Thoracolumbar Traumatic Injuries Complications

Dr. Arad Tahaei

Consultant Neurosurgeon

University of Szeged

2024.05.24

General aspects

- Thoracolumbar junction is affected mainly (Th X – L II /Th XI – LI) 50-60%
- Lumbar region 20-30% Thoracic 10-20%
- The most vulnerable region Th-L junction
  - The rigid Thoracic region (due to ribs bilat.) meets a more flexible region
- High velocity high energy Vs Low impact injuries
- High velocity – High energy injuries in this region have 25% risk of SCI
- 25% Patients with fractures in this region also have another fracture elsewhere
- 27% have neurological deficits
- 10% of patients with Th fractures have SCI (40% in C spine)
- Median Age population is 35 years now
- Primary Vs Secondary Injuries

Mechanisms of Injury

- Axial compression
- Flexion compression
- Distraction
- Extension
- Rotation
- Shear

Highest rate of deficits!

AO Spine classification !!

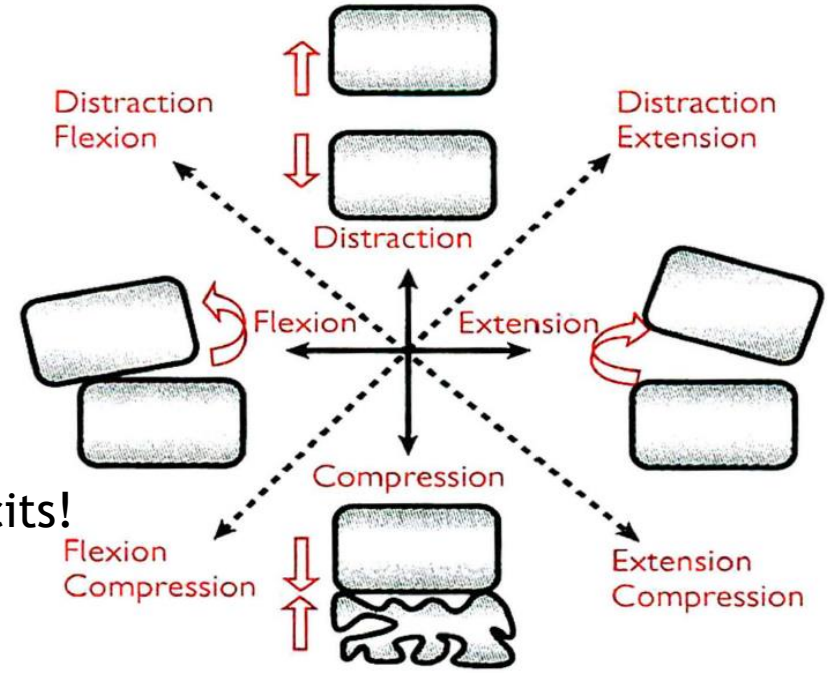
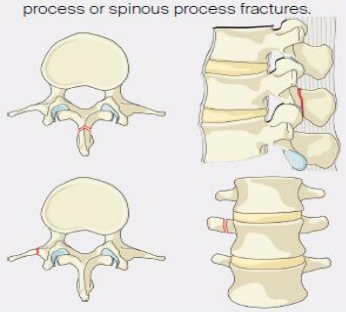


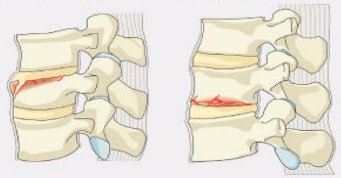
Fig. 6.7.1 Main types of fracture in thoraco-lumbar spine.

Type A Compression Injuries

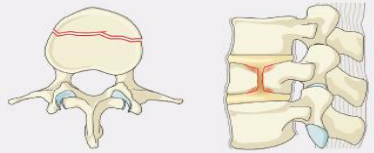
A0 Minor, nonstructural fractures
Fractures, which do not compromise the structural integrity of the spinal column such as transverse process or spinous process fractures.



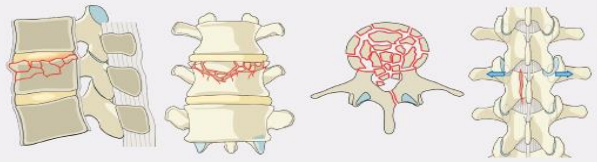
A1 Wedge-compression
Fracture of a single endplate without involvement of the posterior wall of the vertebral body.



A2 Split
Fracture of both endplates without involvement of the posterior wall of the vertebral body.



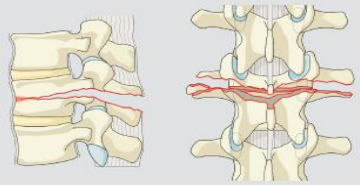
A3 Incomplete burst
Fracture with any involvement of the posterior wall; only a single endplate fractured. Vertical fracture of the lamina is usually present and does not constitute a tension band failure.



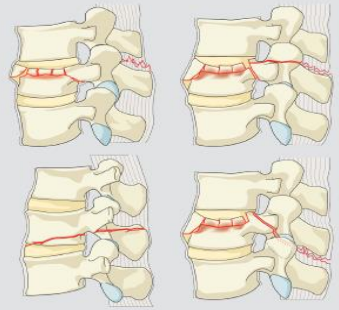
A4 Complete burst
Fracture with any involvement of the posterior wall and both endplates. Vertical fracture of the lamina is usually present and does not constitute a tension band failure.

Type B Distraction Injuries

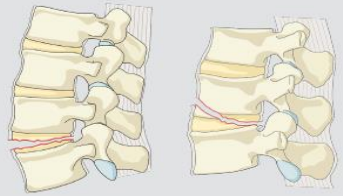
B1 Transosseous tension band disruption Chance fracture
Monosegmental pure osseous failure of the posterior tension band. The classical Chance fracture.



B2 Posterior tension band disruption
Bony and/or ligamentary failure of the posterior tension band together with a Type A fracture. Type A fracture should be classified separately.

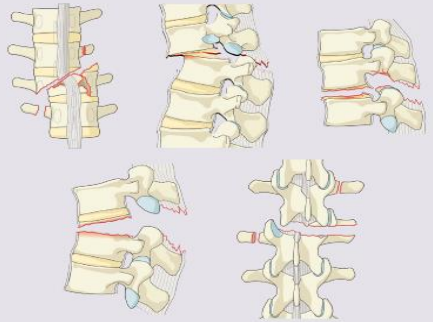


B3 Hyperextension
Injury through the disc or vertebral body leading to a hyperextended position of the spinal column. Commonly seen in ankylotic disorders. Anterior structures, especially the ALL are ruptured but there is a posterior hinge preventing further displacement.



Type C Translation Injuries

C Displacement or dislocation
There are no subtypes because various configurations are possible due to dissociation/ dislocation. Can be combined with subtypes of A or B.



Acute phase Vs Chronic phase

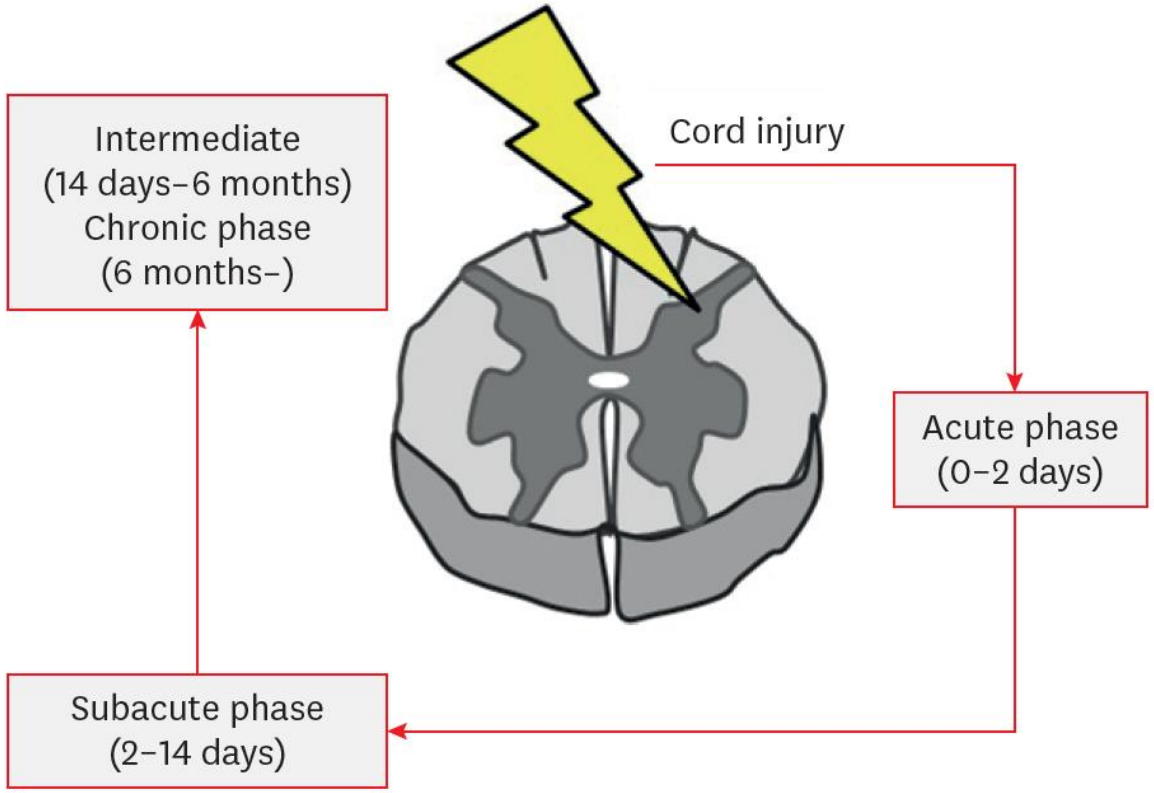


FIGURE 1. Phases and subdivisions of spinal cord injury.

Primary Injury

- Damage done by the trauma
  - Deficits
  - Damage to the spinal column
  - Damage to nerve roots
  - Damage to the spinal cord

  } Can cause temporary or persistent symptoms

- Long term complication of cord or nerve root injury
  - In severe cases paraplegia and severe sensation loss +- vegetative problems
    - If patient is bed ridden and mobilization is not done properly lots of problems such as DVT, decubitus, pulmonary congestion and infections etc.. ..

Secondary Injury

- Damage to prolonged cord compression
- Improper immobilization during transport or during hospitalization
- Bleeding and rebleeding
- Malpositioned screws after surgical treatment
- Complications of coexisting injuries (spinal shock, circulatory problems etc..)
- Edema
- contusion
- Scar tissue formation
- Etc….

Pathophysiology

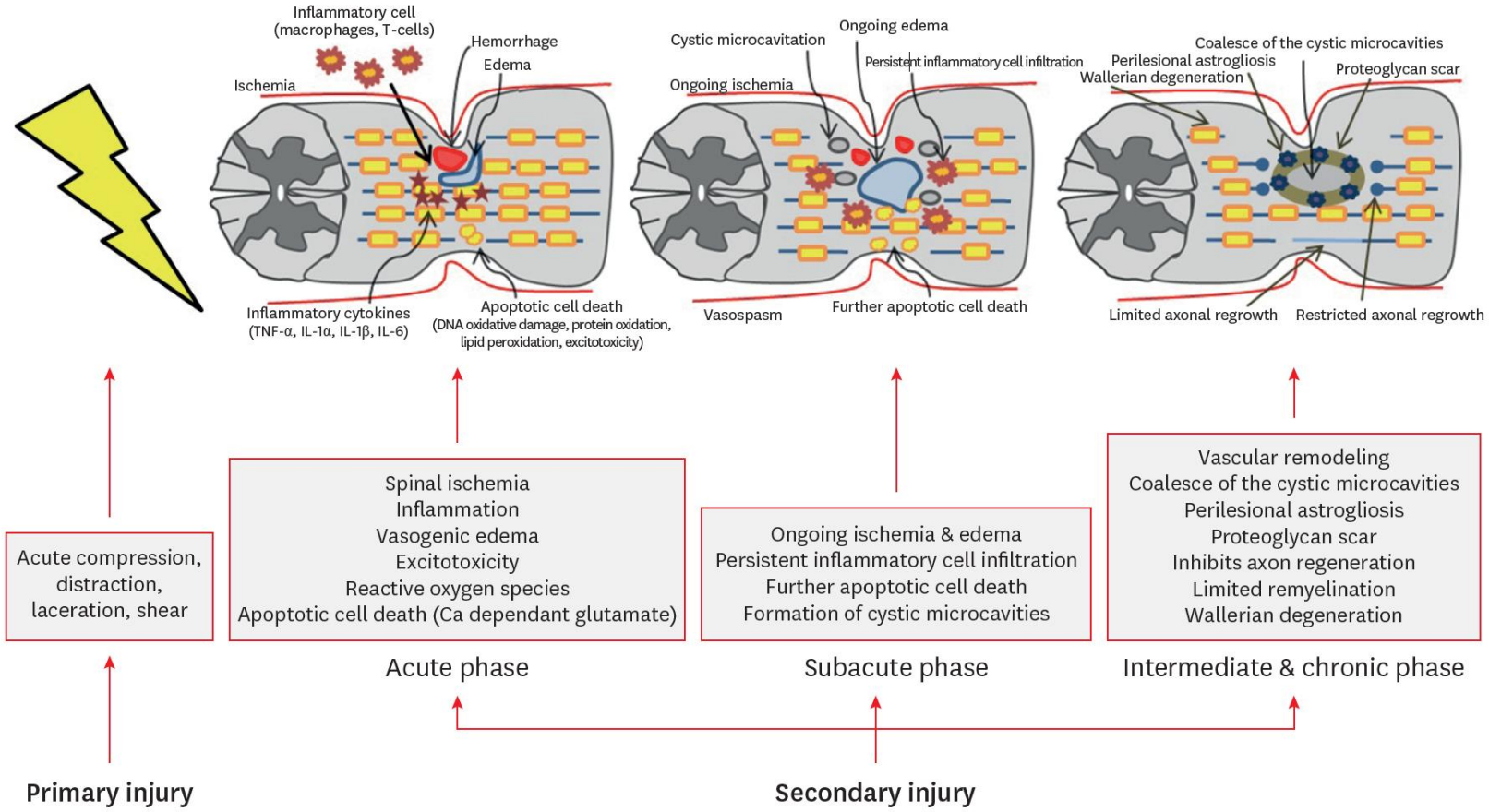


FIGURE 2. Pathophysiology of spinal cord injury.

Use of Steroids, a big controversy !

- In total 7 big studies
- NASCIS studies (3 studies 1984,1990,1997)
- Sauerland 2000 study (2500 patients in 51 trials)
  - High dose steroid 15mg/kg or 1g MPSS as a single dose can be repeated within max 3days
  - GI bleeding RD = 0.3%
  - Wound complication RD = 1%
  - Pulmonary complications (MPSS is protective !) RD = -3.5%
  - Death RD = -0.9%
- In 2017 AOSpine concluded:
  - 24h infusion of high dose MPSS within first 8 hours
- In general, recent studies show:
  - In a phase III clinical trial steroids improve neurological symptoms and it was replicated in another phase II trial
- If Steroids are used, then :
  - MPSS within the first 8 hours of insult 30mg/kg IV for 15 mins, 45 mins later5.4mg/kg /h for 24h followed by continues infusion
- South Korea implemented the use of steroids in their treating protocol!!

Conservative Vs Surgical

- Treatment of Th-L fractures can be challenging
- How to decide ?
- Type of fracture
- Involvement of min 2 columns of the 3 spine column
- Neurological deficits
- Modifiers
- Existing comorbidities (osteoporosis, age, other traumatic injuries ….)
- Outcome ? Bed ridden patient ?

Patient Assessment

- ASIA impairment score
- Frankel Score

ASIA Impairment Scale		
A	Complete	No motor , No sensory, No sacral sparing,
B	Incomplete	No motor, sensory only
C	Incomplete	50% of muscles LESS than grade 3 (cant not raise arms or legs off bed)
D	Incomplete	50% of muscles MORE than grade 3 (can raise arms or legs off bed)
E	Normal	Motor and sensory function are normal

Grade		Description
A	Complete	No motor or sensory function below level of lesion
B	Sensory only	No motor function, but some sensation preserved below level of lesion
C	Motor useless	Some motor function without practical application
D	Motor useful	Useful motor function below level of lesion
E	Recovery	Normal motor and sensory function, may have reflex abnormalities

The Frankel scale for spinal cord injury that classifies the extent of the neurological/functional deficit into five grades 6)

Surgical Treatment

- Instable fractures
- Presence of neurological deficits

} Acute Surgery

  - Cord damage, ischemia, nerve root damage , epidural bleedings etc.…
- Failure of conservative treatment
  - Progressive kyphosis (> 20 degrees kyphosis)
  - Progressive compression (loss of body height more than 50%)
  - Non-union
  - Persisting pain

Conservative treatment

- If indications of surgery (previous slide) not present then patient can be a candidate for conservative treatment
- Orthosis
- Mobilization
- Regular follow ups with X-ray or CT scans
- Regular assessment of neurological status
- Pain management

Complications of Conservative Tx

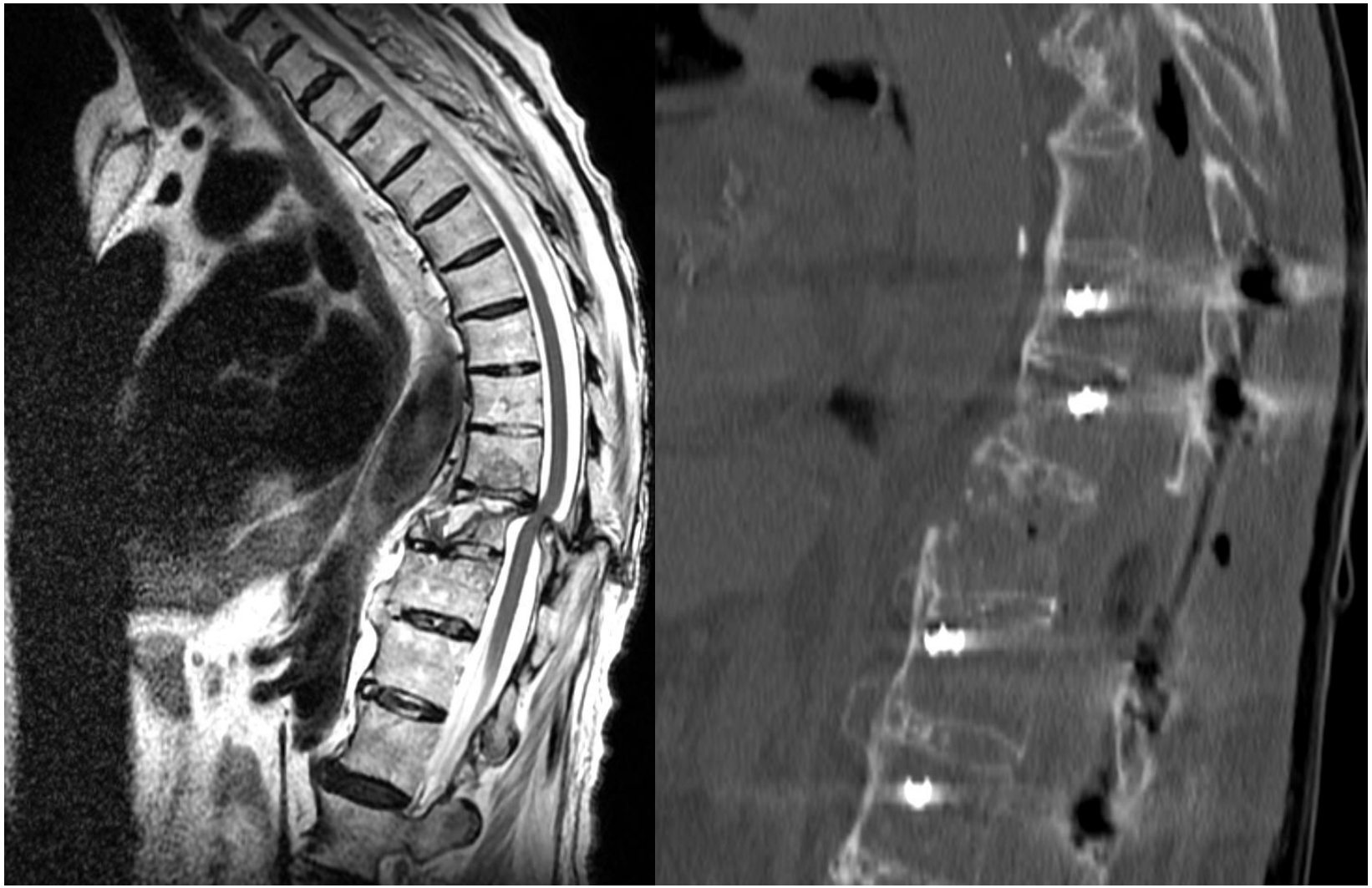
- Pain management is not always achieved properly
- Non-union
- Pseudoarthrosis , arthrosis and chronic pain
- Progression of kyphosis – kyphoscoliosis
- Progression of fracture, loss of body height
- Progression into neurological deficits
- More challenging surgeries afterwards

Complications of Surgical Tx

- Failed instrumentation in long term or short term (Loosening, migration etc.)
- Malpositioning of screws and PMMA in case of augmentation
- Risk of Anesthesia
- Progression of fracture despite instrumentation
- Insertion of long rods and causing facet arthrosis and chronic pain
- Wound healing and infection
- Over correction and loss of mobility
- Under correction and progression of fracture
- Further need of complex surgeries later on

Case 1

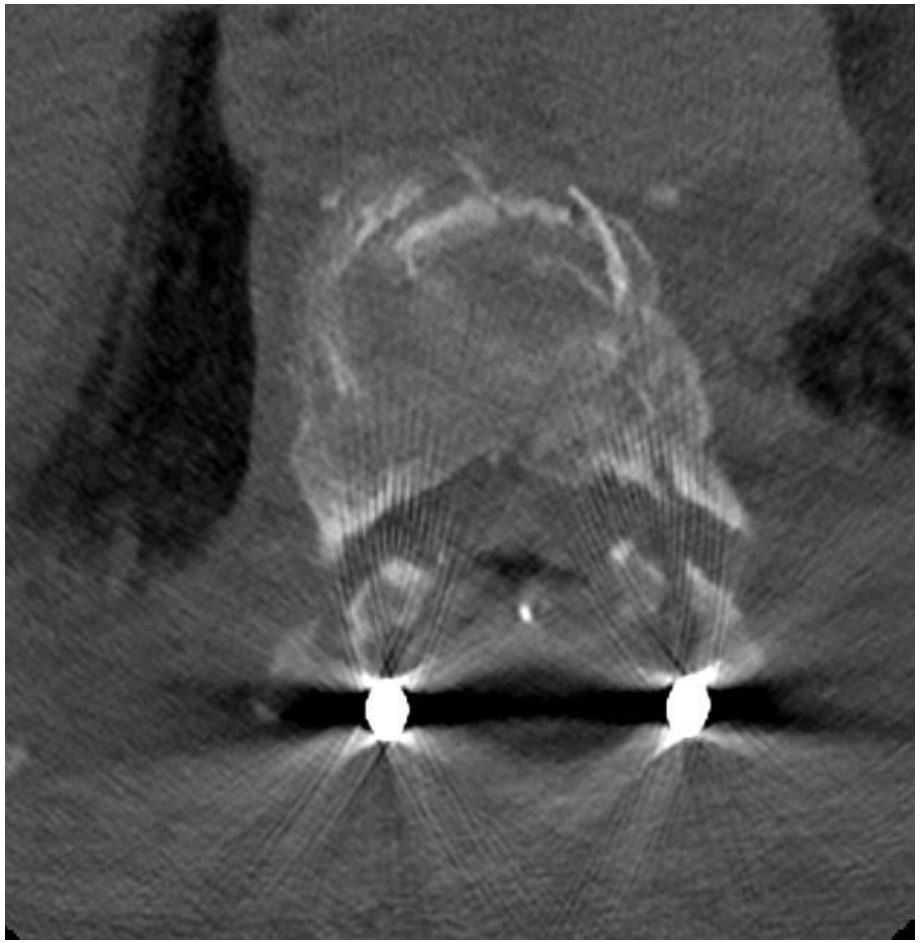
- Elderly patient with ankylosing spondylosis , suffered a loss , severe neurological deficits (1/5 paraparesis and urinary incontinency, hypesthesia)
- Surgery was done
- After surgery patient was stable, no infection during hospitalization
- Neurological status improved to a 2+/5 paraparesis
- Was transferred to an elderly caring facility
- After couple of months, she is brought back to the ER due to oozing of the wound
- She was bed ridden for the whole time in the elderly facility
- No rehabilitation, no proper nursing




10.3 mm

Case 2
Importance of proper diagnosis for proper surgery

- Middle aged male, suffered a fall from a ladder
- Excruciating back pain
- No neurological deficits
- Taking Blood thinners
- CT was done A Th X Chance Fracture was identified
- MRI took 4 days to happen, meanwhile patient was stable and no signs of detoriation
- A decision of surgery without MRI was almost made !

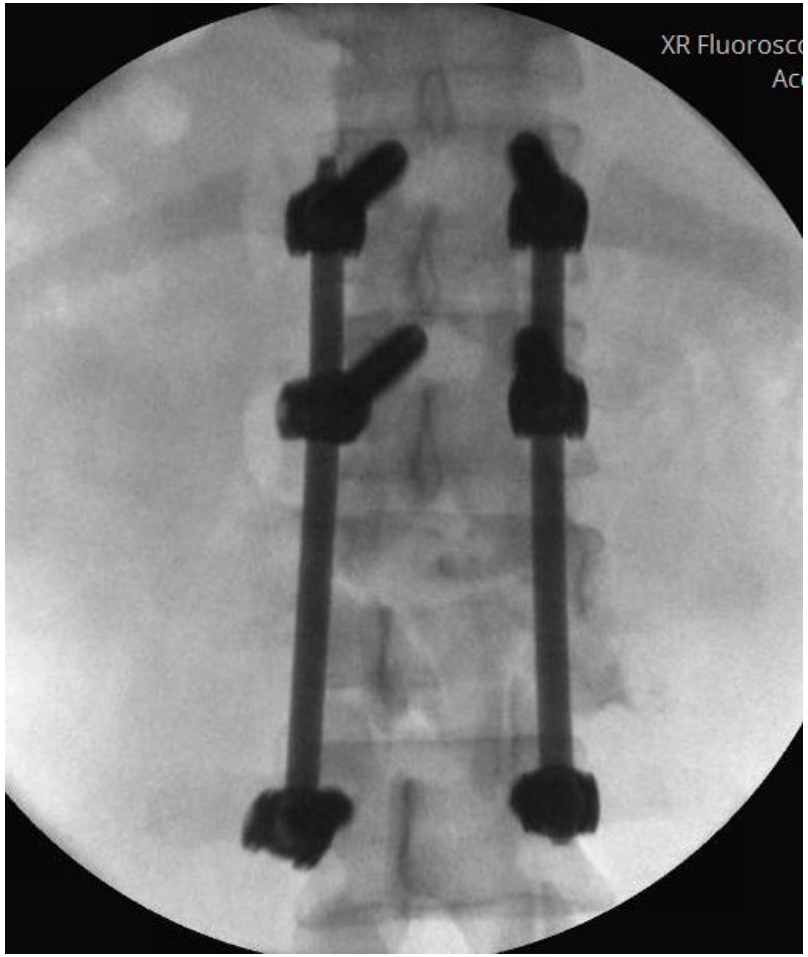


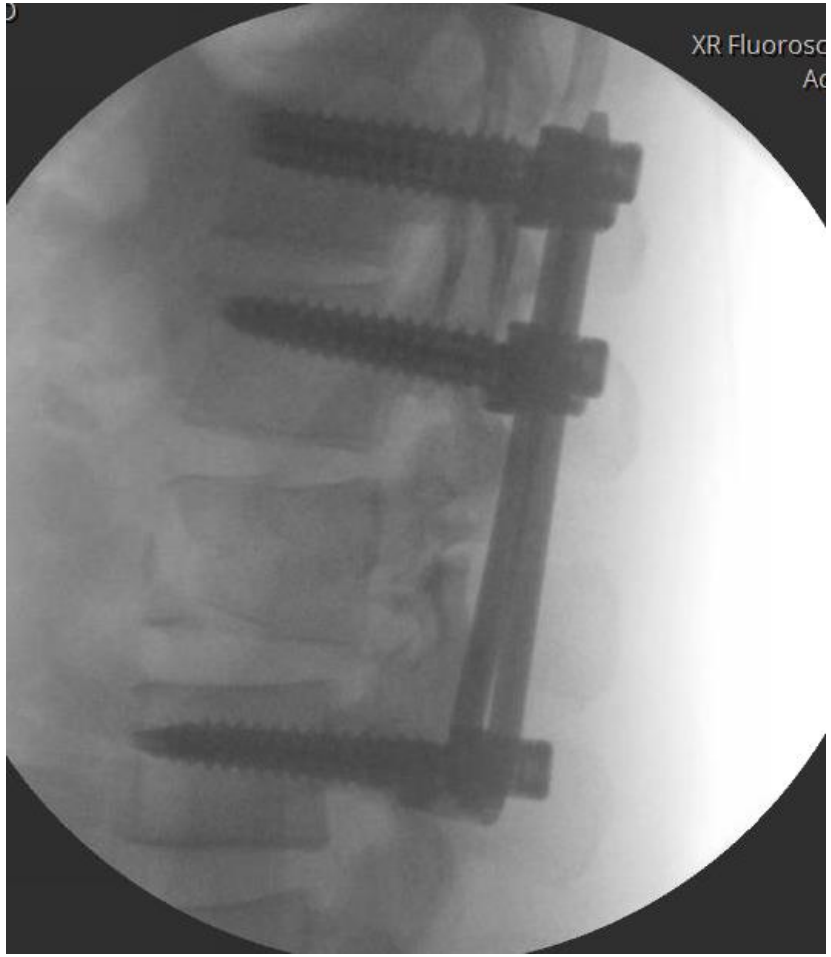
Case 3

- 38 years old male
- Fall from 3m
- Deficits on both lower extremities
- ASIA B
- Having a foley catheter


6 H

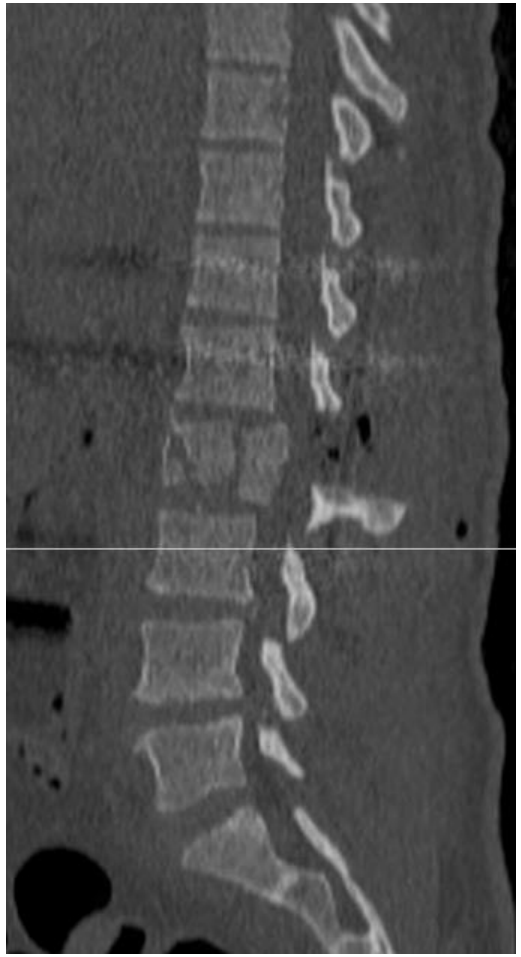

H

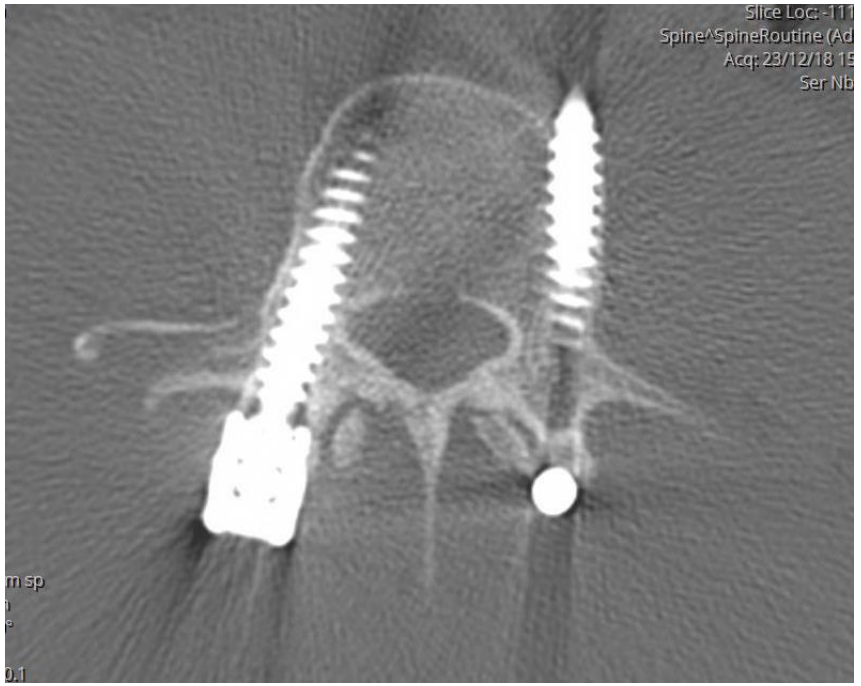

XR Fluorosc
Ac

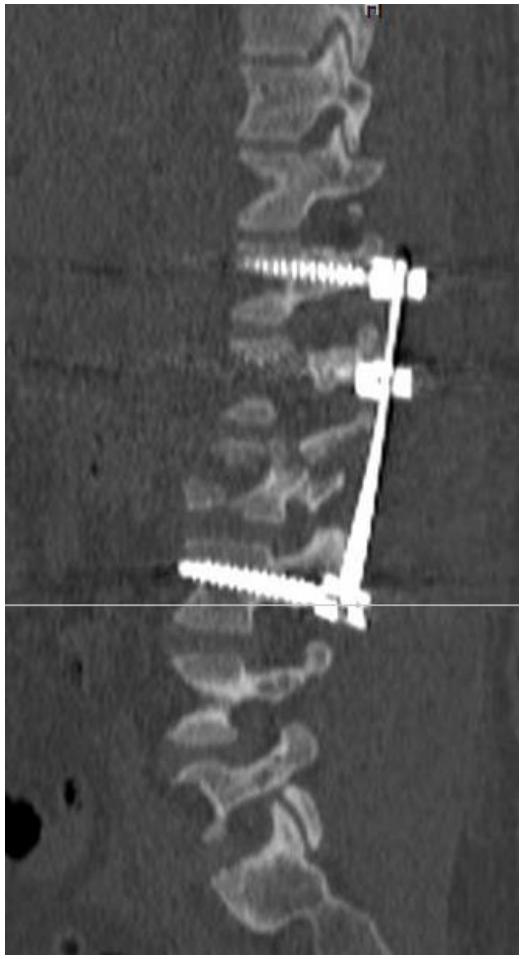

XR Fluorosc
Ac

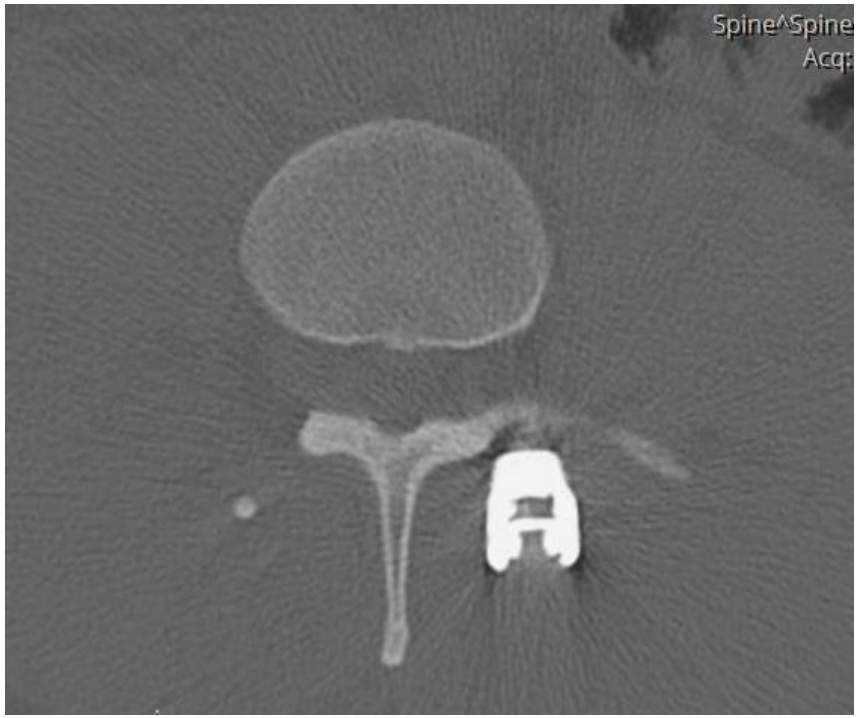

HAL

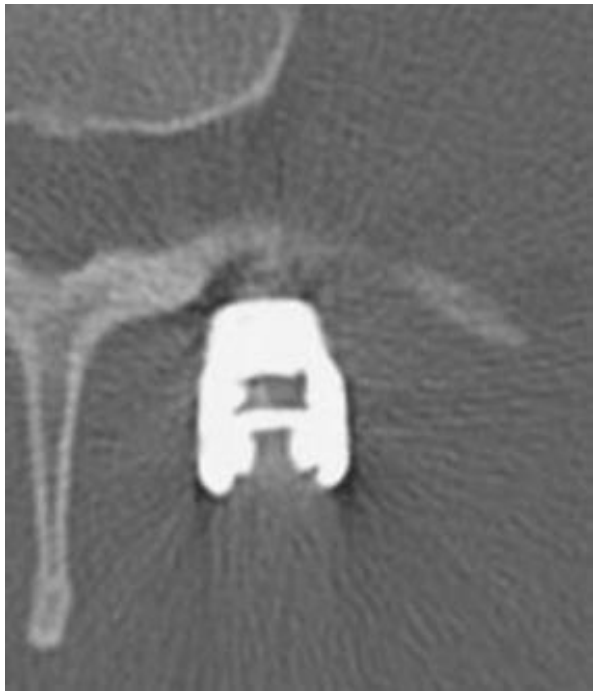

HLP



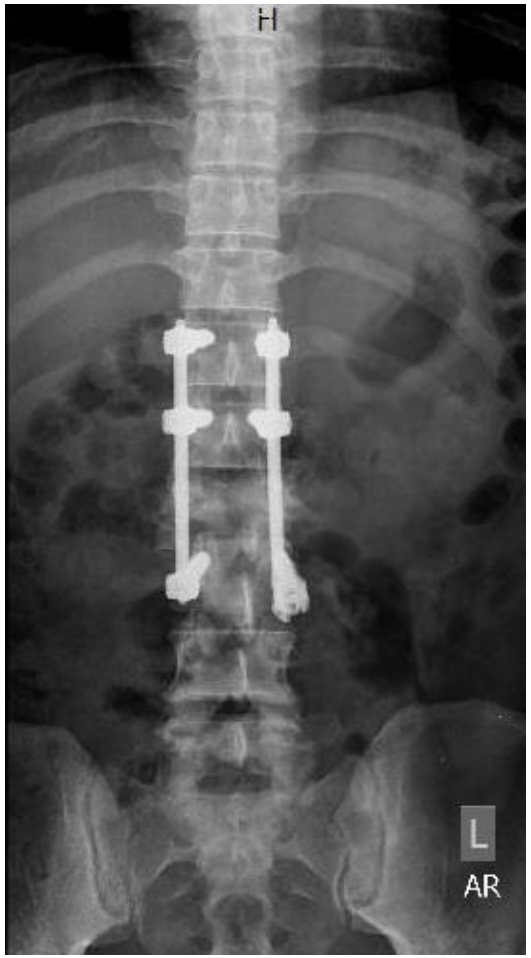

Slice Loc: -111
Spine^SpineRoutine (Ad
Acq: 23/12/18 19
Ser Nb
m sp
0.1

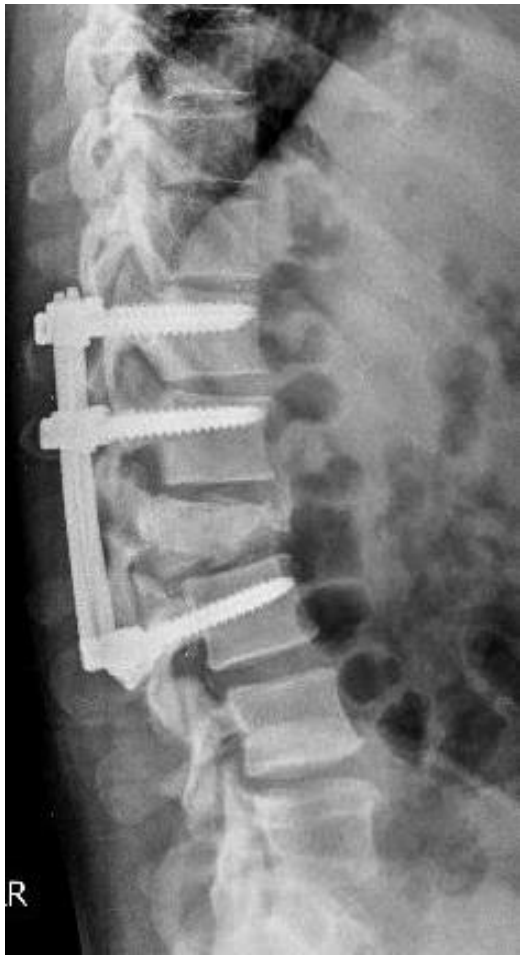


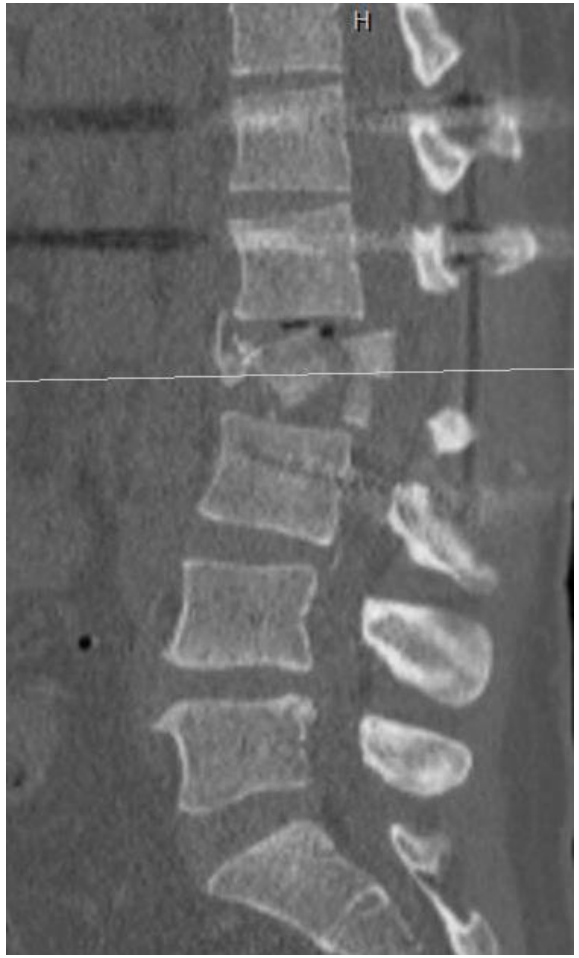

Spine^Spine
Acq:

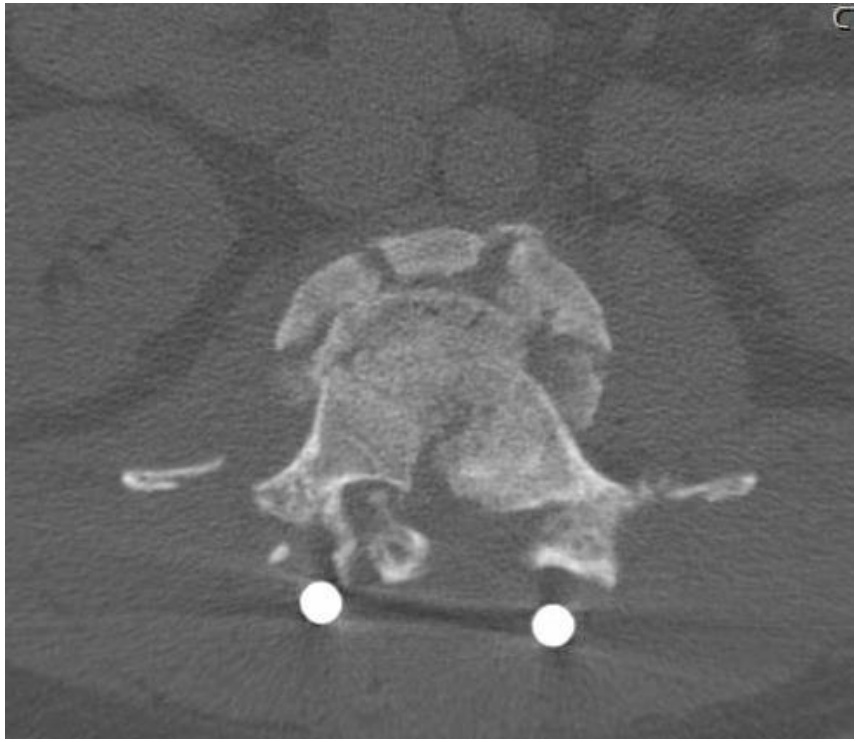


9 weeks follow ups

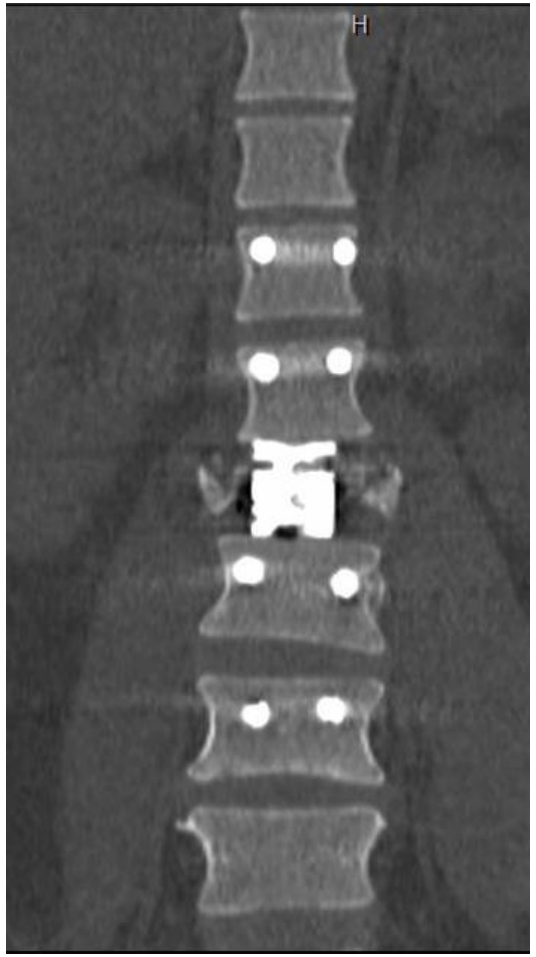


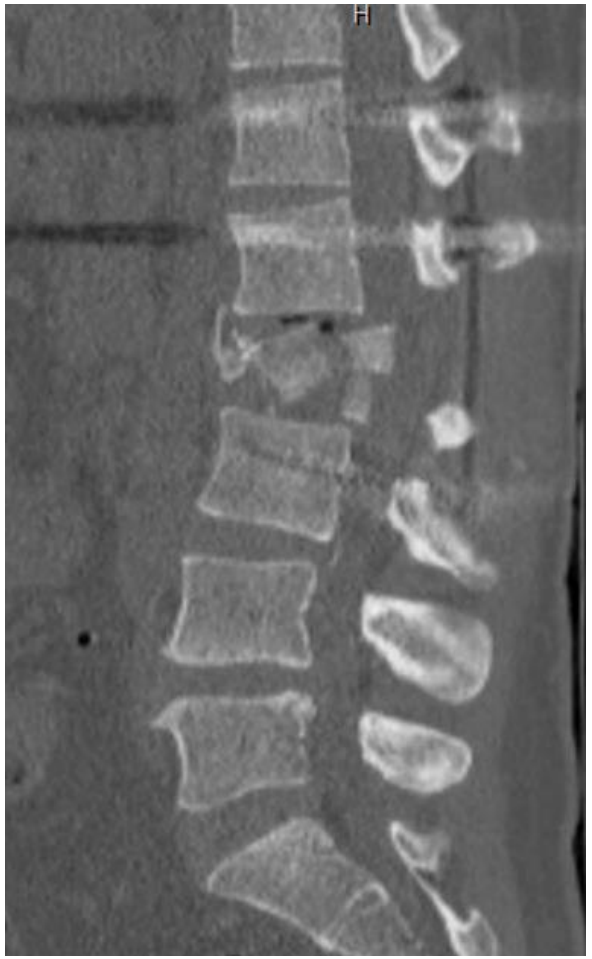
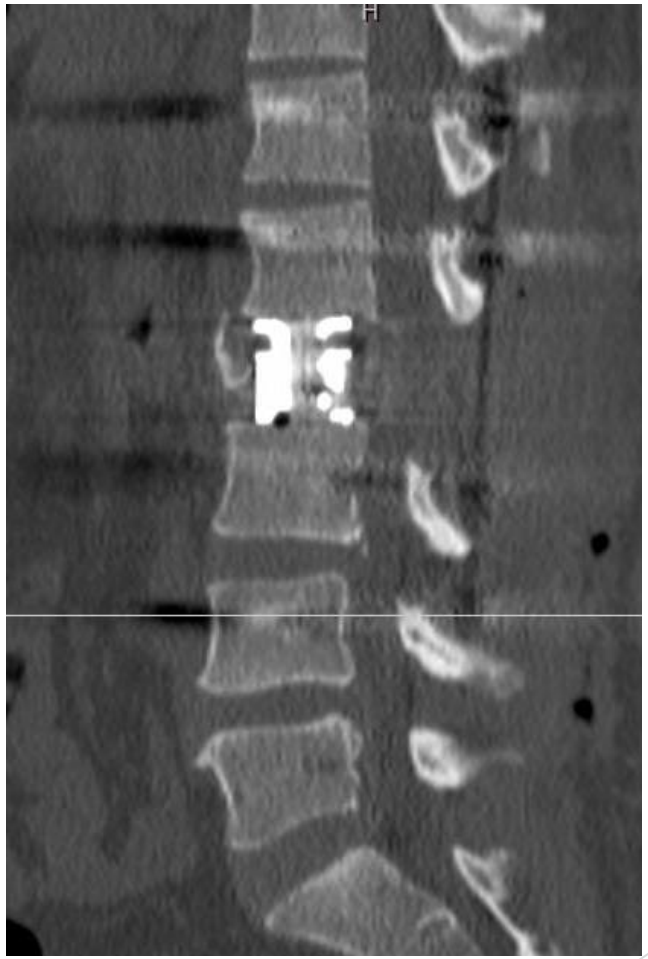



H


C

Reconstruction



Take Home Message

- Use protocols to decide the best treatment for patients
- Not all complete burst fractures may need surgery
- Not all incomplete fractures benefit from conservative treatment
- There is a thin line when it comes to making decision about treating patients
- Be aware of the consequences of under or over treating
- Be aware of the consequences of making drastic decisions !