# Thoracolumbar Trauma

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Spine Term
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- Summary

# Introduction

- Male > Female
- Force
- Transitional anatomy
- T11 – L1 (52%)
- L1 – L5 (32%)
- T1 – T10 (16%)
- Associated injuries

Gertzbein SD. *Spine*. 1992 May;17(5):528-40.

# Initial Management

- ATLS
- Log Roll
- 2 Survey
- Boggy swellings, Bruising etc.
- Associated Injuries
- Full Neurological Examination
- Complete or incomplete SCI

# Initial Management

- X-ray Trauma Series
- Full Thoracolumbar AP & Lateral Films
- Steroids?
- DVT Prophylaxis
- Contact Local Spinal Team Early

# Imaging

| Modality | Advantages | Disadvantages |
|---|---|---|
| Plain Radiographs | Inexpensive<br>Quick | Poor views of middle spinal column disruption & canal involvement |
| CT | Bony anatomy<br>Middle spinal column<br>Canal shape and patency | Poor for soft tissues |
| MRI | Soft Tissues<br>Disc, Ligaments & Spinal cord | Poor detailed bony anatomy |

# Imaging

- Contiguous and Non-contiguous Fractures
- Plain Radiographs of C/T/L/S Spine

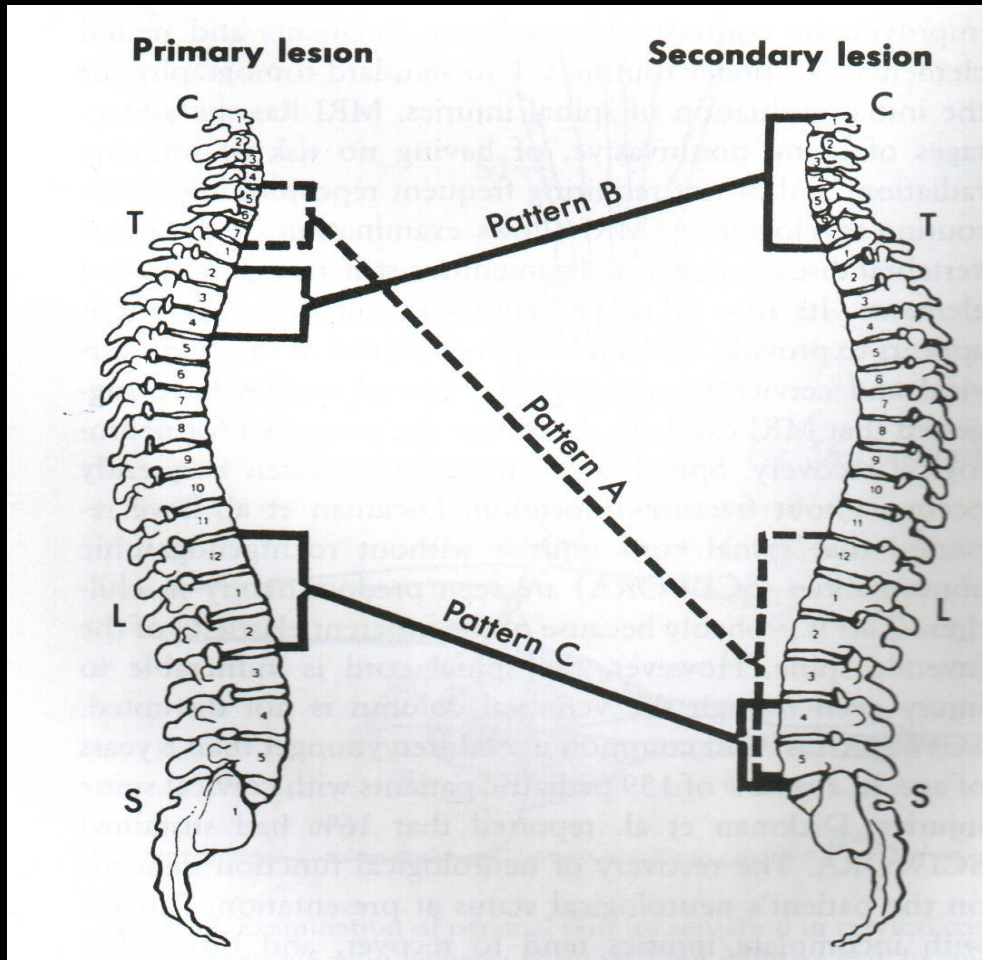
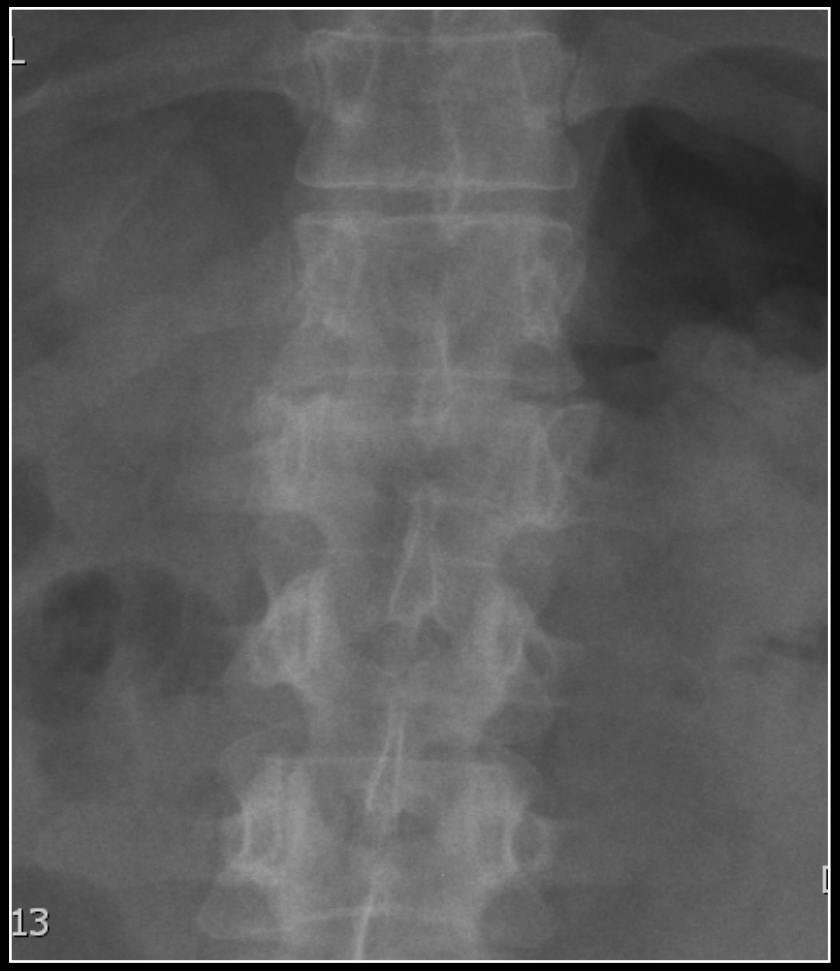
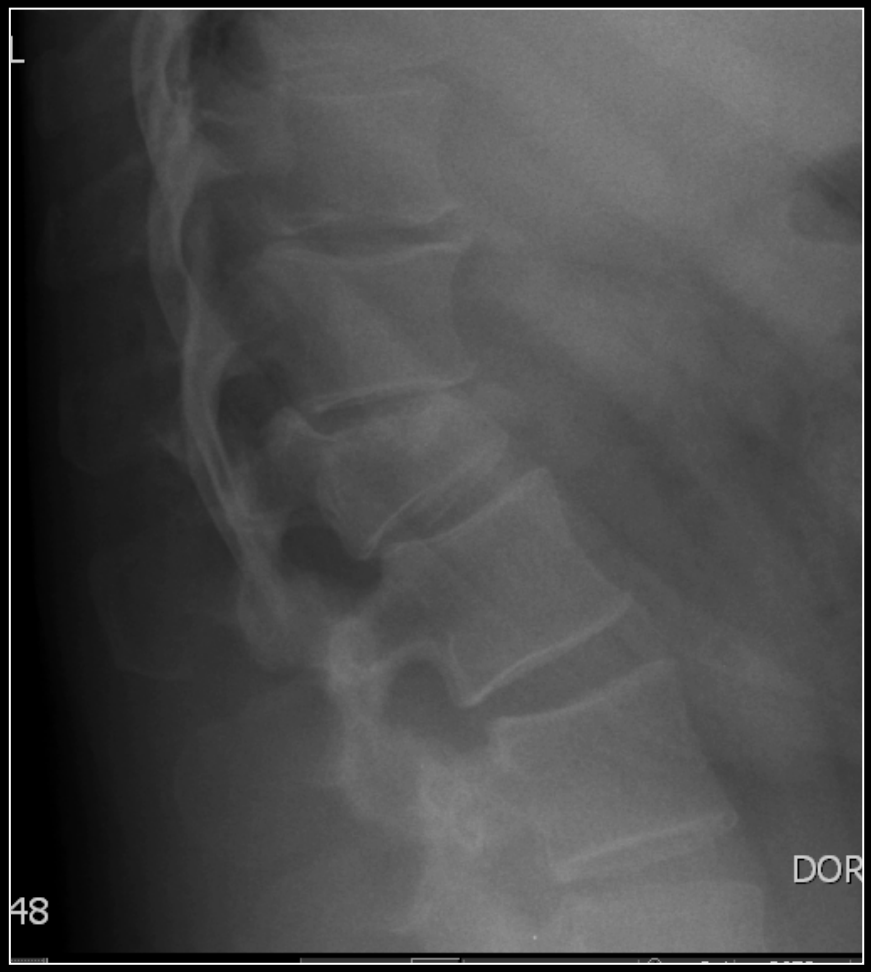



*Fig. 56-6* Three patterns of multiple-level injury described by Cale noff et al. (see text). (From Calenoff L, Chessare JW, Rogers LF, et al *Am J Roentgenol* 130:665, 1978.)

# Imaging - X-rays



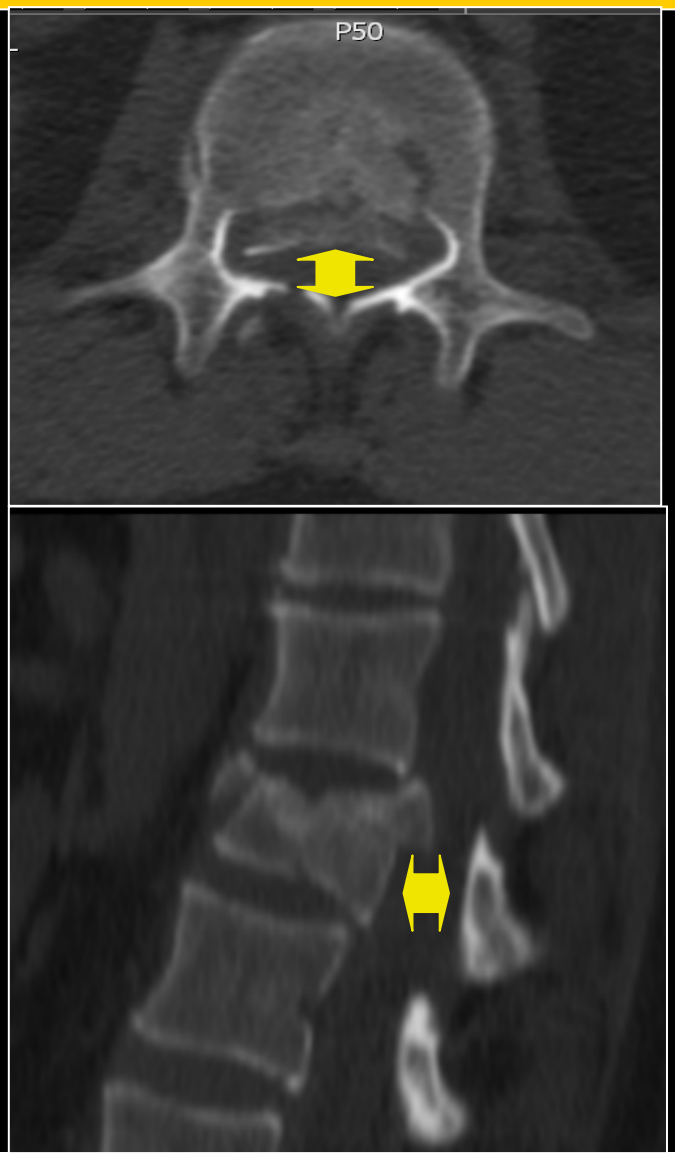



# Imaging - X-rays

- Weight Baring Views
- Stability
- Guide Treatment
- Supine x-rays

# Imaging: CT

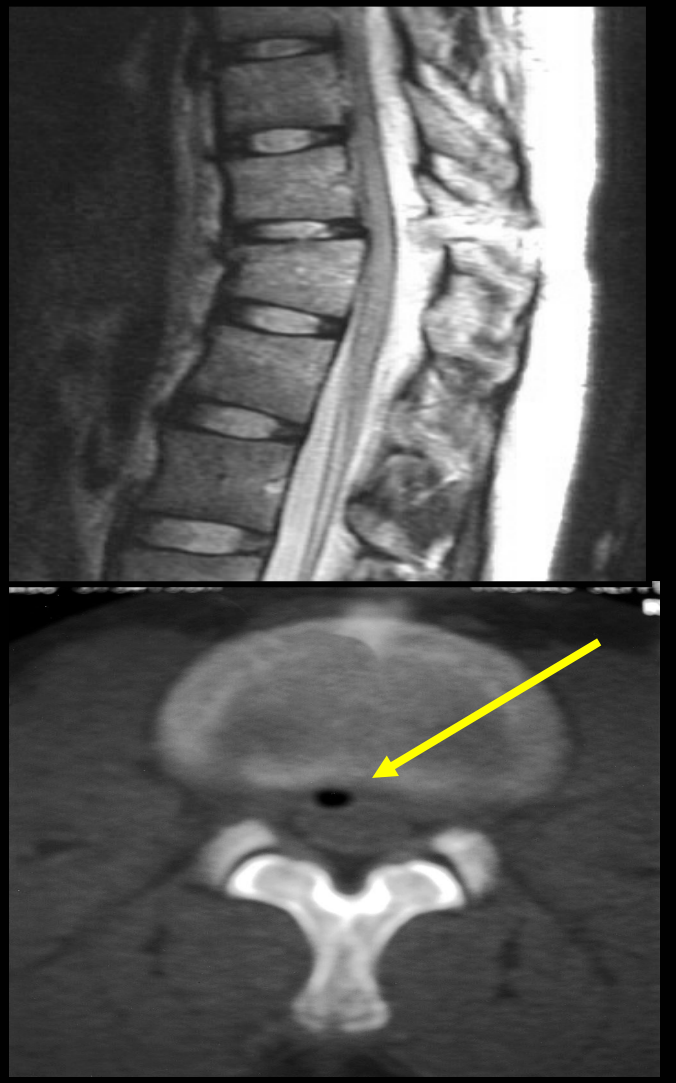
- Axial Fine cuts
- Reconstructions
- Fracture Pattern
- Degree of canal compromise




Vaccaro et al. Spine 2001. 26: 371-6

# Imaging: MRI

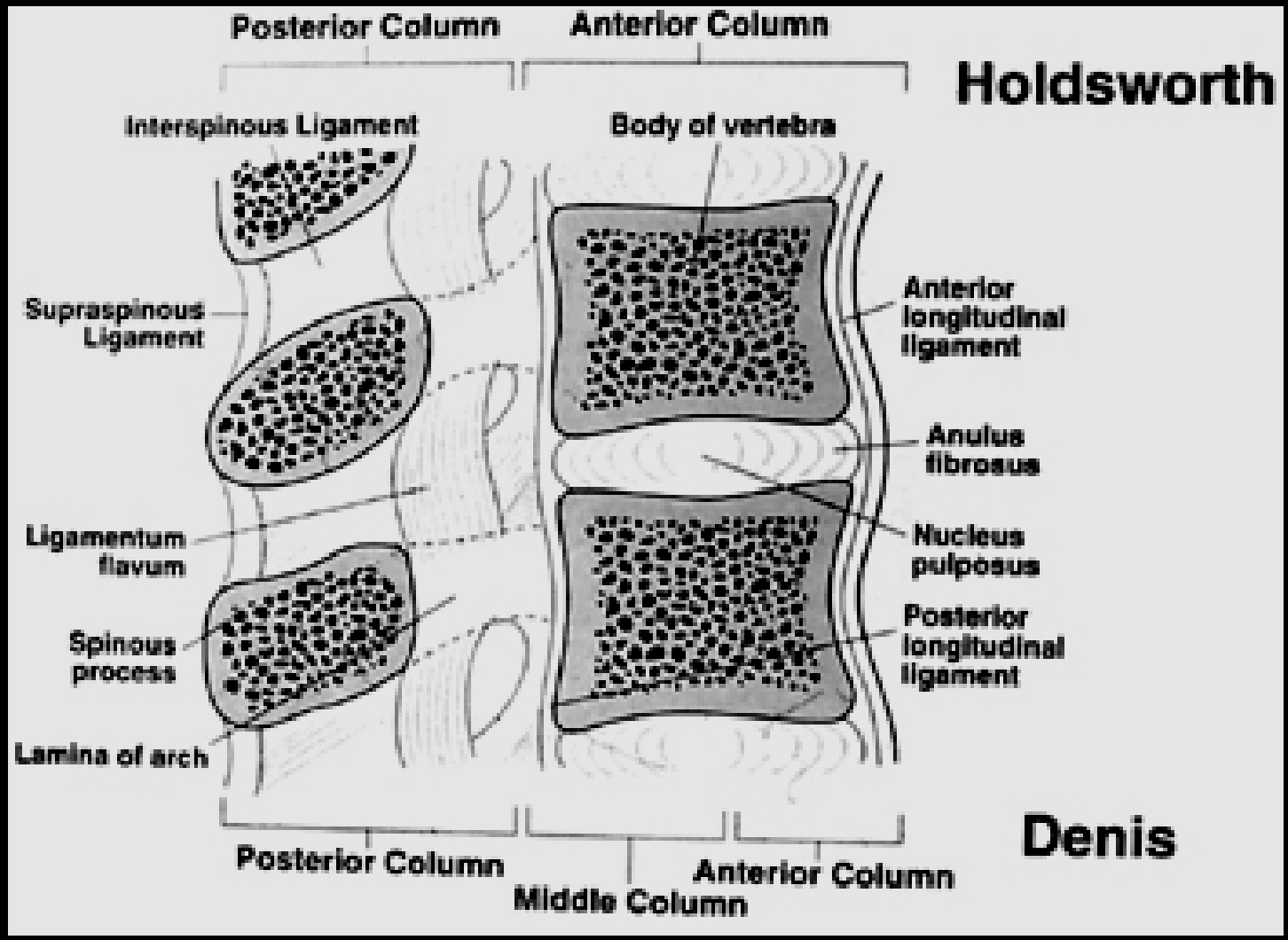
- Neurological deficit
- Cord compression
- Anatomy
- Epidural haematoma
- ? Ligamentous injuries
- Gas in posterior tissues or spinal elements



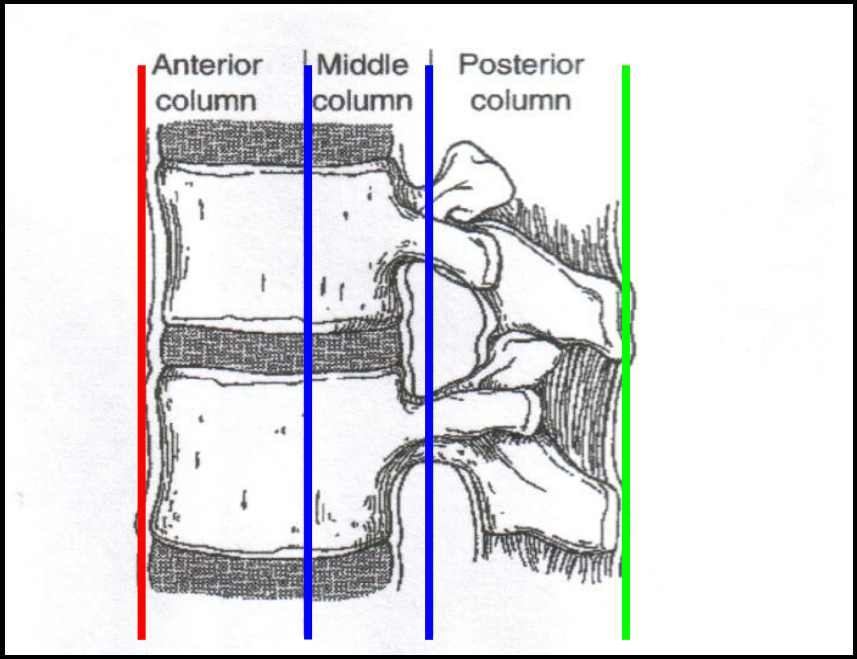
# Classifications

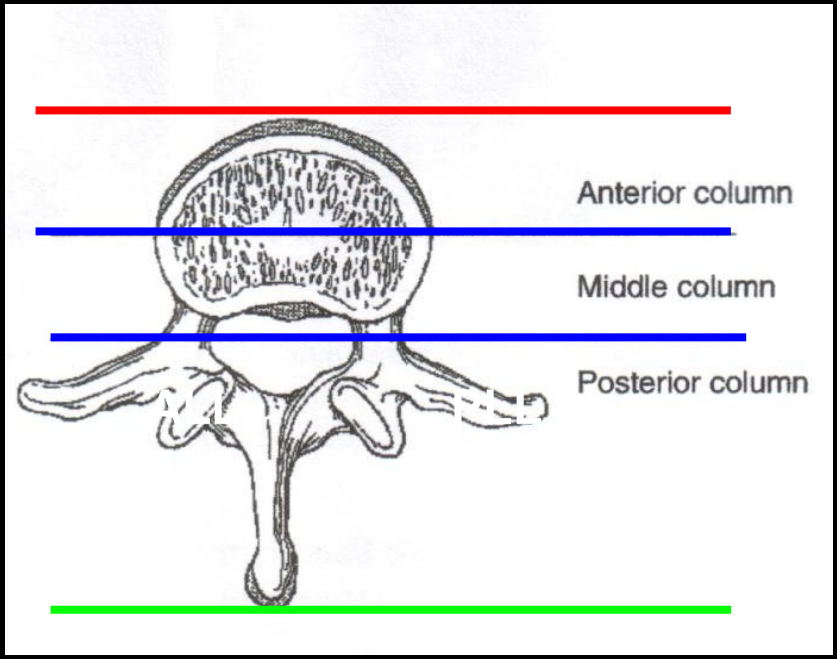
- Holdsworth (1963)
- Denis ( X-ray)
- McAfee (CT)
- AO

# Classifications



# Denis 3 Columns




Denis F. *Clin Orthop Relat Res*. 1984

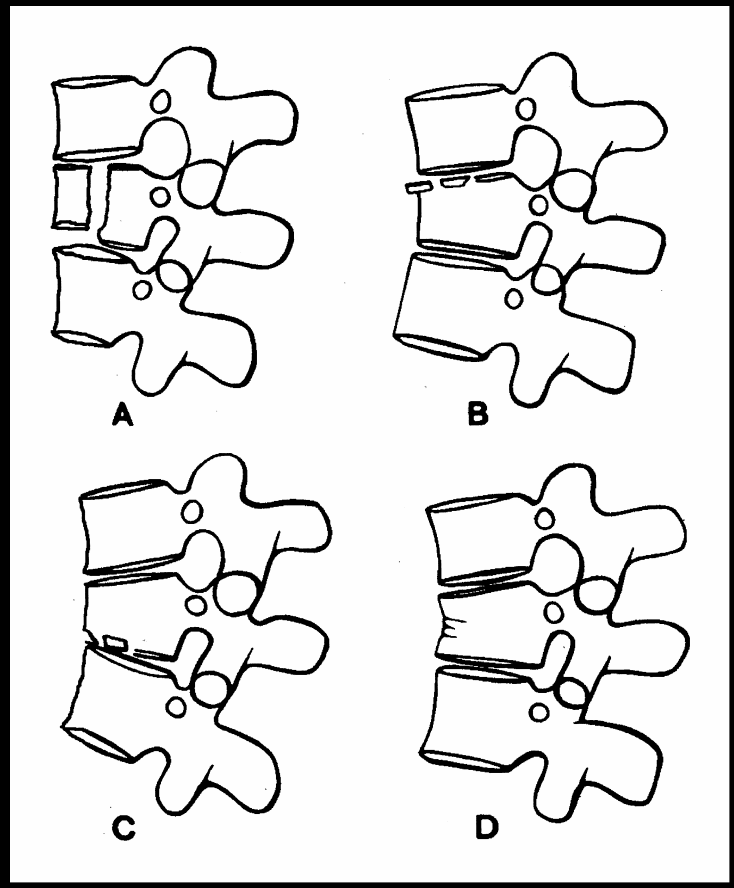
# Denis Classification

- Middle column
- Compression
- Burst
- Flexion-Distraction (Chance #)
- Fracture-Dislocation

Denis. *Spine.* 1983. 8:823

# Compression #

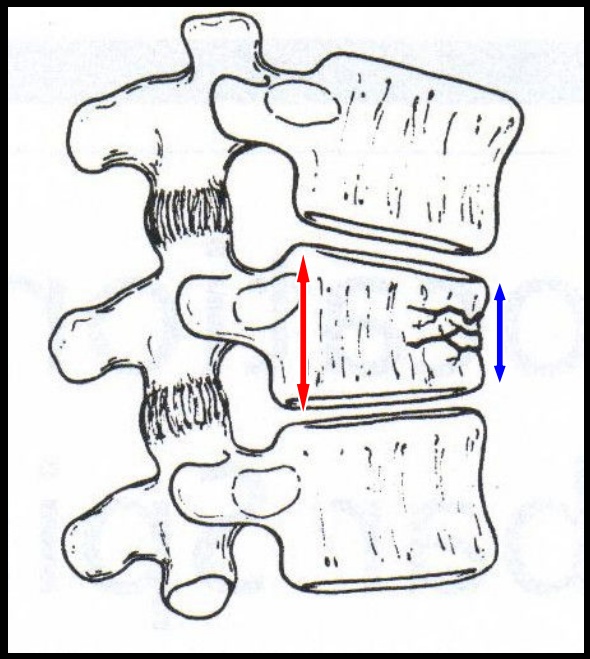
- Failure of anterior Column
- Posterior column
  - Stability
- Rule out Burst #

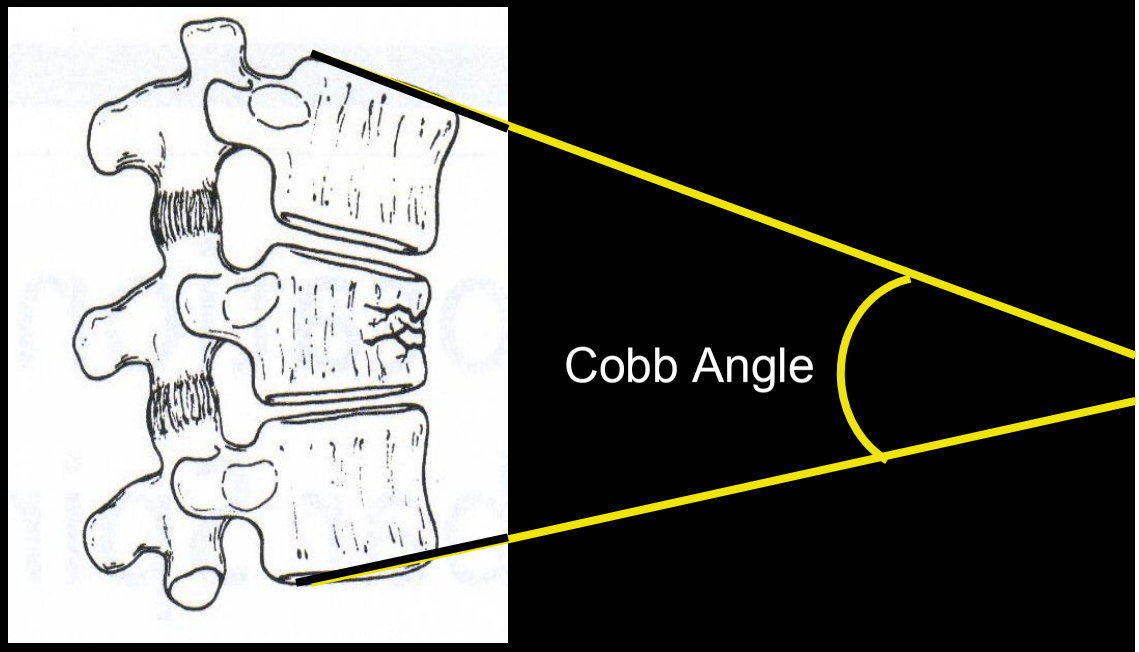


# Compression #

- Rule out Burst #
- X-ray - 25% error rate
- Use CT if suspicious

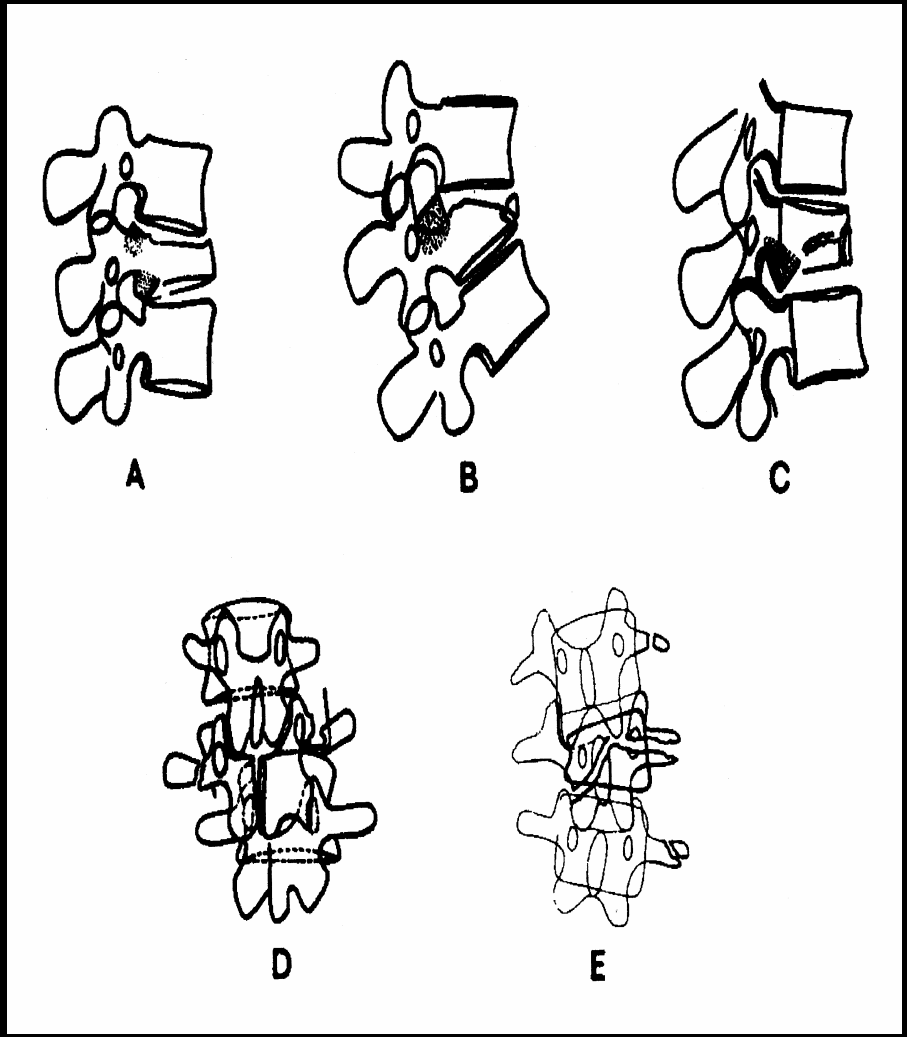
Balloch et al. JBJSBr. 1992. 74:147-50





# Burst #

- Compression failure of Anterior and Middle
- Canal compromise
- Retropulsion
- Stability?

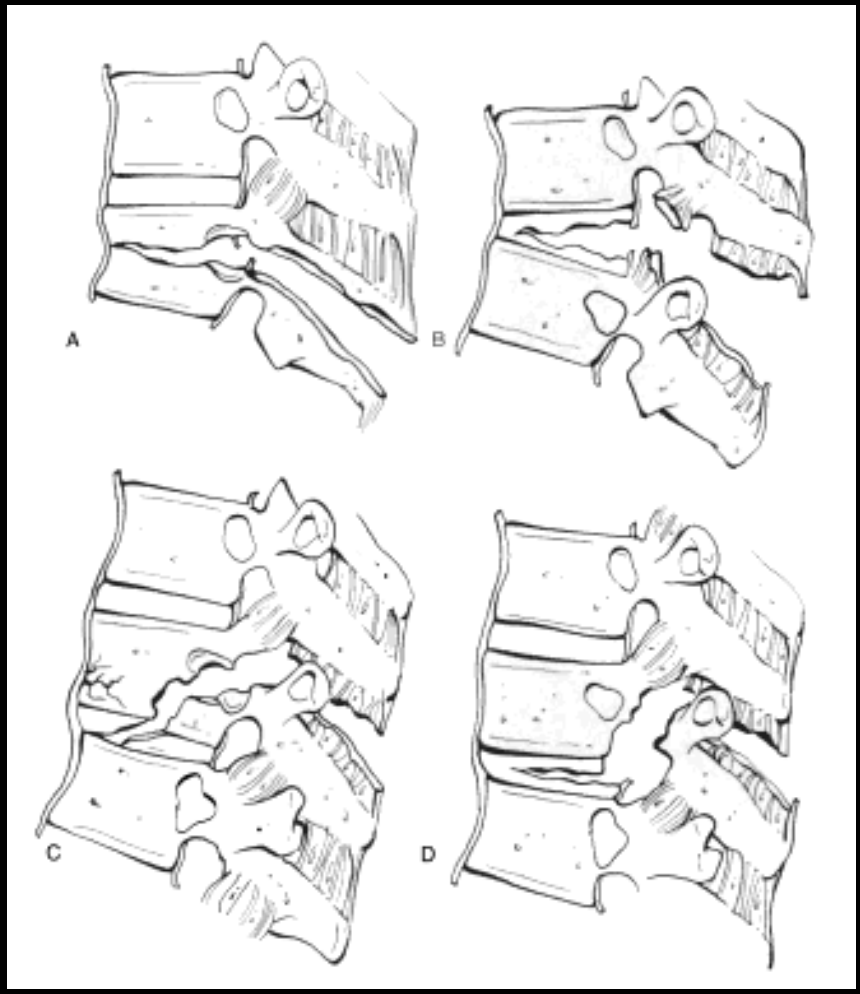


# Burst #

- Radiographs
  - Loss of Ht.
  - Kyphotic Angle
  - Interpedicular Distance
- CT
  - Canal Compromise
- MRI
  - Cord injury
  - Haemorrhage
  - Epidural haematoma
  - STI

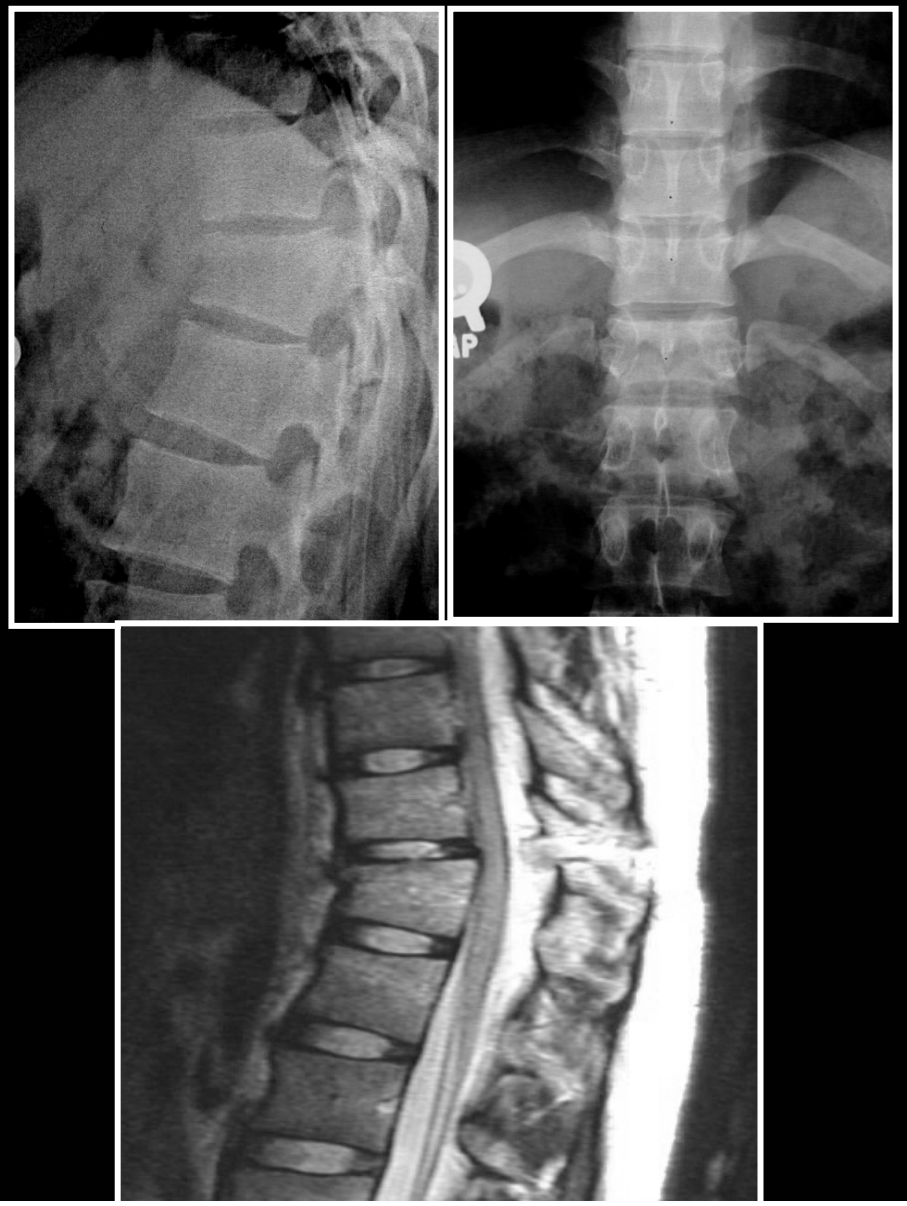
# Flexion-Distraction # (Chance)

- Axis rotation ALL
- Failure in tension
- 45% intraabdominal injury
- 10-15% neurological injury



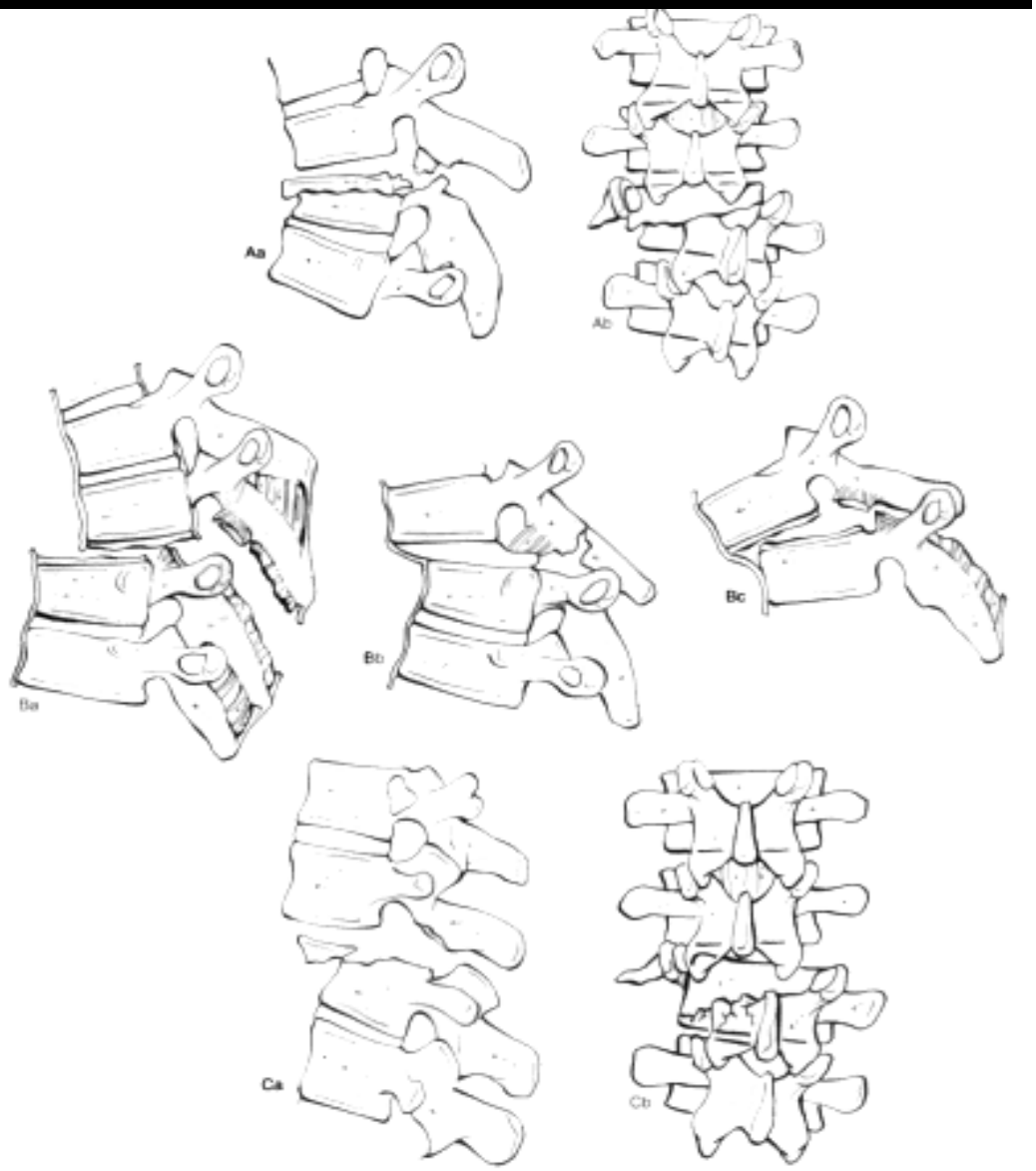
# Flexion-Distraction # (Chance)

- Radiographs
- CT
  - # Pattern
  - Middle column comminution
  - Surgical planning
- MRI
  - Path of injury
  - ?Bony or STI

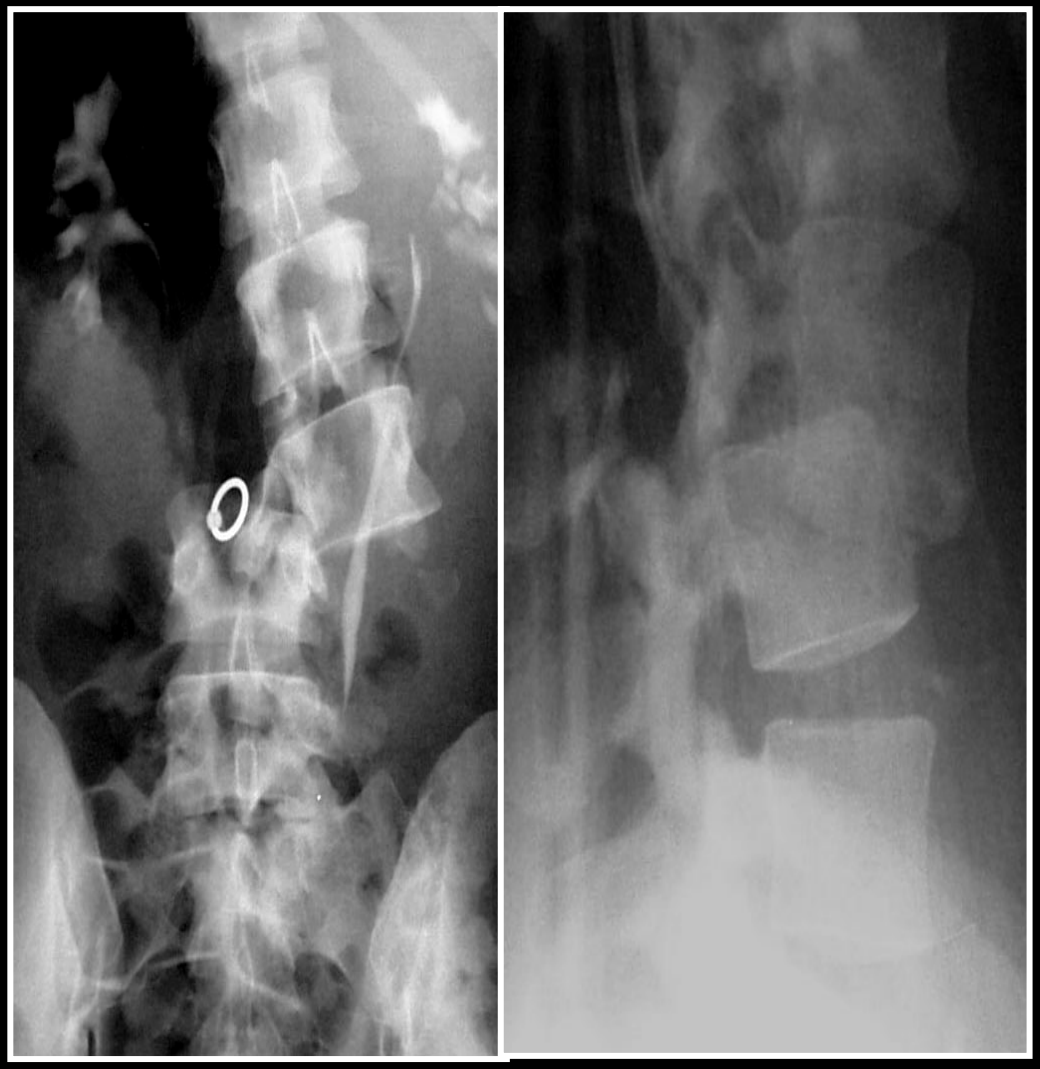


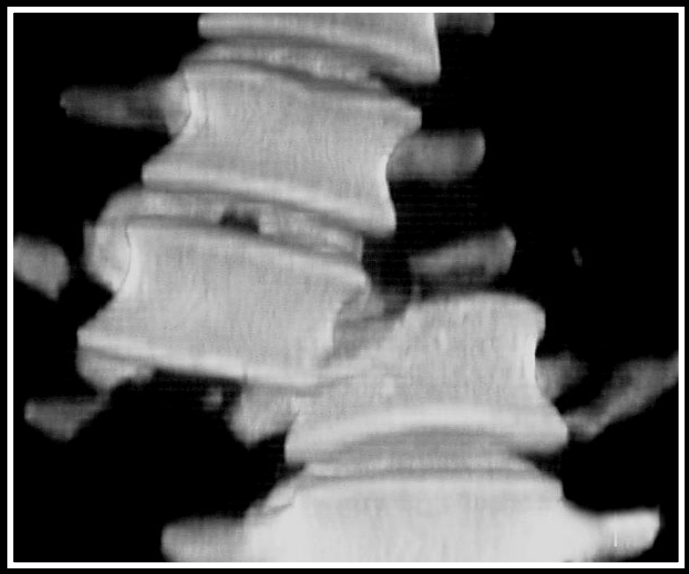
# Fracture-Dislocation

- Shearing forces
- Unstable - 3 columns
- Complete SCI
- Radiographs
  - Horizontal translation or rotation
- CT - Planning
- MRI - ?incomplete



# Fracture-Dislocation





# Management

**Considerations**

- Neurological status
- Spinal Stability
- Deformity
- Associated Injury

# Management

**1º Aims**

- Prevention of neurological injury
- Limitation of neurological injury
- Stability
- Pain Relief

**2º Aims**

- Correction of deformity
- Maintain motion
- Allow rapid rehabilitation

# Stability

**Posterior column injury**

- >50 % loss of anterior height
- >30 º Cobb kyphosis
- Increased interpedicular distance
- Increased interspinous distance
- MRI

# Determining Stability

**Static**

- Radiological Inference
- Plain films – Anterior height, Kyphosis, IP Distance
- CT - facet complex disruption
- MRI - disrupted PLC

**Dynamic**

- Acute Kyphosis loading spine (standing)
- Progressive kyphosis

# Non-Operative Management

***Stable fracture***

- < 40% anterior height
- < 25$^{o}$ Kyphotic angle
- < 40% canal compromise (Lumbar)
- < 30% canal compromise (Thoracic)
- PLC intact

# Non-Operative Treatment

- ?TLSO bracing
- 12 weeks
- Radiographic follow-up
- Physical therapy

# Operative Management

**Aims**

- Stabilise the spine
- Decompress a progressive neurological deficit
- Protect intact or incompletely injured neurological elements

**Methods**

- Decompression
- Fixation for stability and deformity correction
- Fusion with bone graft maintain reduction / stability

# Decompression

**Indications**

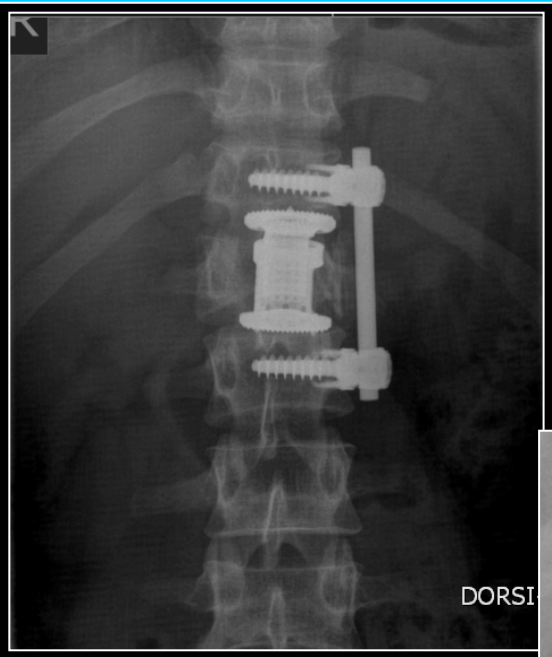
- Progressive neurological compromise with significant canal compromise
- > 30% Thoracic
- > 40% Lumbar
- Cauda Equina
- Incomplete SCI with evidence of compression

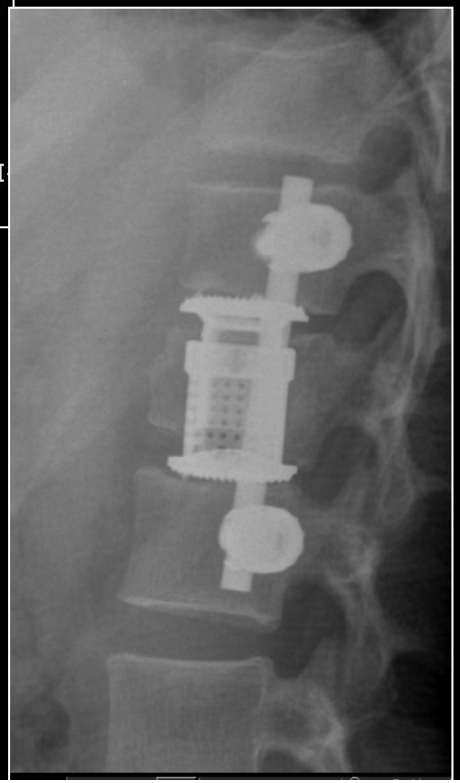
# Timing of Decompression

- Controversial
- Timing - poor correlation with degree of neurological recovery Kim et al. 1999. *Spine*. 24: 290-4
- Indirect decompression (posterior surgery) best results within 3 days
- Early - progressive neurological deterioration
- Early - reduces morbidity and resource utilisation Kerwin et al *J Trauma*. 2007. 63(6):1308-13.

# Anterior Decompression

- Canal compression anterior
- Direct visualisation of cord
- Reconstruction and fusion
- Combined posterior instrumentation



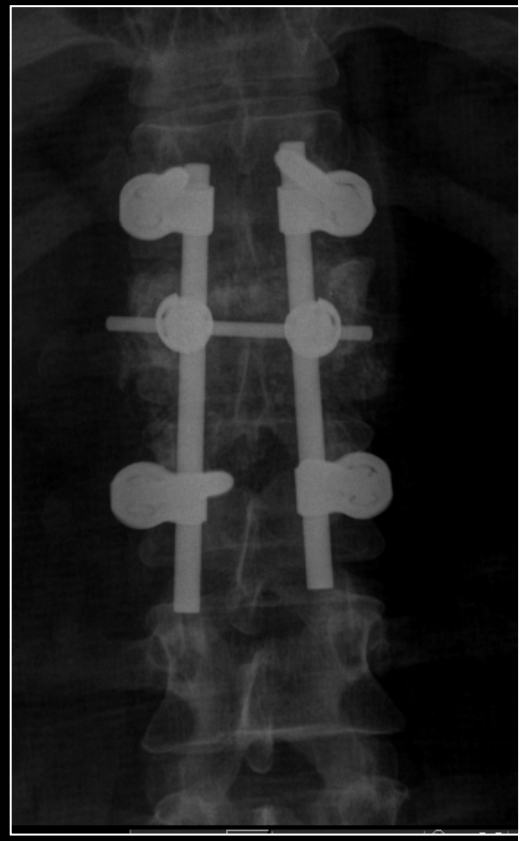



# Posterior Decompression

***Indirect***

***Decompression***

- Distraction instrumentation and ligamentotaxis
- Intact Posterior annulus / PLL
- Optimal time: <72 hrs.

# Posterior Decompression

***Direct Posterior***

- Transpedicular
- Useful when anterior approach not a viable option
- Useful in lumbar spine with dural mobilisation

# Methods of Decompression

***Laminectomy Alone?***

- Disrupts posterior spinal elements
- Instability
- Lower rates of neurological recovery

Bohlman et al. 1985 JBJSam. 67: 360-9

# Stabilisation

***Early stabilisation***

- Improved fracture reduction
- Preservation of neurological function
- Early mobilisation
- Reduced complications of bed rest

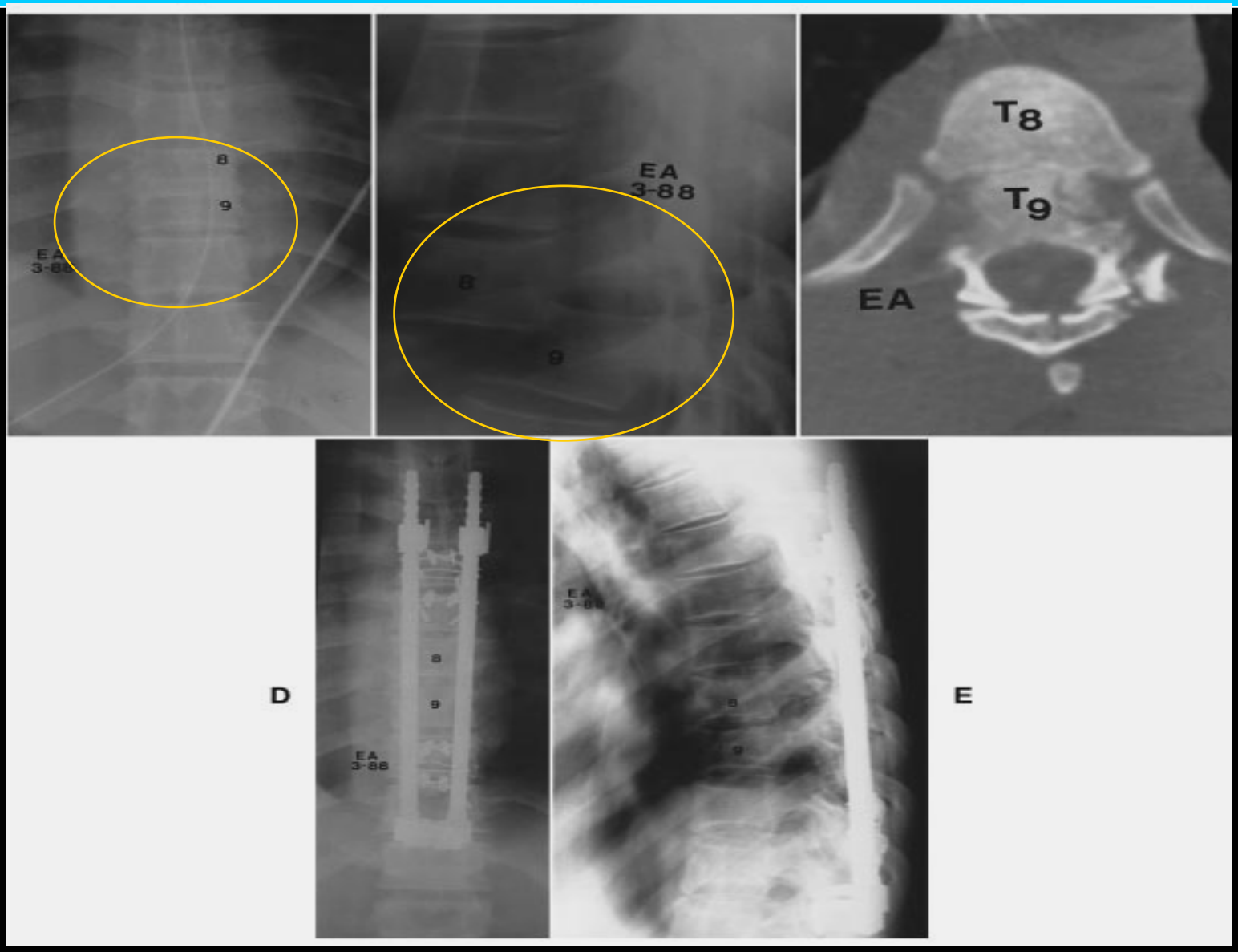
Jacobs et al. 1980. Spine. 5: 463-77

# Posterior Stabilisation

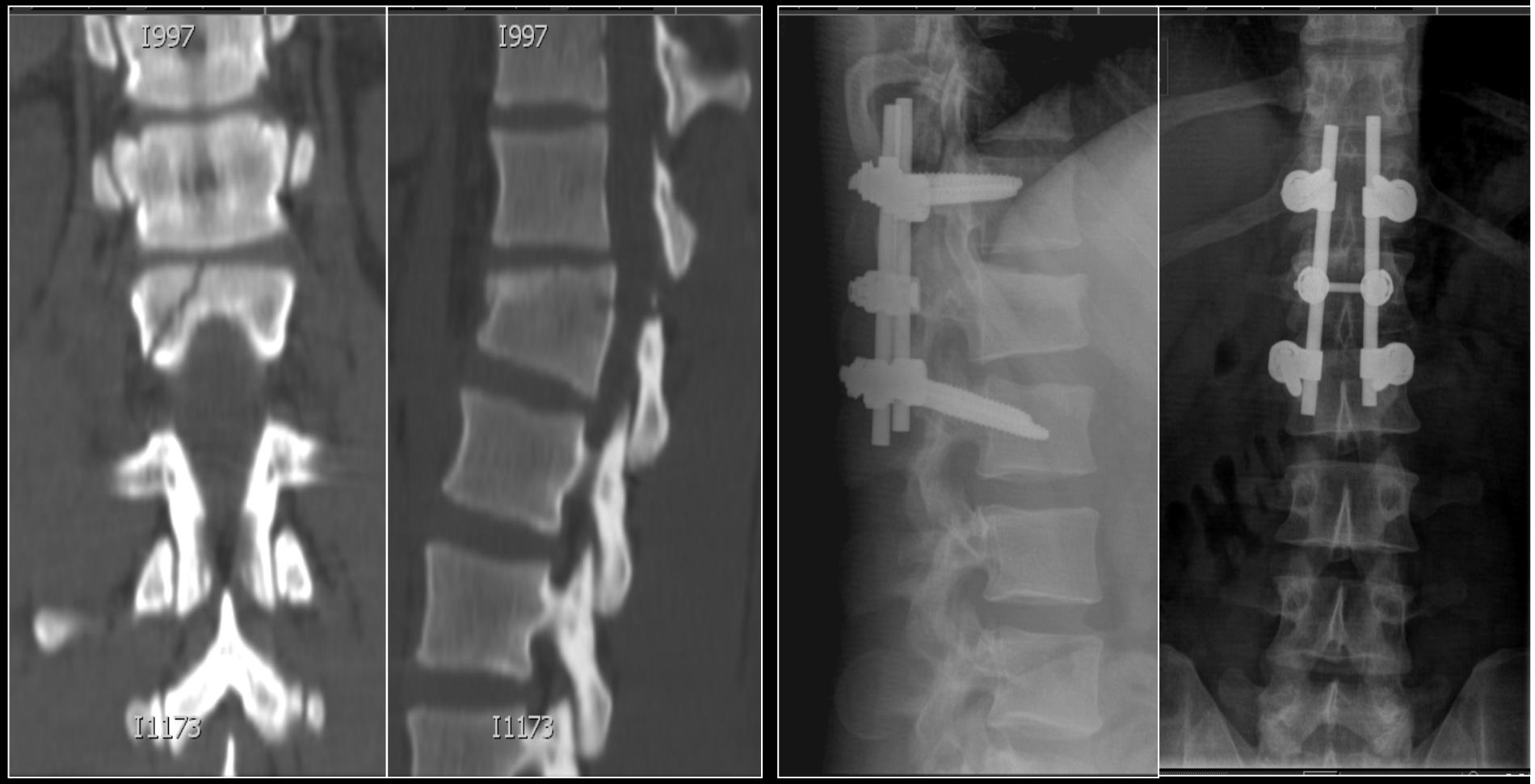
**Indications**

- Flexion – distraction injuries
- Fracture - dislocations
- Unstable burst fractures

# Harrington Stabilisation



# Pedicular Screws



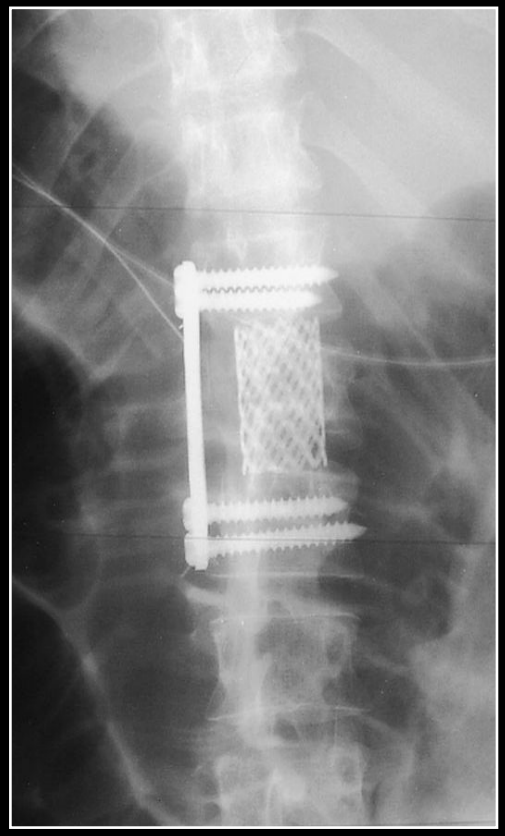
# Pedicular Screws

- Stabilises 3 columns
- Fewer segments
- Restoration of lordosis
- Cross-links for torsional stability
- Multiple Segments

# Anterior Stabilisation

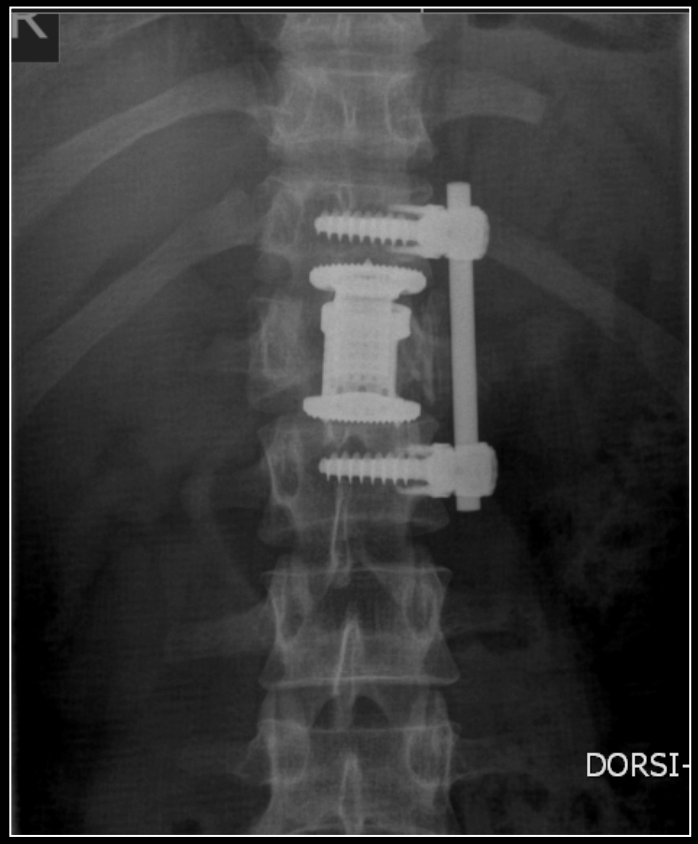
**Indications**

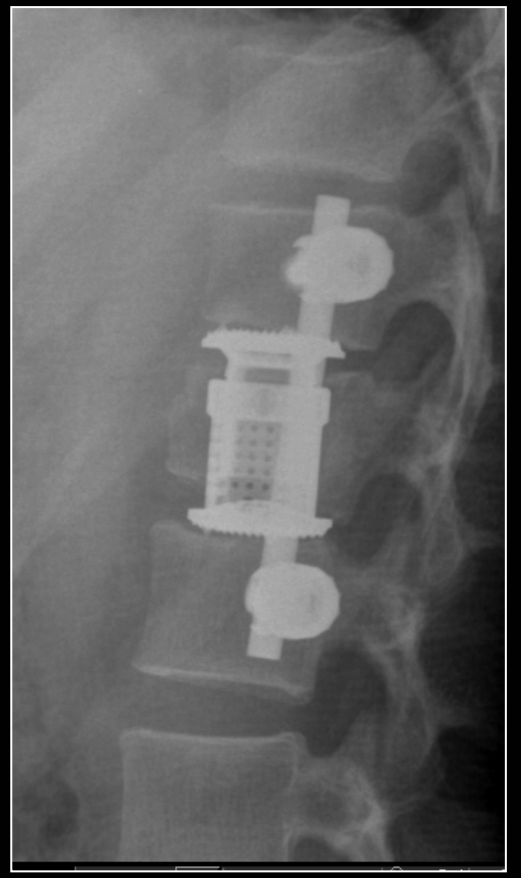
- Combined with anterior decompression
- Delayed situations



# Anterior Stabilisation

- Plate & Rod systems
- Graft is key to success
- 1/3 construct stiffness
- Allo or Autograft
- Cages



# Summary

- Discussed initial management
- Imaging modalities
- Classifications
- Importance of stability to management
- Decompression
- Anterior or Posterior Stabilisation

# Thank You