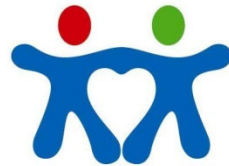


Subaxial Cervical Spine Conditions in Children. The road less travelled.

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Orlando

Florida USA



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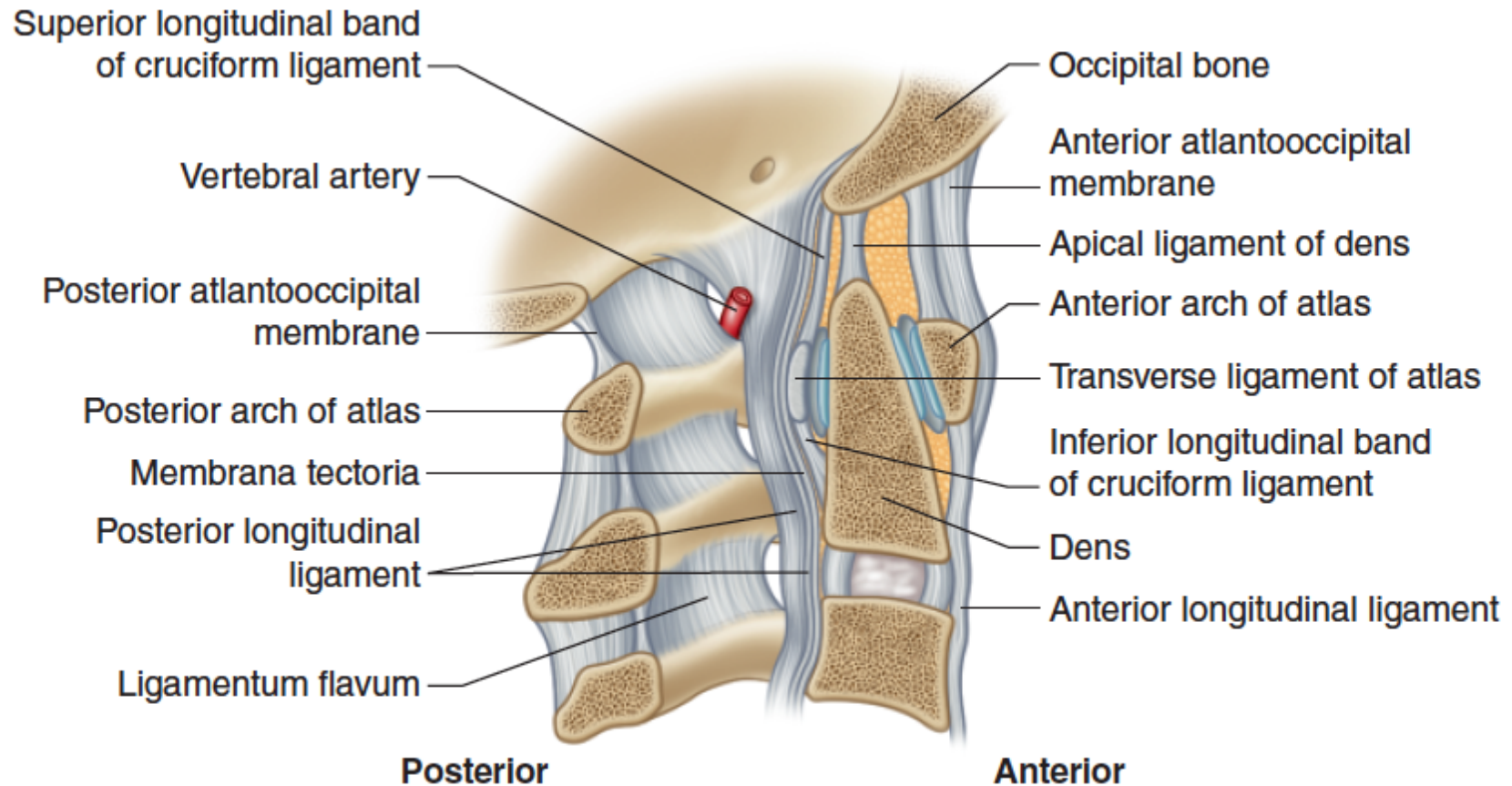
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Principles

- Kids necks are different
- They have a huge head on a little spine
- The orientation of their cervical joints is more horizontal when young
- Their muscles are weak
- Their ligaments are more elastic than later in life



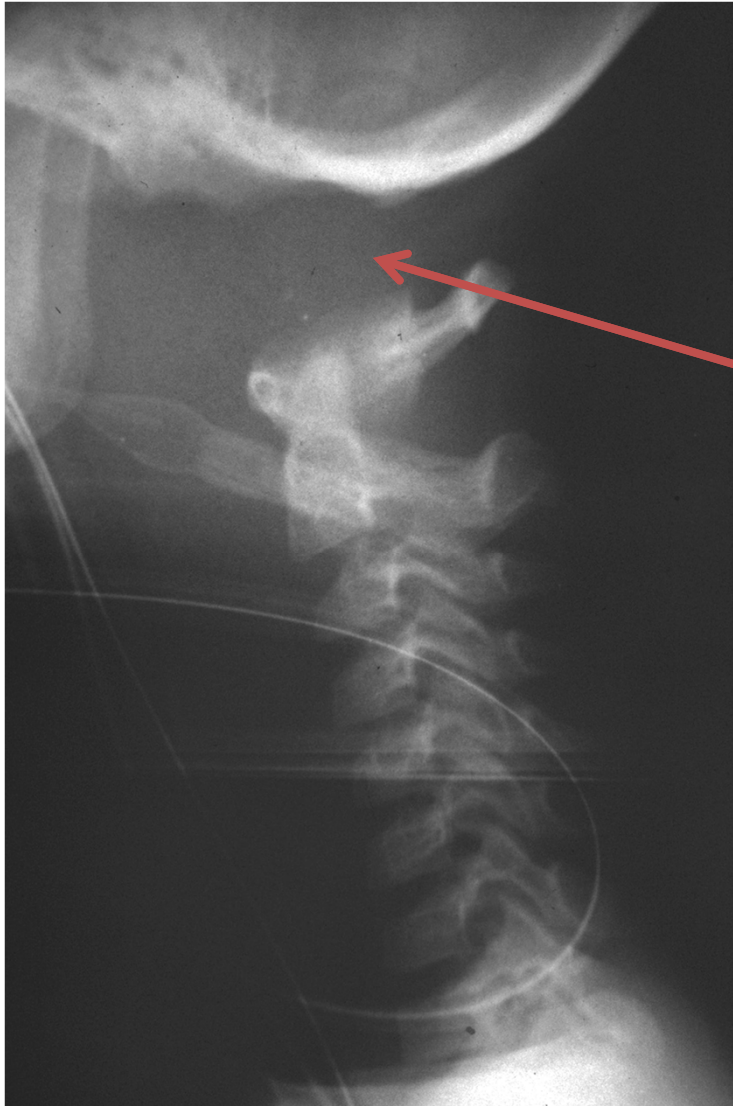
Cephalad ligaments are extremely complicated



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This is why.....



This happens



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For the most part:

- We are more concerned about Occiput to C2 pathology in kids
- Subaxial pathology exists but we assume we will see less of it
- Maybe this is changing?



Subaxial Anatomy

- C Spine is highly modified to protect the vertebral arteries and still allow a huge amount of movement.
- Skull to C1/ C2 is very atypical
- Horizontal C3 – 7 facets allow more motion, don't become more vertical until teen years.
- Physes at disks constitute another weak link

Subaxial anatomy

- In older kids this creates the pathology we see in adults
- Jumped facets, teardrops, flexion distraction etc.
- In younger kids (ten and under?) there is a higher incidence of occult injury such as SCIWORA

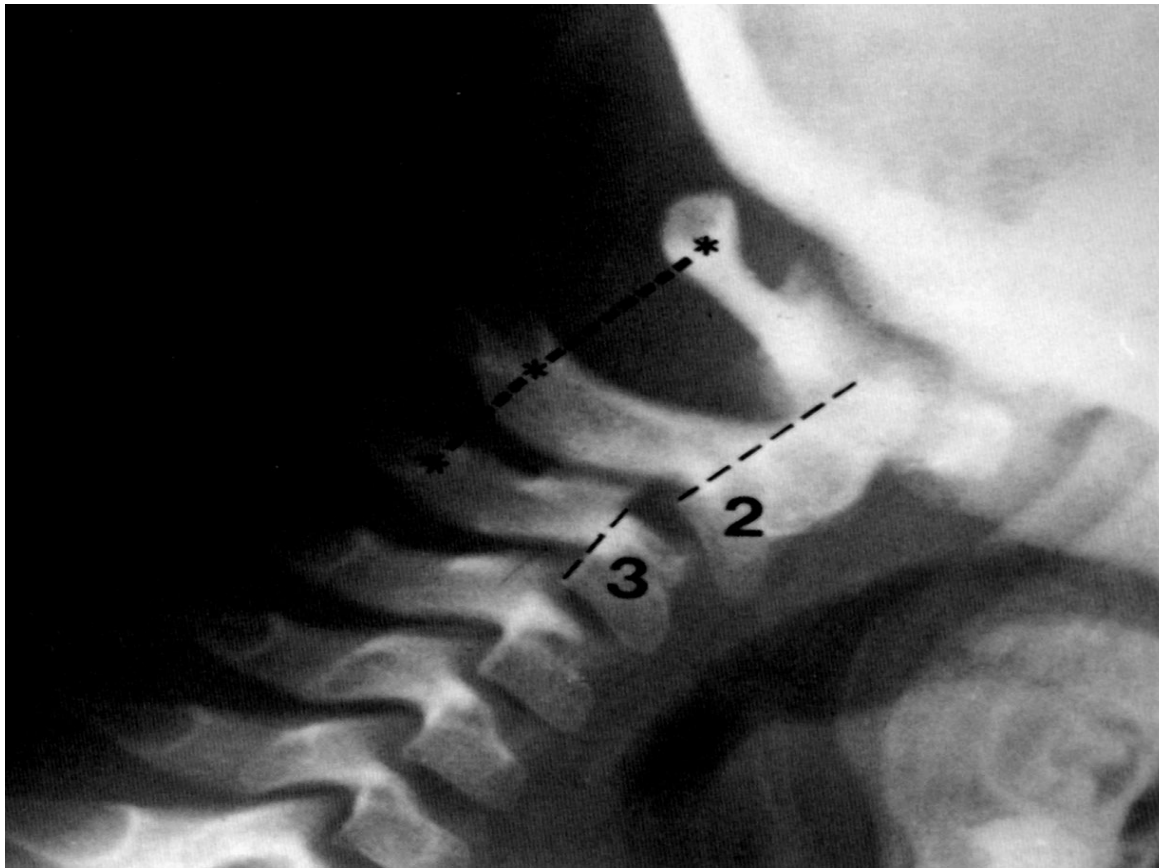
Subaxial Physiology

- Maybe that an increased incidence of soft tissue injury contributes to rate of healing
- Physeal fracture for e.g. heal very quickly
- Ligamentous injury not so much
- Bones heal at a rate in between and can remodel spectacularly in kids

Radiology

- Anatomical variations:
- Pseudosubluxation common in younger kids
- Look at posterior laminar line, if its intact there's no kyphosis

Pseudosubluxation



7 month male, delayed milestones
after precipitate delivery
This is NOT pseudosubluxation



Posterior Fusion C3 - C5

Rapid catch up in milestones



What conditions present with Subaxial Pathology?

- Trauma
- Syndromes
- Pathological bone
- Tumours
- Basically the 'usual suspects' of the upper C Spine

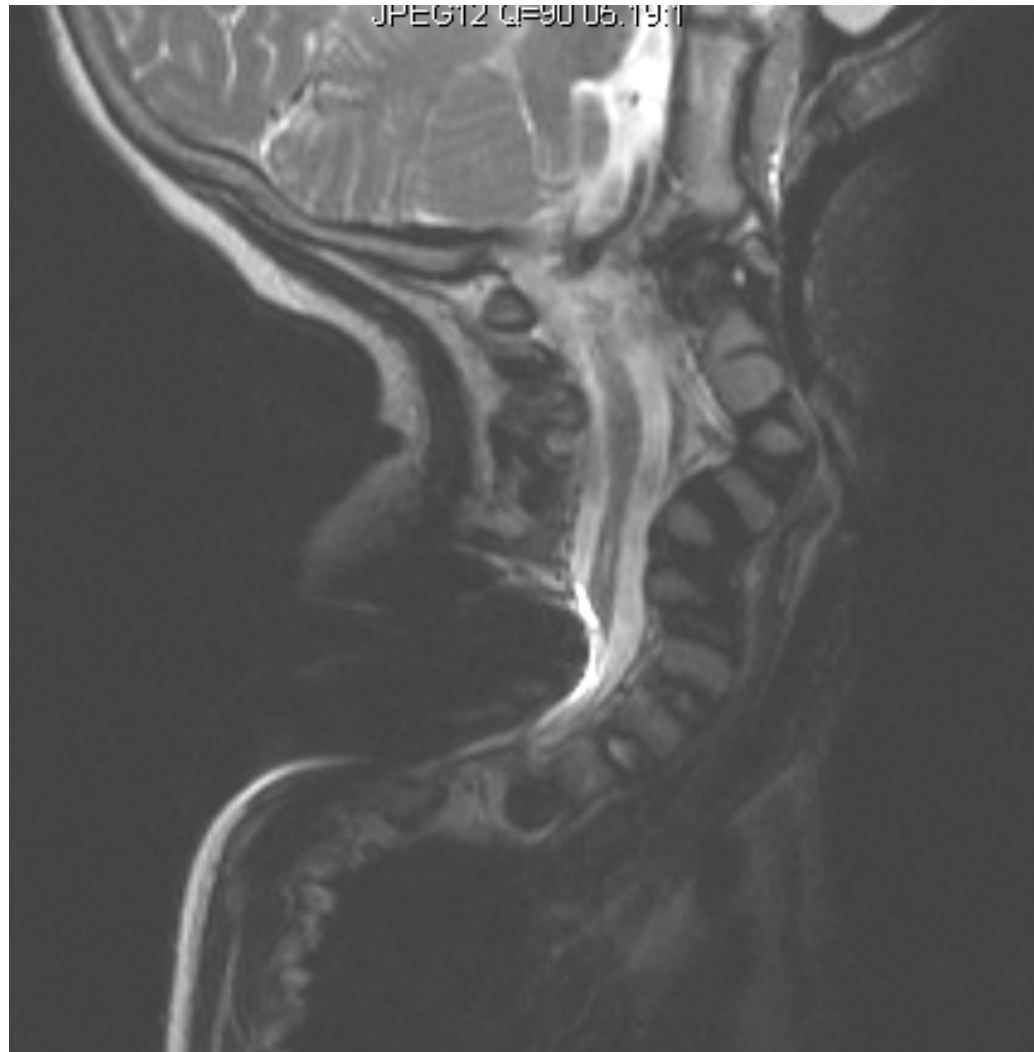
What conditions present with Subaxial Pathology?

- Some conditions are, however, notorious in kids for causing lower cervical problems
- Larsen
- NF1
- Diastrophism

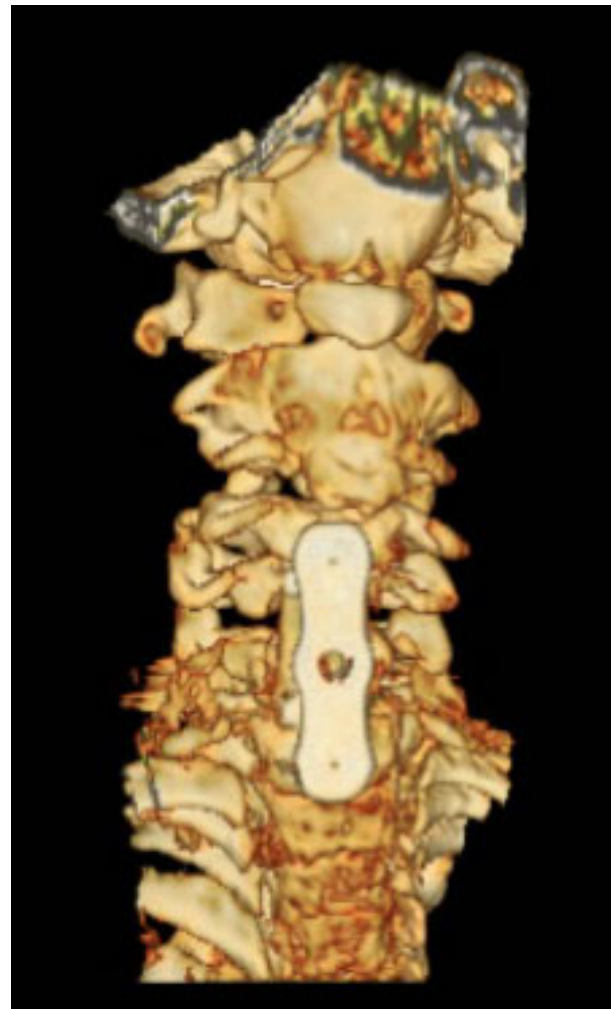
MRI

A03

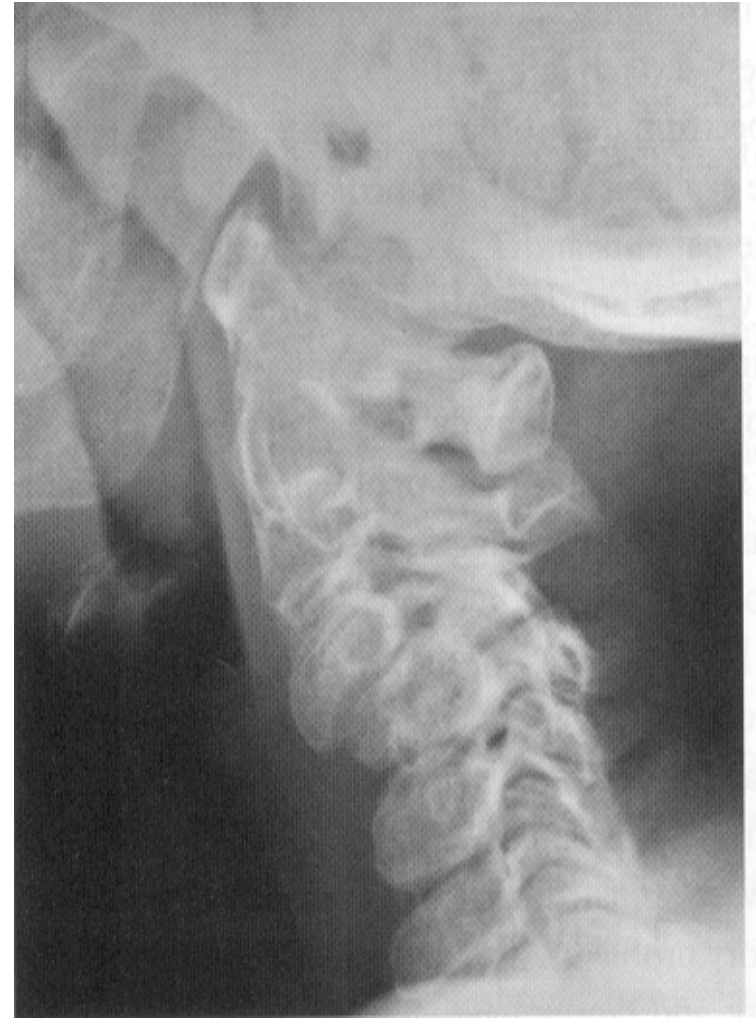
“trouble” with growing rod lengthening



2 level corpectomy and PEEK /Carbon cage + plate



Diastrophic Dysplasia



Nine year male

- Neck pain and torticollis after minor injury
- Restriction of motion, tenderness
- Normal Xrays
- No response to soft collar
- CT.....

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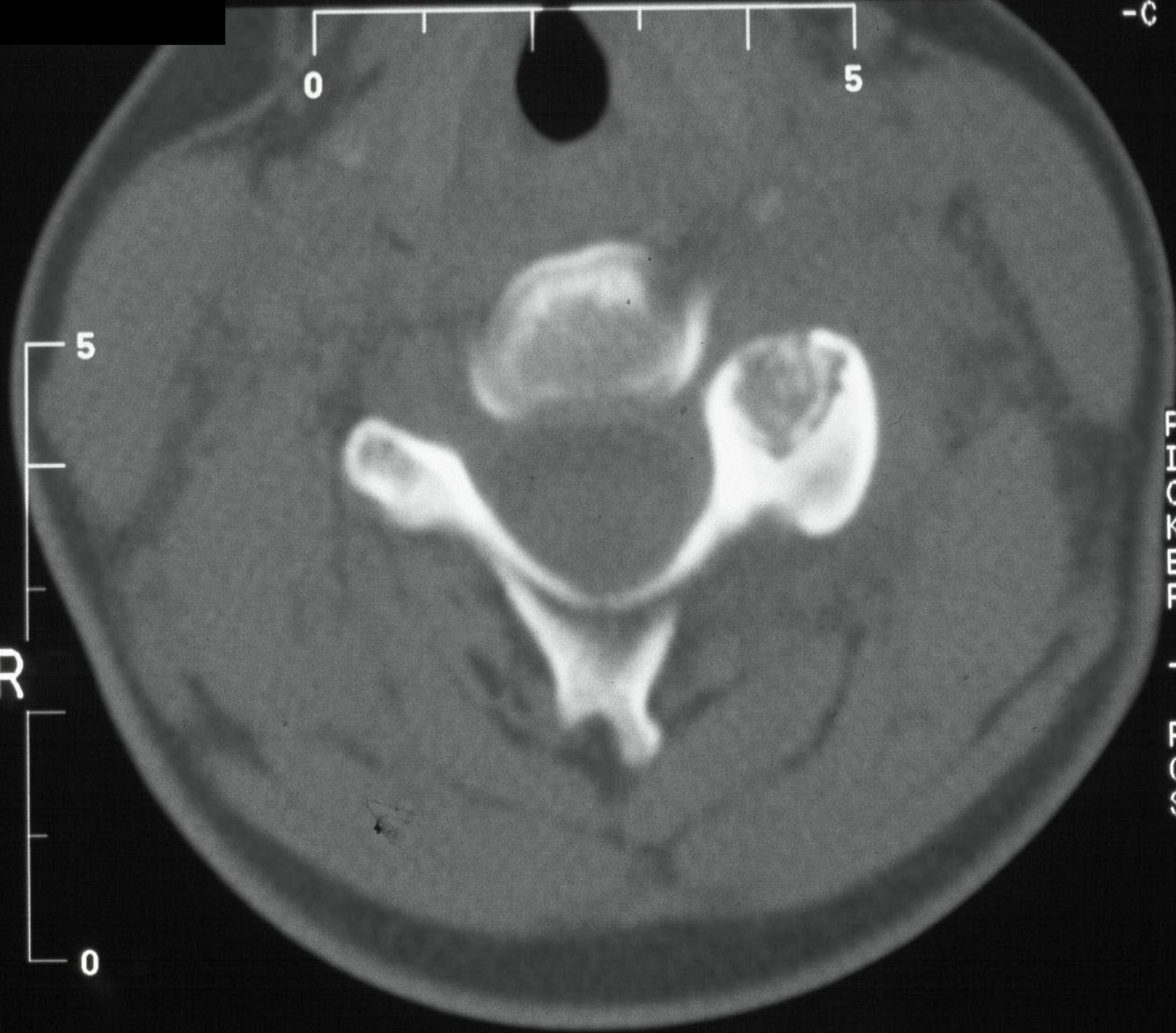
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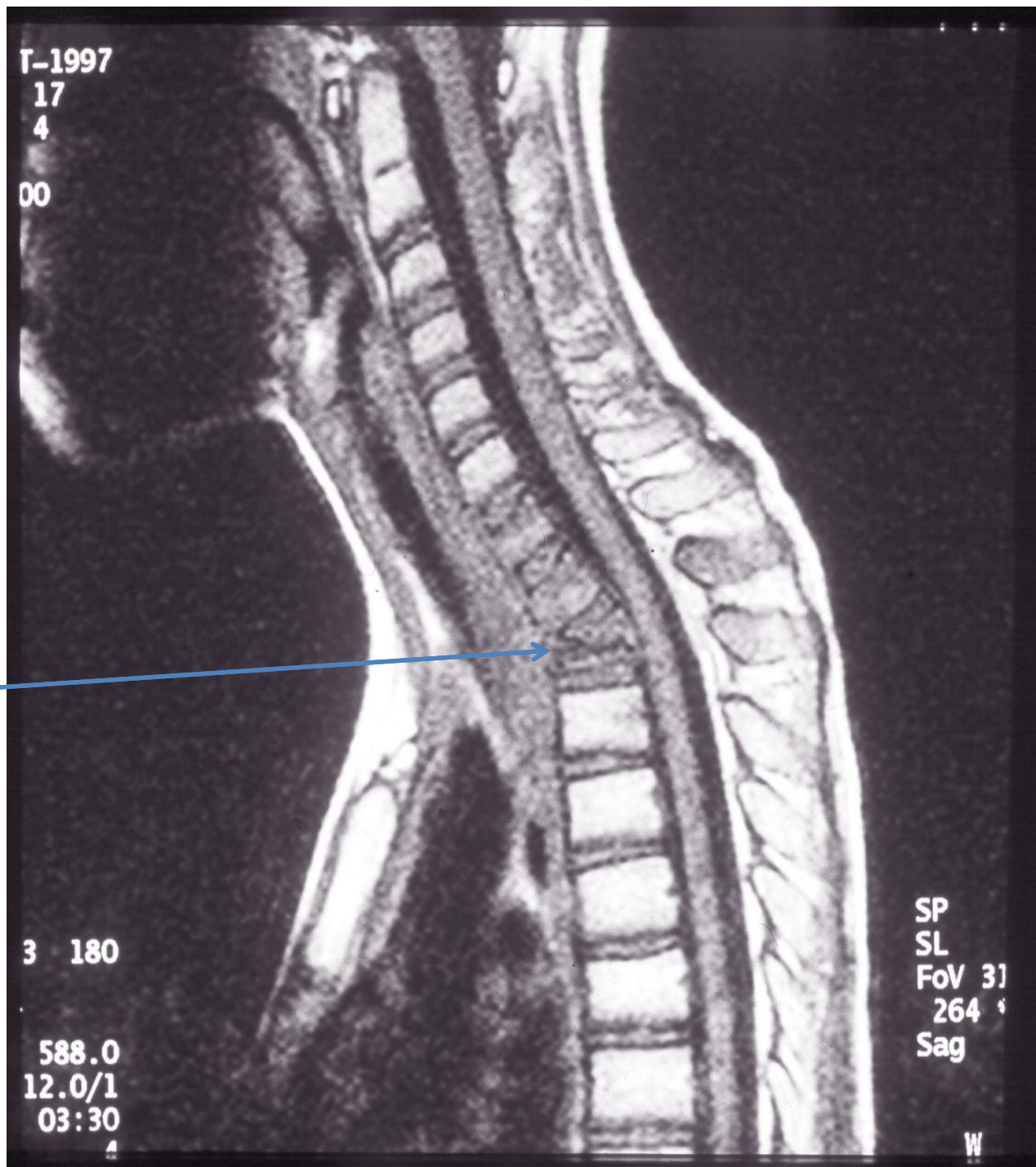
PICKER
-
PQSS



Ten year female

- Neck pain, lethargy
- Restriction of motion
- Tender C7
- ESR elevated
- Plain films abnormal

CRMO



Clinical Presentation

- Highly variable
- Trauma an obvious history
- Sometimes very subtle neuro Sx
- Pain not always present

Clinical Presentation

- Physical exam:
- Decreased neck ROM
- Tenderness
- Particularly important to do an excellent neuro documentation

Imaging

- Plain films may be diagnostic: 3 yr old with OI

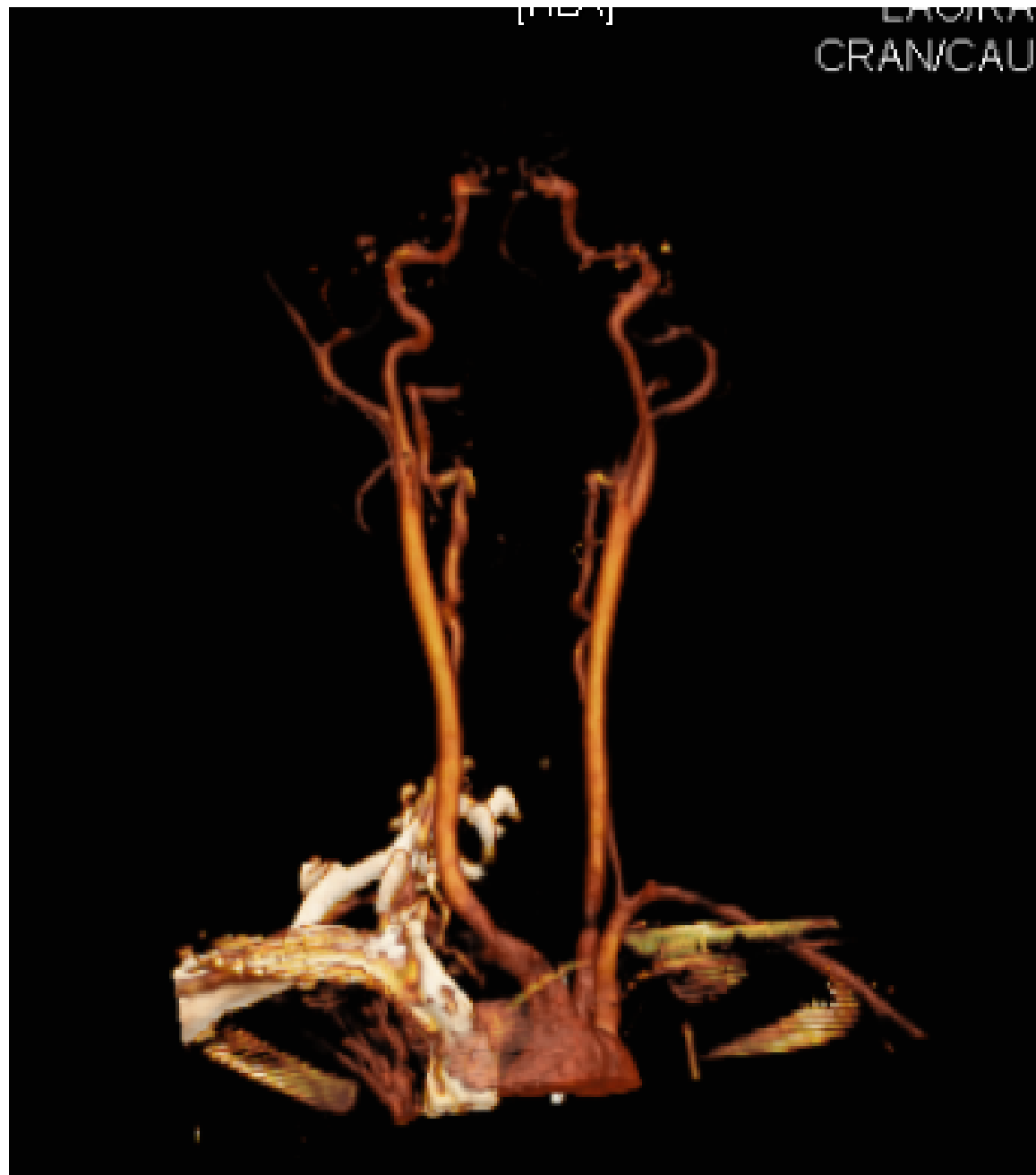


Imaging

- Flex ex laterals very important (but don't do them in trauma)
- MRI very important
- CT very important
- CT angio very important
- Flex ex CT may help
- Flex ex MRI may help

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EXOTIC
CRAN/CAUD



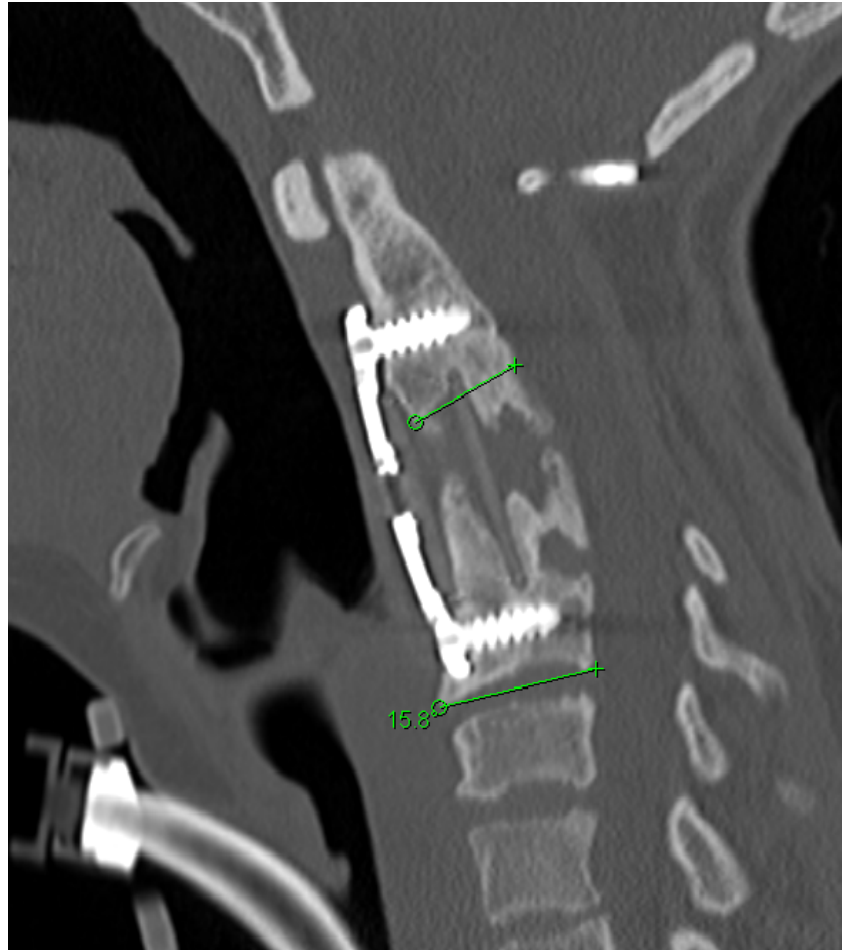
Surgical Approaches

- Assuming criteria for surgical intervention are met
- Posterior surgery
- Anterior surgery
- Both
- Plus or minus decompression

13 year old with brainstem tumour
iatrogenic kyphosis
Paraparetic



Can't go posterior because of scar /
shunts



12 yr old, water slide neck flexion



MRI at time of injury



4 weeks in collar



1 yr postop psf at 4/5



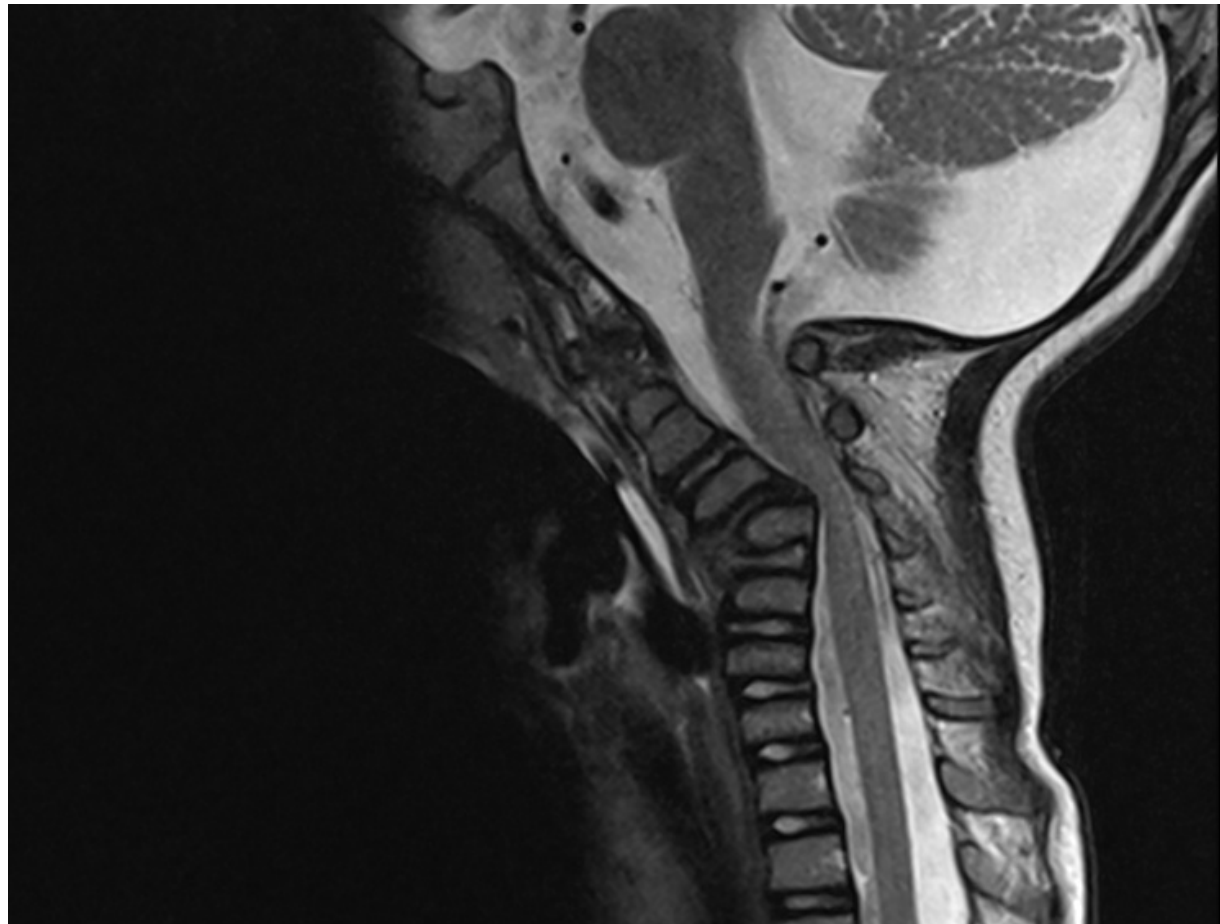
Imaging

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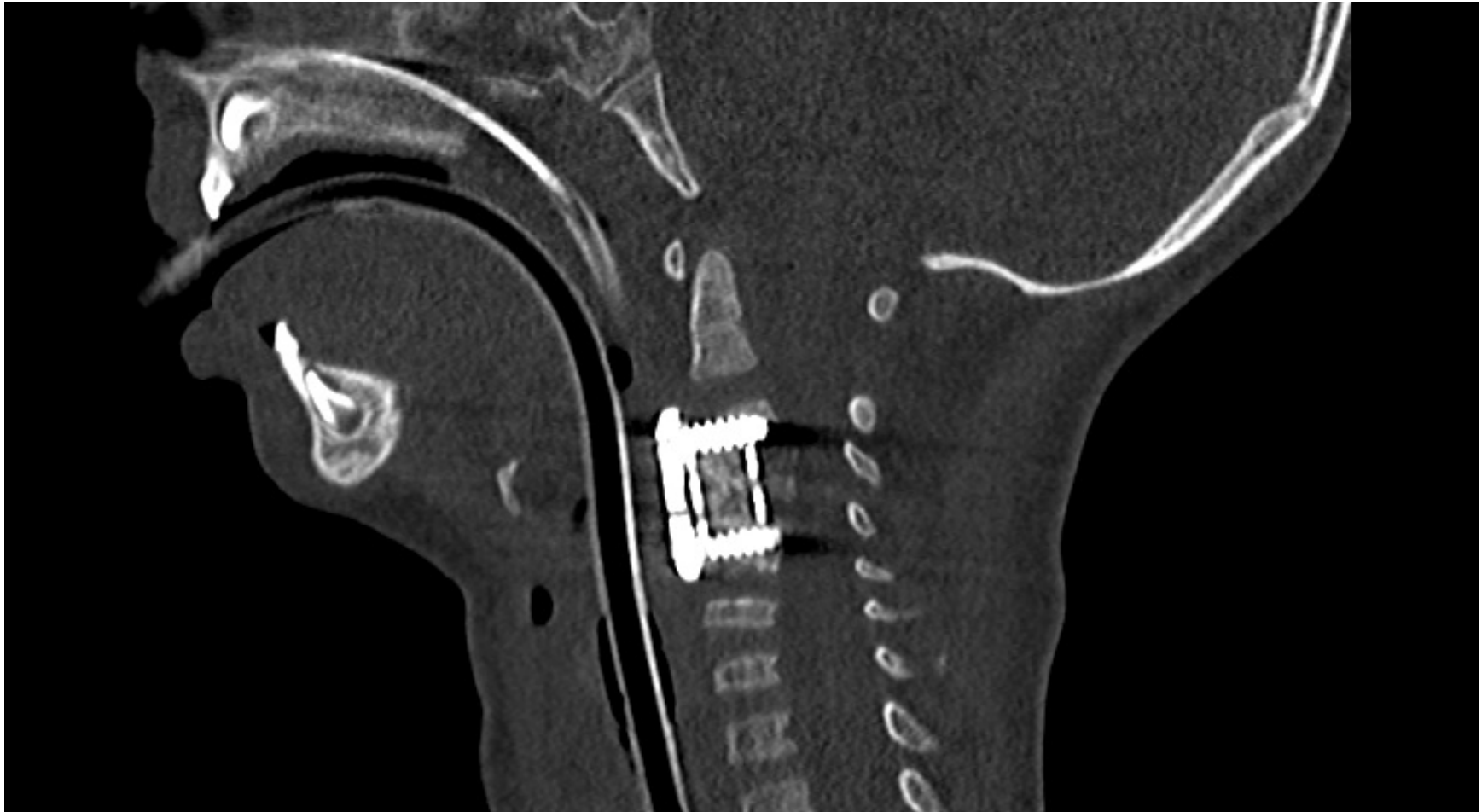


3 yr old OI

- Snoring, drooling, sleep apnoea, dysphagia
- Falling episodes



Anterior C4 corpectomy, cage, plate.

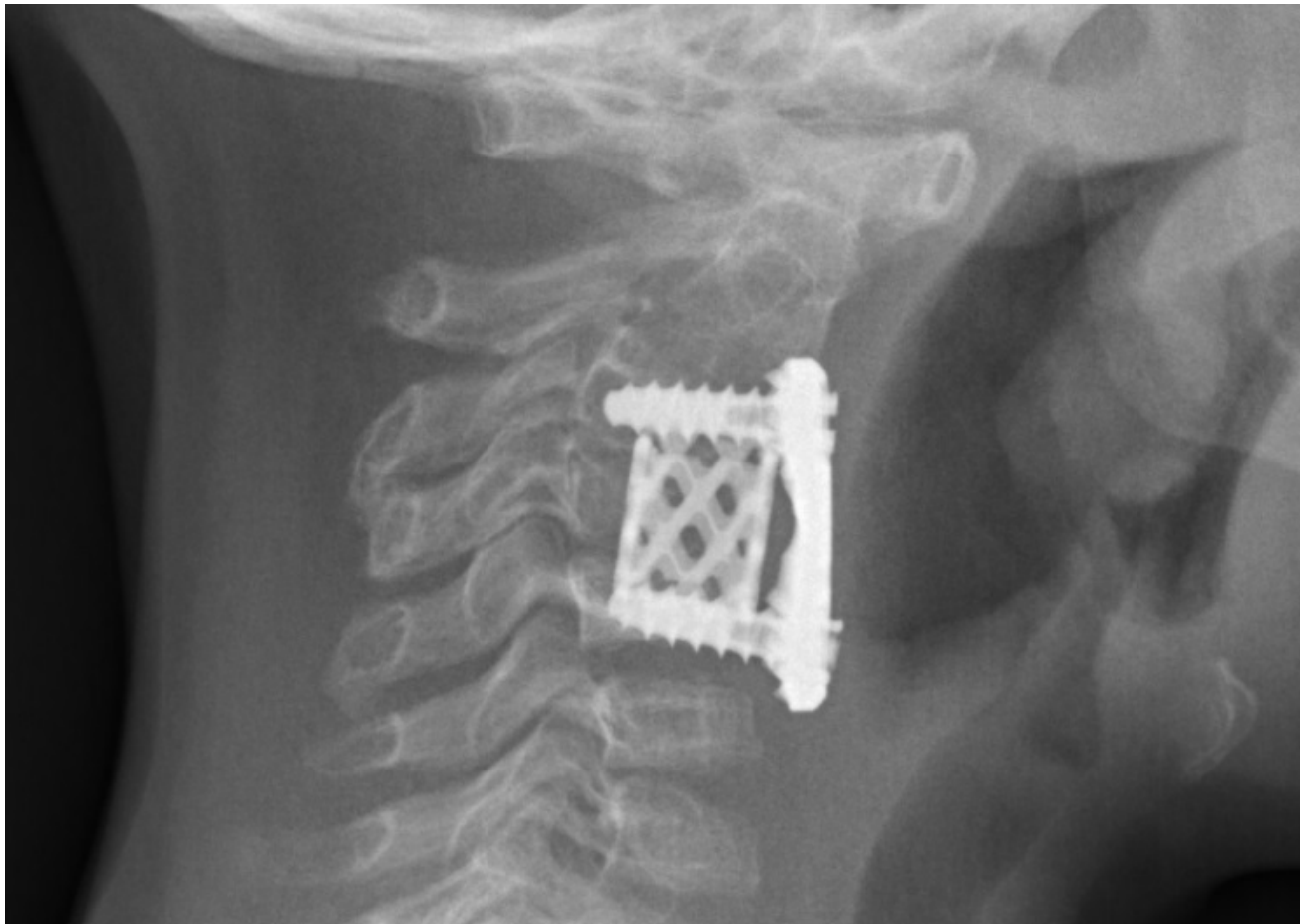


3 yr old OI

- Halo placement (ten pins at 2 pounds)



1 yr follow up



Summary

- Subaxial pathology in children's necks is not common
- It sneaks up on you
- The conditions are similar to those in Occiput C2
- There is more need for anterior surgery
- All techniques including halos are applicable