

# Easily **Missed** Findings in Emergency Radiology

## Cervical Spine

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Handout available online at: [www.uth.tmc.edu/radiology/RSNA/2008/](http://www.uth.tmc.edu/radiology/RSNA/2008/)

## Learning Objectives

- 1) Detect easily overlooked findings on cervical spine imaging.
- 2) Distinguish image artifacts from subtle abnormalities on radiography and CT.
- 3) Discover previously unrecognized soft tissue findings on cervical spine CT.

I have no financial relationships to disclose

### Case 1



### Which line is abnormal?

1. Anterior vertebral line
2. Posterior vertebral line
3. Spinolaminar line
4. Clival-odontoid line



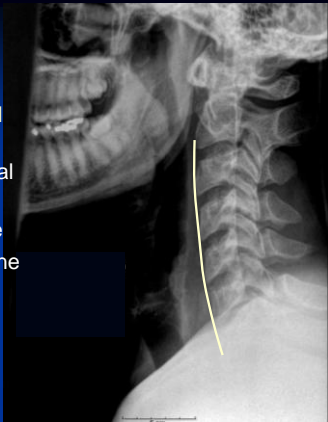
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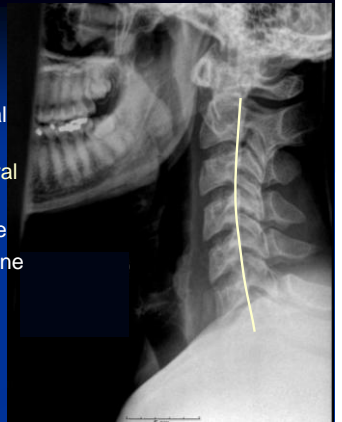
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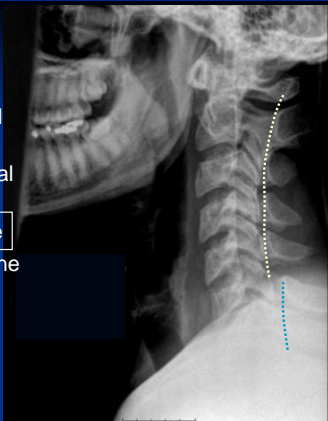
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Basion-Dens Interval  
<13 mm, age 7 or older



Which line is abnormal?

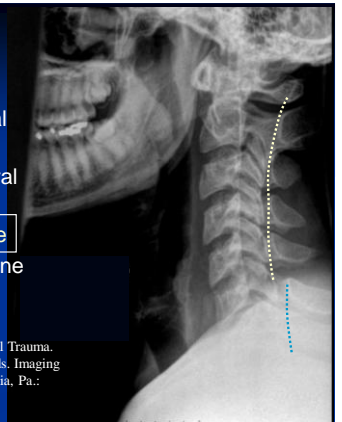
1. Anterior vertebral line
2. Posterior vertebral line
3. Spinolaminar line
4. Clival-odontoid line
5. Interspinous line



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Reference:  
Mirvis SE. Imaging of Cervical Spinal Trauma.  
In: Mirvis SE, Shammuganathan K, eds. Imaging  
in trauma and critical care. Philadelphia, Pa.:  
Saunders, 2003:185 - 295



Concerning rotational injury of the cervical facets, approximately what fraction of patients have **pure facet joint dislocation without associated fracture?**

1. 5%
2. 25%
3. 50%
4. 75%

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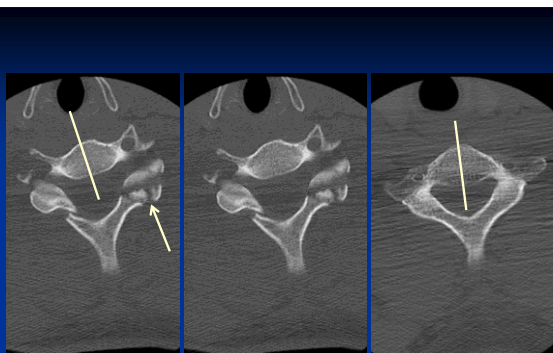
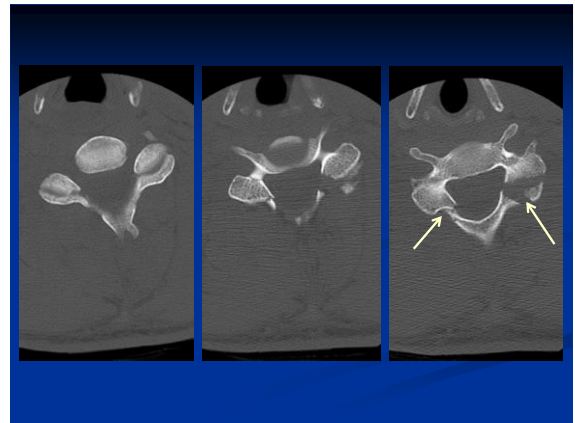
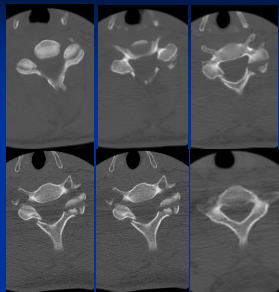
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Reference:

Shanmuganathan K, Mirvis SE, Levine AM. Rotational injury of cervical facets: CT analysis of fracture patterns with implications for management and neurologic outcome. AJR Am J Roentgenol 1994;163:1165-1169

### What is the best diagnosis?

1. Unilateral facet joint dislocation
2. Articular pillar fracture, displaced
3. Hyperflexion sprain (anterior subluxation)
4. Uncertain



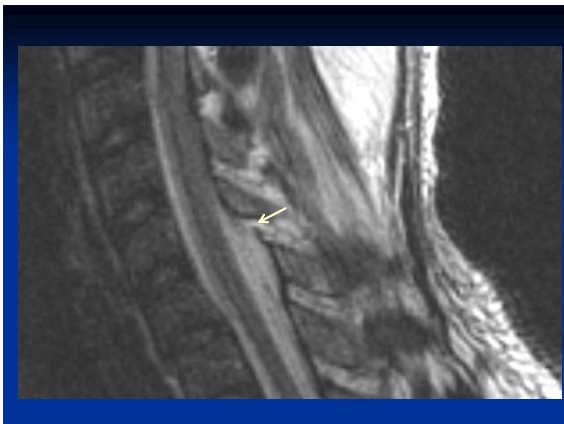
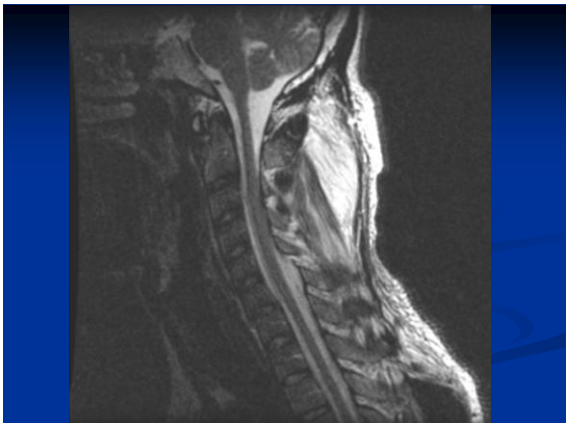
Rotational malalignment on transverse images





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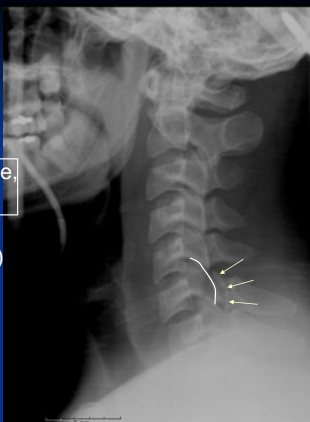
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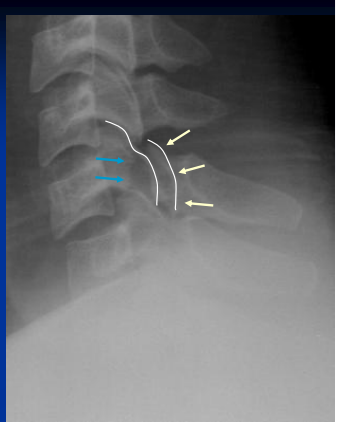
Vintage slide from RSNA 2006 & 2007

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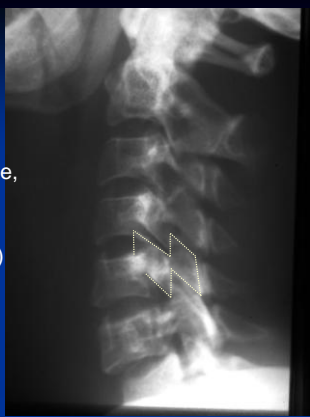


Double cortical outline sign



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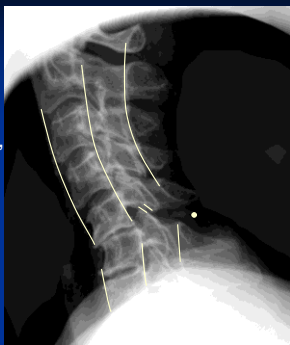
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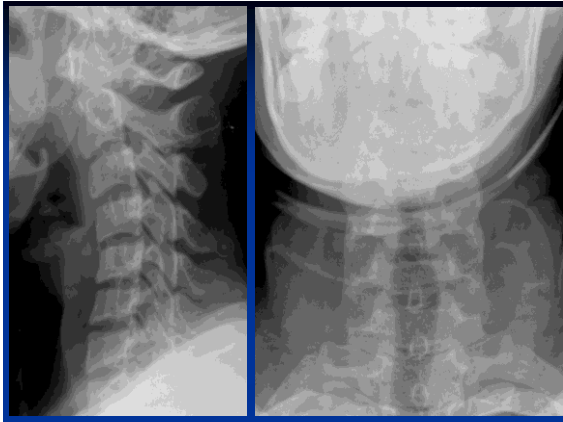
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Rotation on lateral

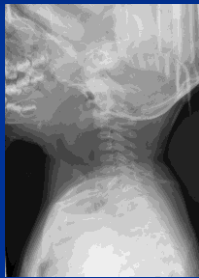




## Teaching Points – Case 1

- Left C6 articular pillar fracture with associated bilateral laminar fractures and rotational malalignment
- Unilateral facet dislocation look-alike
- Only 25 % of rotational injuries have no fracture
- Include spinolaminar line in your search pattern on lateral radiographs
- Assess rotational malalignment on axial CT images

## Case 2



On a lateral radiograph made with the neck in slight flexion on a 15-month-old patient, which of the following findings indicates an injury in the upper cervical spine?

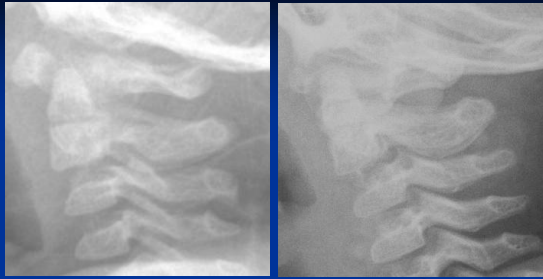
1. Oval shape of C3 vertebral body
2. Anterior wedging of C3 vertebral body
3. 3 mm posterior displacement of C2 lamina point relative to C1-C3 posterior cervical line
4. 3 mm anterior displacement of posterior vertebral body cortex of C2 vertebral body relative to posterior vertebral body cortex of C3



Case courtesy of Len Swischuk, MD

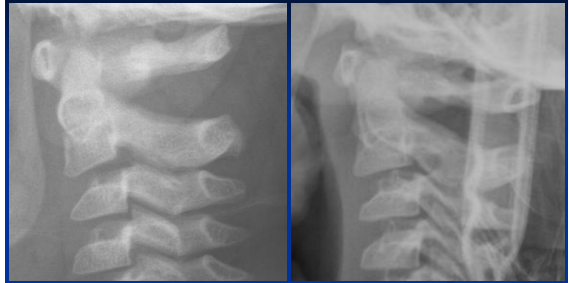
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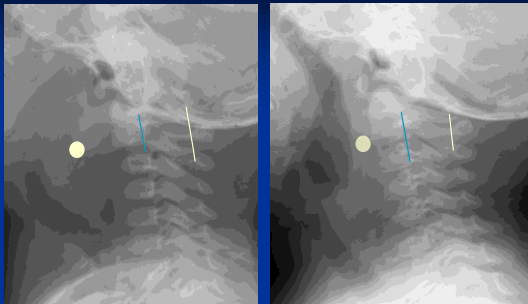
Oval shaped C3 vertebral body  
17 month old female

Oval shaped C3 vertebral body  
21 month old female

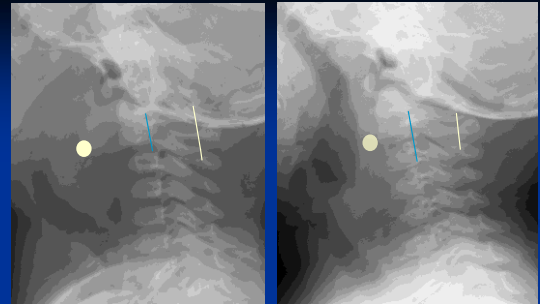


Anterior wedging of C3  
20 month old male

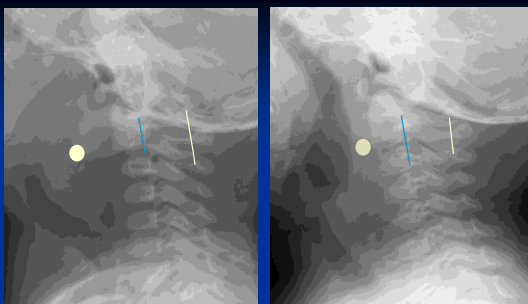
Anterior wedging of C3  
4 year old female



C2-C3 Pseudosubluxation



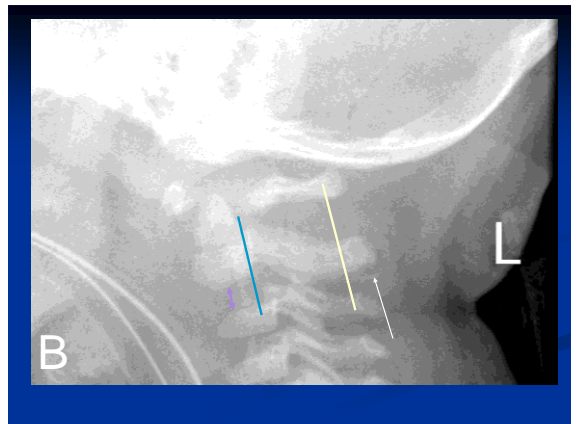
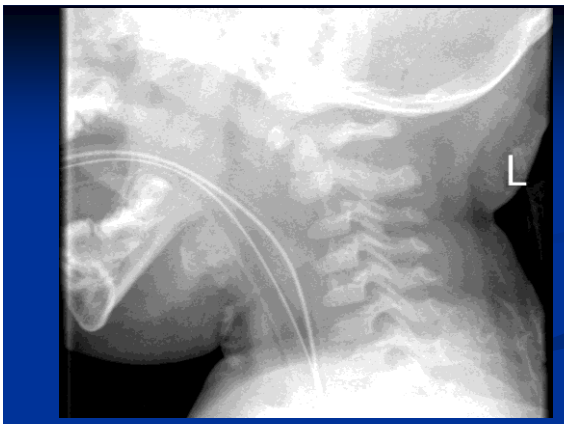
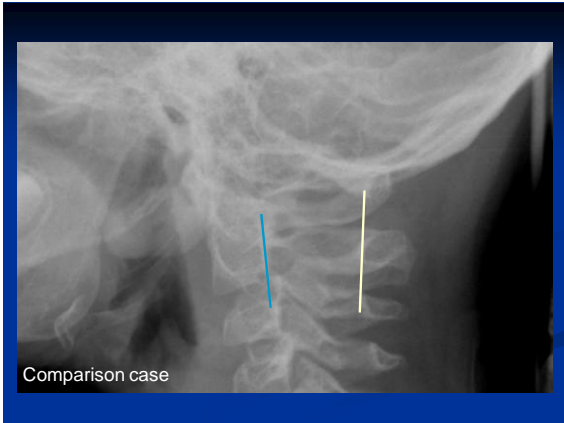
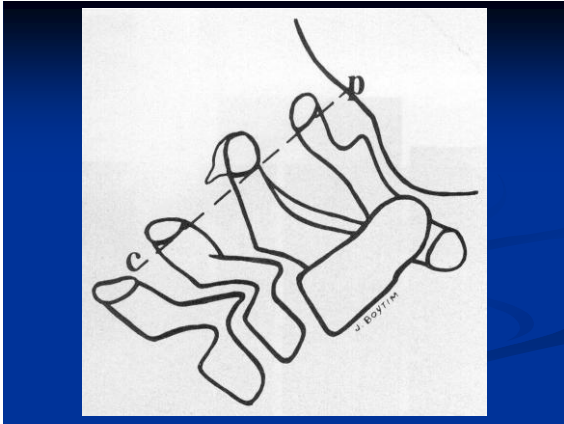
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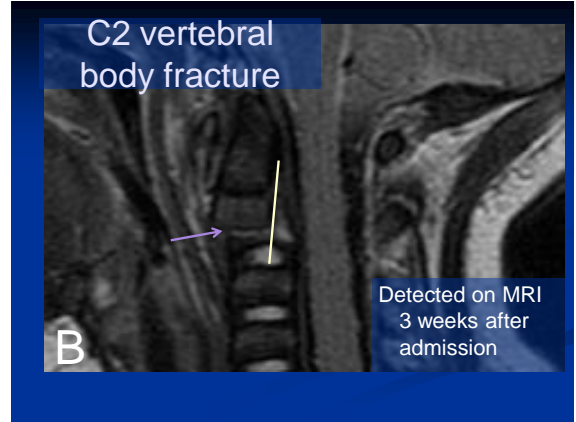
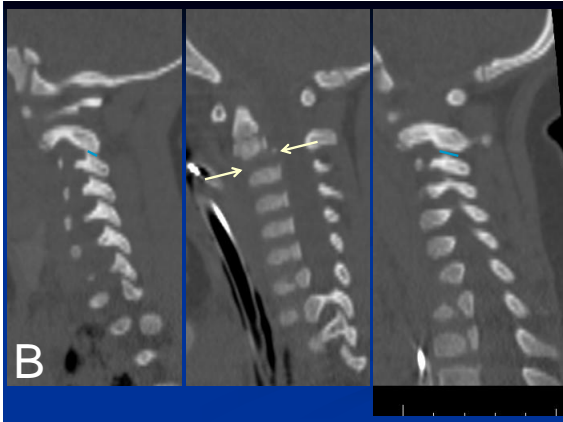
C2-C3 Pseudosubluxation

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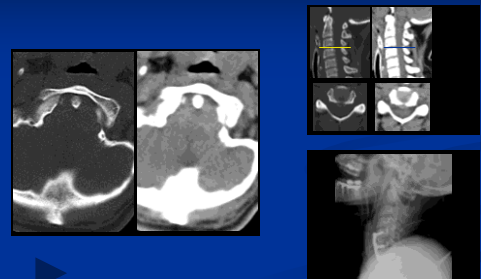




### Teaching Points – Case 2

- Real C2-3 subluxation in an infant
- Distinguish from pseudosubluxation
  - Widening of C2-3 disc space by more than 50% (compared to adjacent levels)
  - Malaligned facet joints (difficult to perceive)
  - Avulsion fracture of C2 spinous process

### Case 3



### Teaching Points – Case 3

- Current generation MDCT scanners depict soft tissue abnormalities in spinal canal that older scanners did not
- Extradural hematoma, traumatic disc "herniation," and spinal cord compression are now CT diagnoses
- Interpret soft tissue transverse and/or sagittal images on every C-spine CT

### Summary

- Use 5 lines to assess cervical spine alignment
- Distinguish articular pillar fracture from unilateral facet joint dislocation
- Differentiate C2-3 injury from pseudosubluxation
- Seek extradural soft tissue findings on MDCT

## Handout available online

[www.uth.tmc.edu/radiology/RSNA/2008/](http://www.uth.tmc.edu/radiology/RSNA/2008/)

[http://www.uth.tmc.edu/radiology/RSNA/2008/west\\_easily\\_missed\\_cervical\\_spine.htm](http://www.uth.tmc.edu/radiology/RSNA/2008/west_easily_missed_cervical_spine.htm)

# The End