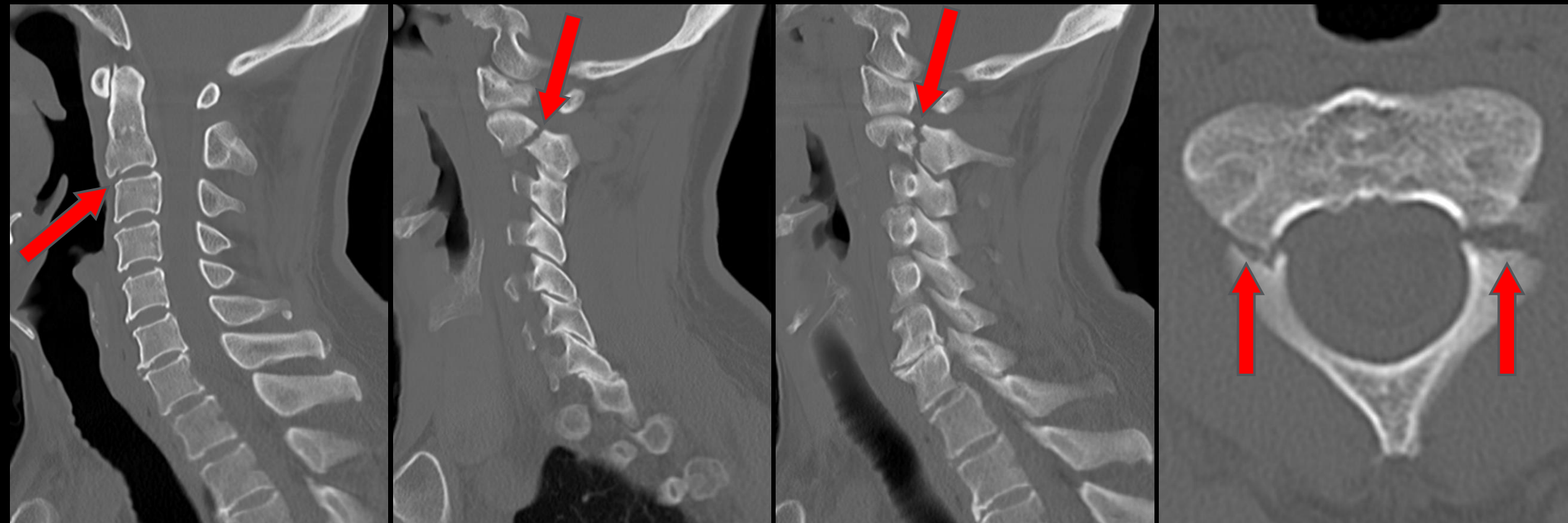




Jefferson fractures

- Heavy axial loading
- C1 anterior and posterior rings, lateral spreading of fragments
- Usually stable
- Check for vessel injury (CTA)

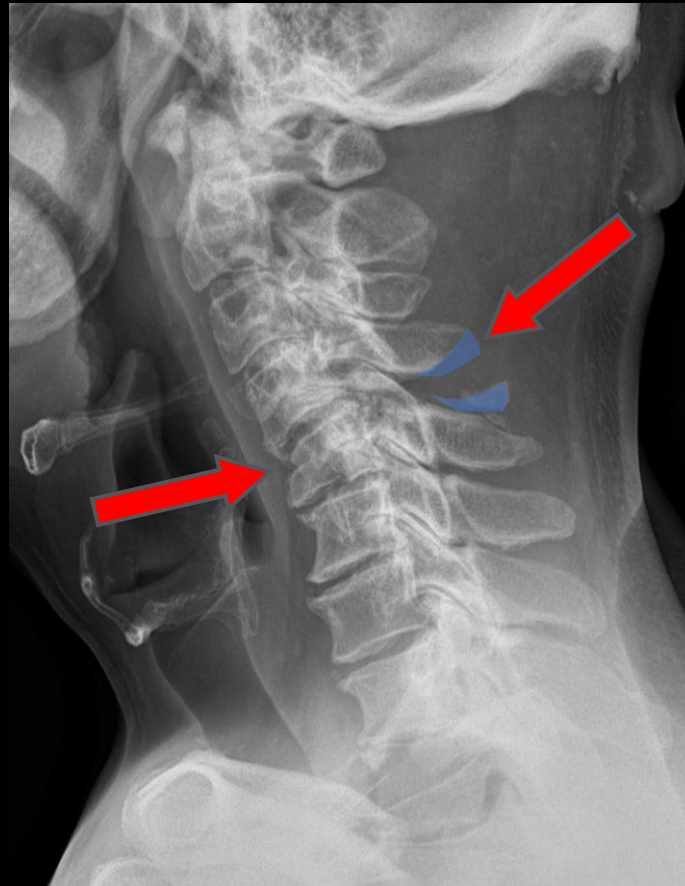
38 year old man, MVA



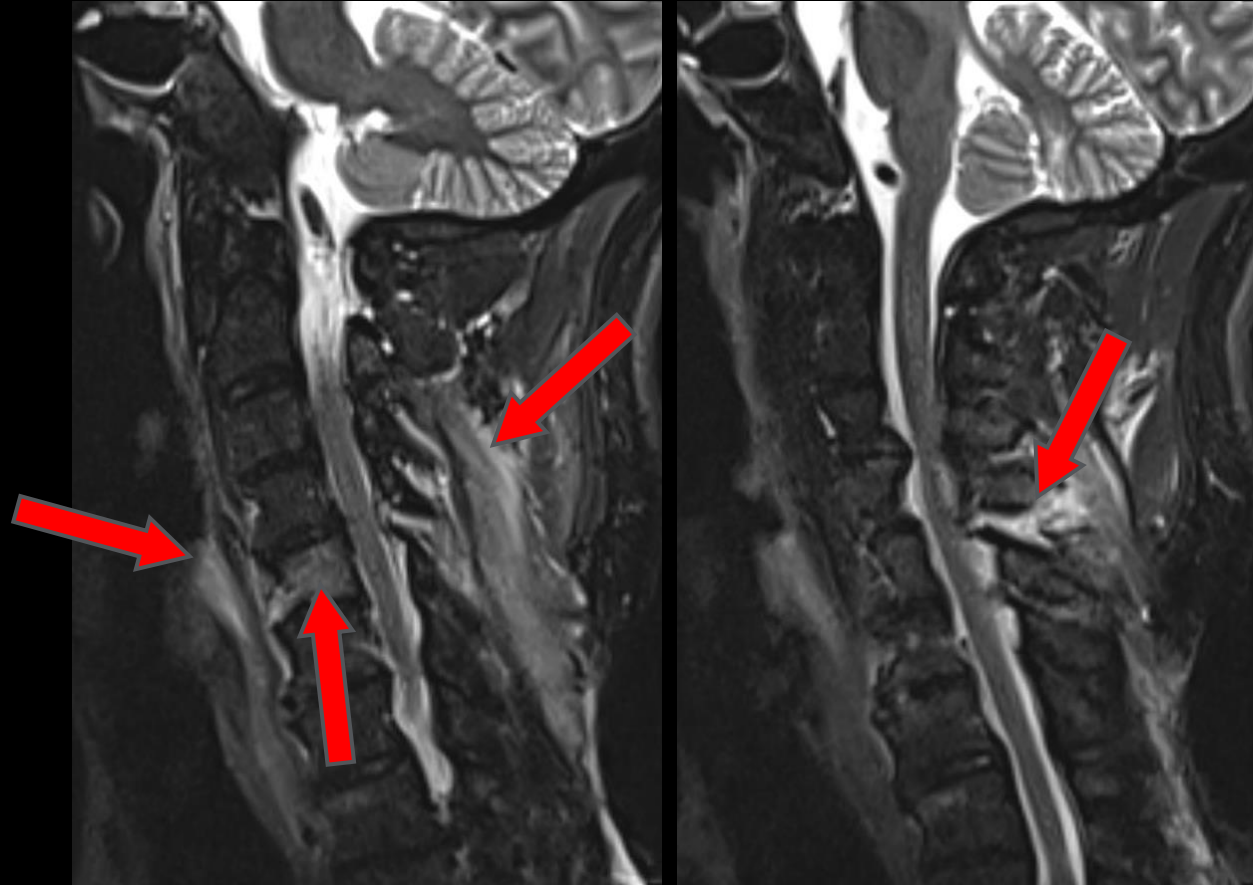
Hangman fractures

- Bilateral C2 pars fractures
- Hyperextension and axial loading (not from hanging)
- Check for vessel injury (CTA)
- Majority are unstable, but may be stable if minimally displaced

72 year old man, struck by heavy falling object





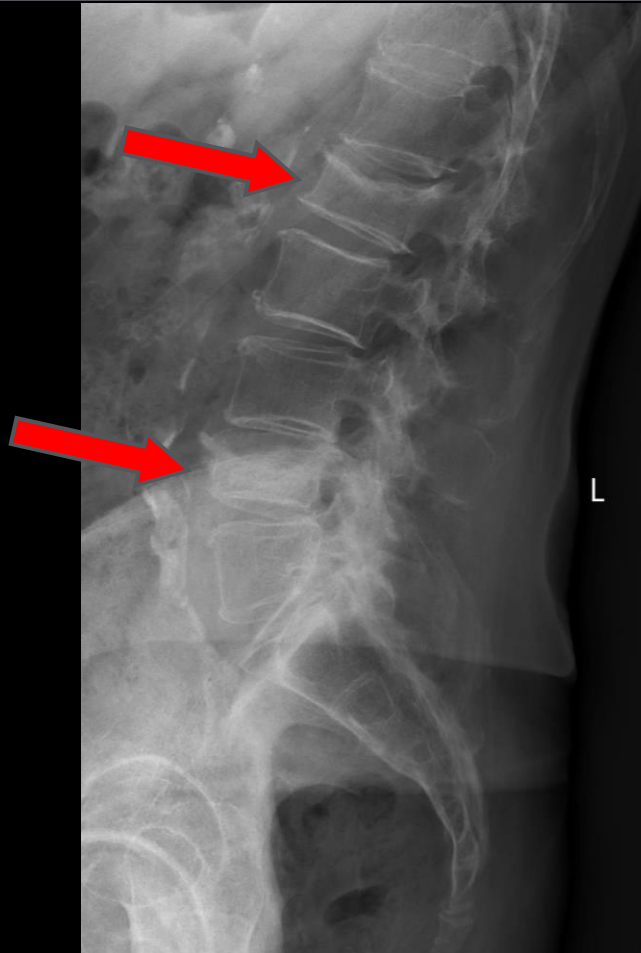


Flexion teardrop

- Hyperflexion/axial compression, high energy
- C5>C4>C6
- Often unstable, high risk of neuro injury, tetraplegia
- “Extension” teardrops are higher (C2/C3), smaller, and stable but can look similar
- Surgical treatment



79 year old woman, acute on chronic back pain

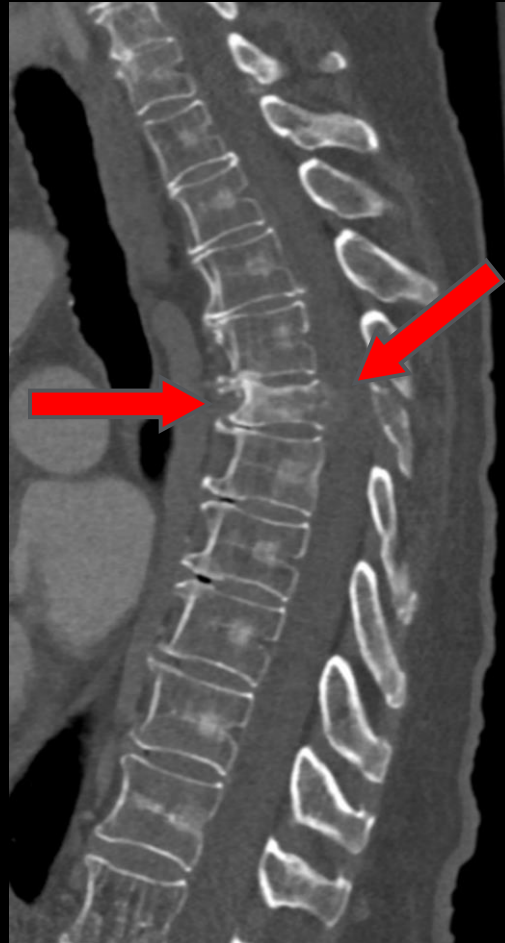




Osteoporotic compression fracture

- Osteopenia/osteoporosis
- Often multilevel, of varying ages (worsened kyphosis predisposes to more fractures)
- May appear sclerotic from impacted trabeculae
- Look for retropulsion
- Treatment generally conservative, or kyphoplasty/vertebroplasty

76 year old man, back pain, unintentional weight loss



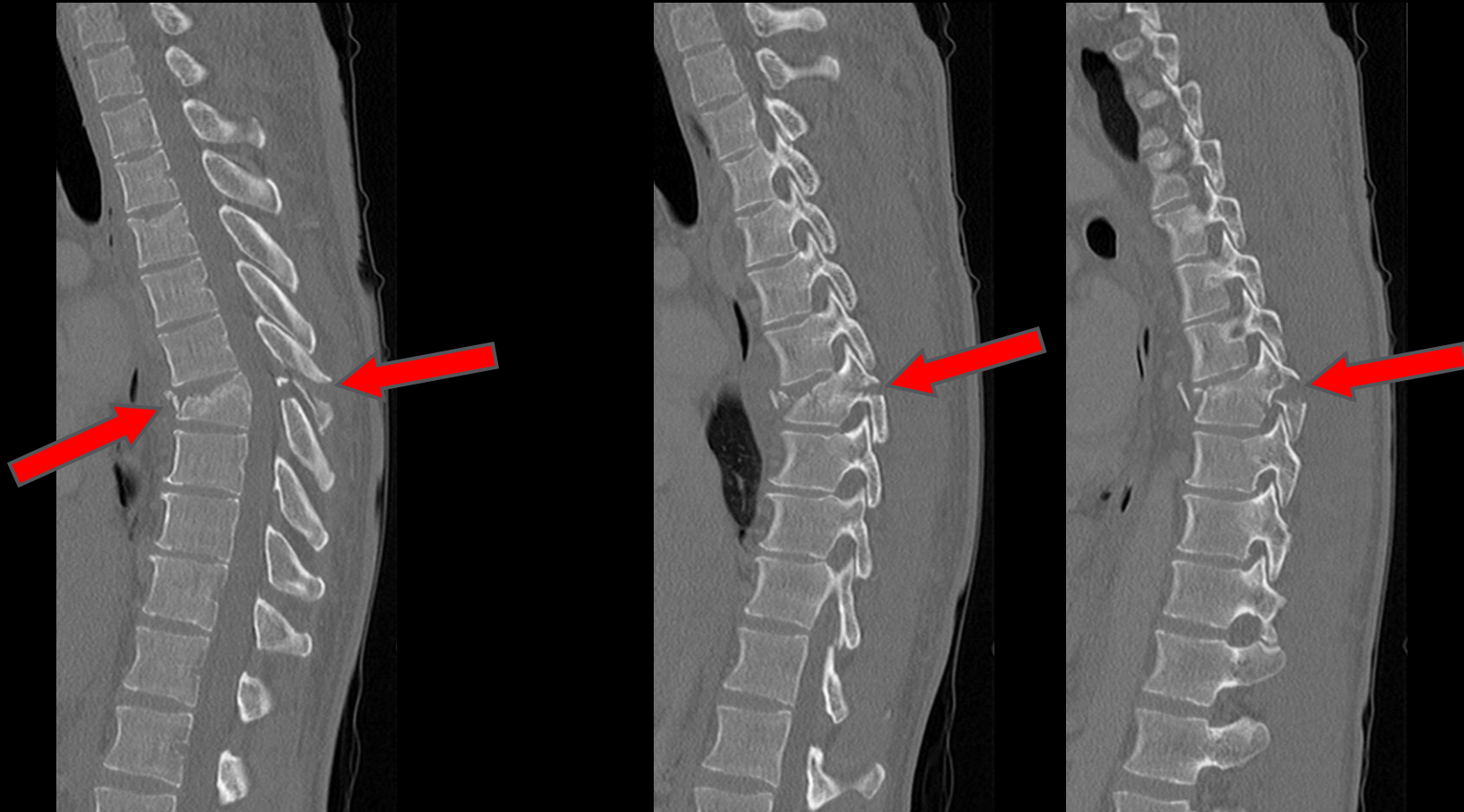


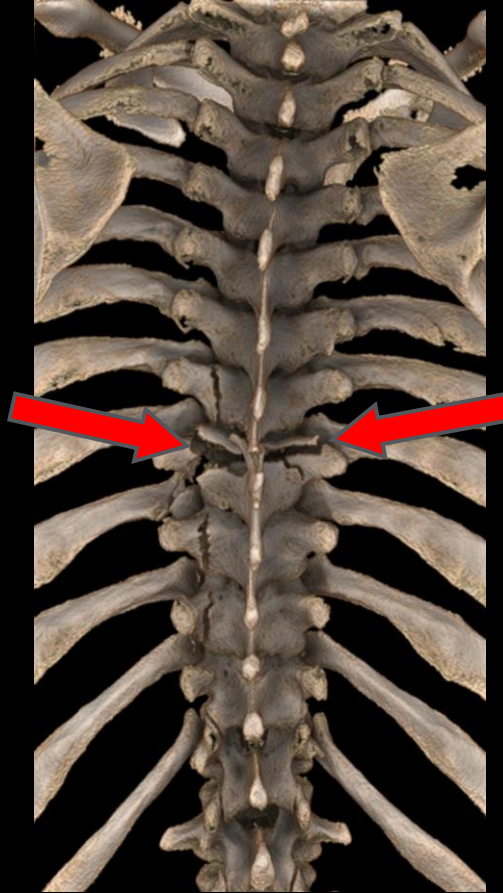
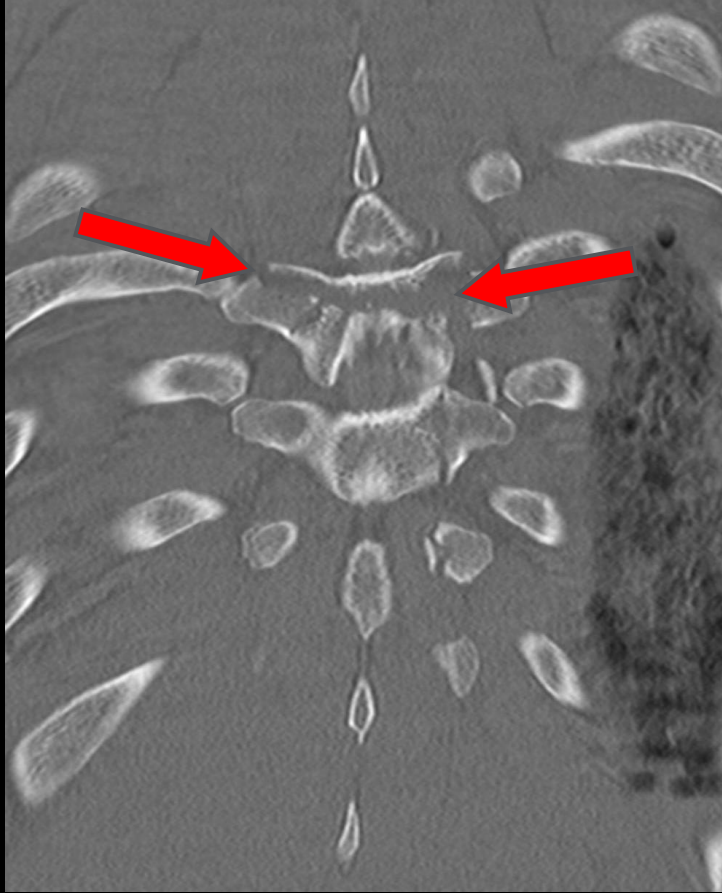
Pathologic compression fracture

May be hard to distinguish from osteoporotic fracture:

- T1 marrow replacement + enhancement
- Extra-osseous soft tissue
- Convex margins (expansile rather than compacted)
- DWI, perfusion, in/out of phase imaging

36 year old woman, MVA, was wearing lap seatbelt

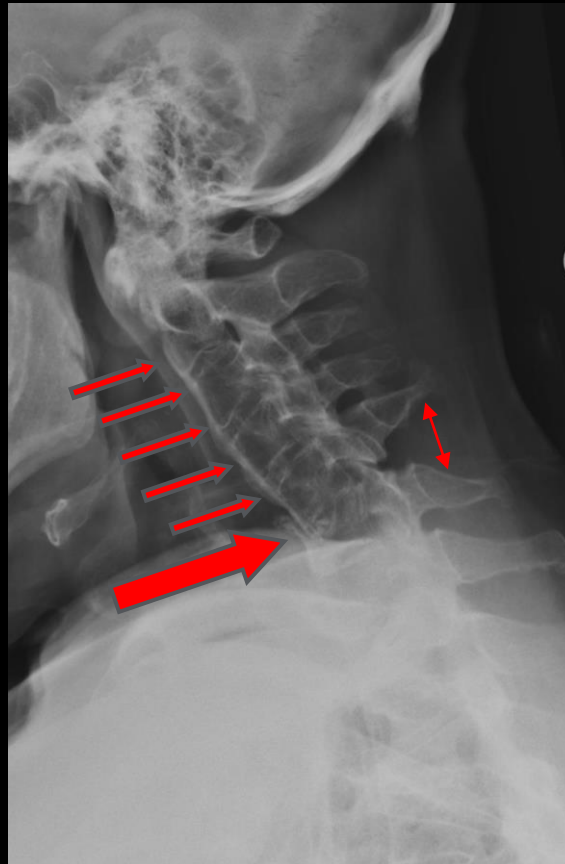


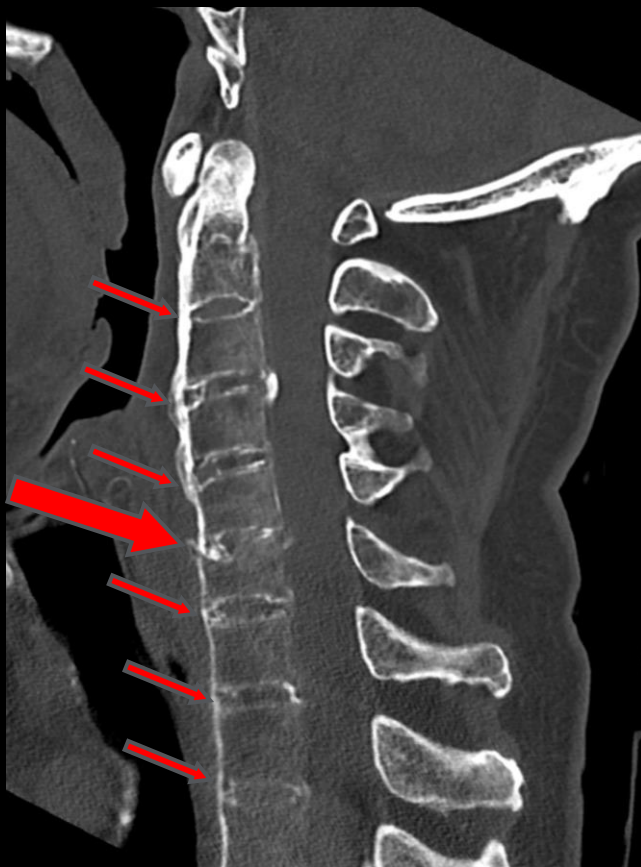


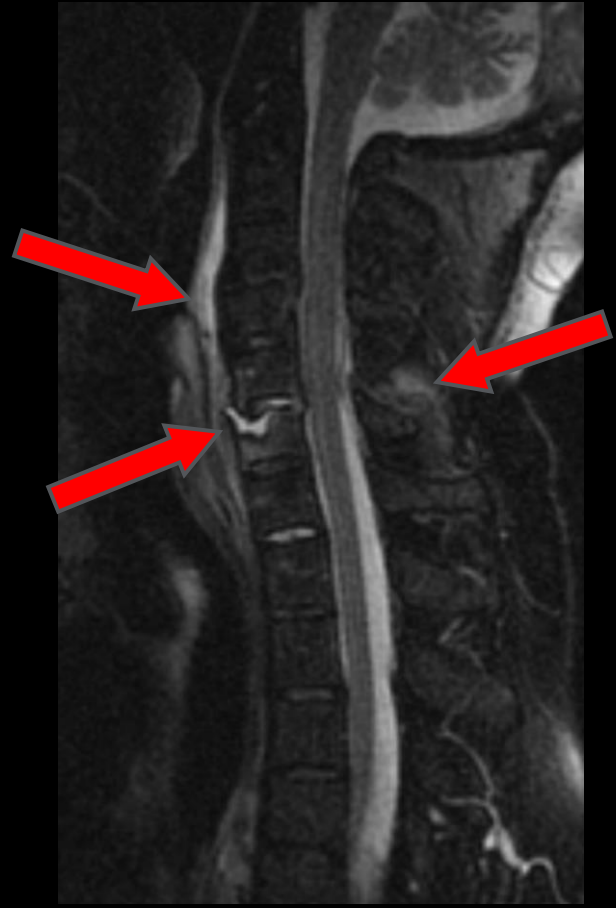
Chance fracture

- Horizontal fracture through posterior elements, pedicles, and body
- Hyperflexion, often with lap band seatbelt
- Typically upper lumbar or lower thoracic
- High associated rate of abdominopelvic organ injury

51 year old man, tetraplegia after fall from standing



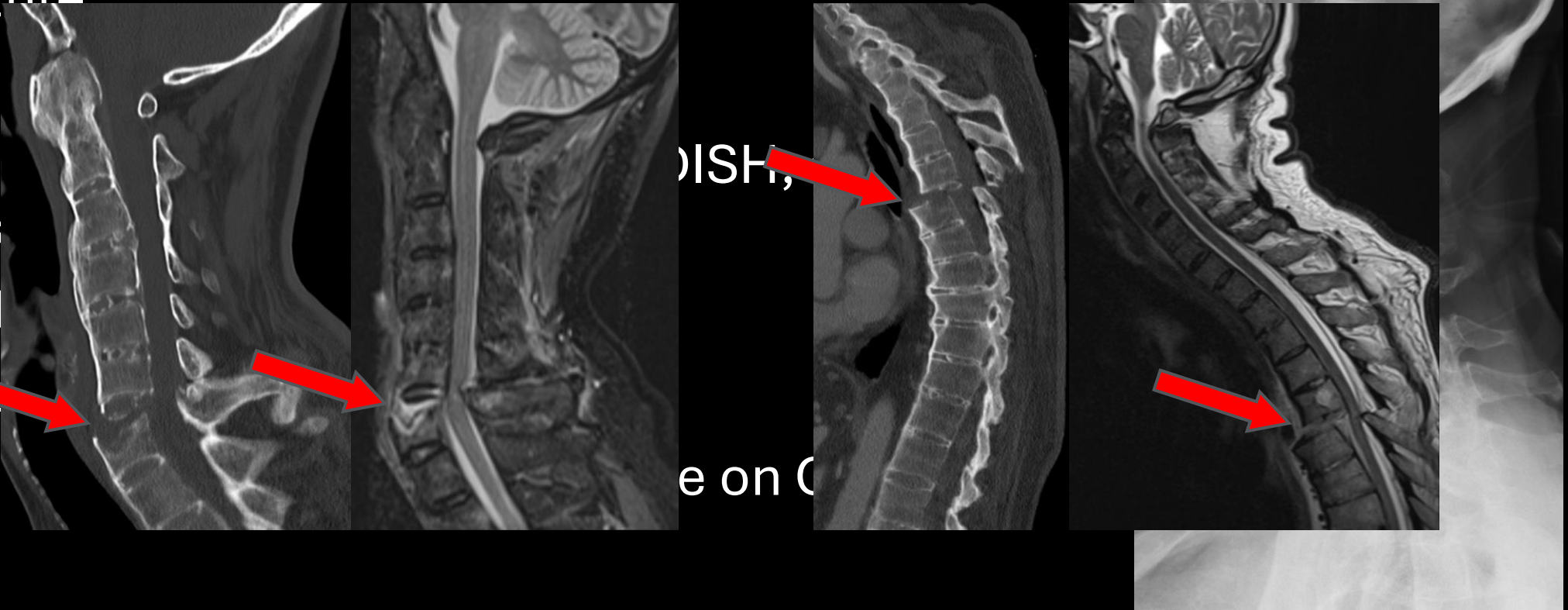




Chalkstick fracture

Hyperextension “chalkstick” or “carrotstick” fracture

- Occurs
- Rel
- On
- Ma



Take home points

- Conceptualize stability and biomechanics with “**tension bands**.”
- Features of pathologic compression fractures include extra-osseous soft tissue, bulging of the vertebral bodies, replacement of T1 marrow signal and posterior element involvement.
- Horizontally oriented fractures are at higher risk of distraction.
- Have high sensitivity when **rigid spine** disorder is present, even with minor trauma.