

Spine Trauma

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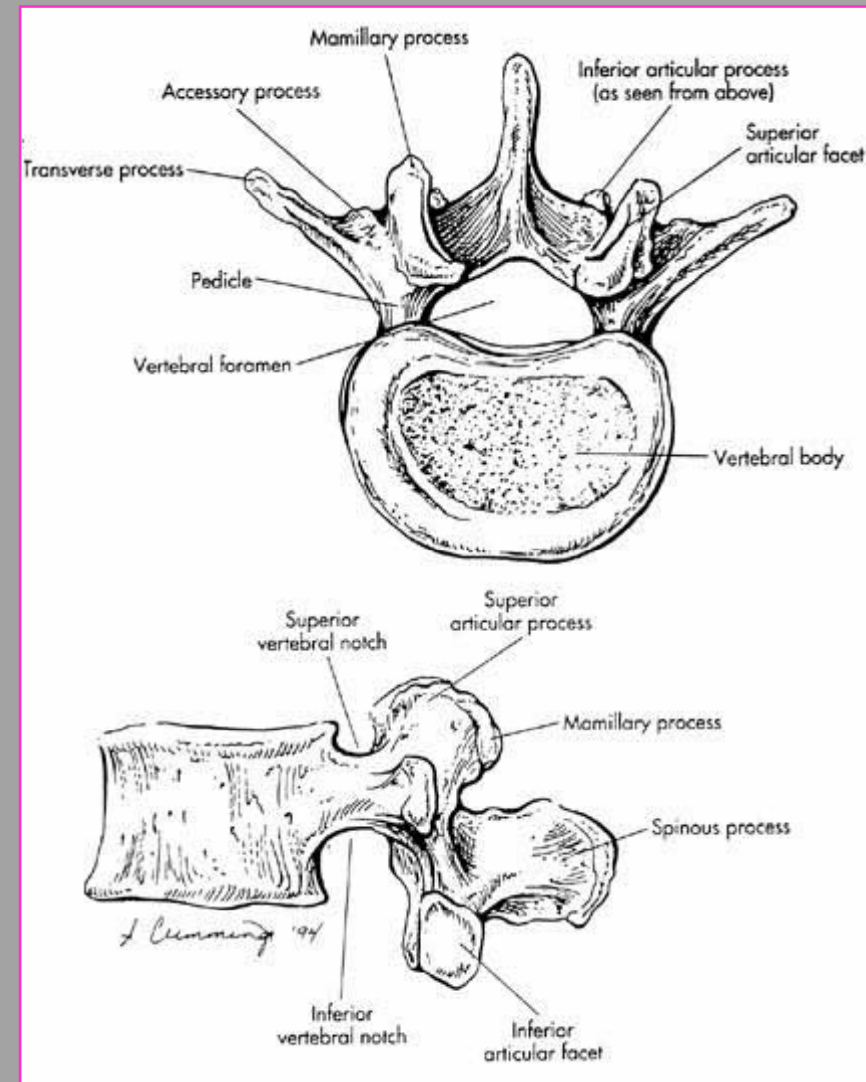
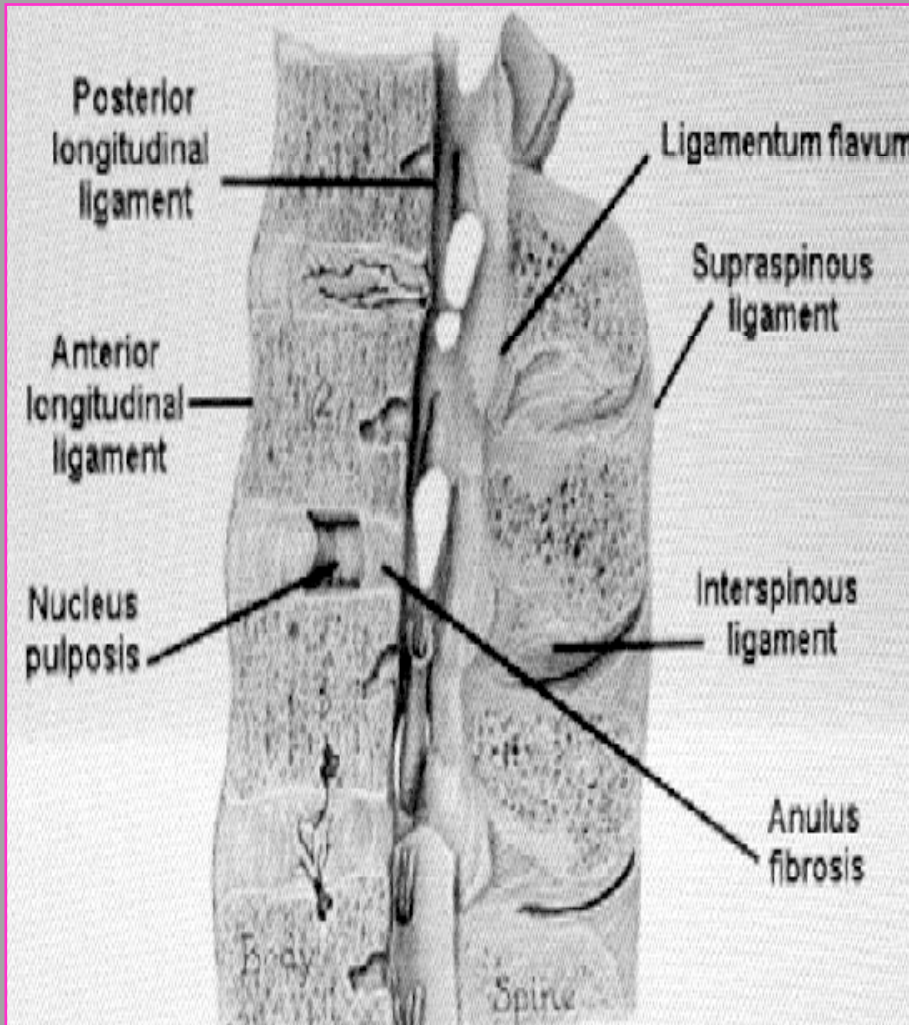
Professor of Orthopedics

University of Jordan

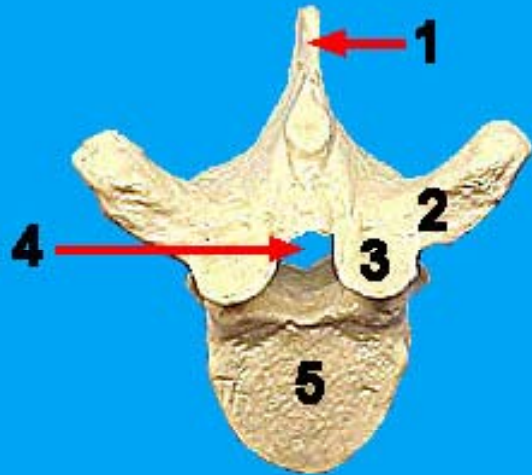
Anatomy of the Spine

Each vertebra articulates with adjacent vertebrae at three points

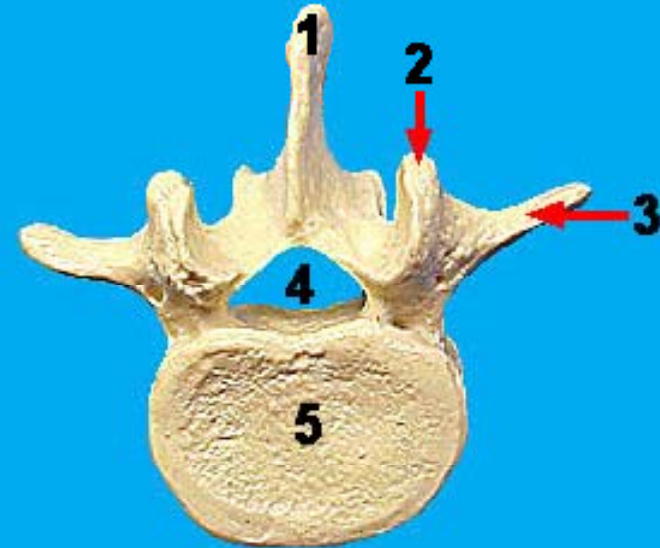
- 1- Intervertebral disk**
- 2- Paired facet joints posteriorly**



THORACIC VS LUMBAR



1. Spinous process
2. Transverse process
3. Sup. articular facet
4. Vertebral foramen
5. Body



1. Spinous process
2. Sup. Articular process
3. Transverse process
4. Vertebral foramen
5. Body

The Thoracolumbar Junction

Vulnerability to injury

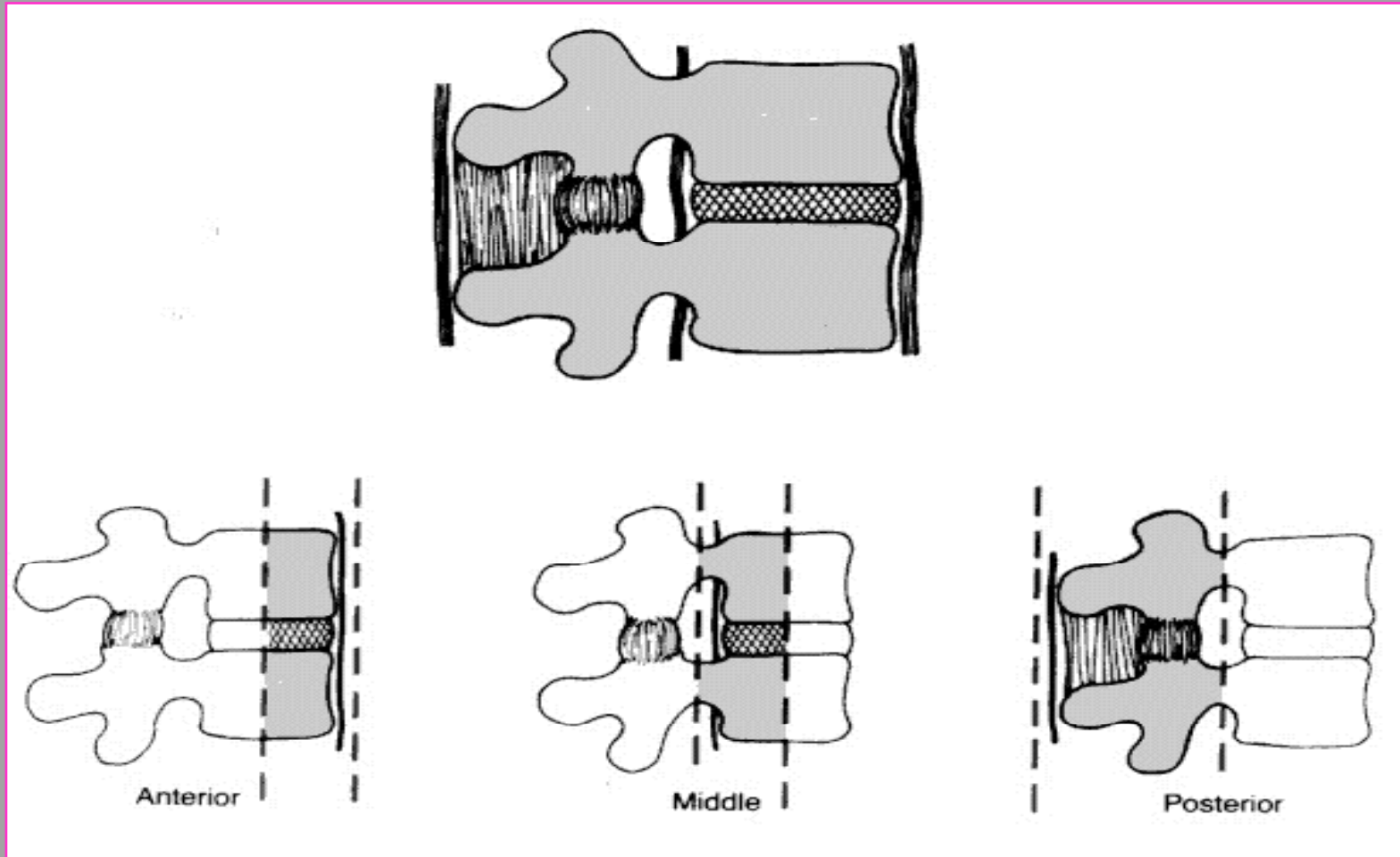
- 1-Alignment changes from kyphotic curvature to a lordotic alignment**
- 2-Lumbar spine segments are more mobile and less stable.**

1-No ribs to provide additional stability

2-Changing orientation of facet joints

→ facets assume an oblique orientation in upper lumbar spine and a sagittal orientation at the L.sacral junction

Denis 3 Column Concept



Denis 3 Column Concept

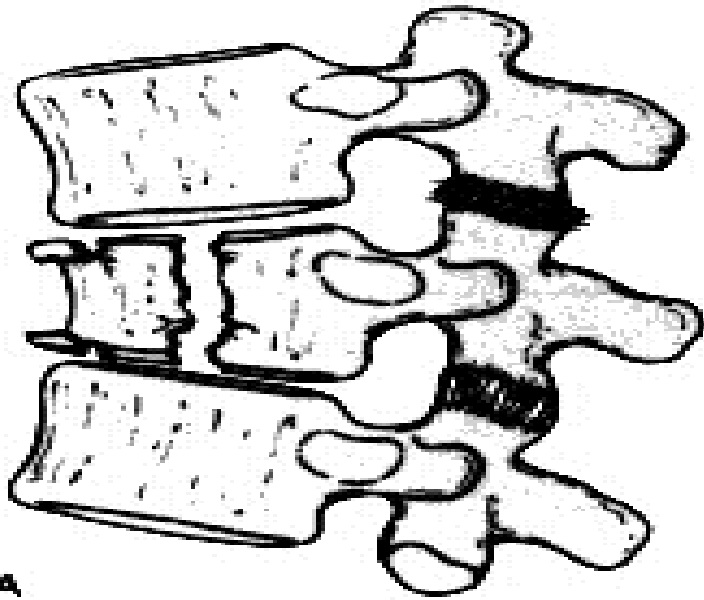
Determines fracture severity and predicts stability.

- * **Fractures involving only the ant. columns → stable**
- * **Fractures that additionally involve the middle or all three columns → unstable.**

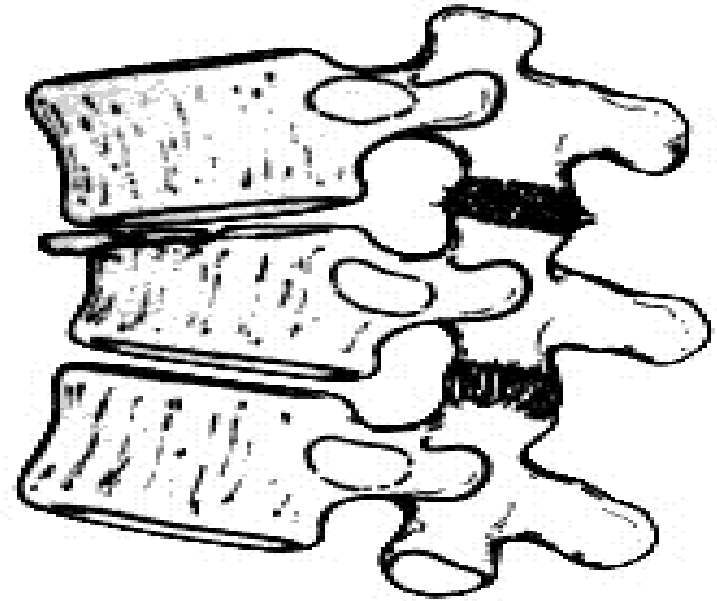
Th. Lumbar Spine Fractures

According to mech. of inj. & columns

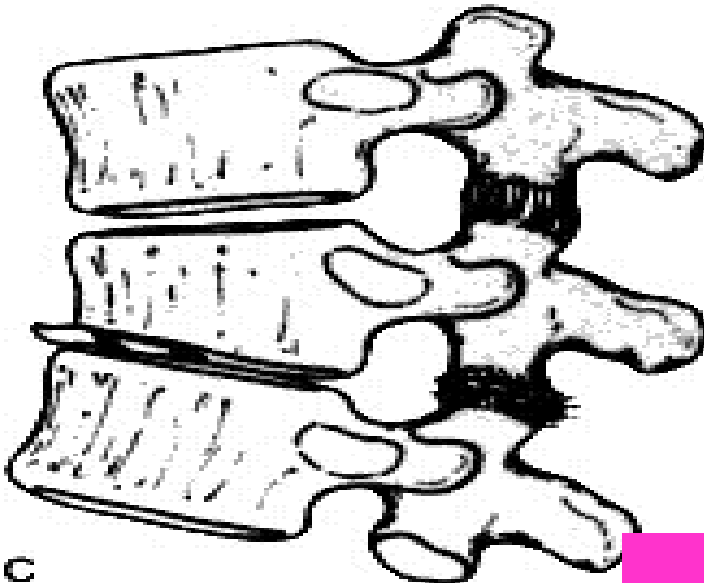
*1-Flexion → Compression →
ant. column #*



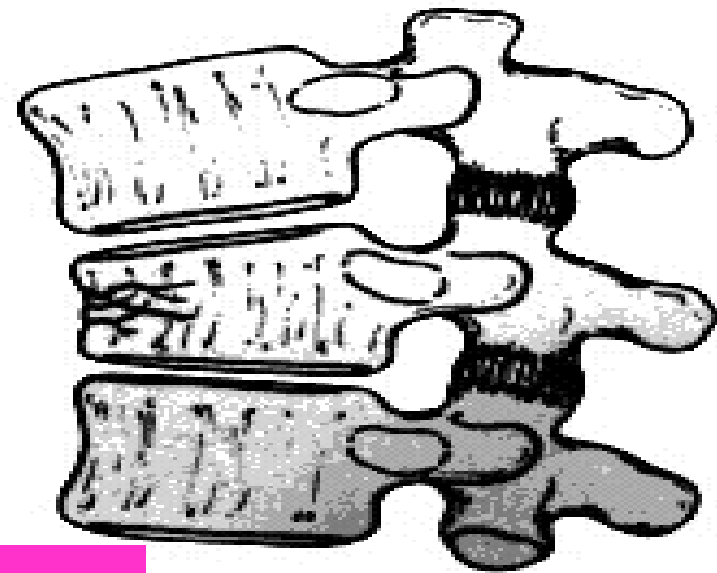
A



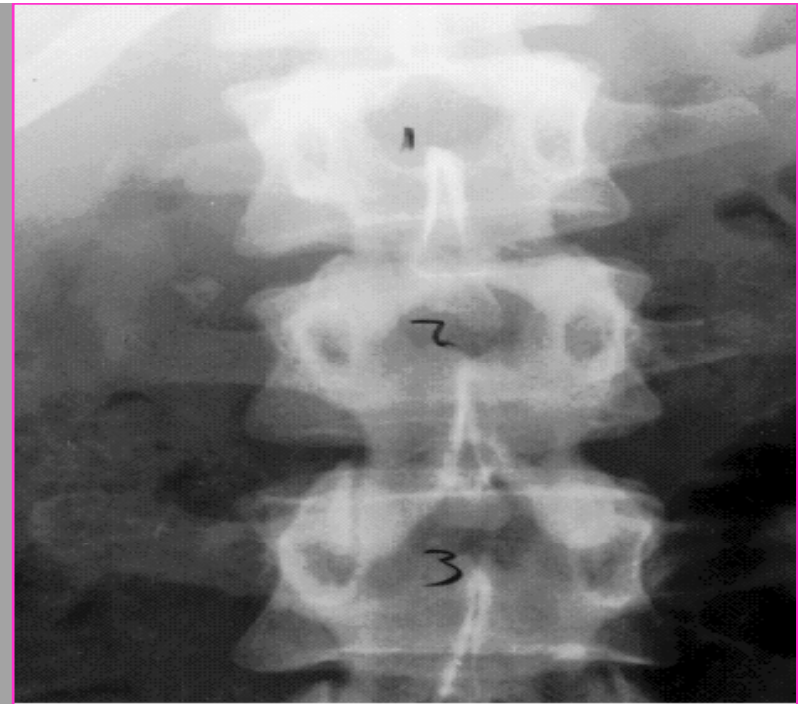
B



C



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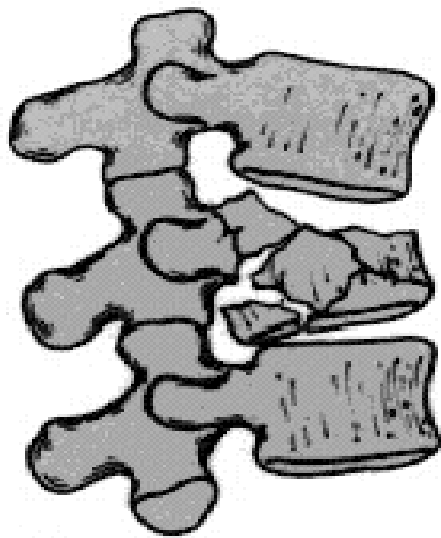


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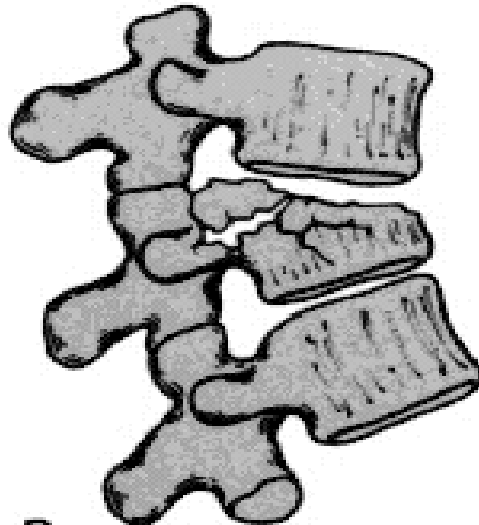
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***2-Hyperflexion & axial loading
of a vertebra → Burst Fracture***

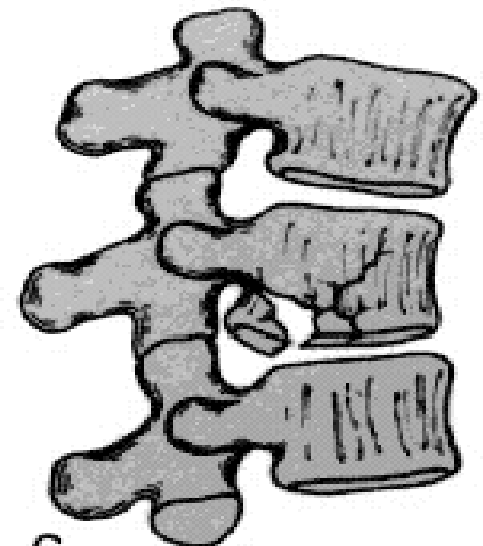
→ Ant. & Middle columns



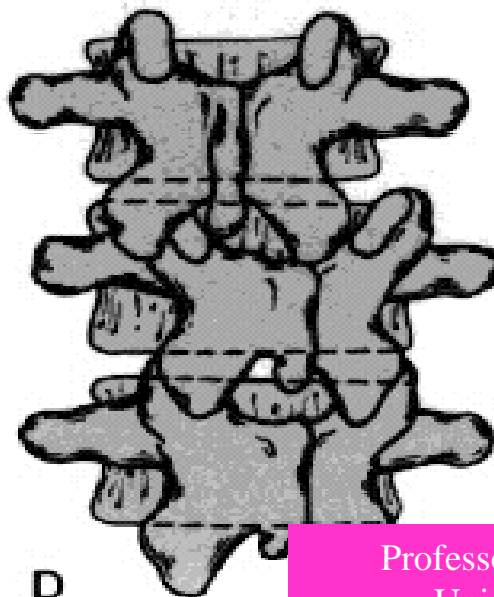
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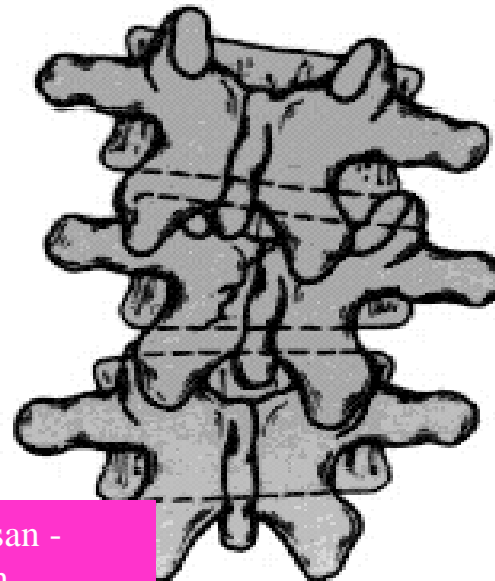
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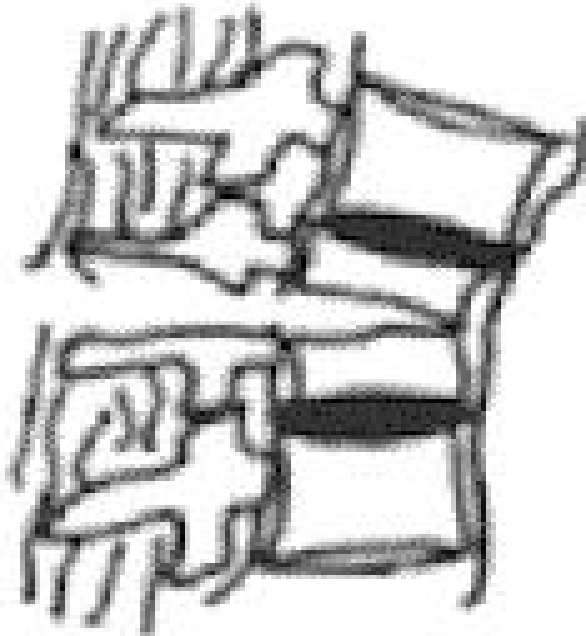


D



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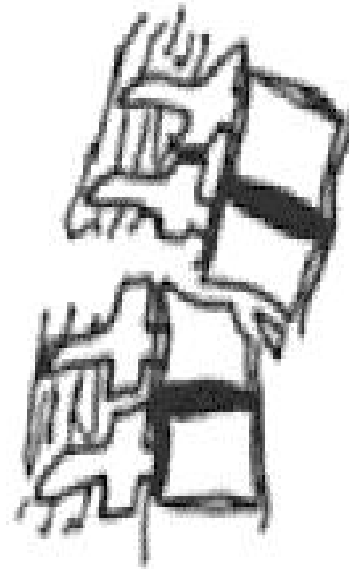
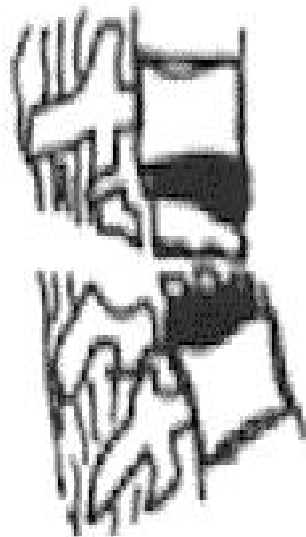
3-Flexion – Distraction (Seat Belt Inj.)
→ MIDDLE AND POST. COLUMNS



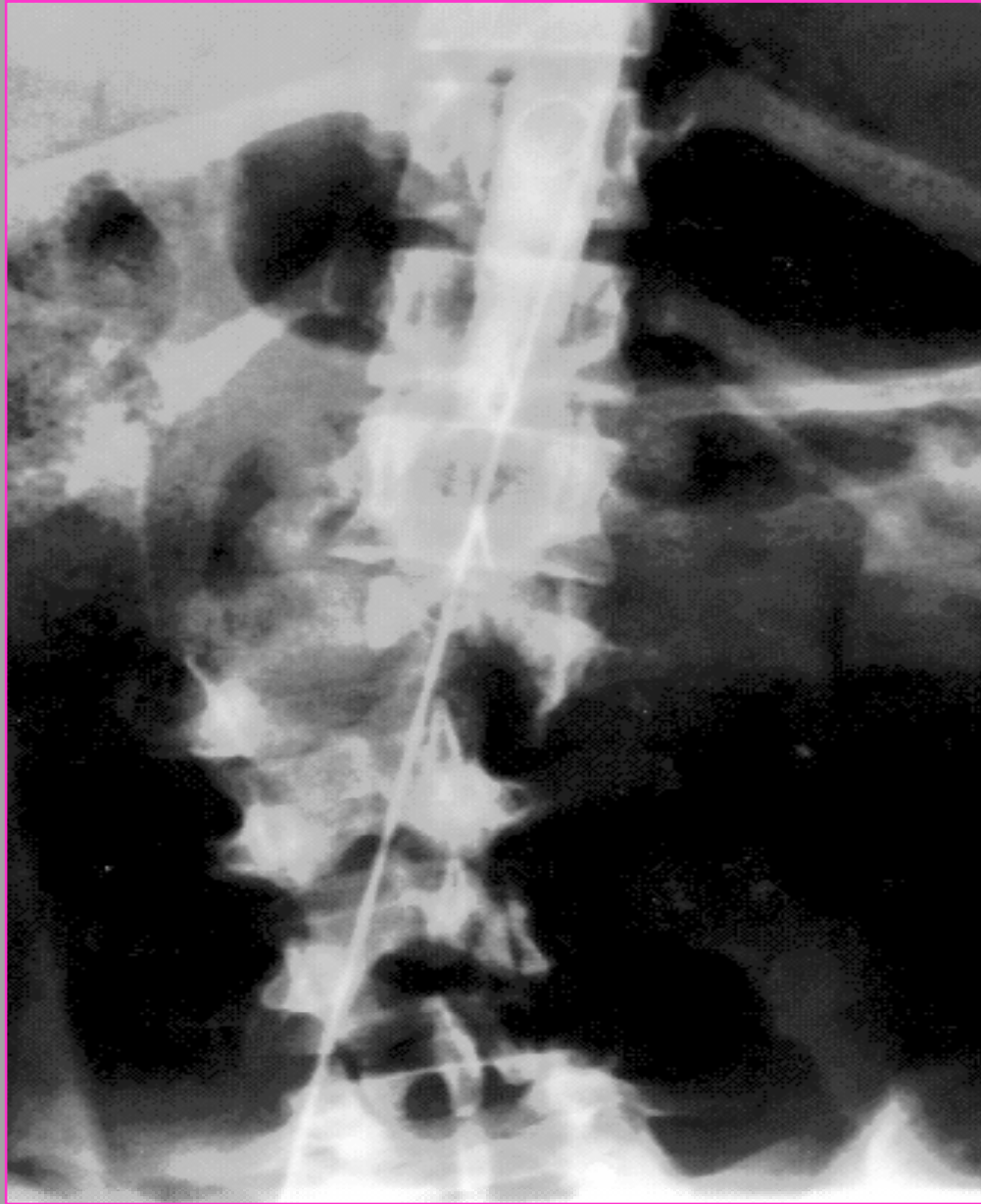
Chance Fracture

4-Fracture-Dislocation

**Multiple forces are involved:-
Rotation, Distraction, Compression,
and Shear.**



Flexion Distraction



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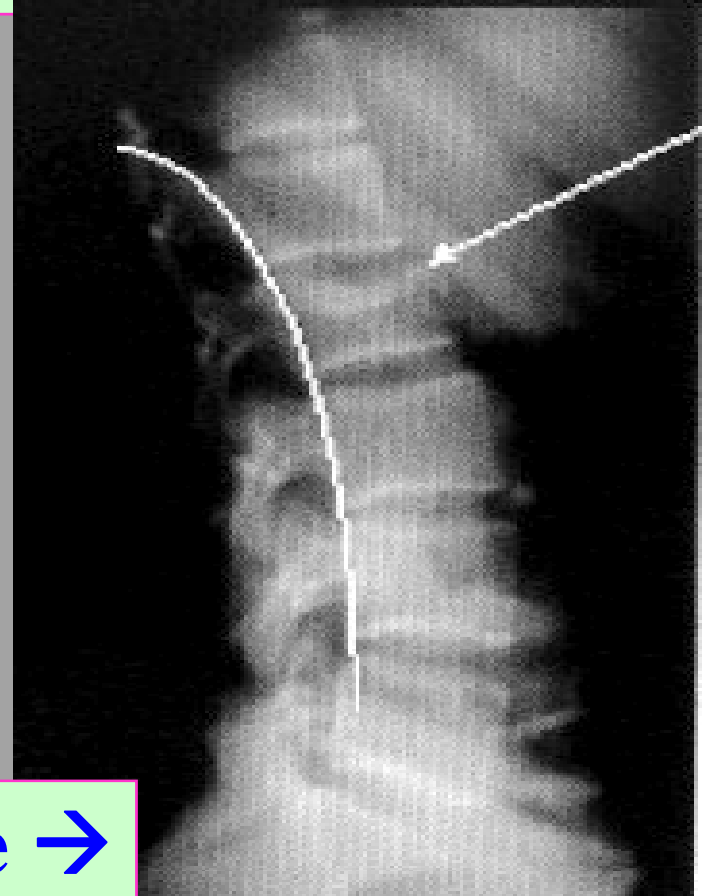
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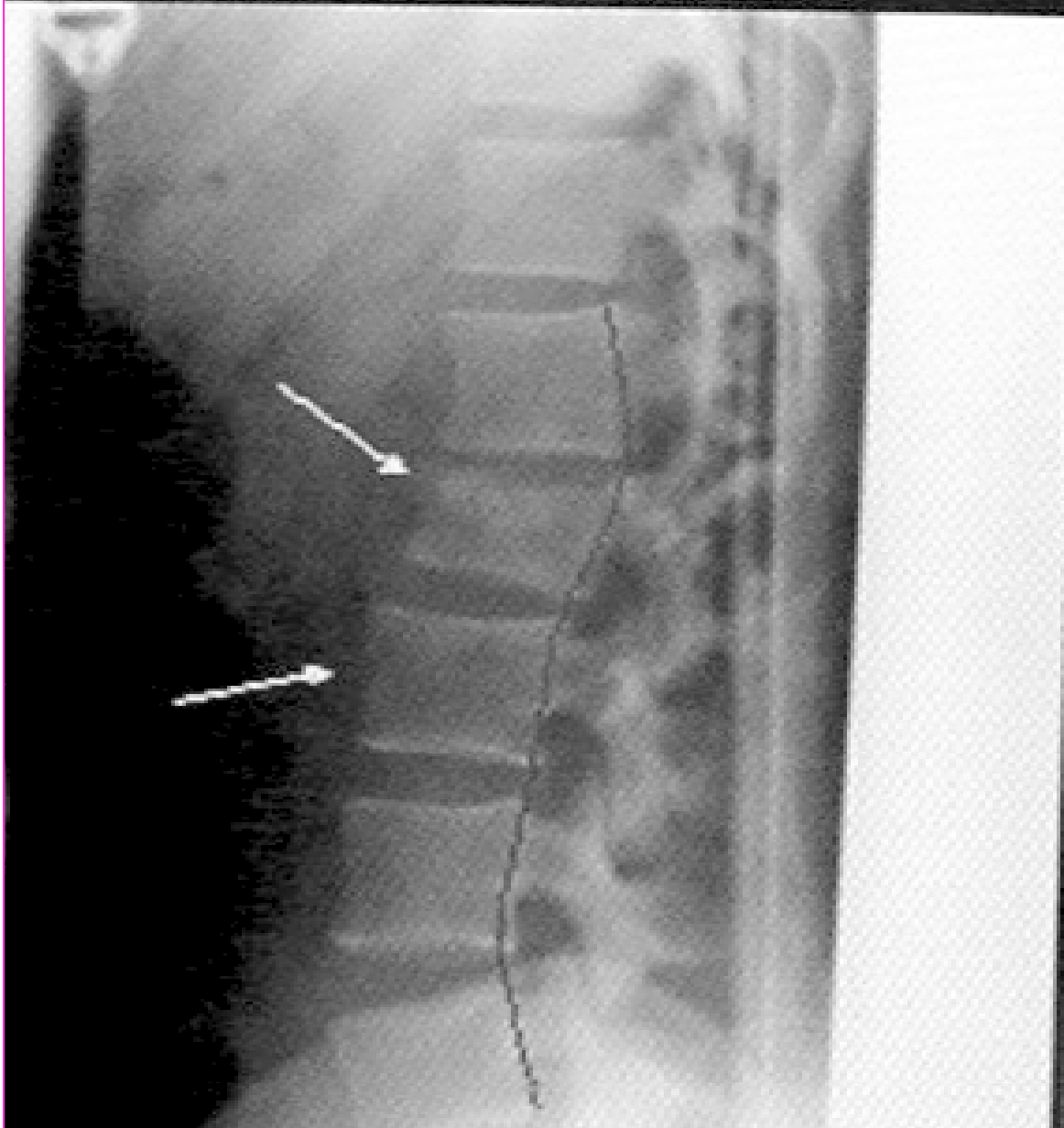
Compression fracture

- **Most common 58%**
- **Only ant. column**
- **Stable**
- **No neurological deficit**

**Look at the post vertebral line →
mild convex anteriorly**



LATERAL L-SPINE



→ Compression
Fracture?
Think twice
Order CT

→ L3
Teardrop
fracture

Mangement

1-Short period of bed rest .

**2-Early ambulation is encouraged in
a hyperextension orthosis.**

**3-loss of $> 50\%$ of vertebral body height,
angulation > 20 degrees, or multiple
compression # \rightarrow open reduction and
internal fixation**

Burst Fractures

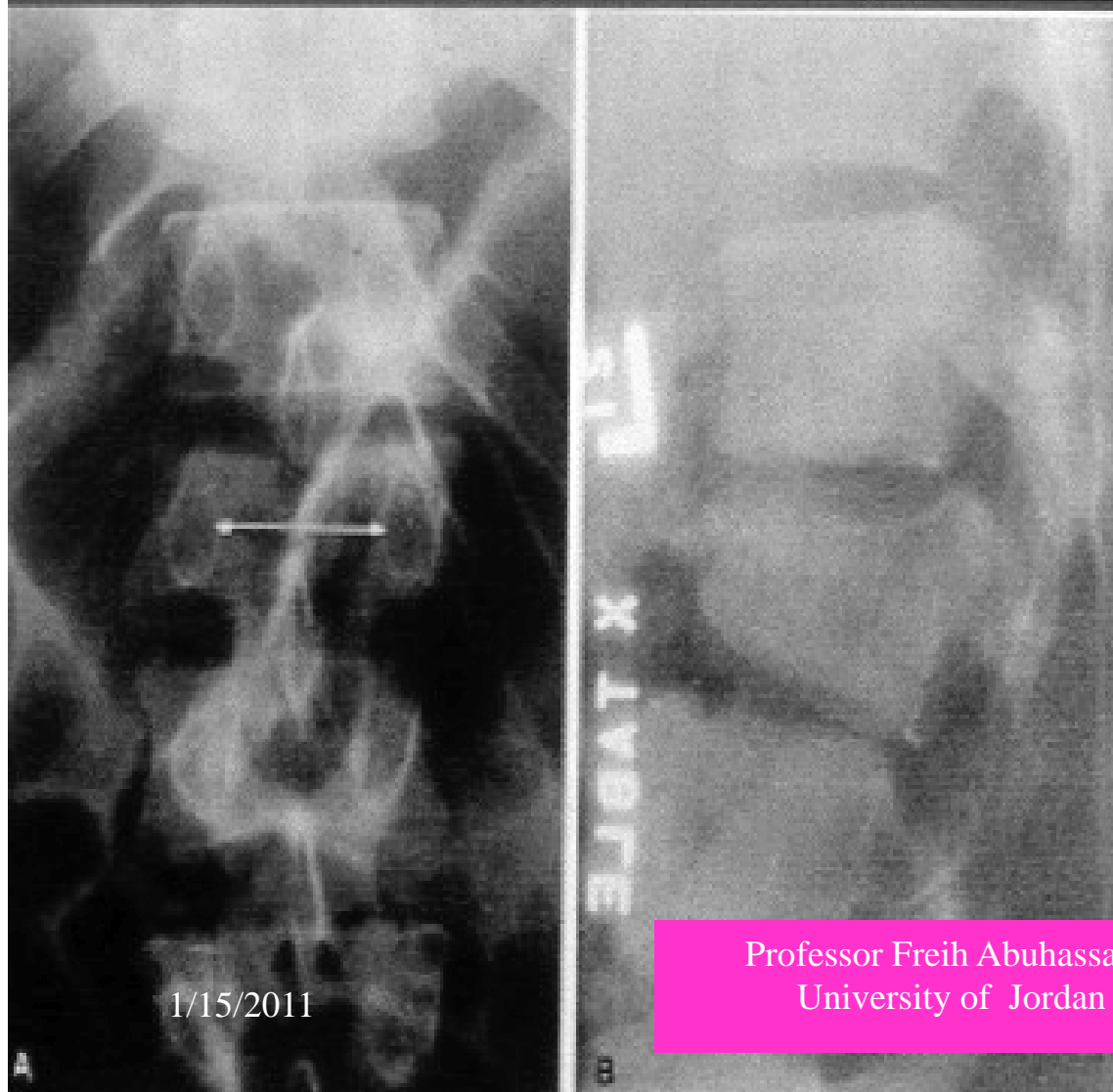
1- 17% of major spinal fractures

2- 50% → neurological problems

3-Compressed disk herniates into the vertebral body

4-Unstable

Radiology of Burst Fractures



PLAIN FILMS

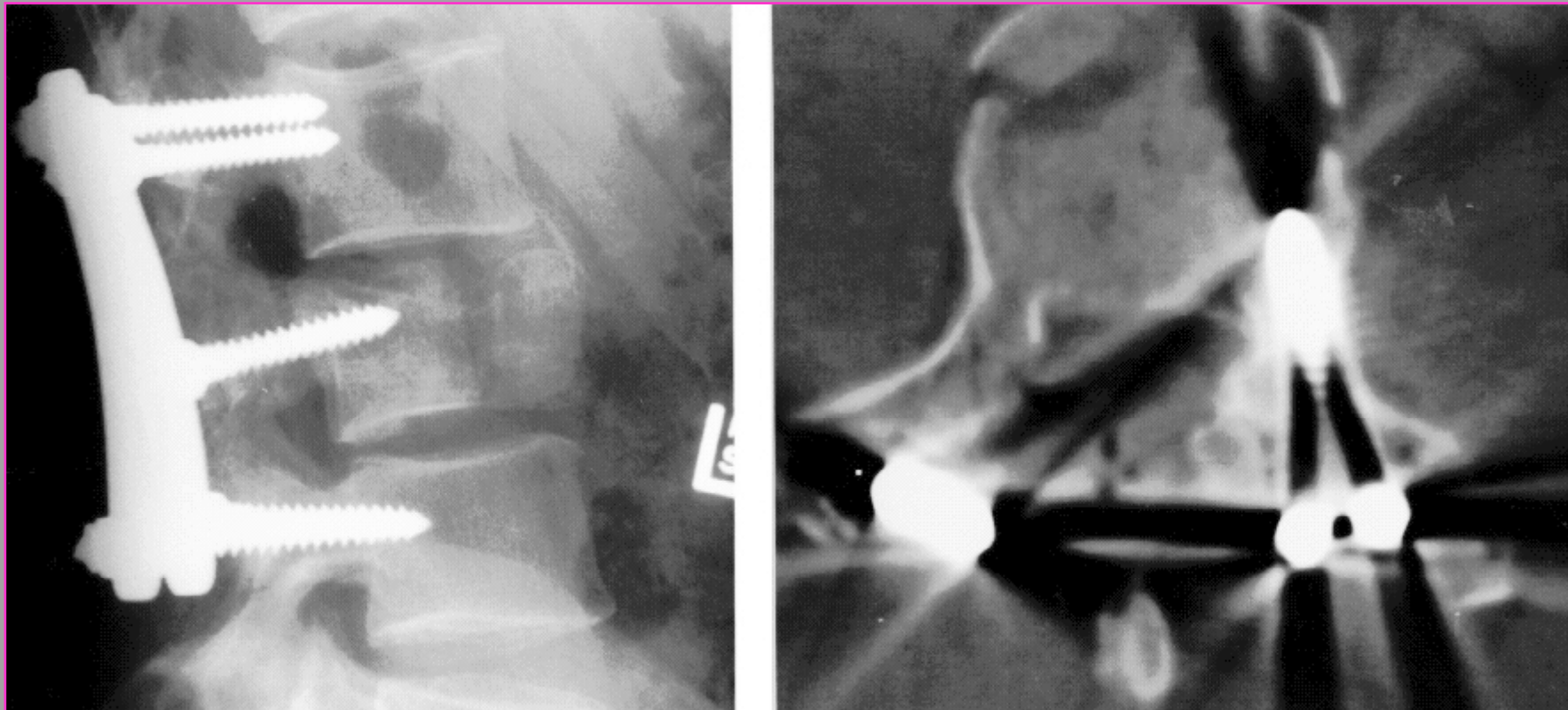
- AP Vertebral Body height ↓
- If severe:
 - Posterior column fractures
 - widening of interpedicular distance

Every Burst fracture should be examined closely for evidence of a retropulsed fragment !!!!!





Needs surgical stabilization



Seat Belt Injuries

- 1- 6% of Major Spinal Fractures
- 2- Lig. & Bony Injuries: Chance #
- 3- Unstable

Chance fracture that involves the upper half of the spinous process and extends anteriorly through the pedicles to emerge on the superior aspect of the vertebral body

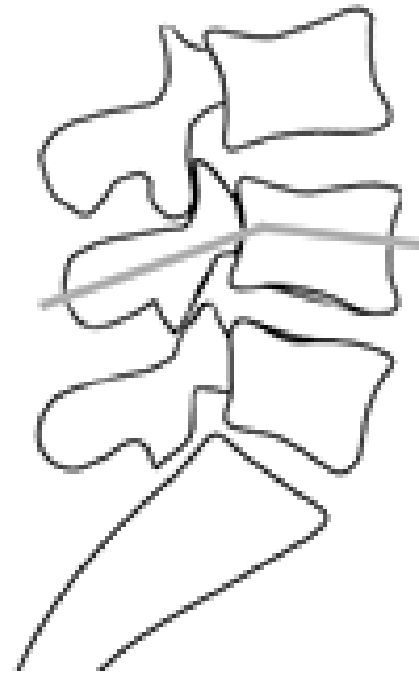
Seat-belt Injuries



**posterior
ligamentous
disruption**



**Chance
fracture-
dislocation**

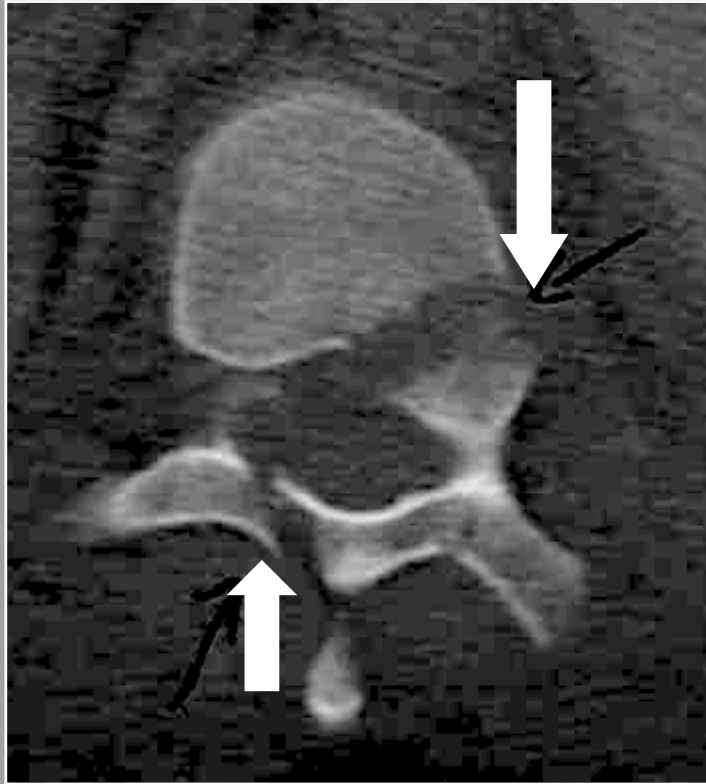


**horizontal
fissure
fracture**

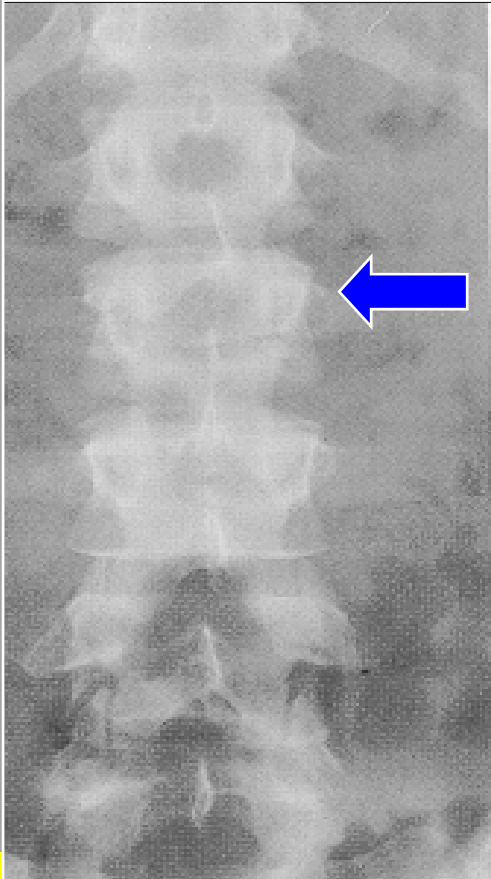


**Smith
fracture-
dislocation**

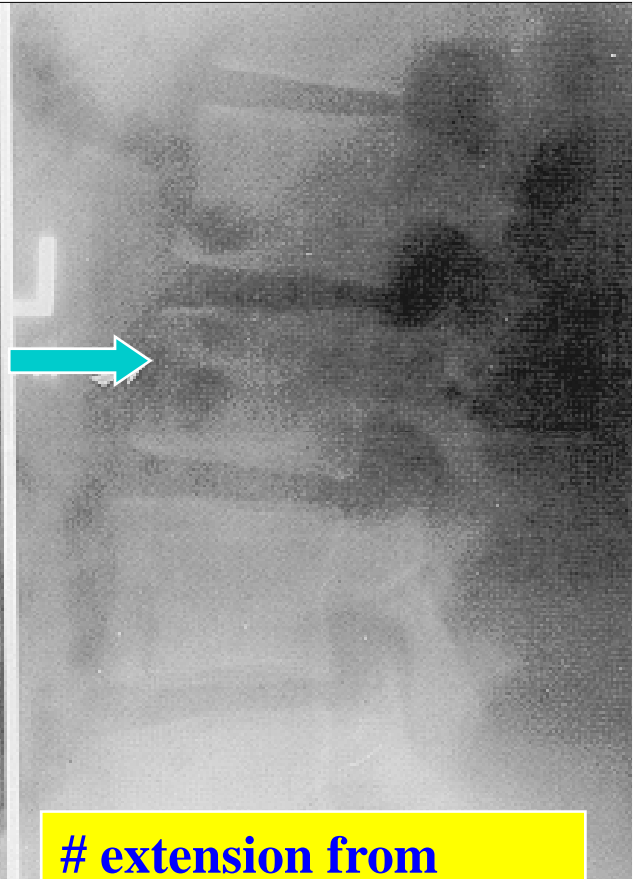
Chance Fractures



Fracture can extend through the pedicles into posterior elements



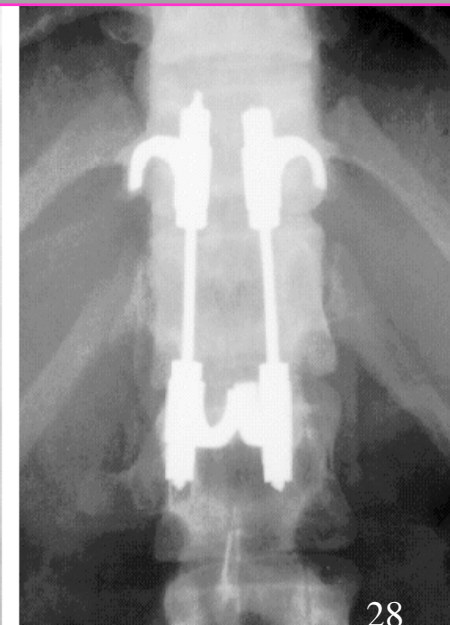
involvement of pedicles & lamina



extension from posterior elements into vertebral body with buckle in anterior cortex

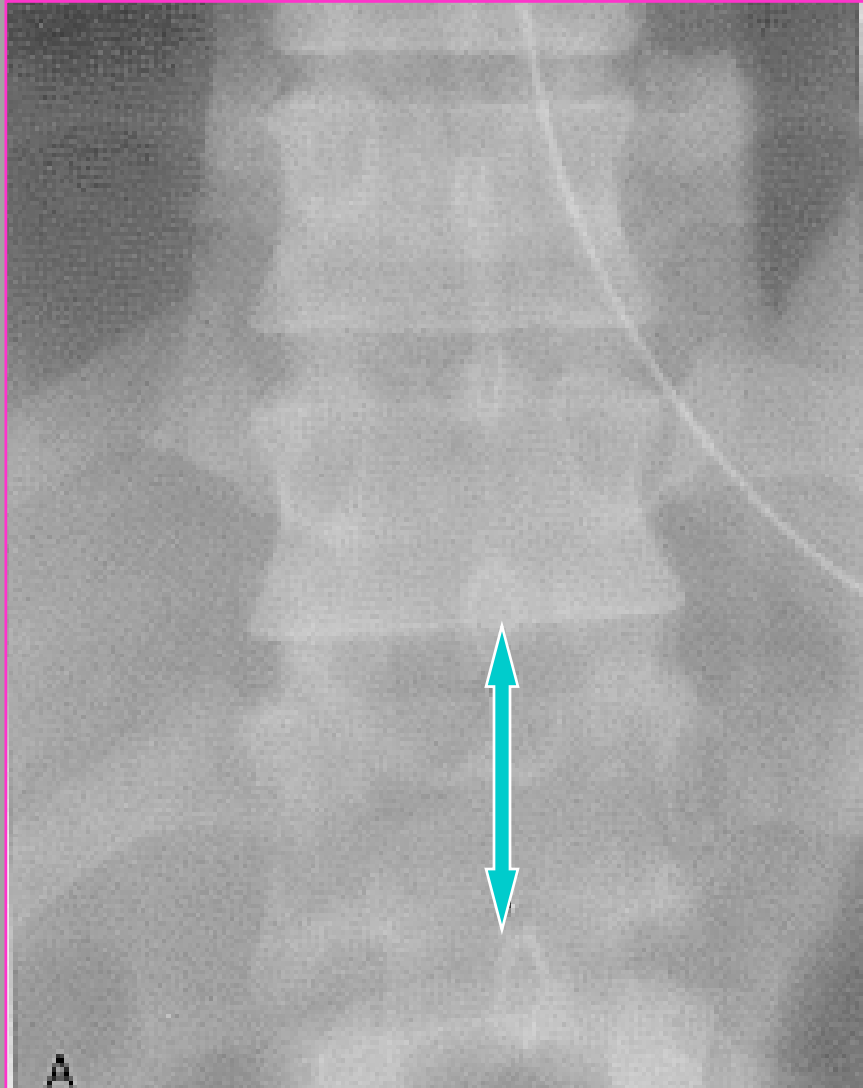
1-When these injuries occur entirely through bone → hyperextension cast.

2-When the posterior and middle columns fail by ligamentous disruption → posterior spinal arthrodesis

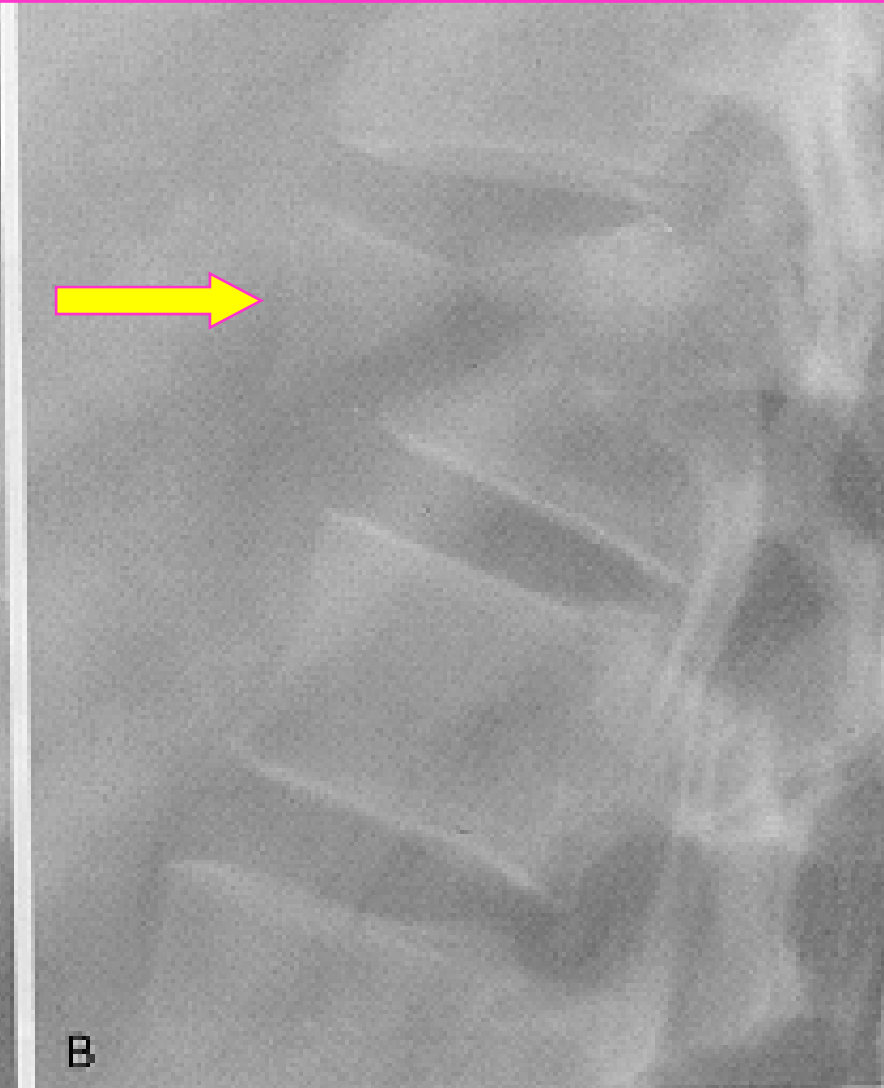


Fracture Dislocations

- **19% of Major Fractures**
- = **Ant. & cranial displacement of sup. vertebral body**
- = **Failure of all 3 COLUMNS!**
- = **Higher incidence of neurologic deficit**

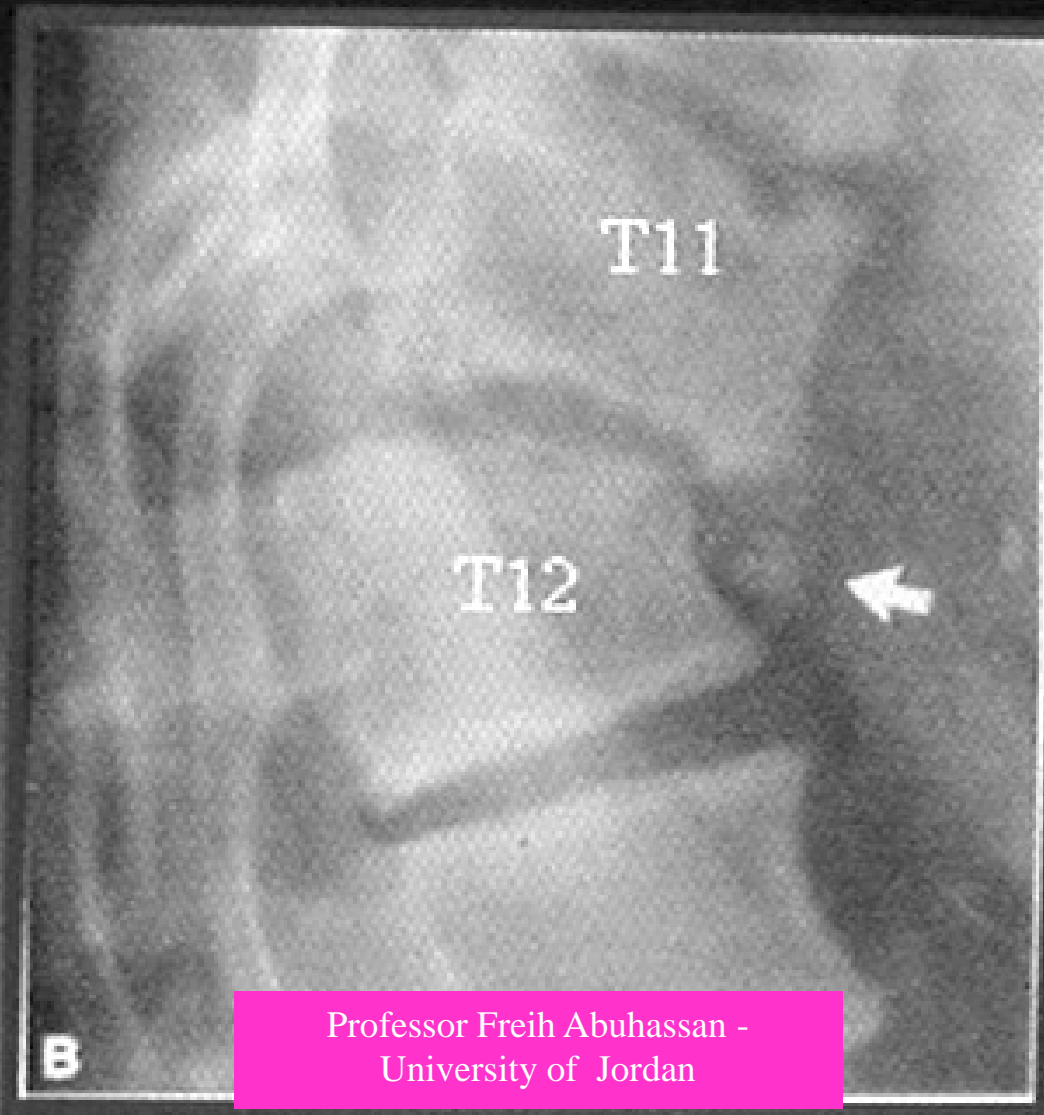


Wide interspinous distance



Anterior translation

Fracture Dislocation of T11-T12



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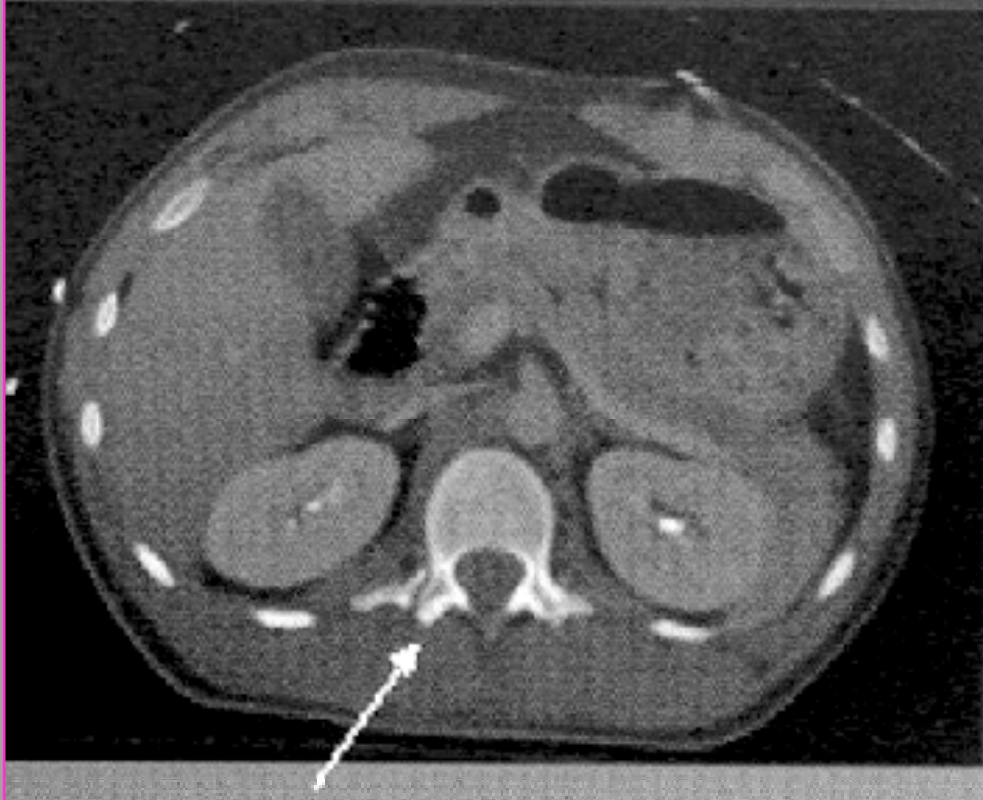
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Posterior stabilization

Transverse Process Fractures

There is frequent association with intraabdominal(particularly renal) injuries and pelvic disruption.

Transverse Process Fracture at L1



→
nondisplaced
fracture through
the right transverse
process.

Extension Injuries

**= Ant. vertebral body avulsion #,
= # of the spinous processes, lamina,
occasionally, the pedicles.
These fractures are usually stable.**

**Flexion cast or orthosis for a period
of up to 12 weeks**

The primary goals in managing these injuries

- 1-Preservation of life**
- 2-Protection of neurologic function**
- 3-Minimization of the risk of further spinal column or neurologic injury**
- 4-Maintenance or restoration of spinal stability and alignment.**



انقران الكريم (٥٥): سورة الرحمن

﴿٣٦﴾ فَإِذَا أَنْشَقَّتِ السَّمَاءُ فَكَانَتْ وَرْدَةً كَالدِّهَانِ ﴿٣٧﴾ فَبِأَيِّ آلَاءِ رَبِّكُمَا تُكَذِّبَانِ ﴿٣٨﴾

Quran (55): Surat ar-Rahman

37. When the sky is torn apart, so it was (like) a red rose, like ointment

38. Then which of the favours of your Lord will you deny ?