

Cervical Spine Fracture

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RAD 4001

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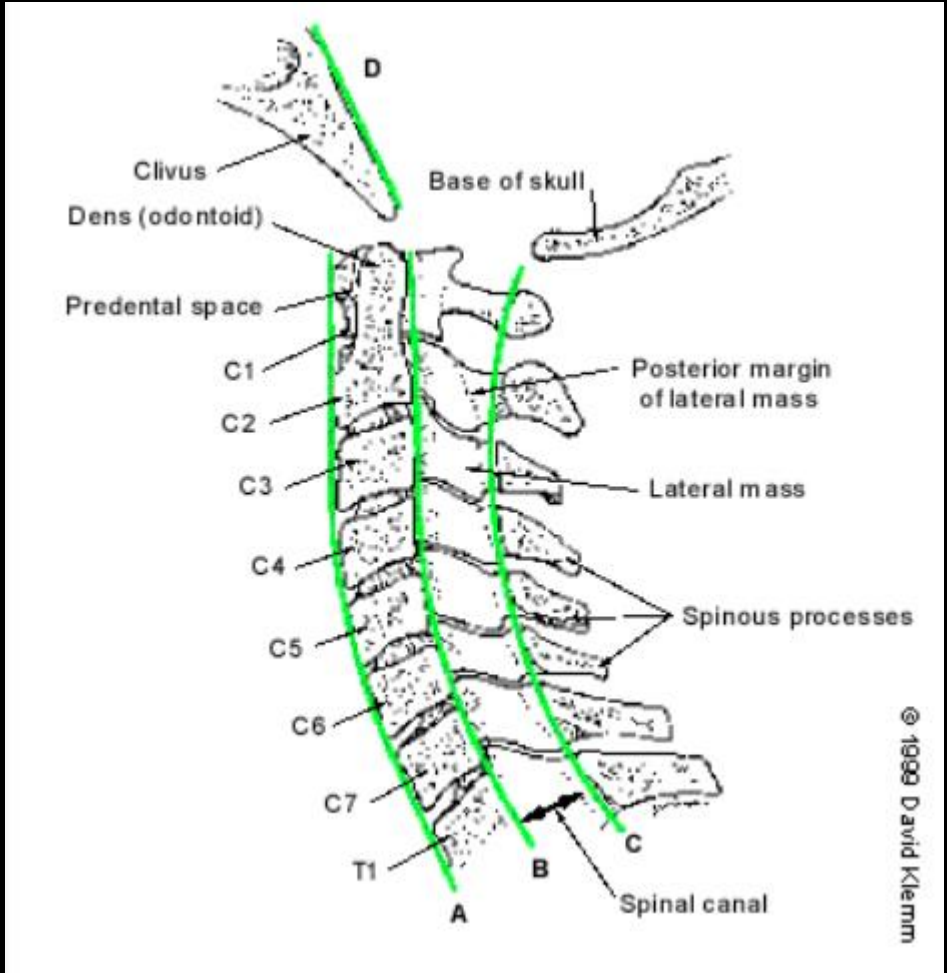
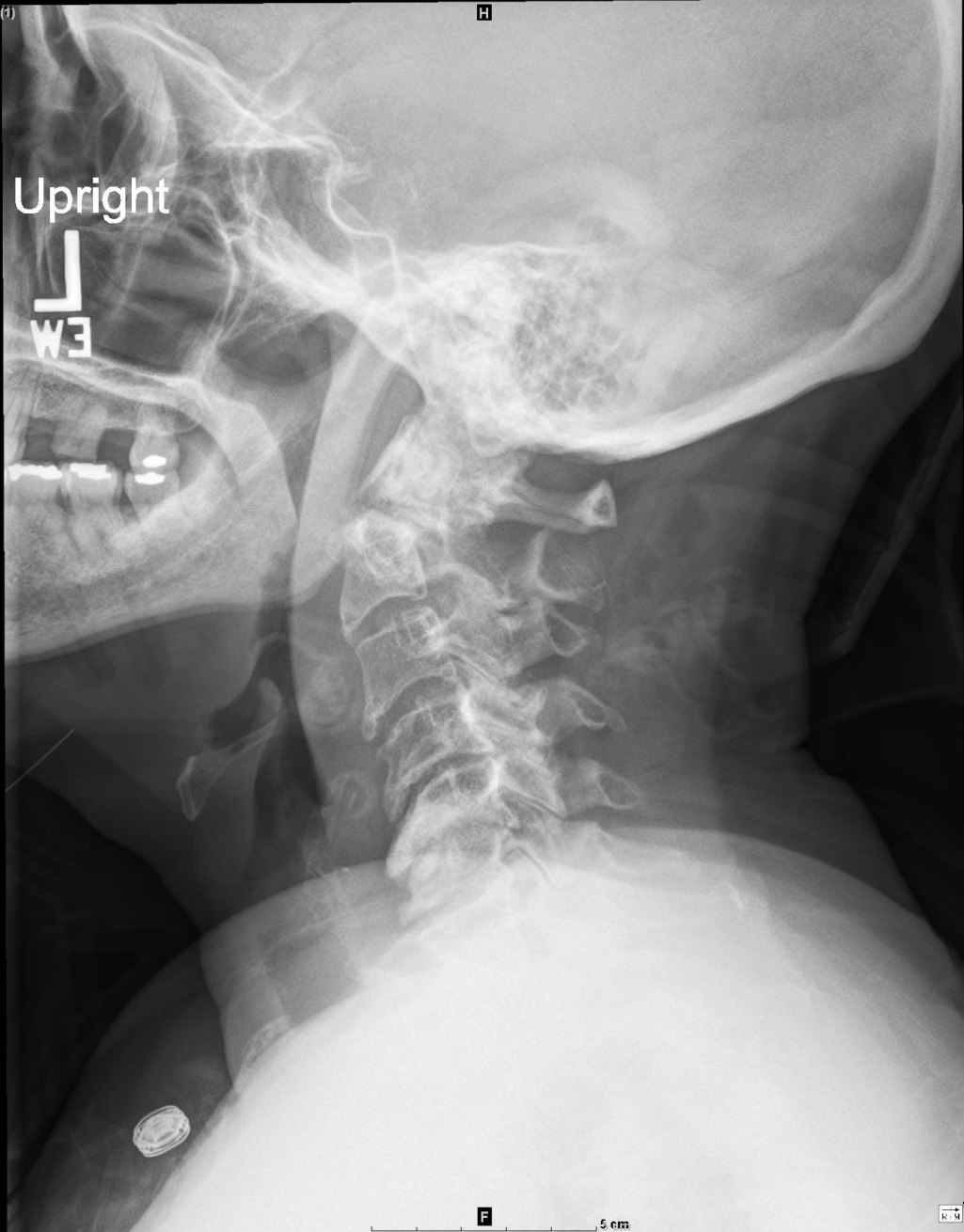


Clinical History

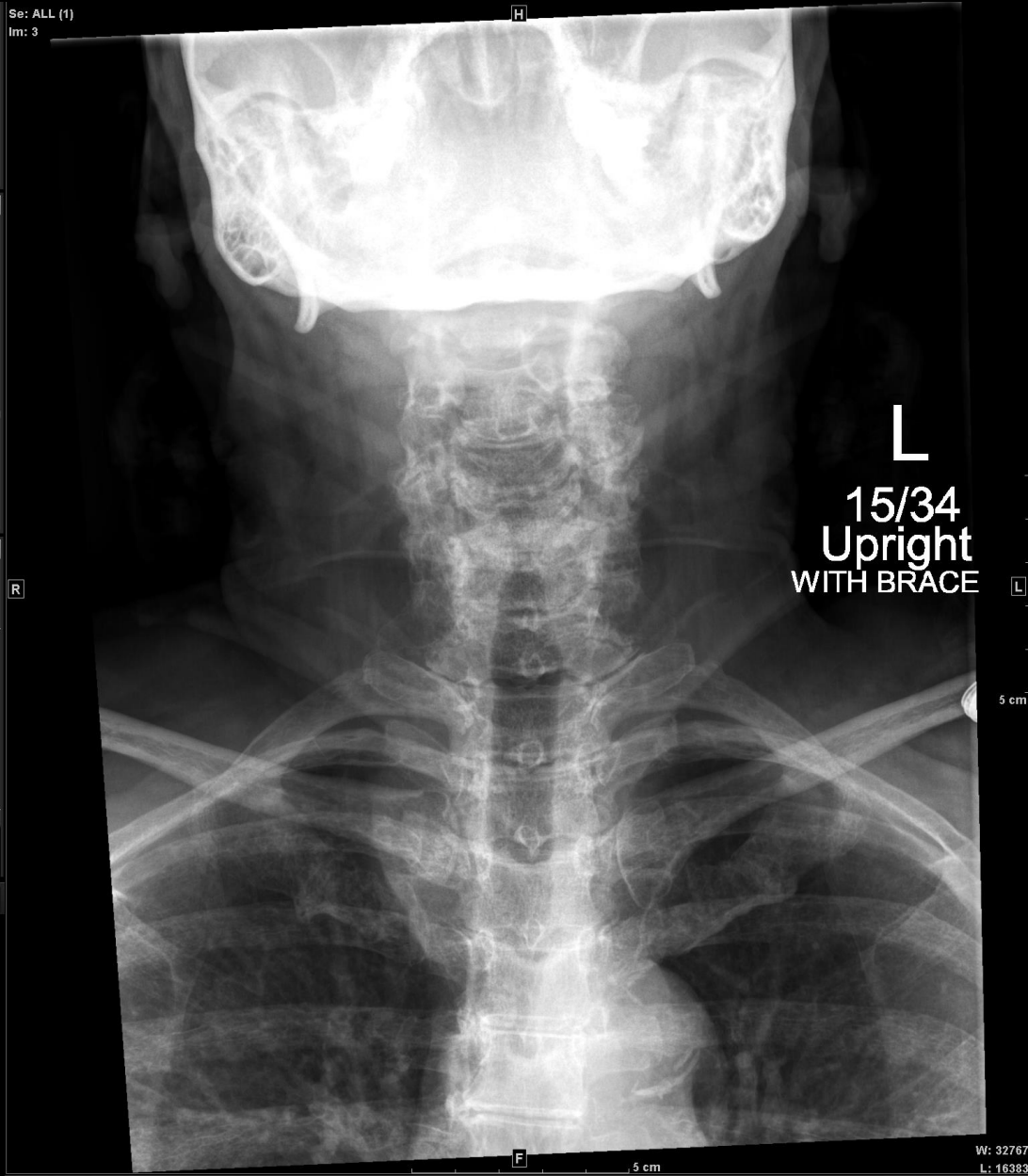
- 75 yo F PMH CVA and CAD on ASA+dipyrimadole, peripheral neuropathy, chronic R foot drop, presented after tripping in her living room and sustaining a ground-level fall, hitting her head
 - Moderate neck pain, no back pain
 - No LOC, headache, vision changes
 - No new numbness, tingling, weakness, sensory deficits in extremities
 - CT brain w/o contrast → no acute intracranial findings

Relevant Imaging

- Radiography C-Spine
- CT C-Spine w/o contrast
- CTA Neck

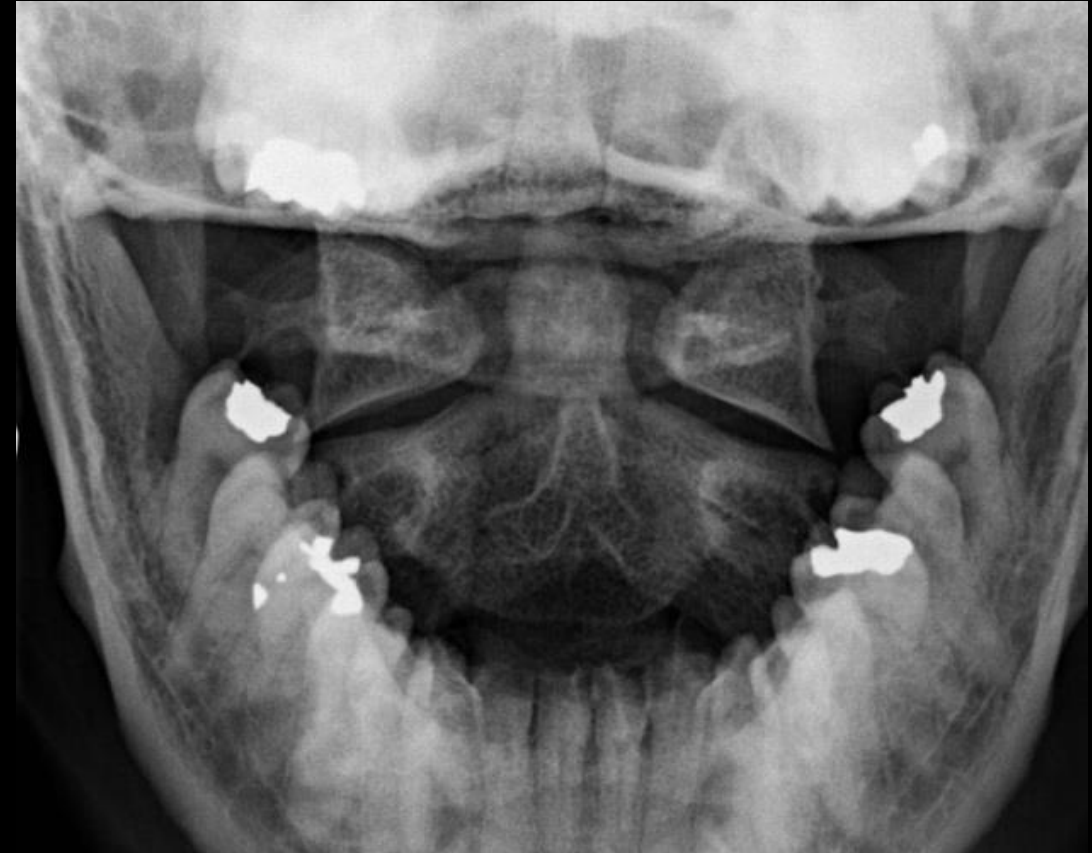


- Posterior displacement/malalignment of C1 by ~5 mm

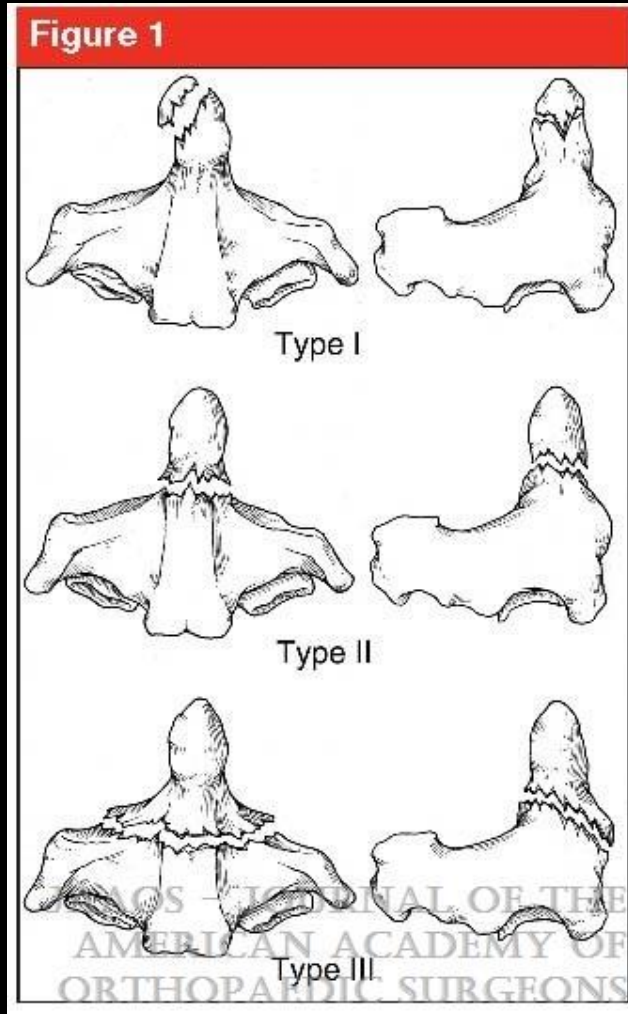


- Age-related degenerative disease
 - Chronic vertebral height loss
 - Degenerative disc height loss
 - Facet hypertrophy
 - Vertebral body osteophytes
- Not indicative of acute process or trauma

Odontoid (open-mouth) AP view- visualizes C1 and C2, focuses on odontoid process (dens)

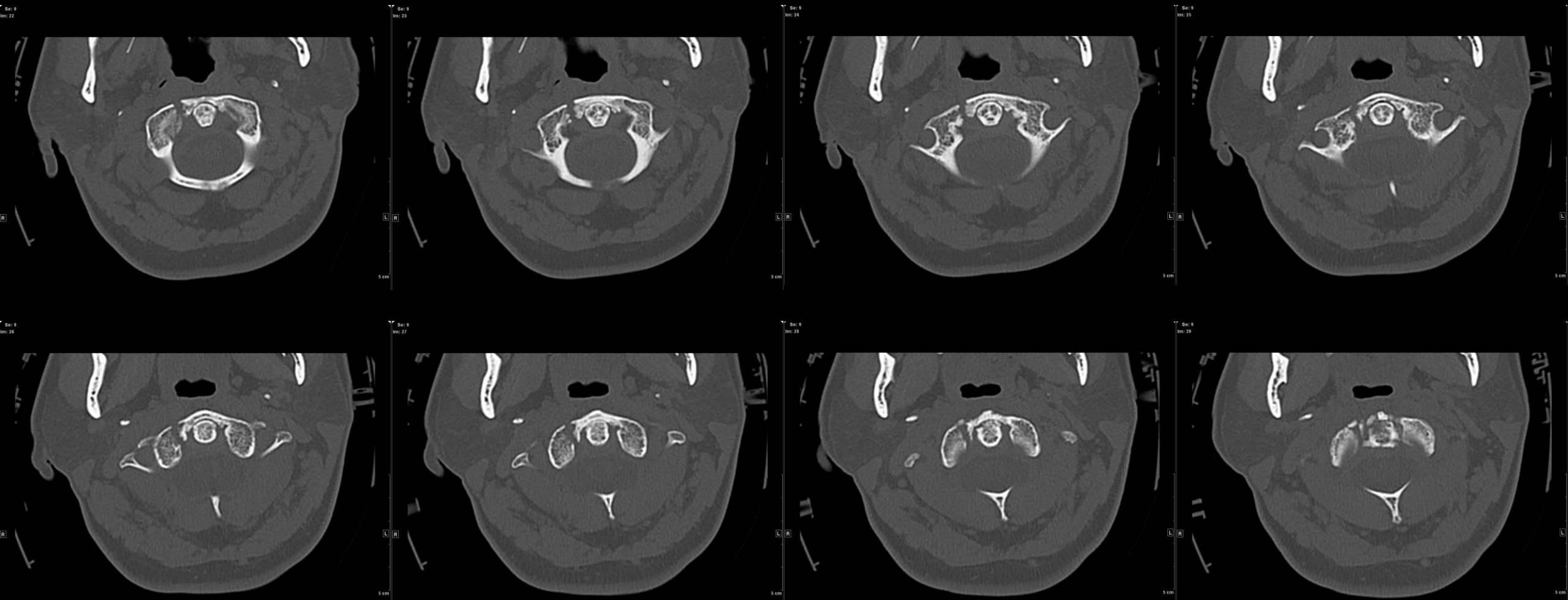


Anderson and D'Alonzo Classification



- Odontoid (dens) fracture- forceful flexion or extension of the head (fall on the forehead)
- Type I- avulsion near the tip of the dens
 - Stable fractures
- Type II- fracture at the base of the dens
 - Unstable, complicated by nonunion in >50% of pts w/ halo vest immobilization
 - Spinal cord injury uncommon
- Type III- fracture extends into body of C2
 - Mechanically unstable, odontoid and occiput move together

CT C-Spine w/o contrast- right anterior C1 ring fracture



CTA Neck Findings

- Minimal contour irregularity of L vertebral artery at level of C4-C5
 - Possible minimal vascular injury
 - No significant stenosis or occlusion
- All other arteries non-contributory

Differential Diagnosis/Discussion

- Displaced, unstable, traumatic Type II odontoid fracture, R anterior C1 ring fracture
- Possible causes/contributing factors:
 - Elderly fall risk
 - Acute CVA- unlikely w/ neg neuro sx's and neg CT brain
 - R foot drop d/t prior CVA
 - Peripheral neuropathy
 - Older female- osteopenia/osteoporosis more common
 - Orthostatic hypotension
 - Medications
 - Visual impairment
 - Environmental factors

Treatment

- Immediate and maintained immobilization
- Unstable injury → spinal surgery consult
- Conservative tx w/ closed reduction under fluoro and halo-vest immobilization
 - Worse outcomes and higher mortality in pts >65, regardless of injury severity



Treatment cont.



- Spinal surgery consulted and recommended non-operative management
- Immobilization with Miami J collar at all times, no heavy lifting
- Repeat radiographs after 10 days showed improvement in lordotic appearance
- No increased pain or neuro changes

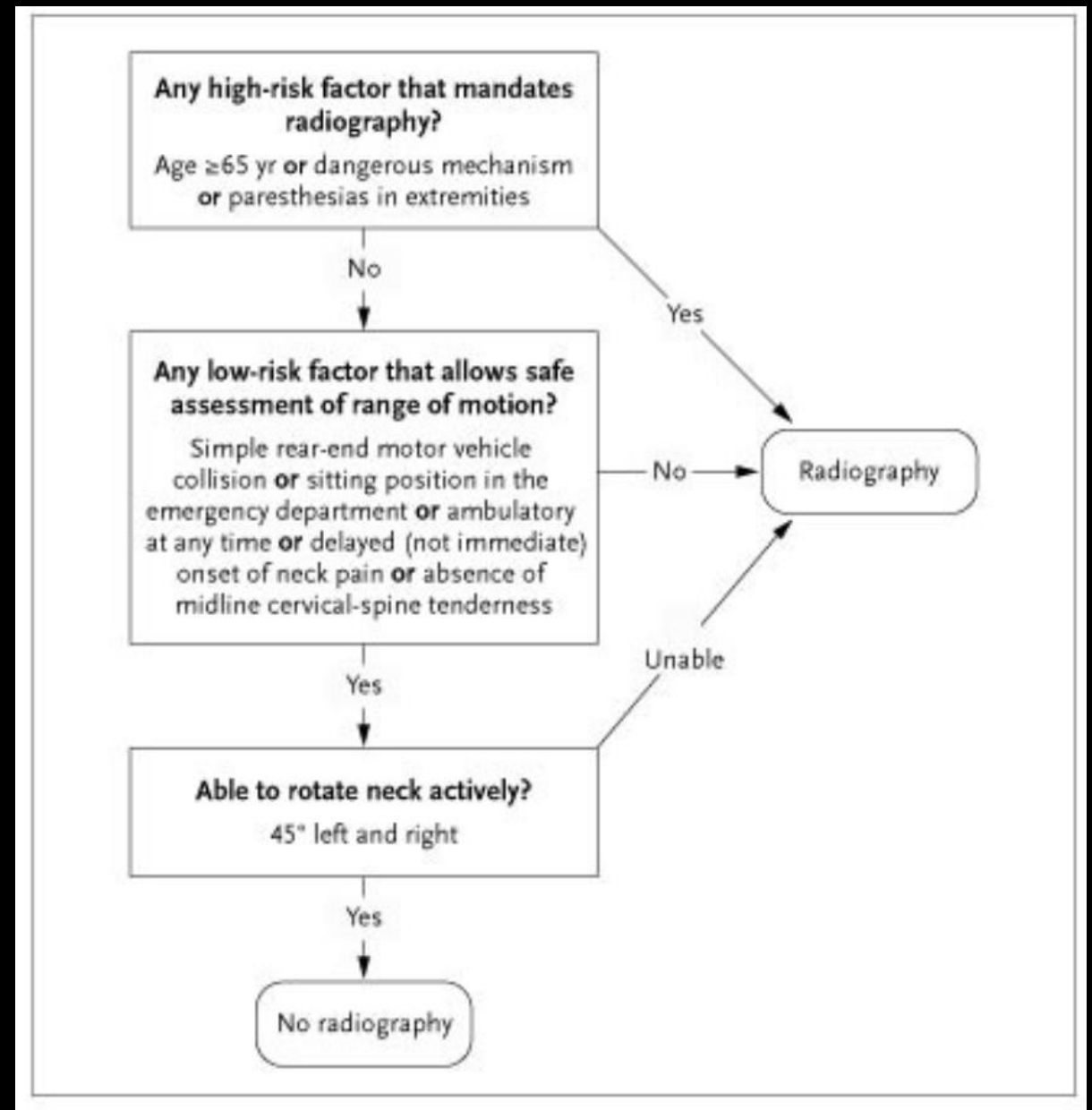


Final Diagnosis

- Type II odontoid (dens) fracture, R anterior C1 ring fracture sustained after ground-level fall

ACR appropriateness Criteria

- NEXUS (not reliable in patients >65)
 - Focal neuro deficit
 - Midline spinal tenderness
 - Altered level of consciousness
 - Intoxication
 - Distracting injury present
- Canadian C-Spine rule →



ACR appropriateness Criteria

Variant 2:

Age greater than or equal to 16 years. Suspected acute cervical spine blunt trauma. Imaging indicated by NEXUS or CCR clinical criteria. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
CT cervical spine without IV contrast	Usually Appropriate	☼☼☼
Radiography cervical spine	May Be Appropriate	☼☼
Arteriography cervicocerebral	Usually Not Appropriate	☼☼☼
CT cervical spine with IV contrast	Usually Not Appropriate	☼☼☼
CT cervical spine without and with IV contrast	Usually Not Appropriate	☼☼☼
CT myelography cervical spine	Usually Not Appropriate	☼☼☼☼
CTA head and neck with IV contrast	Usually Not Appropriate	☼☼☼
MRA neck without and with IV contrast	Usually Not Appropriate	○
MRA neck without IV contrast	Usually Not Appropriate	○
MRI cervical spine without and with IV contrast	Usually Not Appropriate	○
MRI cervical spine without IV contrast	Usually Not Appropriate	○

Cost

Your estimate range for X-ray Cervical Spine – 4
or 5 views is
\$343.44 - \$515.16

Total up to
~\$3,600-
\$4,000

Your estimate range for CAT Scan (CT) Cervical
Spine without Contrast is
\$1,250.21 - \$1,875.31

Your estimate range for CT Angiography (CTA)
Neck is
\$821.52 - \$1,232.28

Take Home Points / Teaching points

- Early and maintained immobilization of trauma patient w/ suspected neck injury is key, until further workup determines the injury is stable
- Based on NEXUS or CCR criteria, appropriate imaging must be ordered in a timely manner
 - Elderly patients (higher risk of injury from falls/trauma) are considered high-risk by CCR and will always get imaging
- Multiple views (lateral vs AP vs odontoid radiographs) and different studies (radiographs vs CT) can give a better picture of what is really going on

References

- Graber MA, Kathol M. Cervical spine radiographs in the trauma patient. Am Fam Physician. 1999 Jan 15;59(2):331-42.
- Hsu WK, Anderson PA. Odontoid fractures: update on management. J Am Acad Orthop Surg. 2010 Jul;18(7):383-94. doi: 10.5435/00124635-201007000-00001.
- Majercik, Sarah MD; Tashjian, Robert Z. MD; Biffl, Walter L. MD; Harrington, David T. MD; Cioffi, William G. MD Halo Vest Immobilization in the Elderly: A Death Sentence?, The Journal of Trauma: Injury, Infection, and Critical Care: August 2005 - Volume 59 - Issue 2
- Paykin G, O'Reilly G, Ackland HM, Mitra B. The NEXUS criteria are insufficient to exclude cervical spine fractures in older blunt trauma patients. Injury. 2017 May;48(5):1020-1024.
- Stiell IG, Clement CM, McKnight RD, Brison R, Schull MJ, Rowe BH, Worthington JR, Eisenhauer MA, Cass D, Greenberg G, MacPhail I, Dreyer J, Lee JS, Bandiera G, Reardon M, Holroyd B, Lesiuk H, Wells GA. The Canadian C-spine rule versus the NEXUS low-risk criteria in patients with trauma. N Engl J Med. 2003 Dec 25;349(26):2510-8
- <https://radiopaedia.org/articles/cervical-spine-odontoid-view?lang=us>
- <https://onlinepatientestimation.com/PatientPortal/facility>



Questions?