

Cervical Spine Fractures

Mr Evan Davies

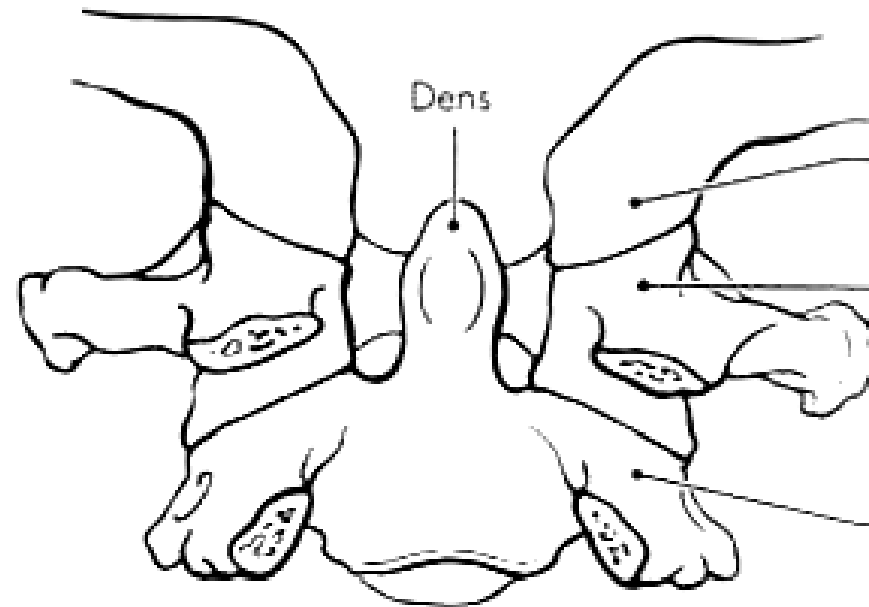
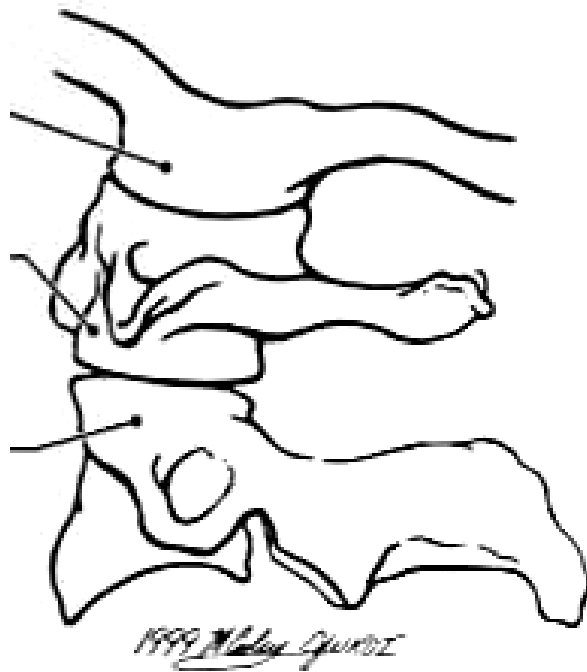
Consultant in Spinal Surgery

Southampton General Hospital

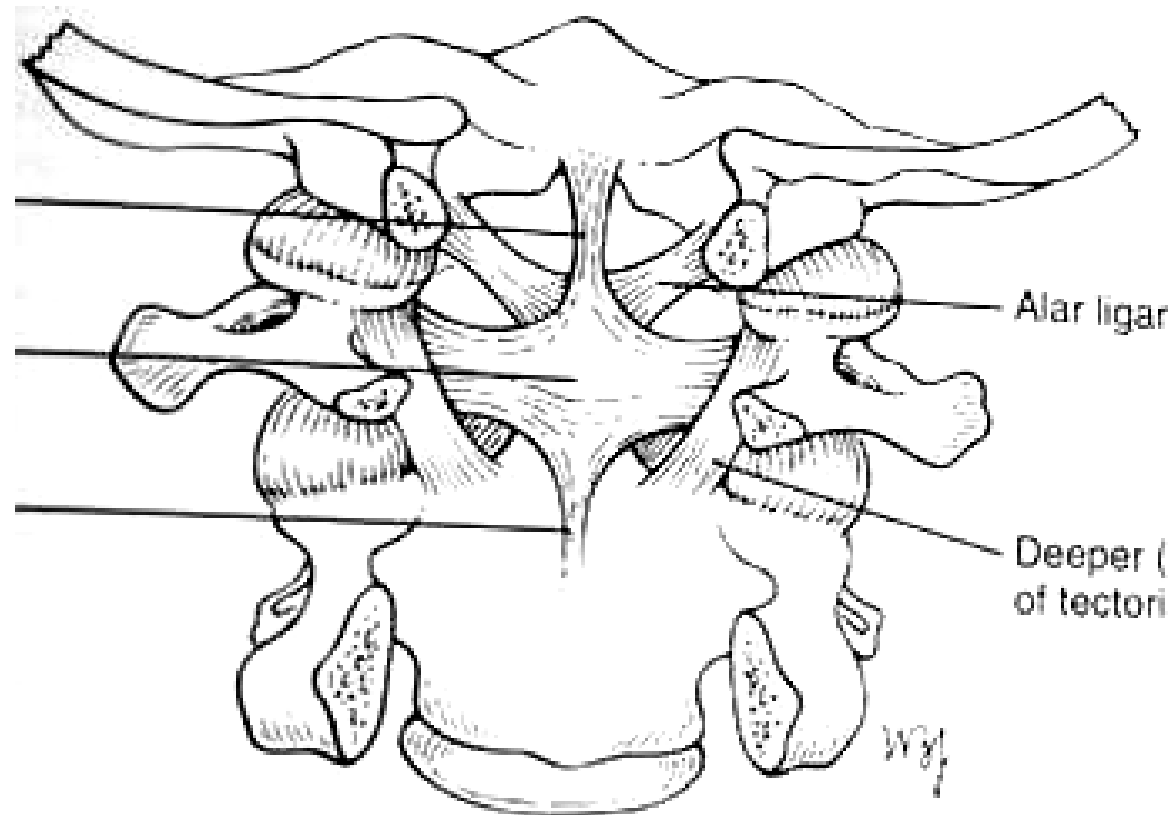
Upper Cervical Spine

- Uncommon Injuries
- Fatal accident 20% craniocervical injuries
- More surviving/High risk of neuro deterioration

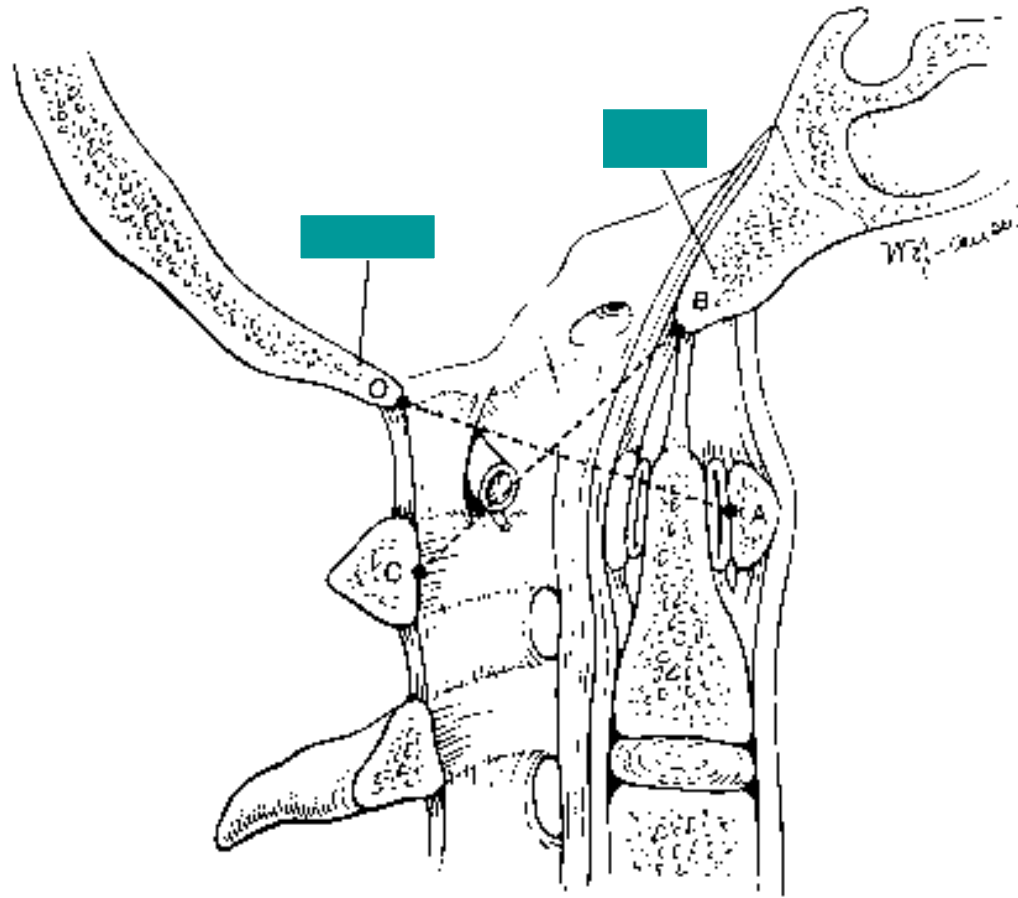
Anatomy



Anatomy



Anatomy



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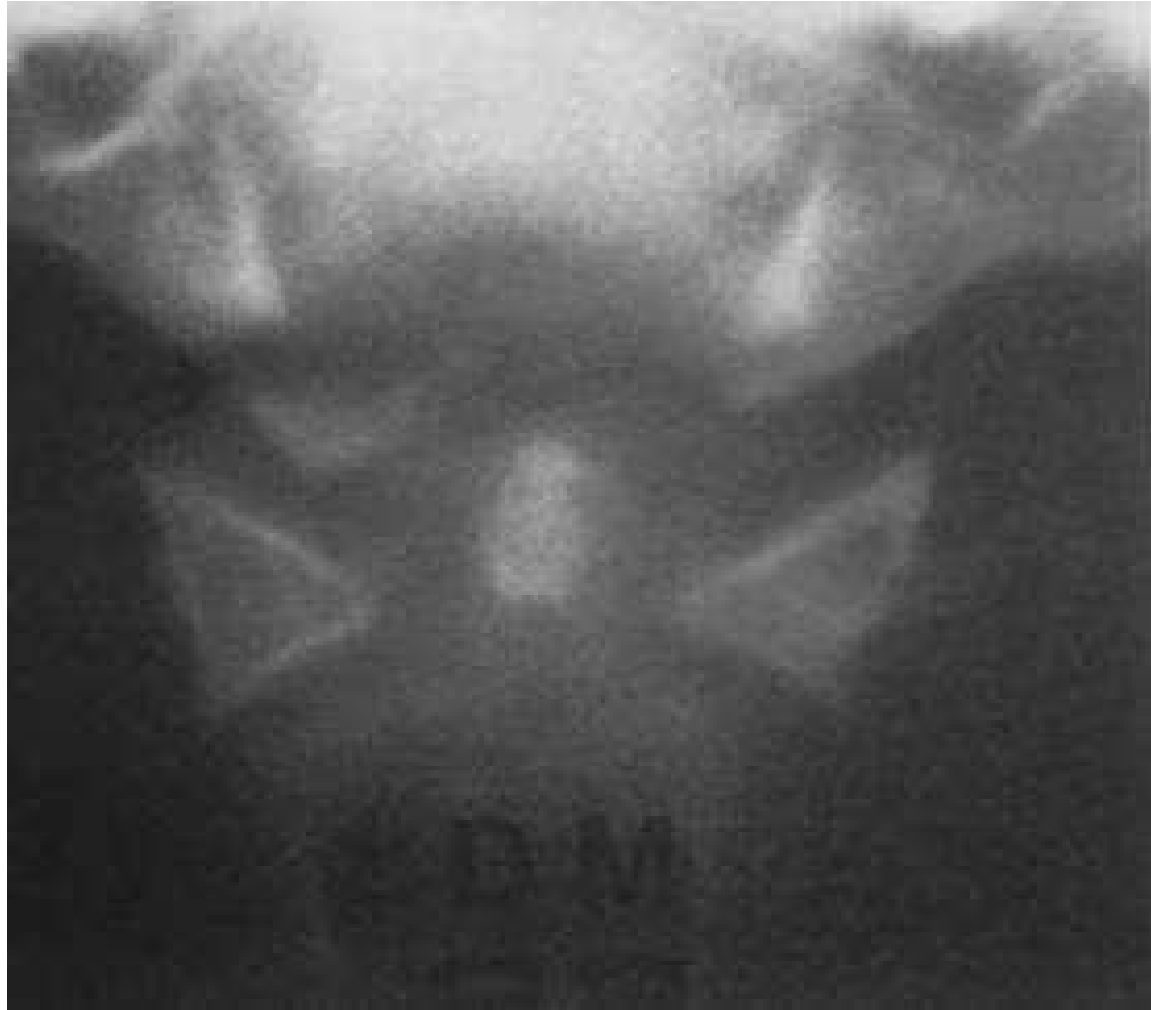
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Assessment of Cervical Spine Injuries

- High level of suspicion esp. altered LOC
- Head/Facial Injuries
- Open Mouth Peg/Lat & AP C-Spine CO- T1
- 4 - 16% other level spinal #

Other imaging

- Oblique
- CT
- MRI
- Flexion/Extension Lateral C-Spine

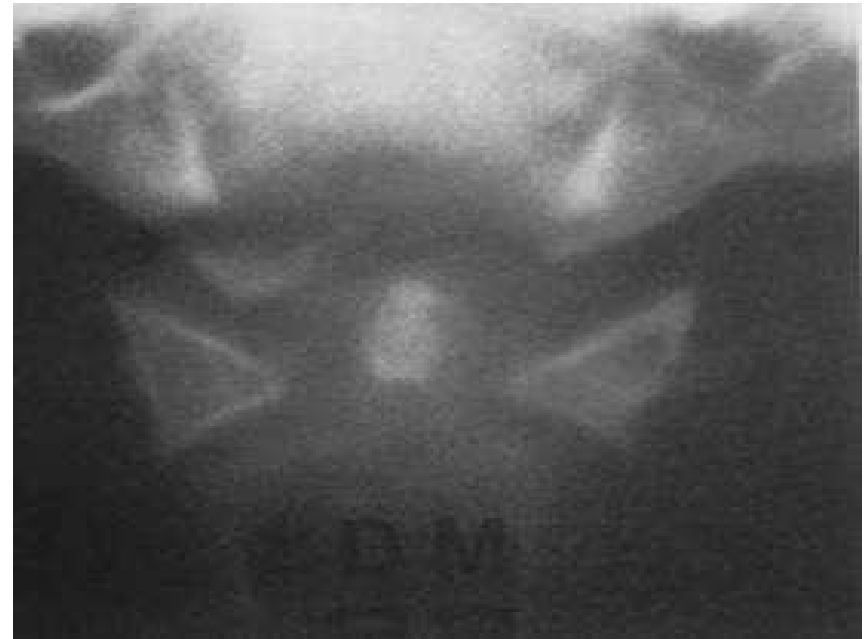


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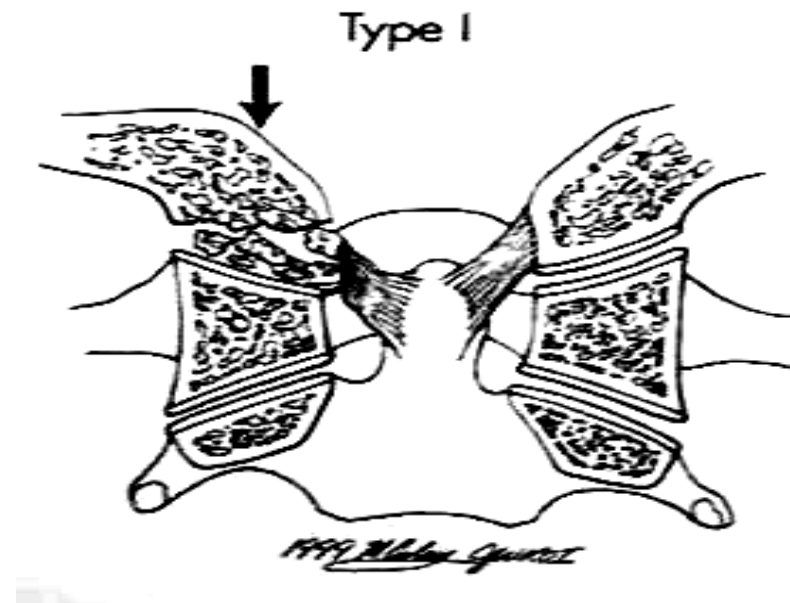
Occipital Condyle Fractures

- 2% cervical #s
- Compression and Avulsion
- Hypoglossal
- CT required for diagnosis



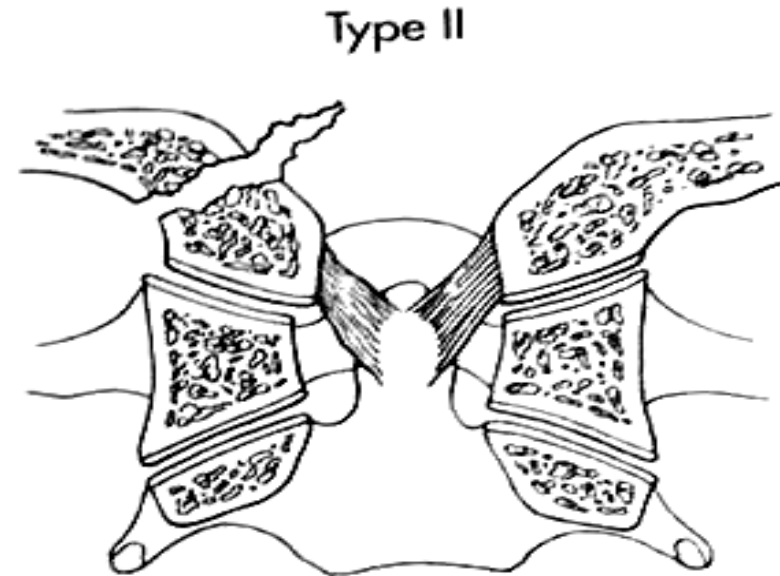
Occipital Condyle Fractures

- Anderson & Montesano
- Spine 1988 13:731-736
- Type 1 Impaction Fracture



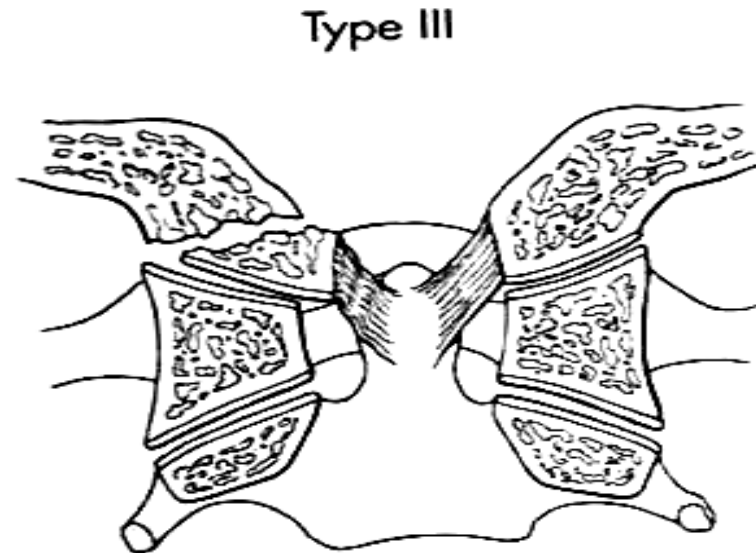
Occipital Condyle Fractures

- Anderson & Montesano
- Type 2
- Associated Basilar #

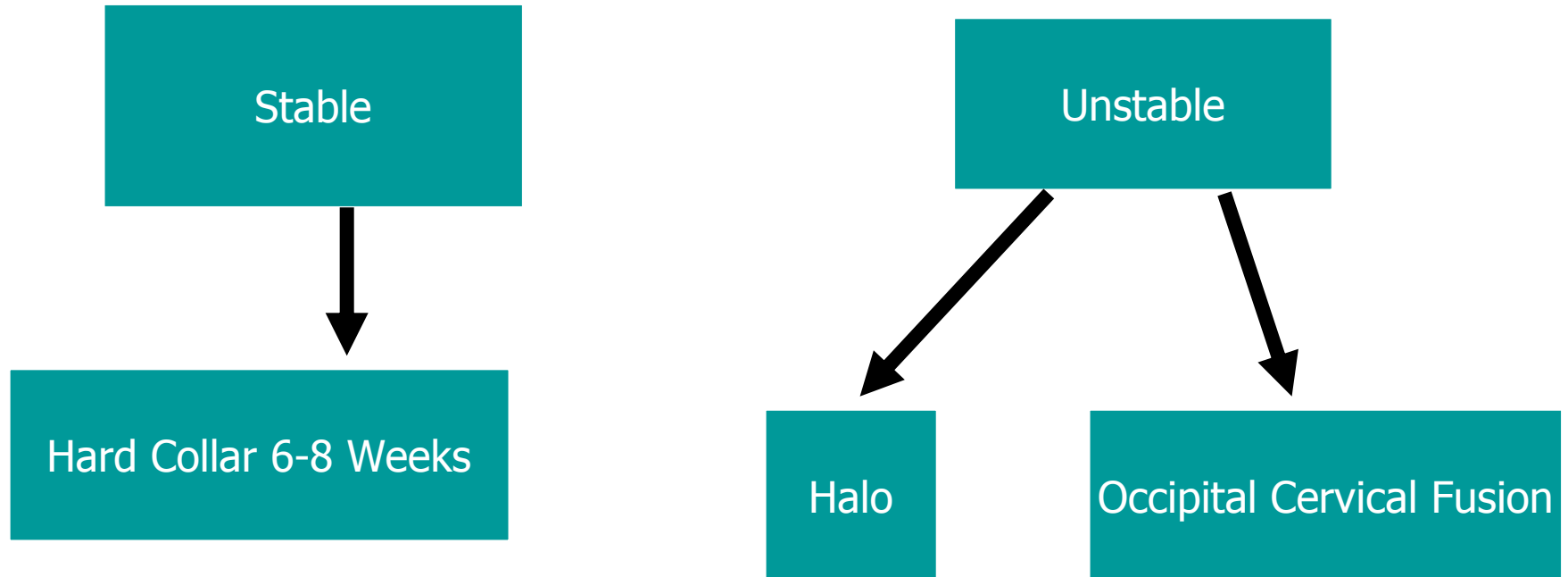


Occipital Condyle Fractures

- Anderson & Montesano
- Type 3
- Condylar Avulsion #



Treatment



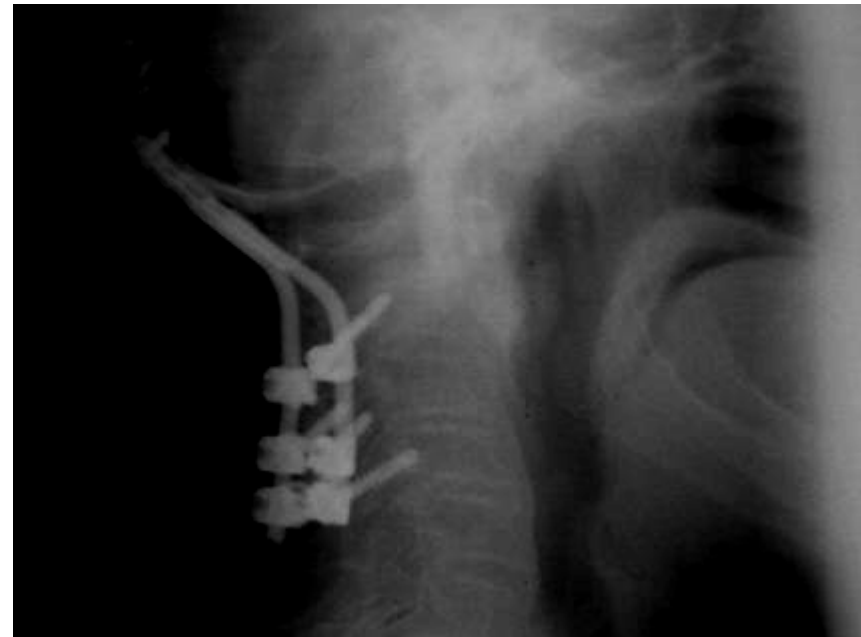


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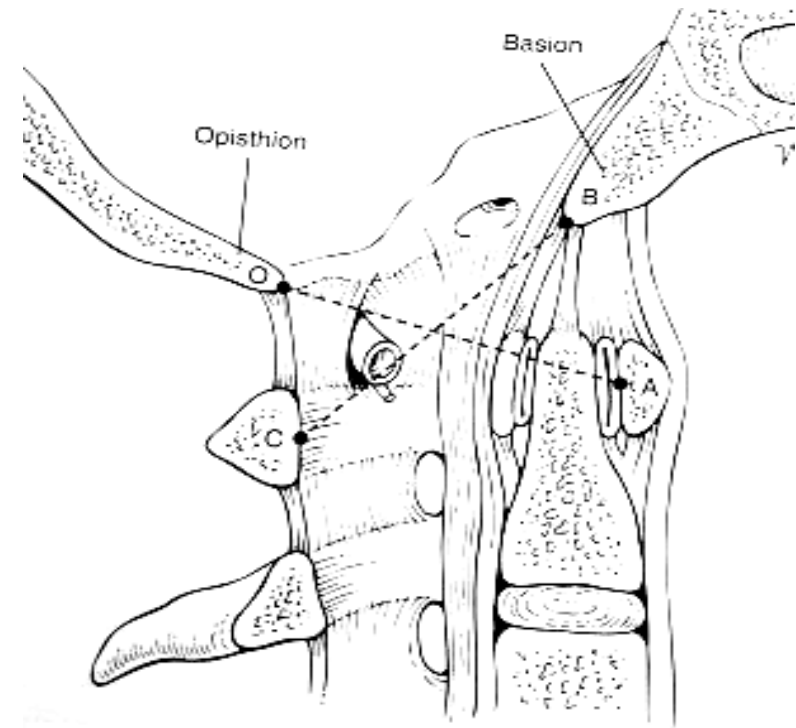
Occipital Atlantal Dislocations

- Rare <1%
- 8% fatal RTAs
- High injury/multiple injuries
- Children>Adults



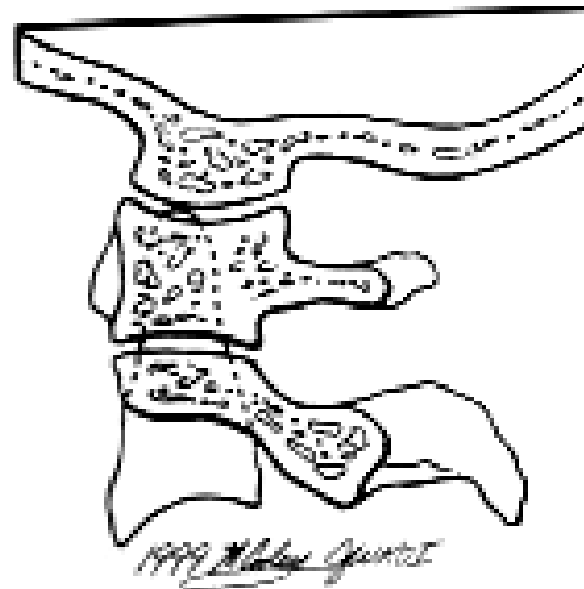
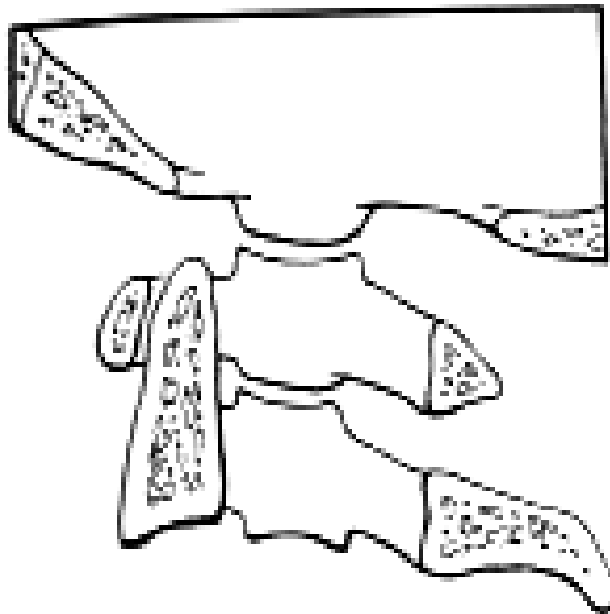
Powers Ratio

- BC/OA Normal 0.77
- BC/OA >1 anterior dislocation
- BC/OA <0.77 ? Post Disc
- No use Children or C1 #

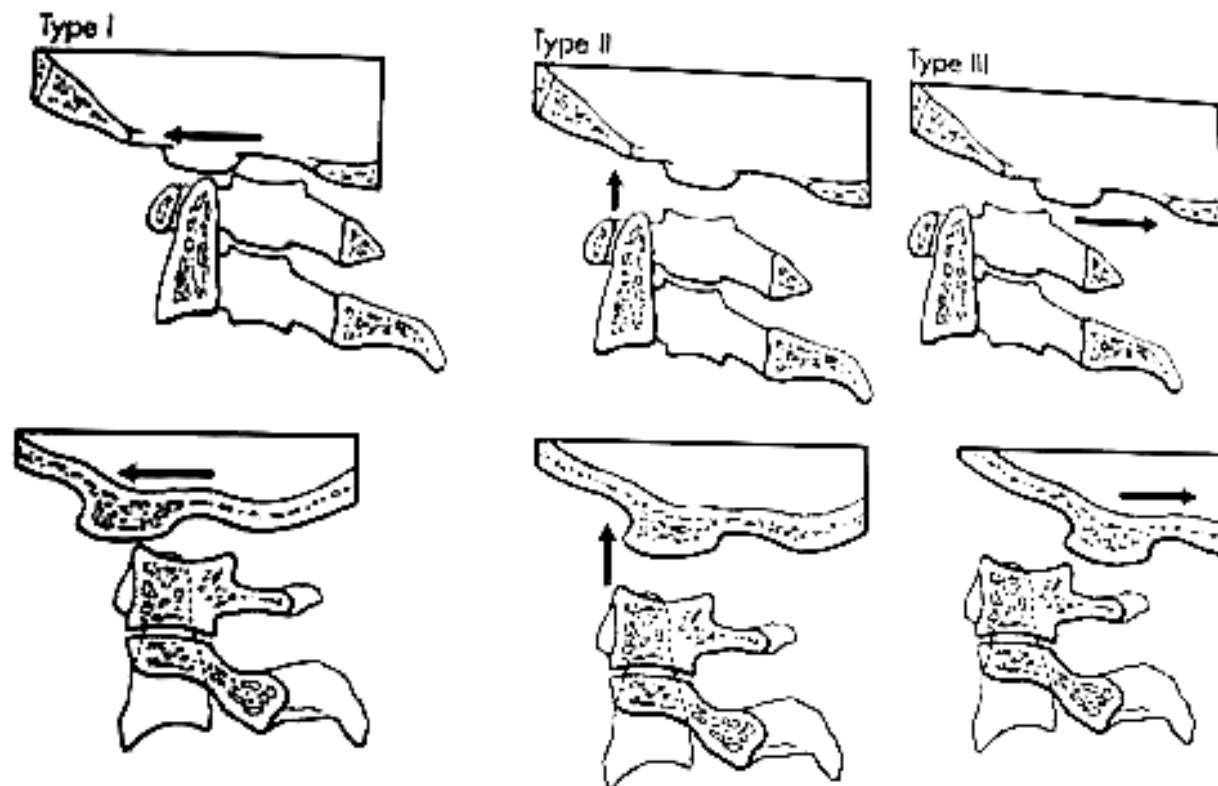


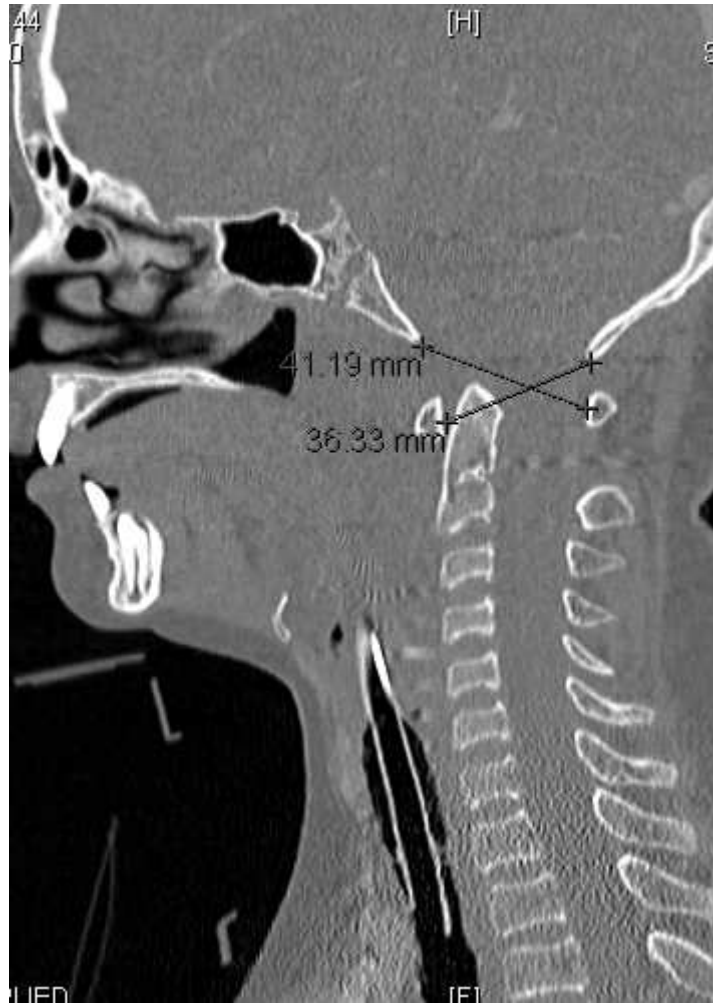
Occipital Atlantal Dislocations

Normal



Occipital Atlantal Dislocations





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Occipital Atlantal Dislocations

- Highly Unstable Injuries Immobilise
- Halo uneffective in long term
- CO-C1 or C2 when patients condition allows



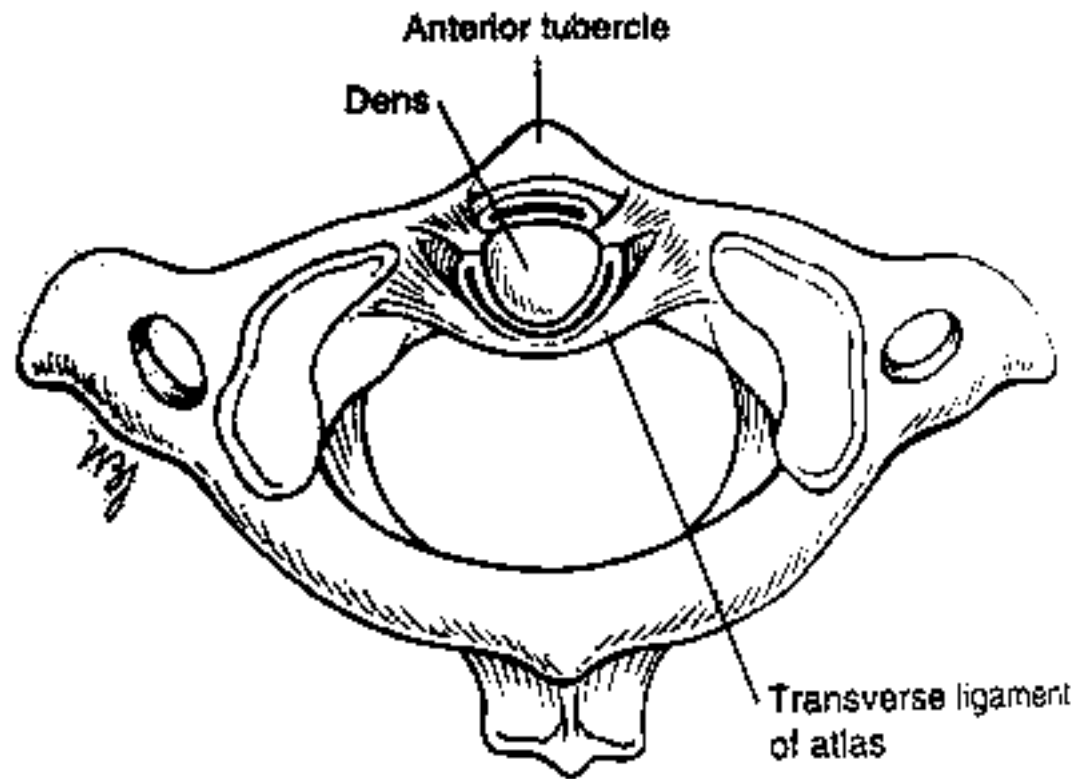
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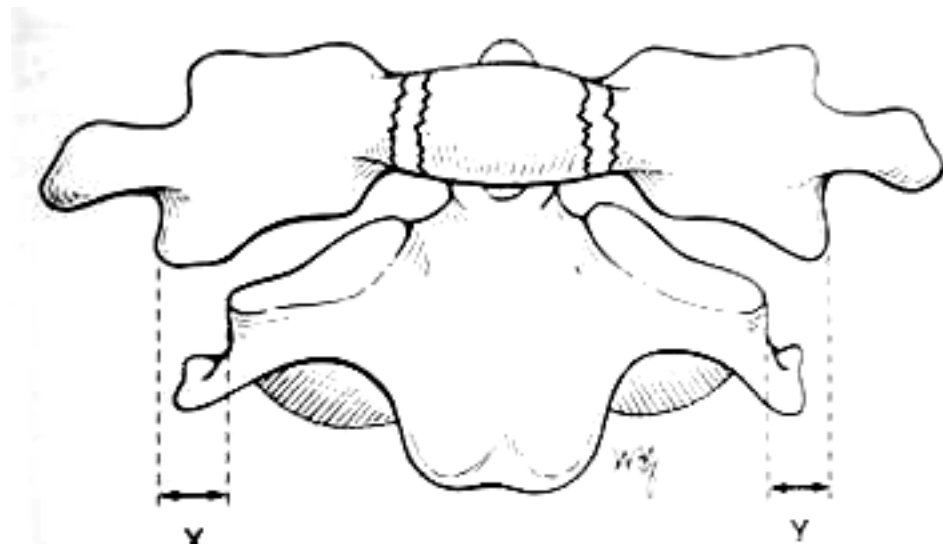
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Rupture of the Transverse Ligament

- Ass C1 # or rotatory subluxation
- ADI = or < 3mm normal
- ADI 3-5mm rupture
- ADI > 5mm incompetence

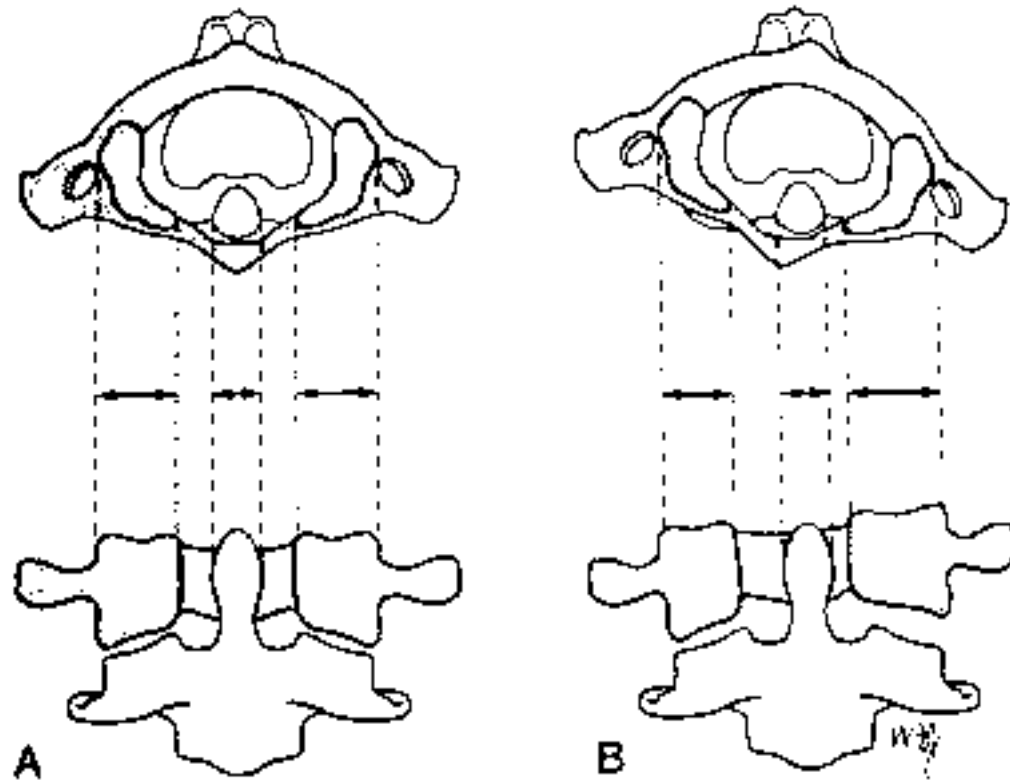






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Treatment

- If fracture avulsion may heal in Halo
- Posterior atlantoaxial fusion



Atlantoaxial Rotatory Subluxations

- Fielding and Hawkins
JBJS Am 1978 60A:1102-1104

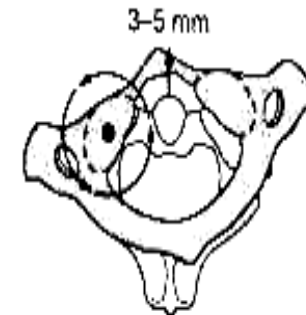
- Most delayed presentation

- Traction to reduce and hold

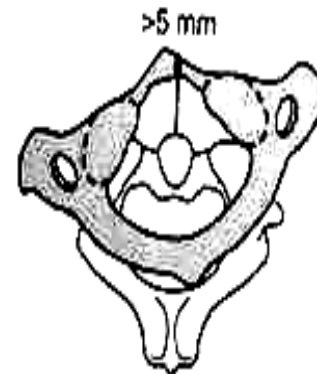
- Fusion if does not



Type I



Type II



Type III



Type IV



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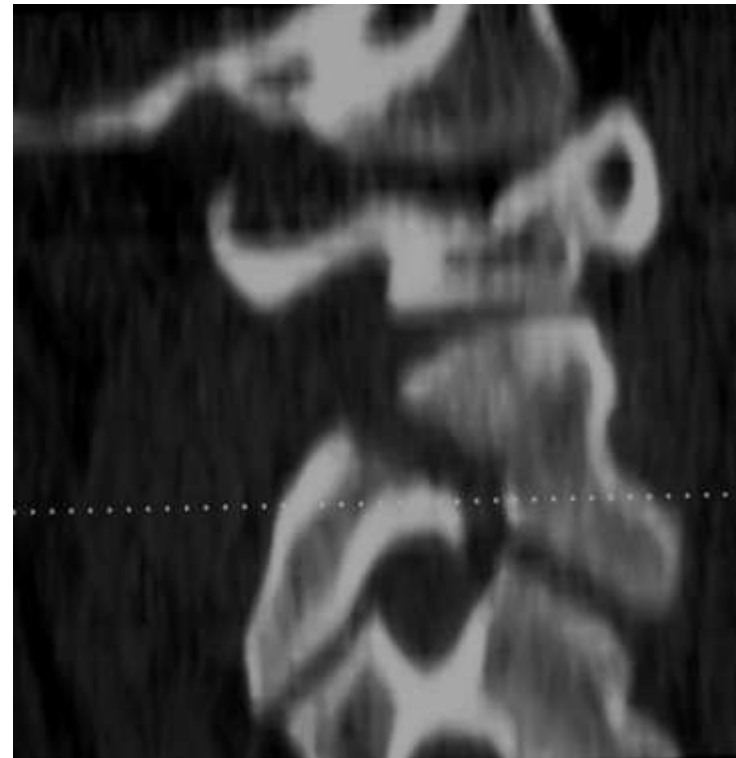
Traumatic Spondylolisthesis of the Axis

- Schneider 1965
Hangman's #
- Not a hanging injury
- Fall or RTA
- 1/3rd have another spine #



Traumatic Spondylolisthesis of the Axis

- Neurology 5-10%
- Pars Intra-articularis
- stress area
- Levine and Edwards
JBJS Am 1985
67A:217-226



Type 1

- Only Stable injury
- Treatment in a cervical orthosis 6 weeks



Type I

Type 2

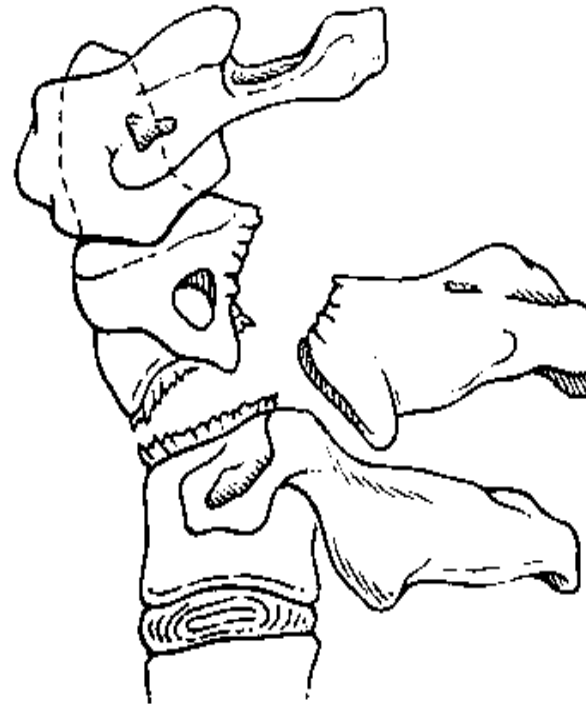
- Most Common & unstable
- Hyperextension – axial loading injury
- ALL and part disc intact
- Reduce in traction -> Halo Jacket



Type II

Type 2a

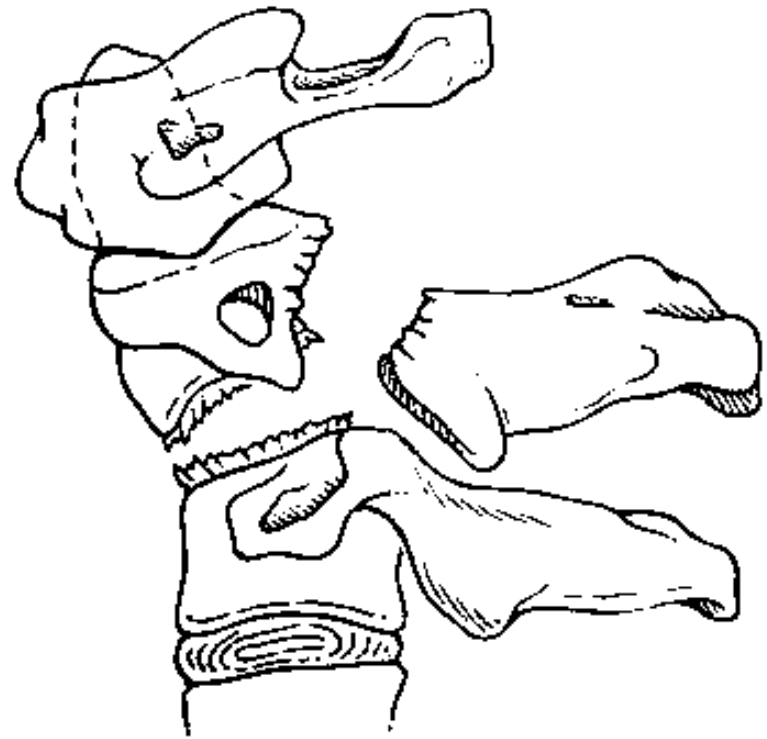
- Angulation with little or no displacement
- Flex-distraction injury
- Traction increases deformity
- Reduce in extension and compression Halo/no traction



Type IIa



Type II



Type IIa

Type 3

- Most unstable
- MRI to assess disc
- Reduce in traction
- Posterior wiring or anterior C2/C3 AIF





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Atlas Fractures

- Jefferson First to report injury
- Major trauma
- Rare to have neurology

- Lateral C-spine shows posterior arch #
- Open mouth shows lateral mass displacement
- Get CT to assess pattern

Classification

- Posterior arch - Hyperextension
- Comminuted & Jefferson - Compression
- Anterior arch - Flexion

Treatment

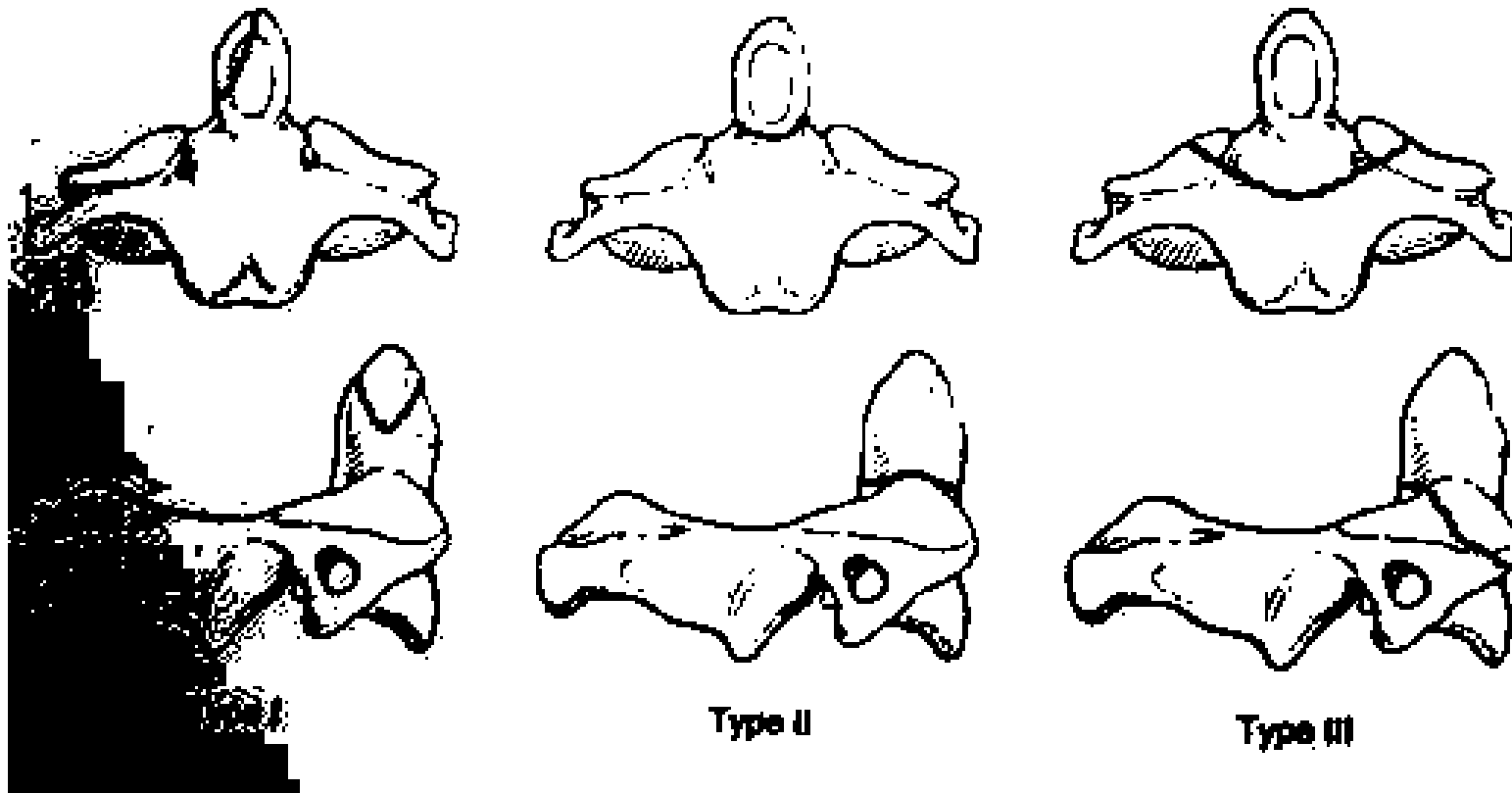
- Isolated posterior arch or anterior arch
 - Cervical Orthosis 8 weeks
- Comminuted & Jefferson
 - If ADI > 4mm or offset > 7mm transverse lig gone
 - If intact Orthosis
 - If gone traction and reduction -> Halo Vest



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Odontoid Fractures



Type 1

- <5% Odontoid #s
- Avulsion # Alar ligament
- Stable Orthotic
- BEWARE Atlano-occipital instability

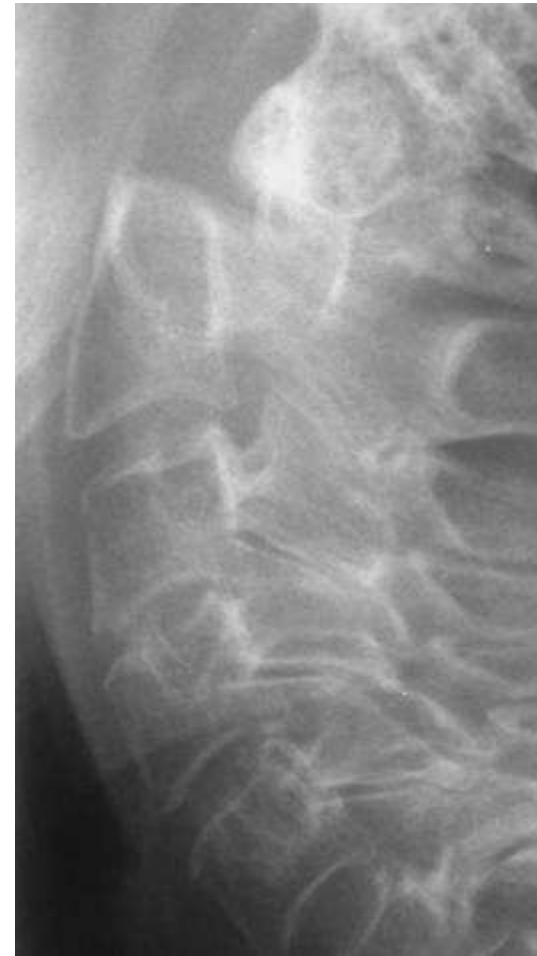
Type 2

- Treatment controversial
- Non-union up to 65% no operation
- CSRS study 66% healed with immobilisation



Type 2

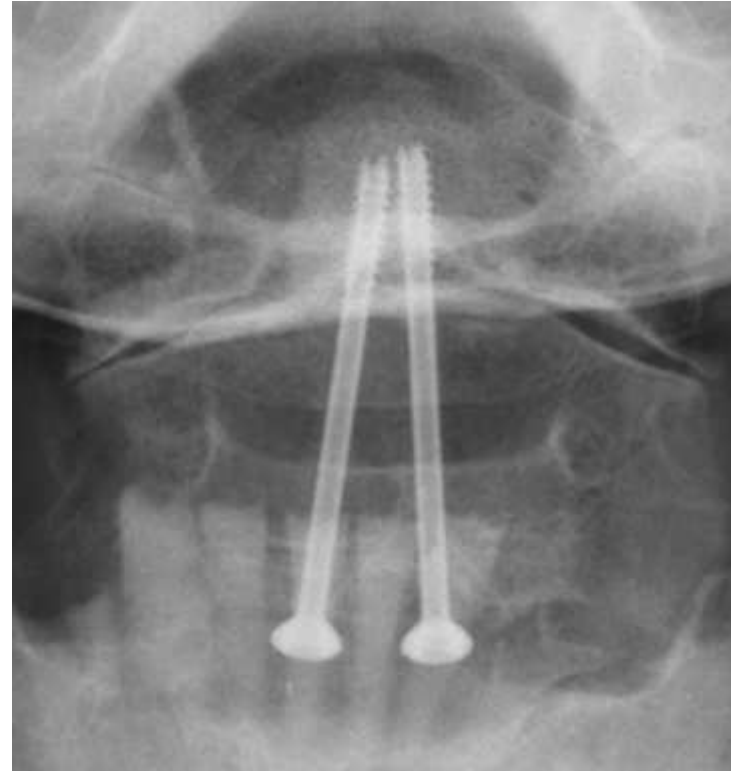
- Increased non-union
 - Displacement 4-5mm
 - Angulation > 10-15 °
 - Aged > 50
 - Posterior displacement



Type 2

- Primary fusion C1-C2
 - Loss atlantoaxial motion

- Anterior Dens Screw



Type 3

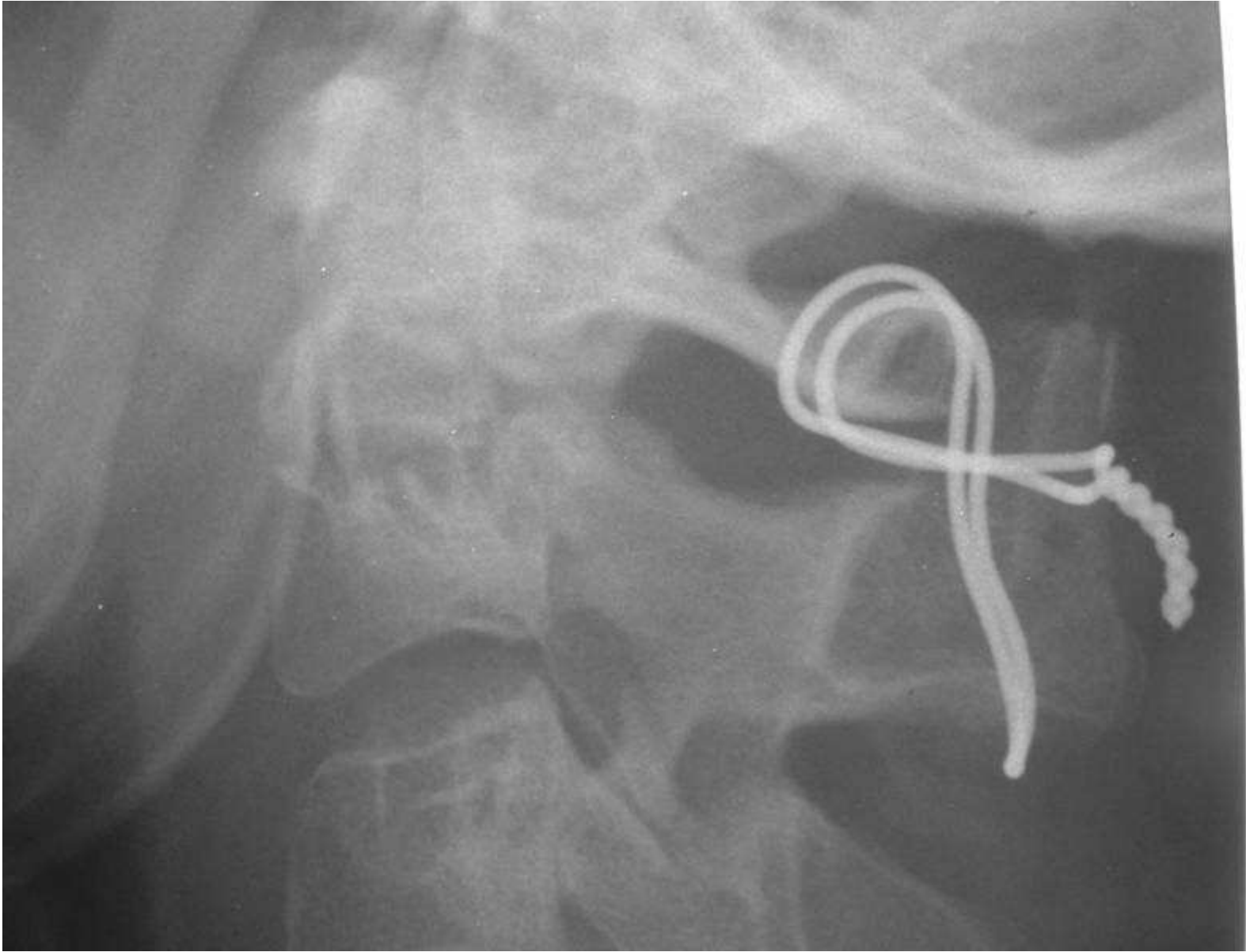
- Reduction and Halo
80% unite
 - Displaced $> 5\text{mm}$
40% non-union
 - Angular deform $> 10^\circ$
22% non-union



Non-Union

- Occipital Cervical Fusion





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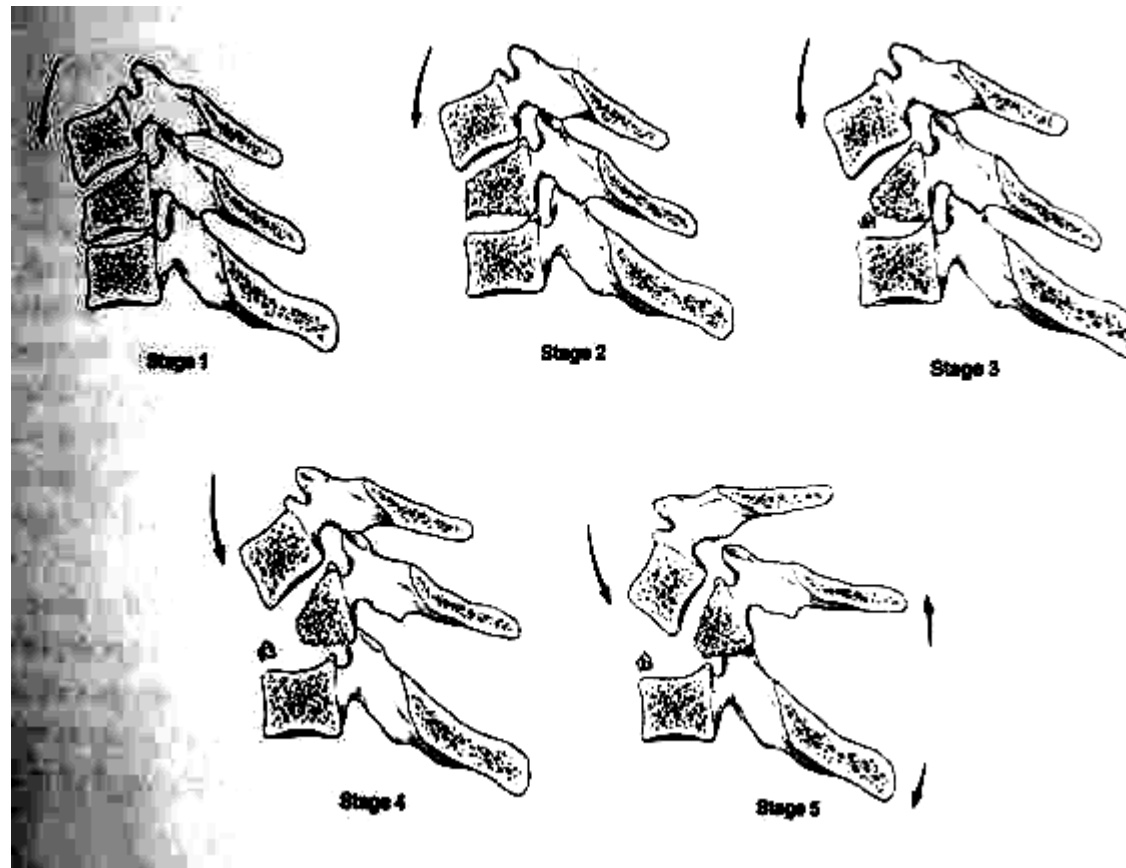
Lower cervical spine fractures



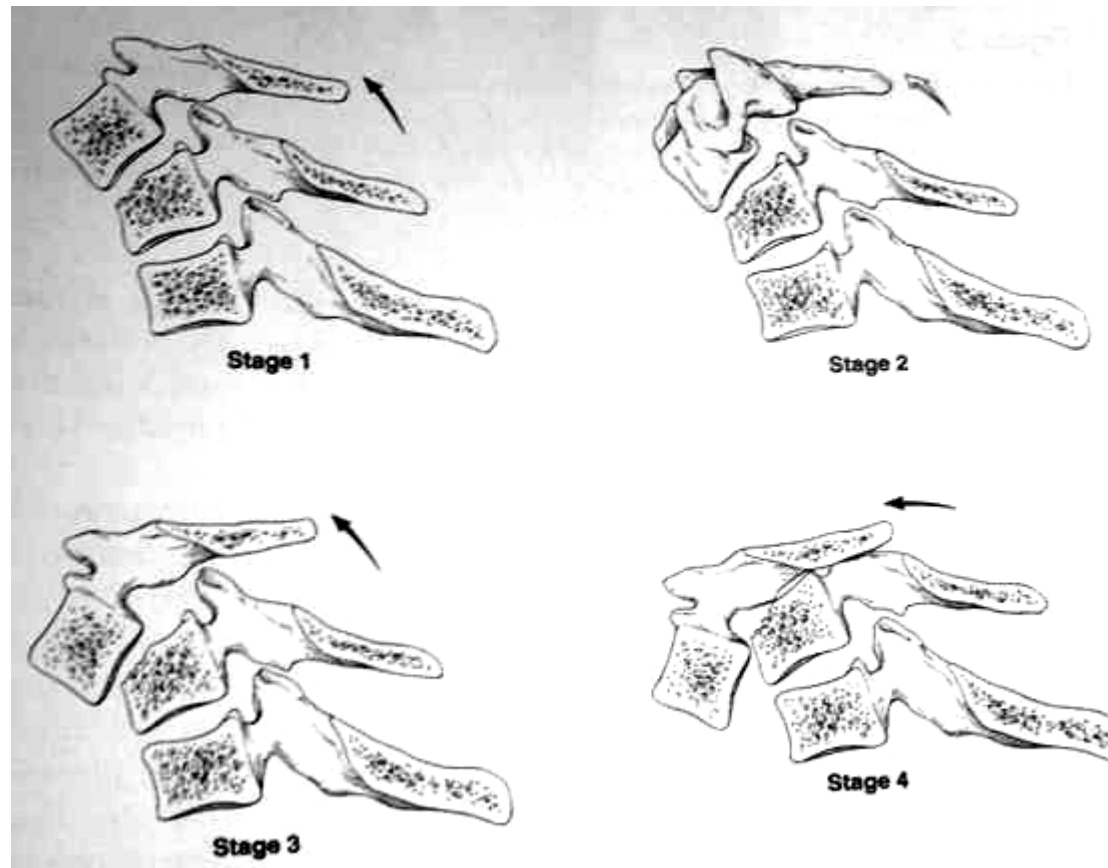
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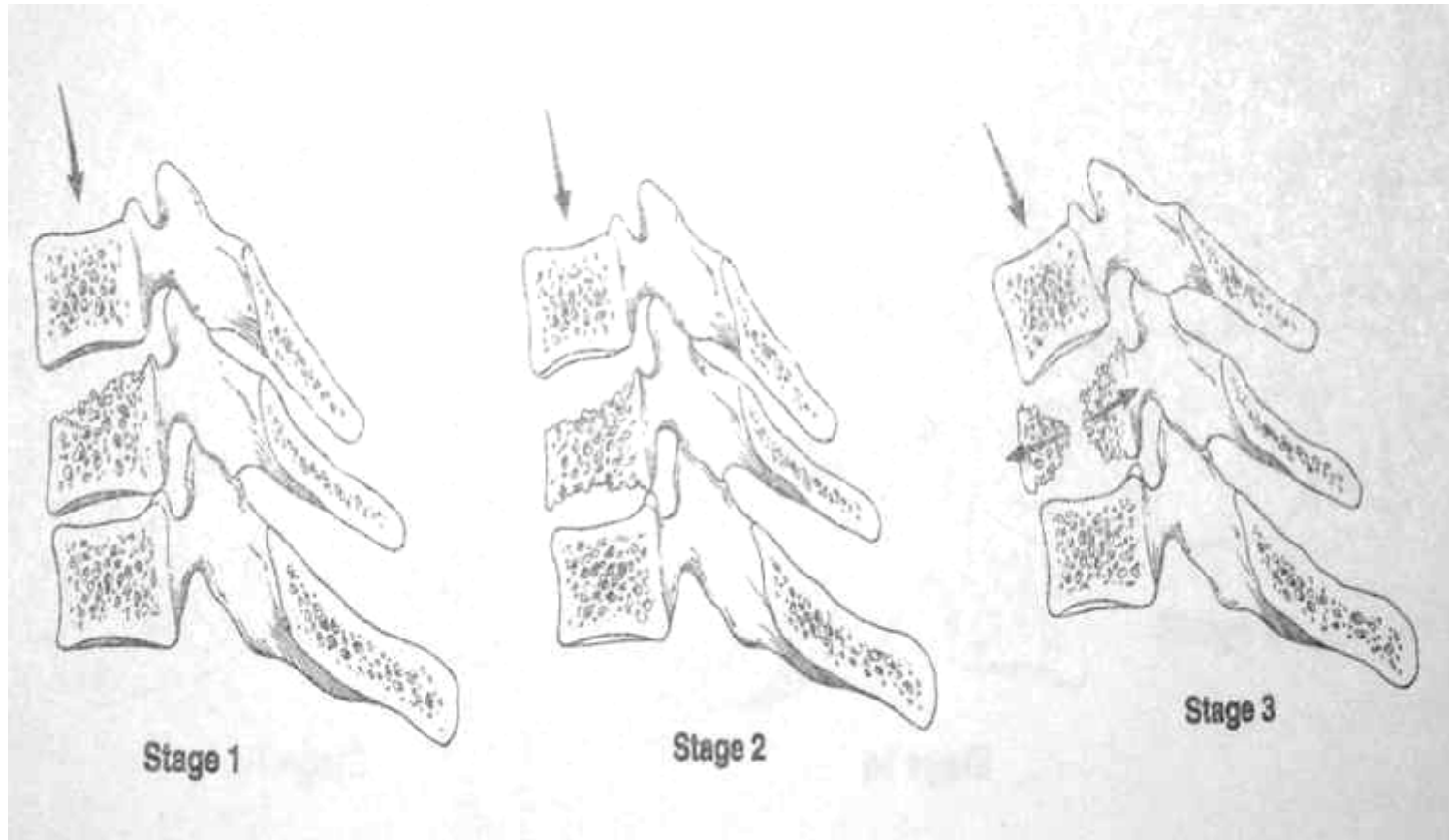
Flexion Compression



Flexion Distraction



Vertical Compression



Posterior Column Injuries

- Isolated Fractures of Posterior Elements
 - Caused by all vector injuries
 - Normally stable
 - Can be associated with ligamentous injuries
 - Exclude instability



Posterior Column Injuries

- Posterior Ligamentous Injury
 - Normally caused by rapid deceleration
 - Radiology maybe normal
 - MRI may show the ligamentous damage
 - Flexion/Extension Radiology in awake patient
 - ?? Controlled screening in unconscious patient

Facet Injuries

- Isolated Facet and Pedicle Fracture
 - Compression
 - Normally stable
 - Often missed
 - Bone Scan CT maybe useful to diagnose



Facet Injuries

- Unilateral Facet Dislocations
 - 25% displacement on plain xr
 - Asymmetric loss of facet joint



Facet Injuries

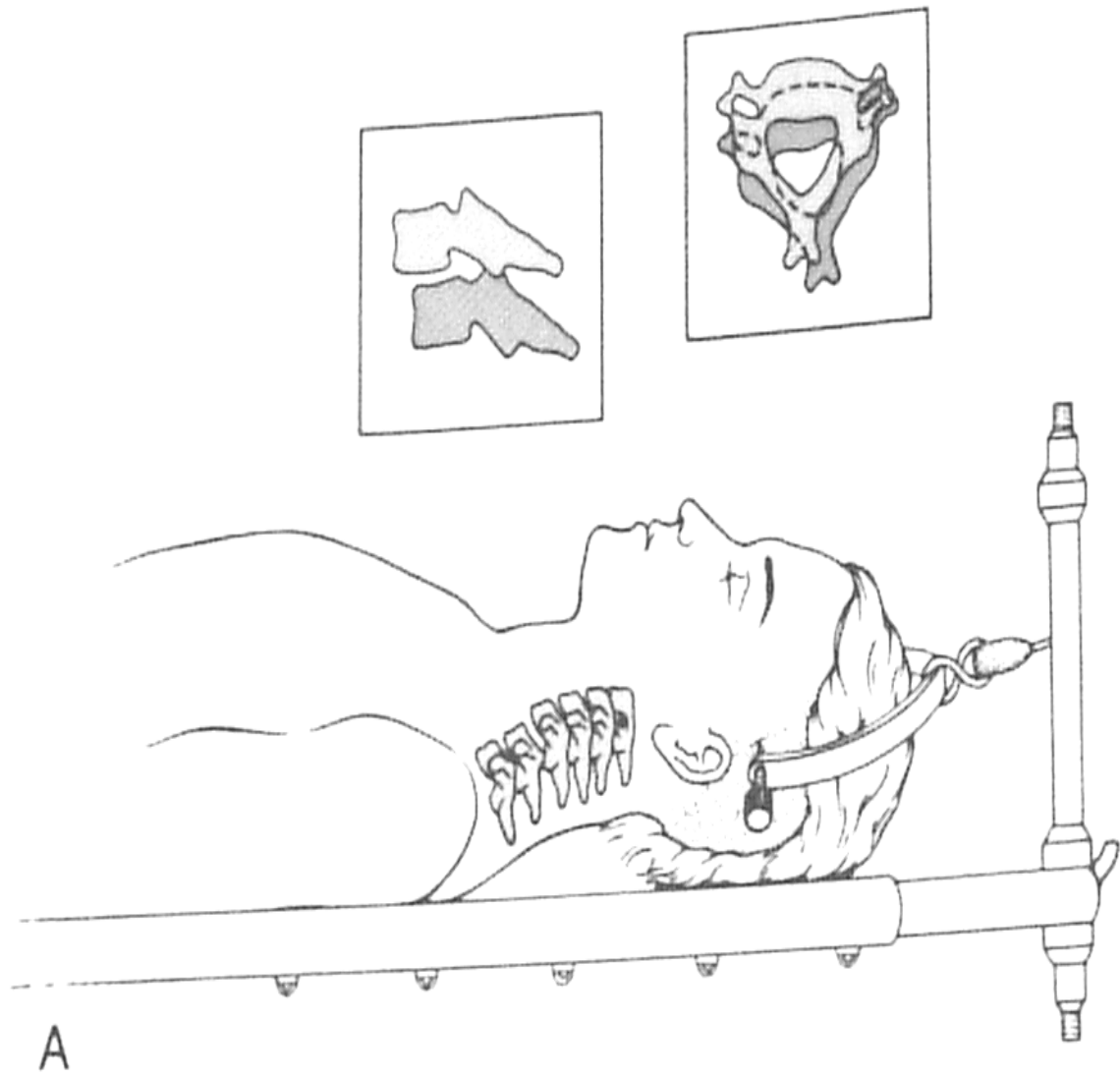
- Pure Unifacet Facet Dislocation
 - Most uncommon
 - 25% vertebral body translation
 - Often difficult to reduce as ligaments intact

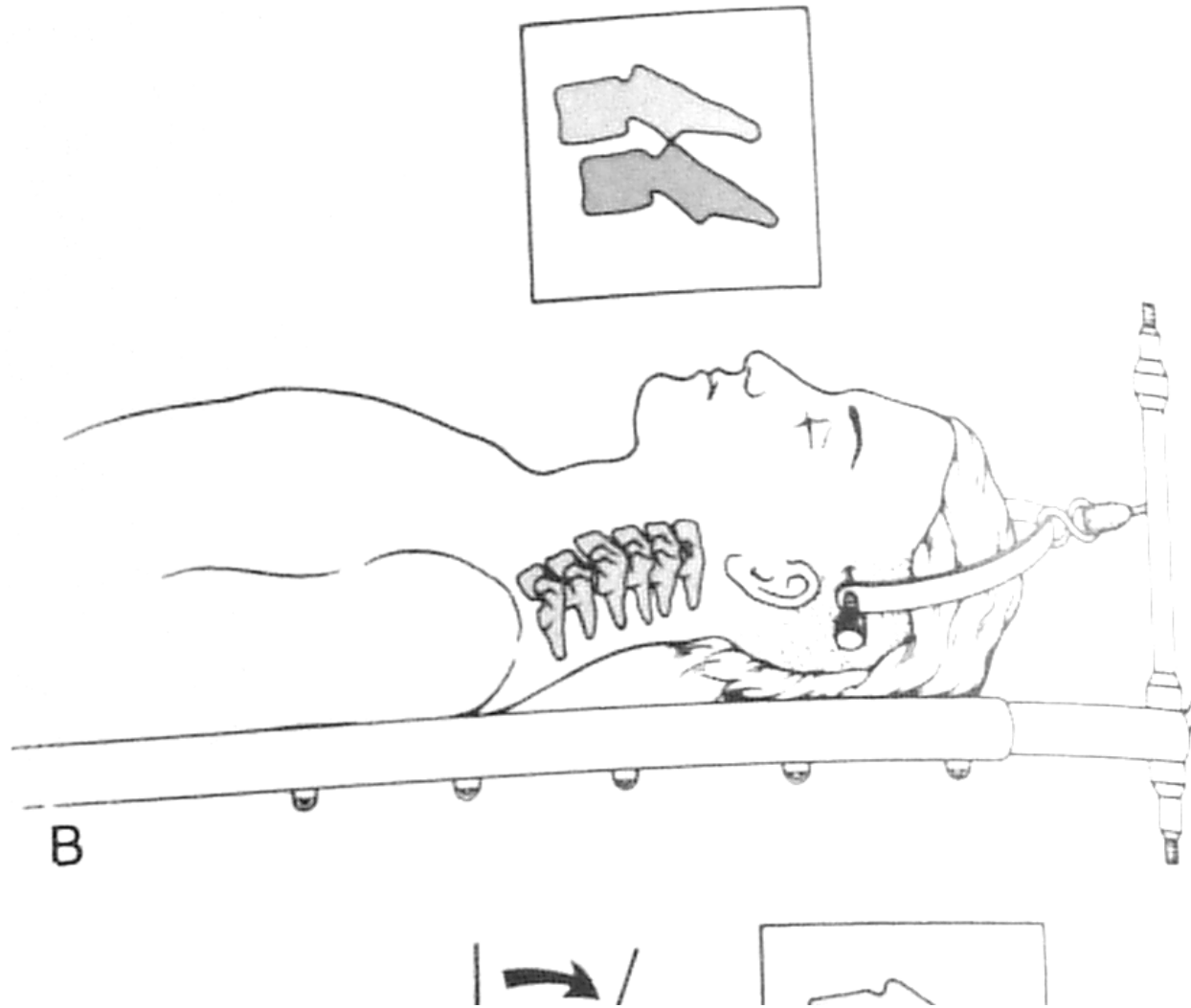


Facet Injuries

- Bilateral Facet Dislocations
 - Unstable injury
 - 40% have disc injury as well

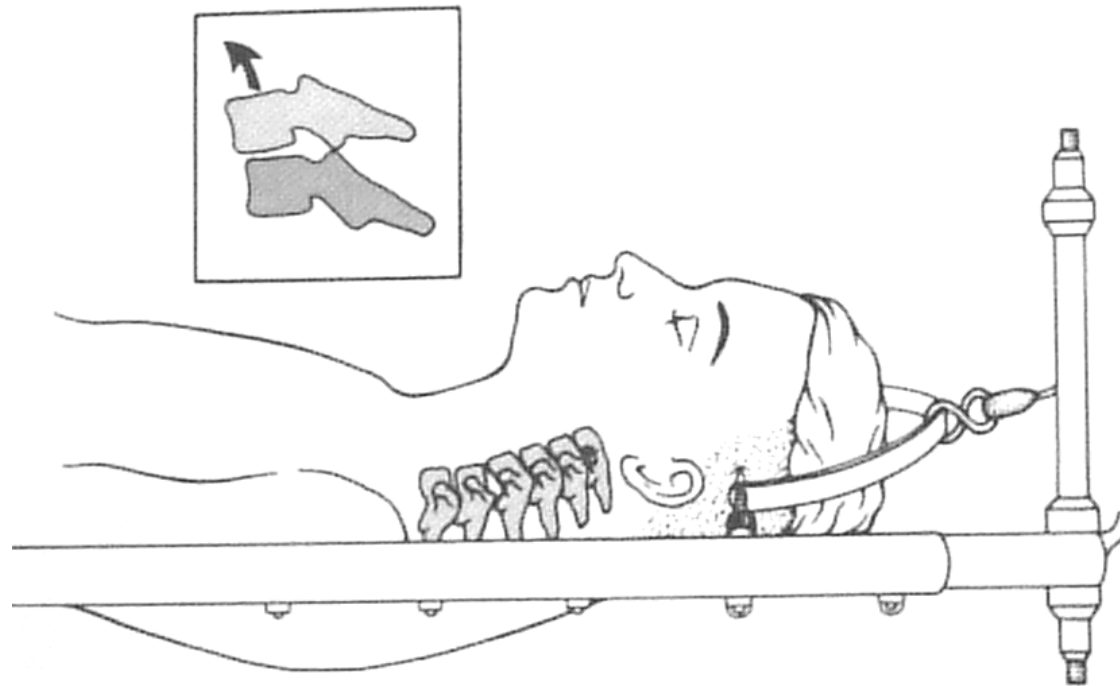






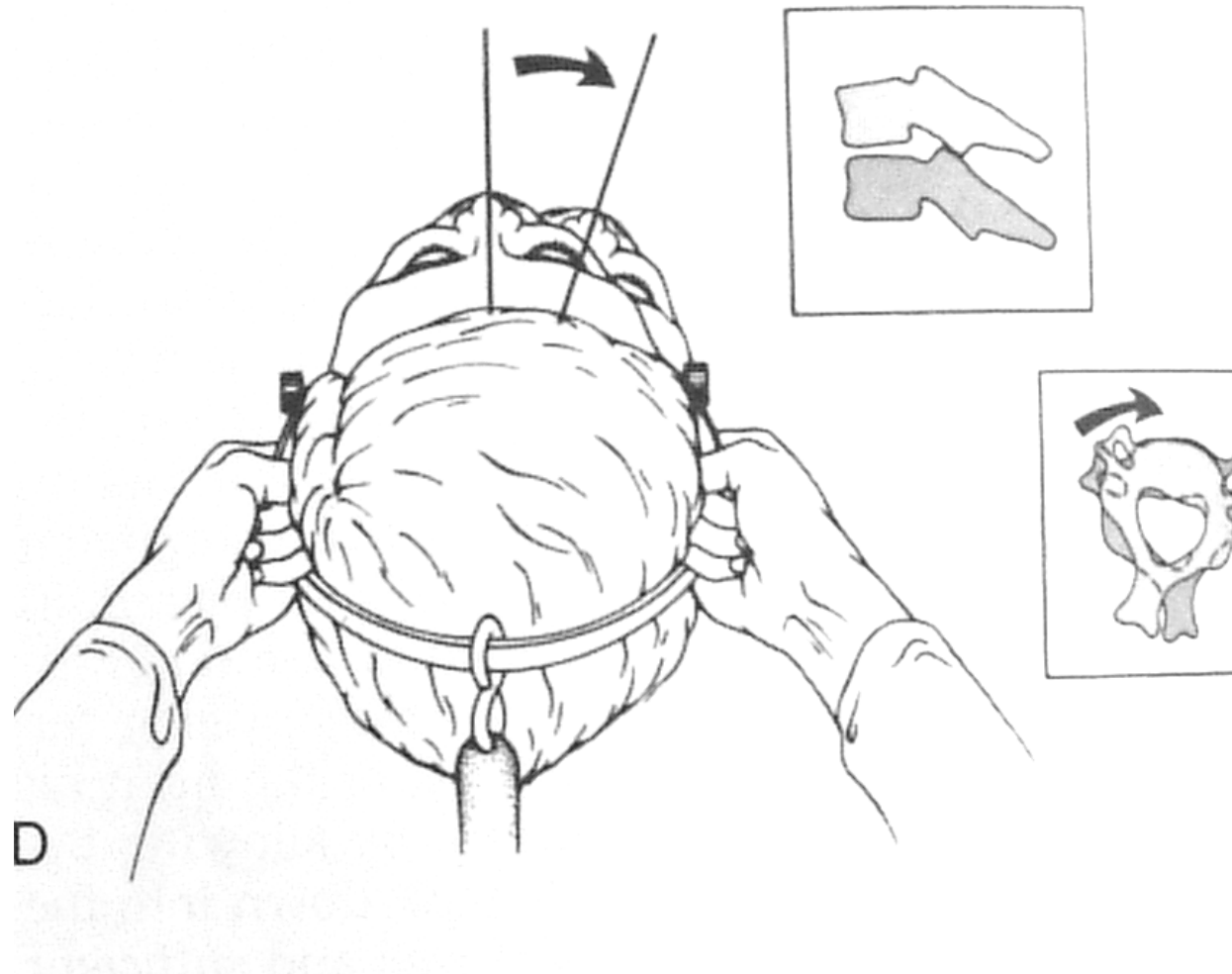
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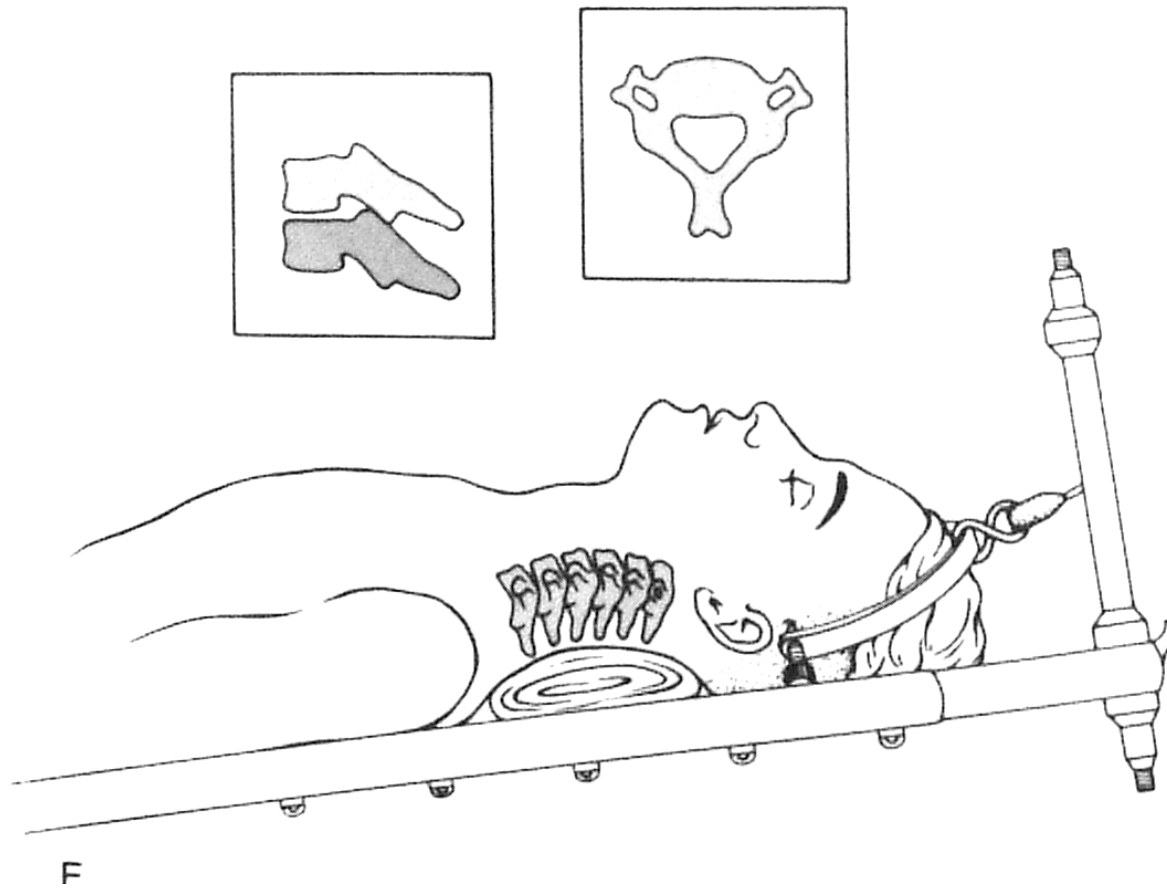
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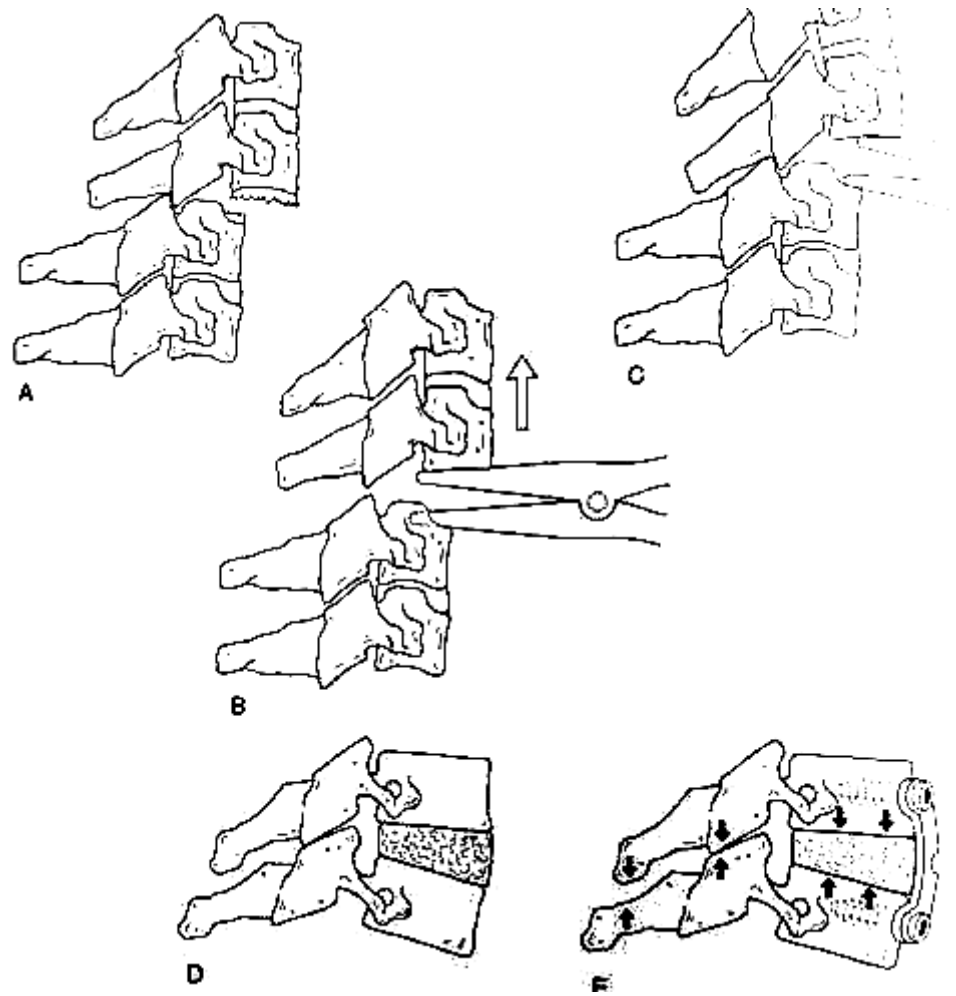
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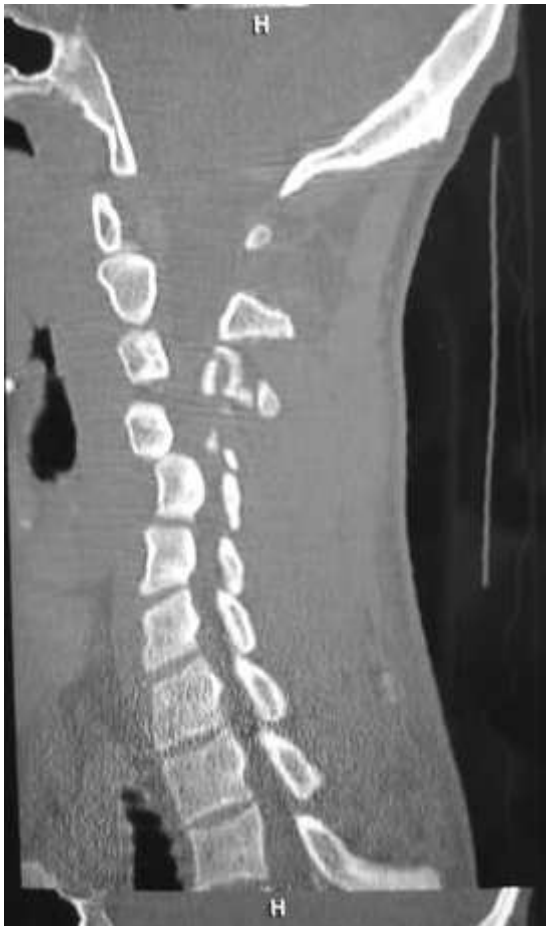
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Anterior Column Injuries

- Vertebral Body
Compression
Fractures
 - Normally stable but
can occur with
significant posterior
injury

Anterior Column Injuries

- Extension Teardrop Fractures
 - Benign avulsion # of the anteroinferior vertebral body
 - Need to exclude flexion teardrop



Anterior Column Injuries

- Burst Fractures
 - Varying degrees of posterior injury
 - Associated with interspinous widening and facet disruptions



Anterior Column Injuries

- Flexion Teardrop Fractures
 - High incidence of paralysis
 - Body # posterior displacement
 - Diving accident

