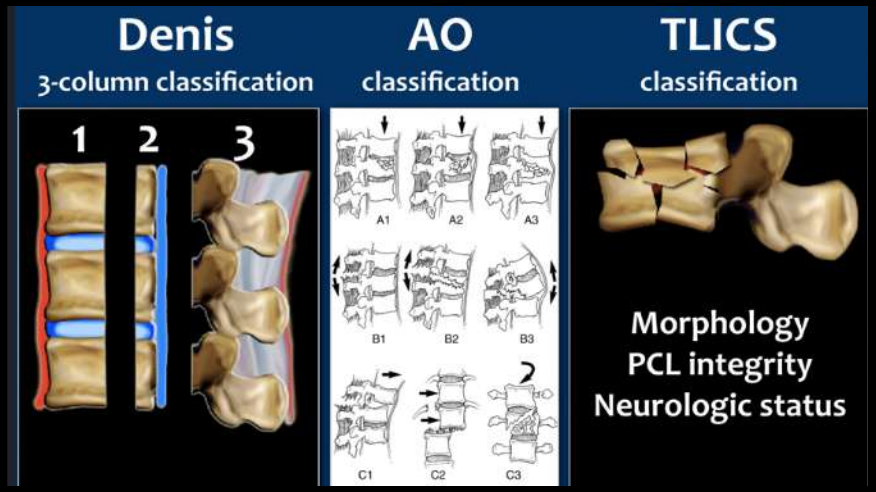
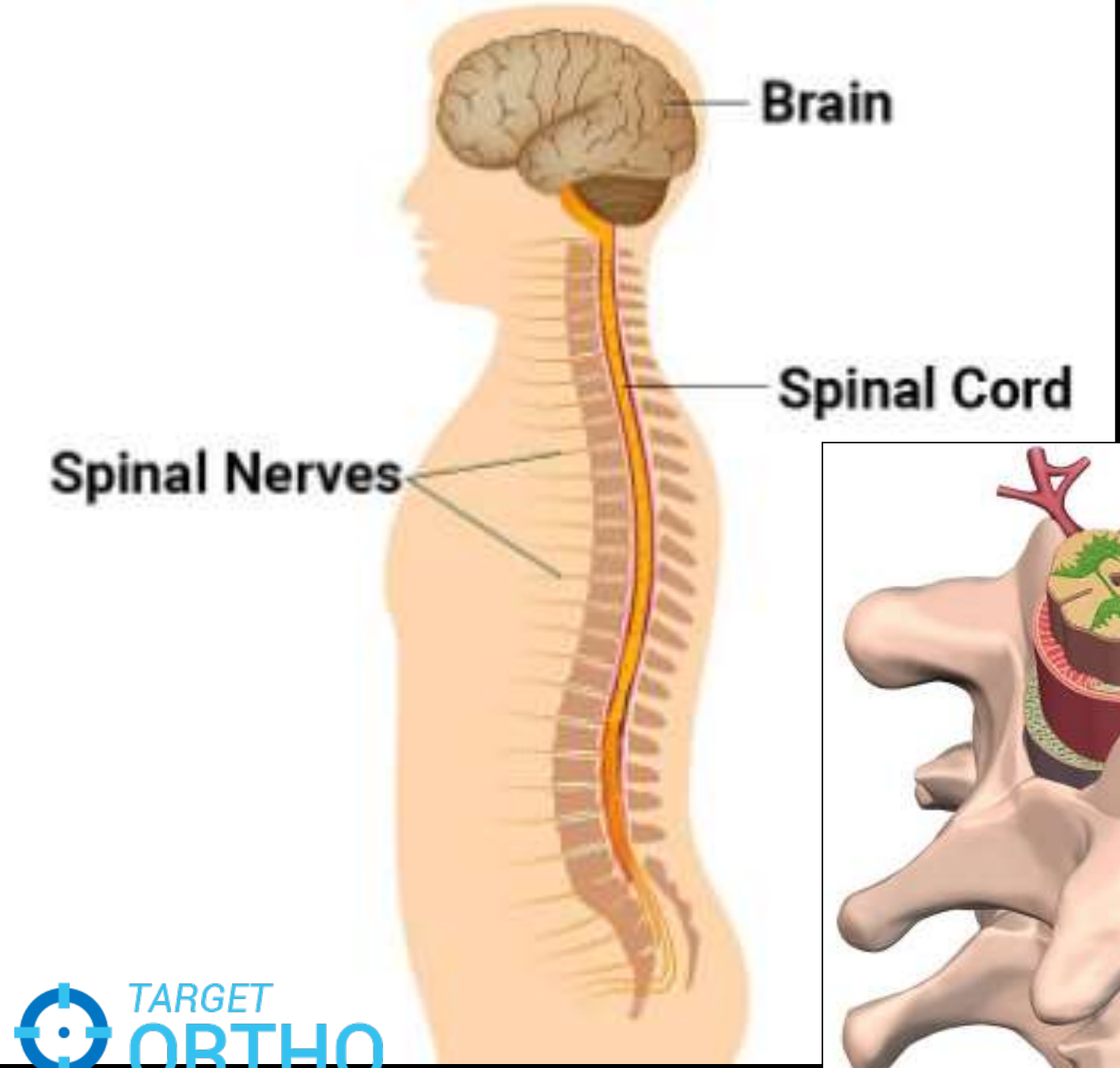
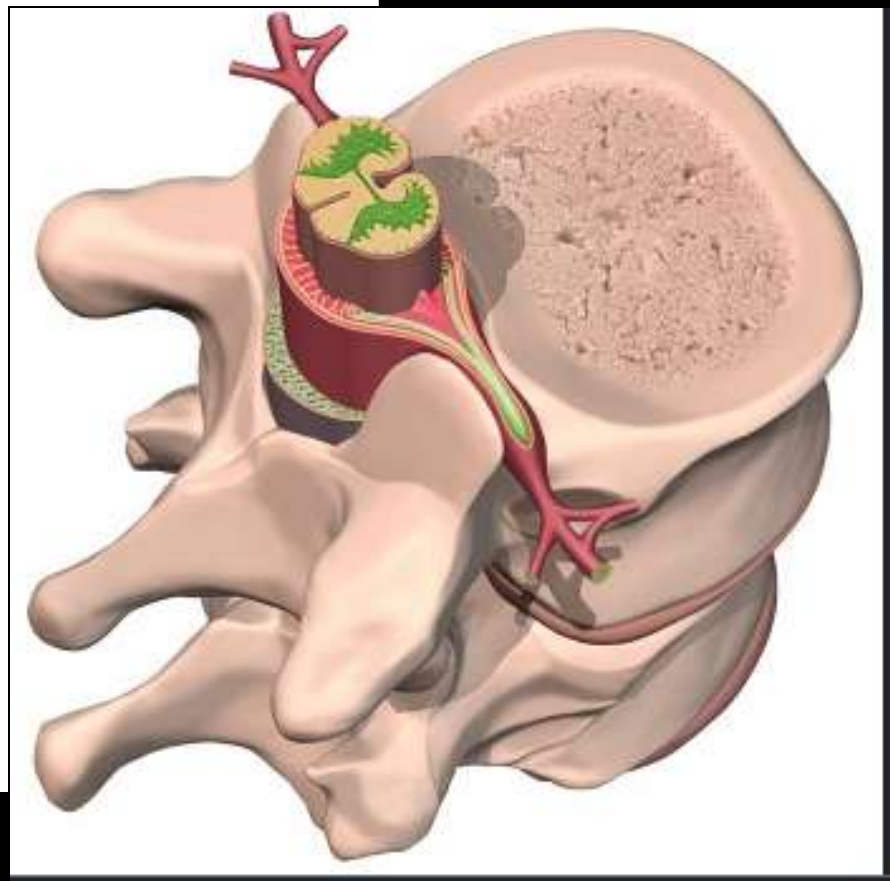
Thoraco lumbar fractures

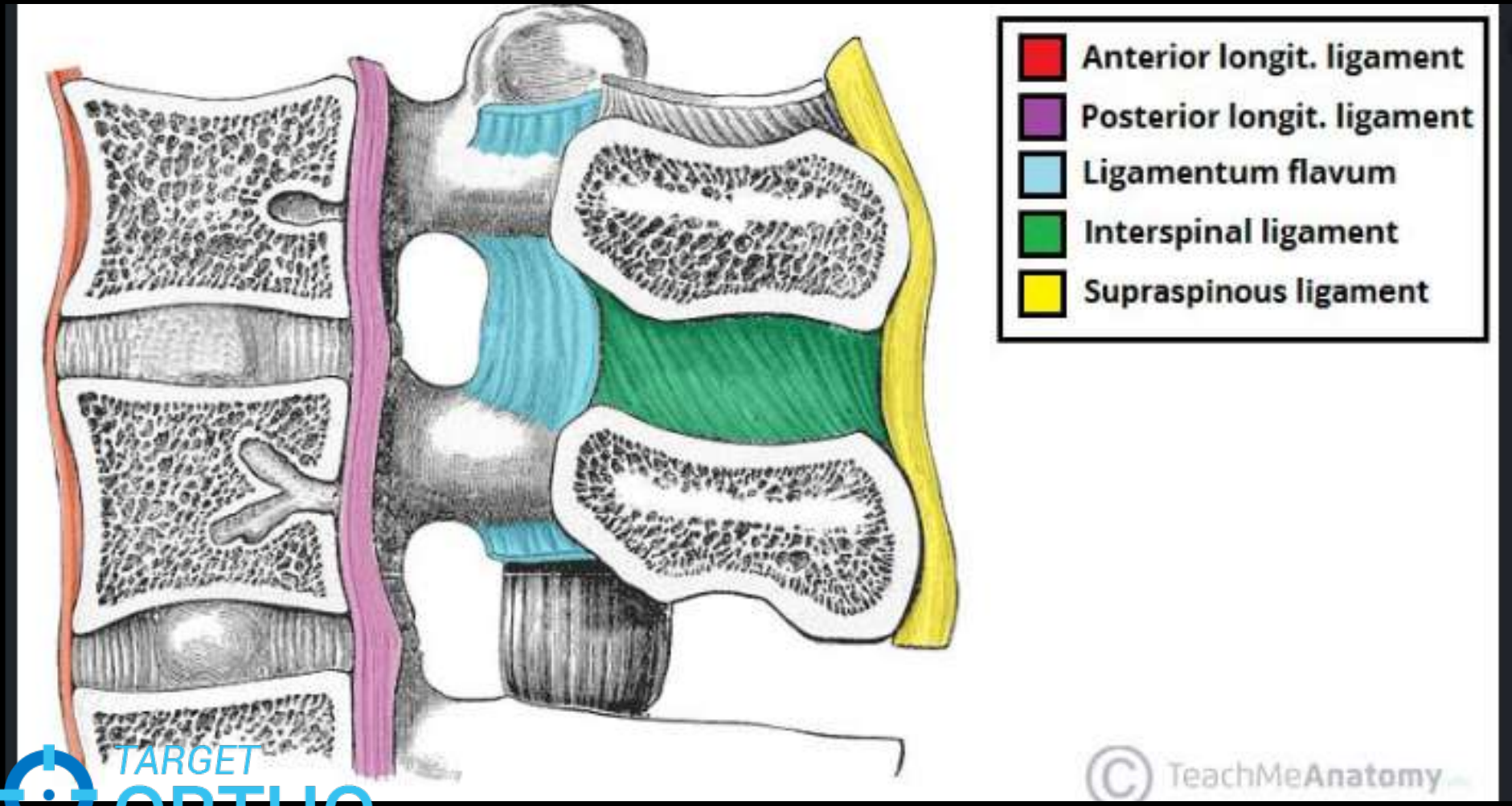


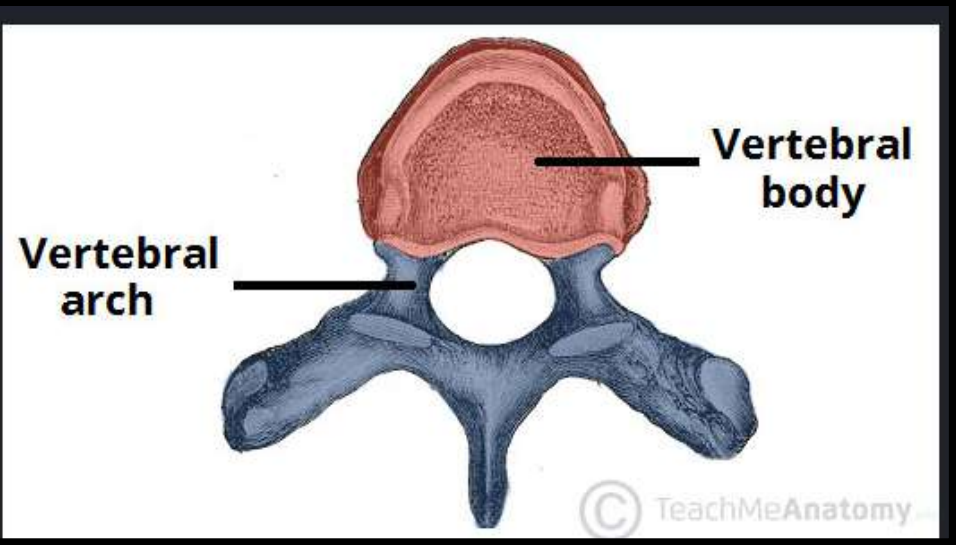
SKSH

Dr.C.S.Vishnuprasath.,M.S.,DNB.,FNB(Spine).,
Consultant spine surgeon,
SKS Hospitals, Salem.







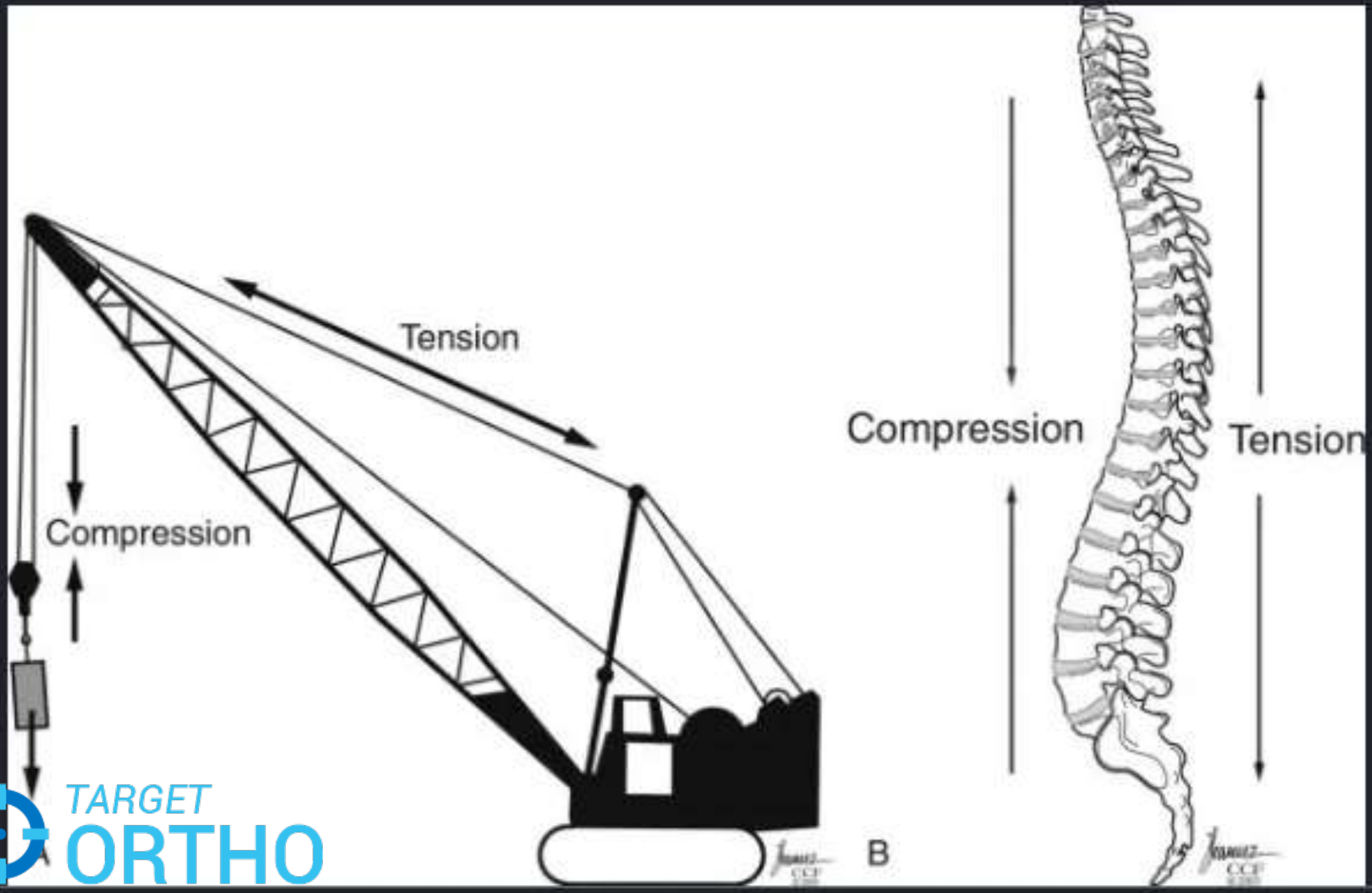


Three biomechanical regions

T1-T8:
relatively rigid (ribcage),
kyphosis.
flexion injury pattern predominates

T9-L2:
transition: immobile - mobile,
transition: kyphosis - lordosis
most injuries occur here

L3-sacrum:
mobile, lordosis
axial load injuries predominate



Spine instability

- ***loss in the ability of the spine under physiologic loads to maintain relationships between vertebrae in such a way that there is neither damage nor subsequent irritation to the spinal cord or nerve roots. In addition there is no development of incapacitating deformity or pain due to structural changes."***

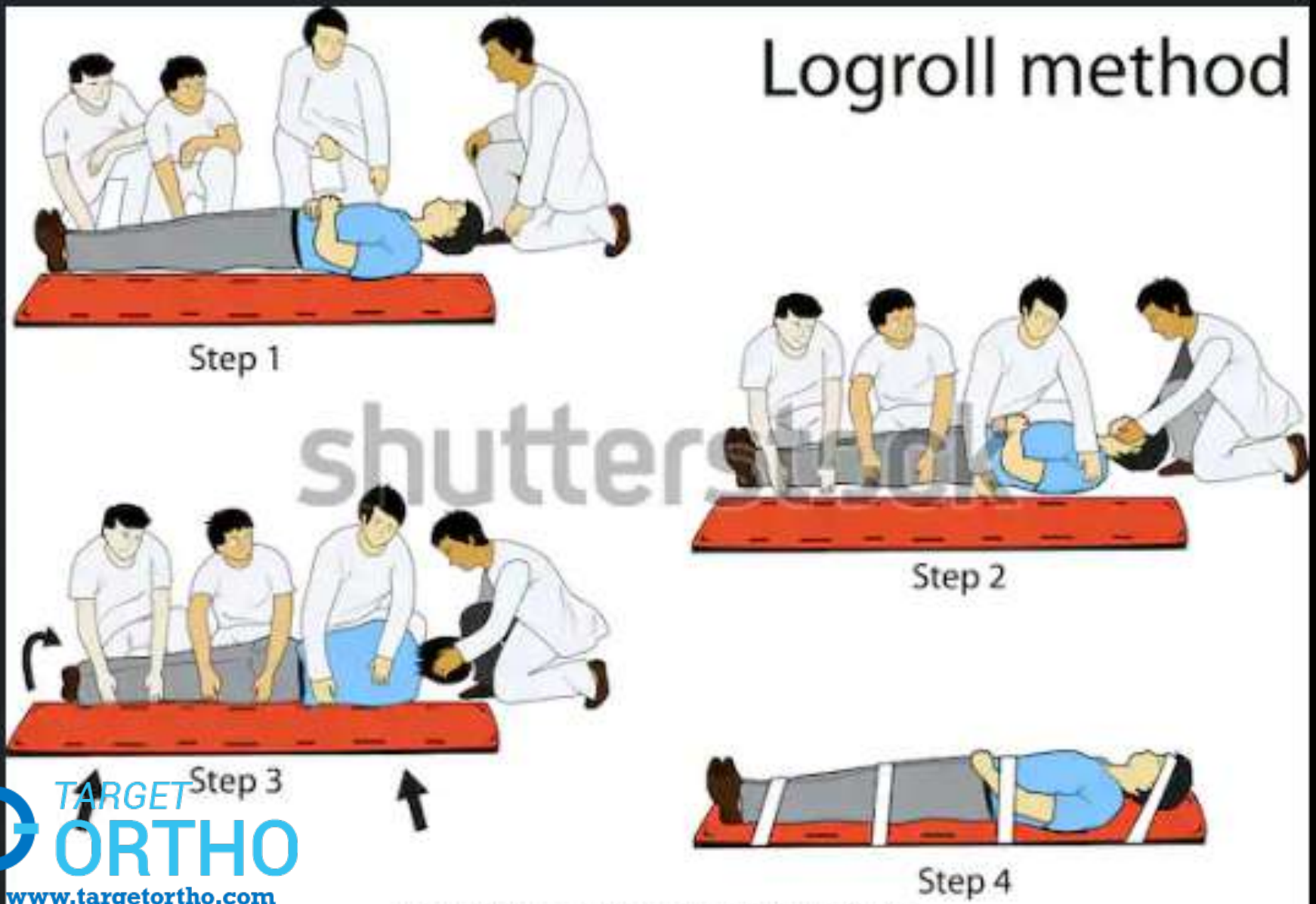
Facts about spinal injury

- 2,50,000 to 5,00,000 – spinal cord injury
- 80% of them due to RTA and fall from height
- 5 times more likely to die prematurely
- Young adult male (20 – 29 yrs)

Assessment of spine injury patients

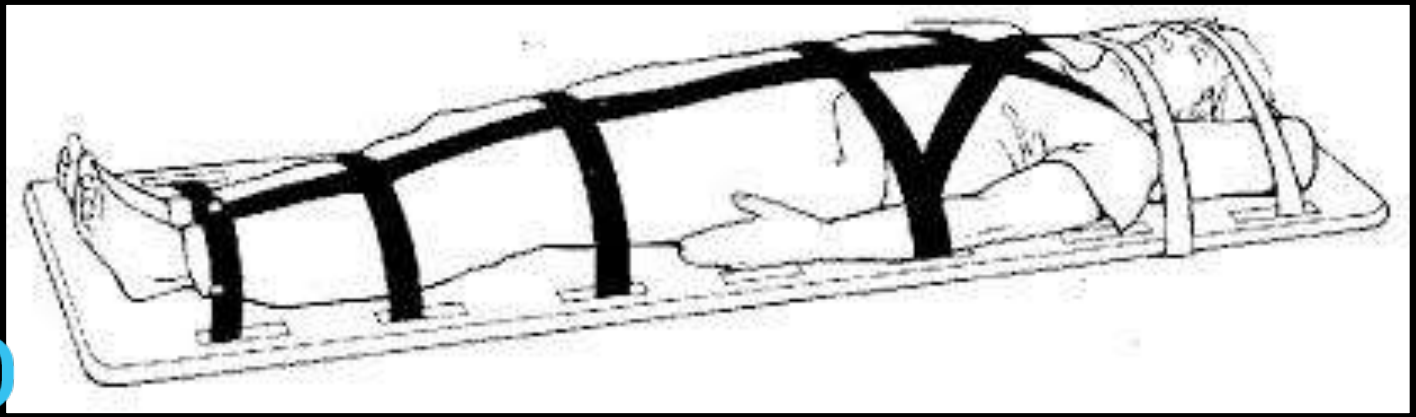
- Accident site response
- Emergency room management
- Imaging protocol
- Treatment strategy

Accident site response

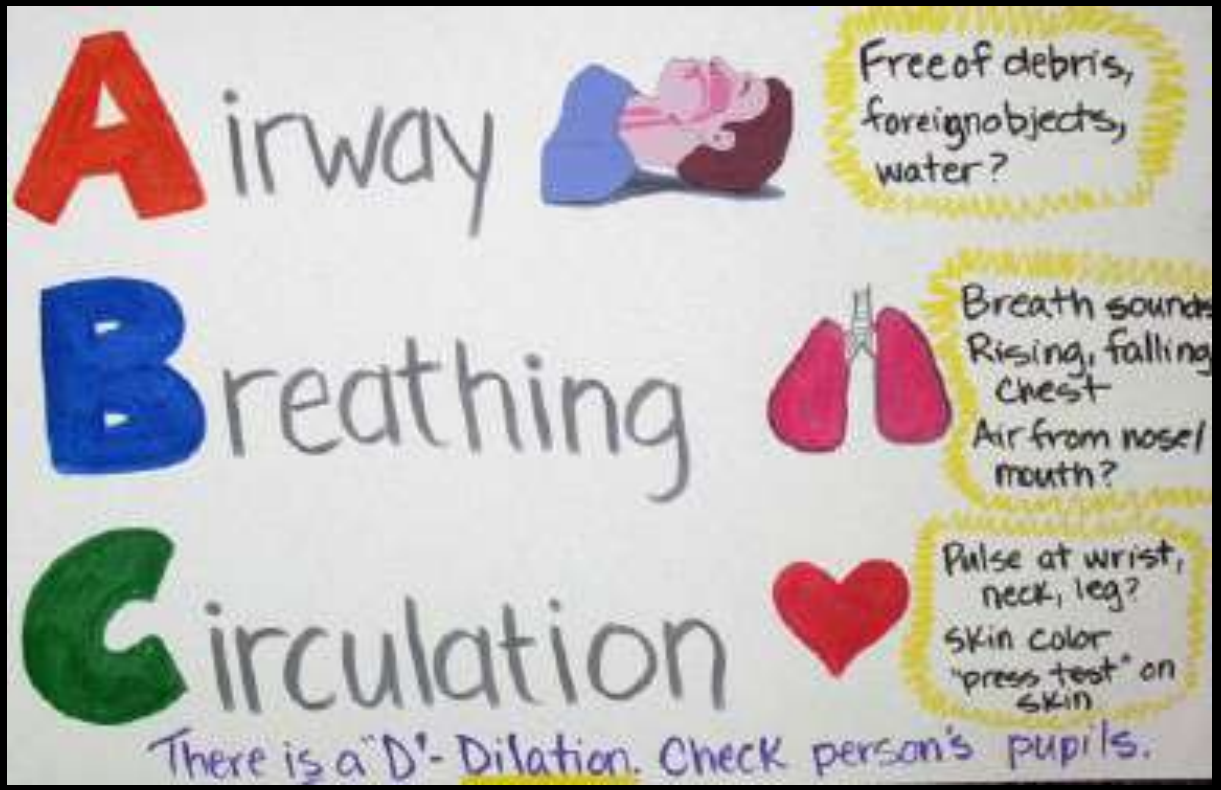


Accident site response

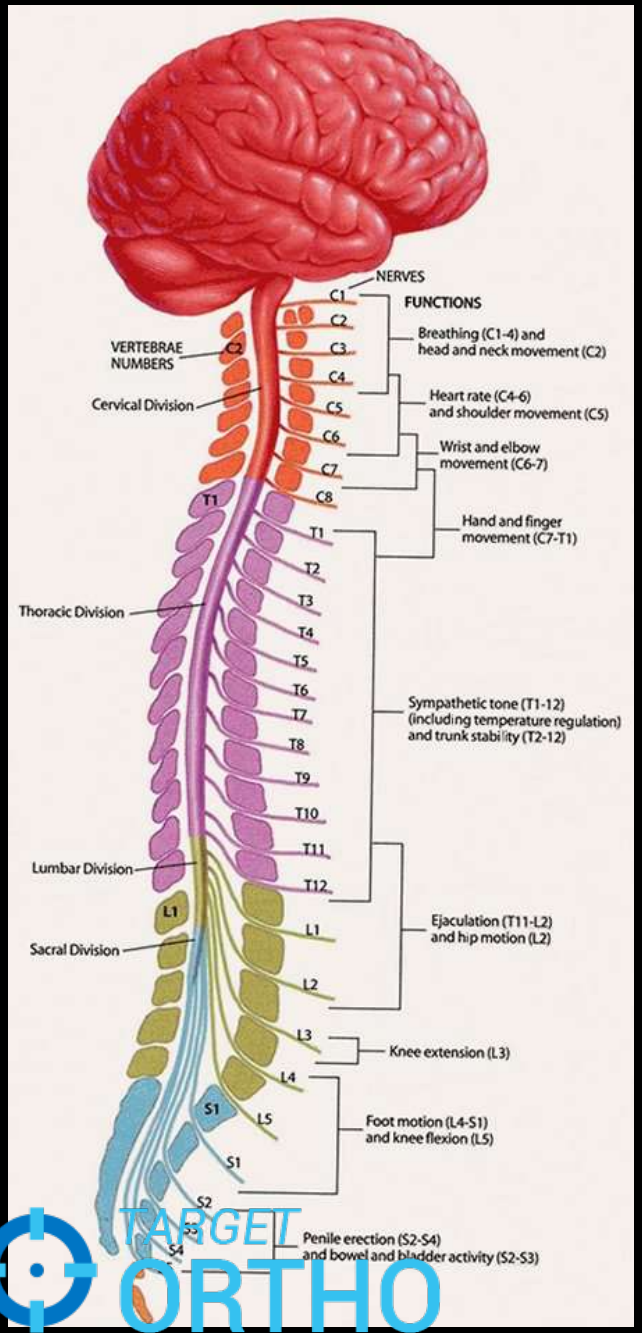
Accident site response



Emergency room management

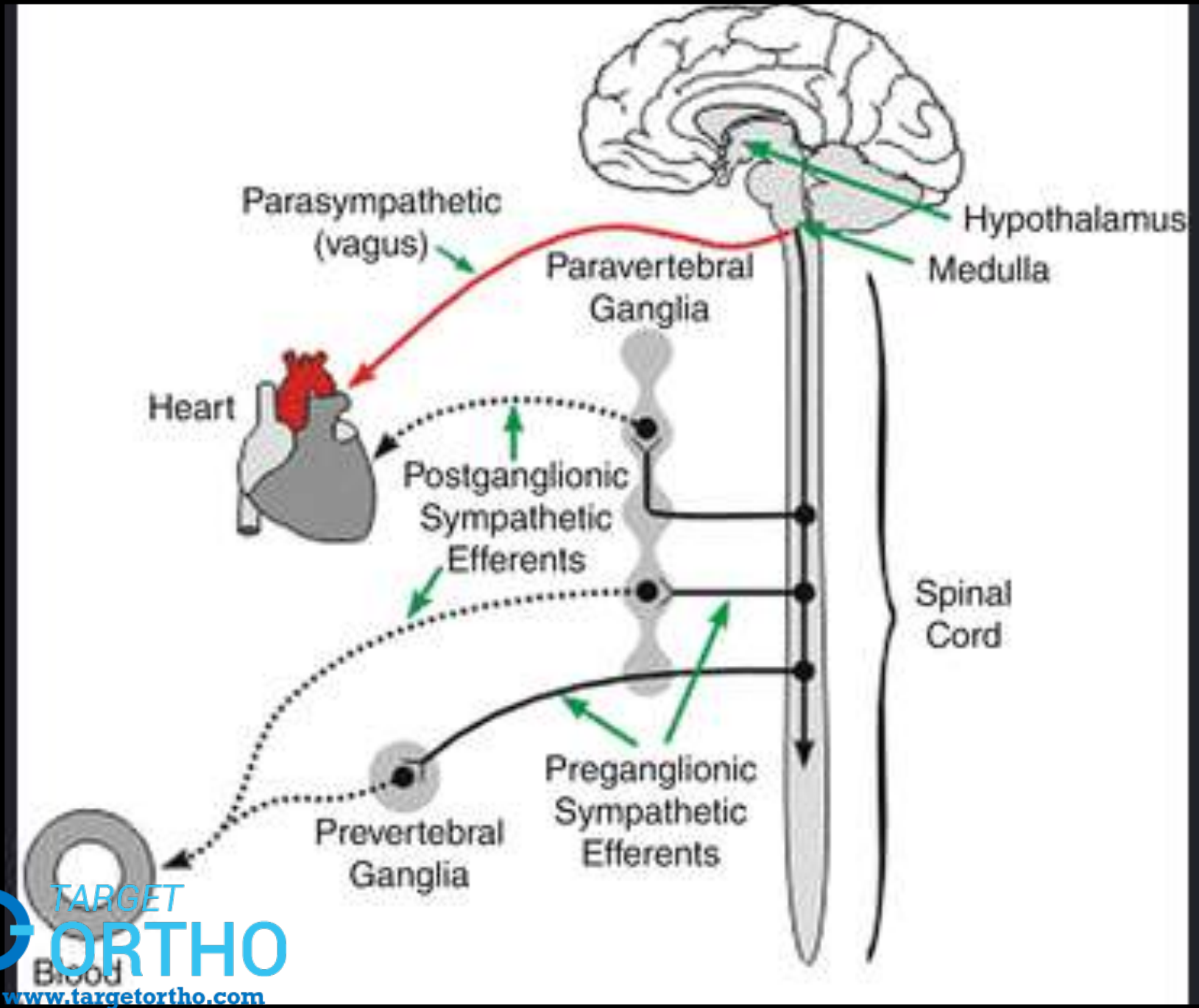


Breathing

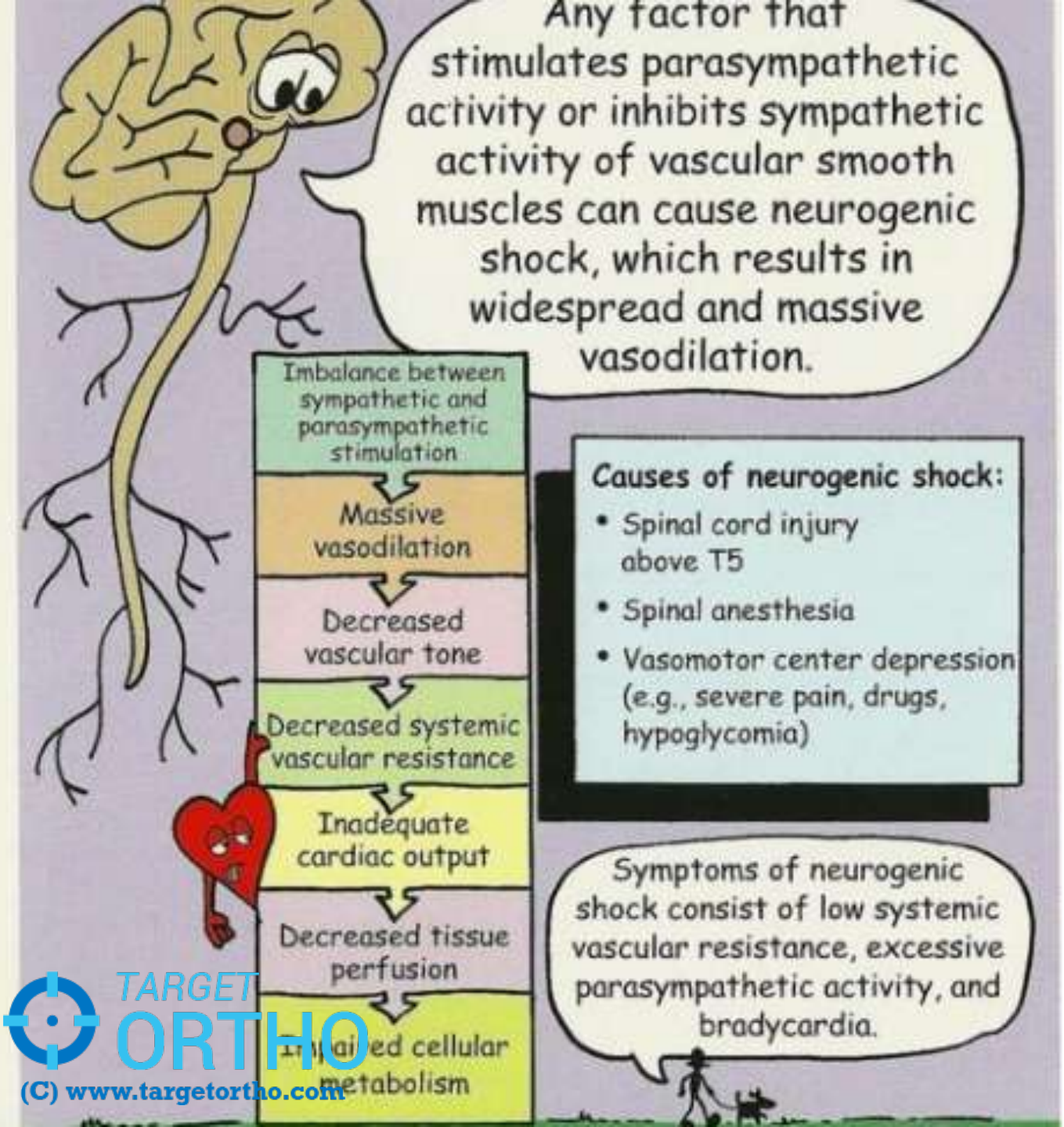


- **Cervical spine injury-** Phrenic nerve palsy and respiratory muscle palsy(c3,c4,c5)

- **Thoracic spine injury-** Chest injury



Neurogenic shock

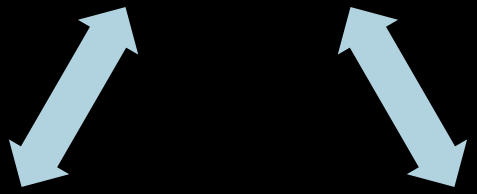


Neurological examination of spine injury patient

Motor power

Sensory examination

Reflexes



Perianal sensation

Voluntary rectal motor function

Great toe flexion

Sacral sparing-incomplete cord injury

Spinal shock

- 50% of patients
- Physiological spinal cord shutdown in response to injury
- M/C – cervical & upper thoracic cord injuries

Flaccid paralysis

Areflexia

Lack of sensation

Spinal shock

- **Resolution of spinal shock-** *reflex arcs caudal to the level of injury begin to function again*

  Bulbovavernous reflex & Anal wink reflex

- Usually within 24 to 48 hours of injury.

- Absence of motor or sensory function below the level of injury after spinal shock- complete injury ***(poor prognosis for neurological recovery).***

- Will not return in conus lesion and caudaequina syndrome

- International Standards for Neurology and Functional Classification of patient with injury in spinal cord

Patient Name _____

Examiner Name _____ Date/Time of Exam _____

STANDARD NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY

MOTOR

KEY MUSCLES

(Scoring on revers side)

C5	☐	☐	Elbow flexors
C6	☐	☐	Wrist extensors
C7	☐	☐	Elbow extensors
C8	☐	☐	Finger flexors *(distal phalanx of middle figure)*
T1	☐	☐	Finger abductors *(little finger)*

UPPER LIMB TOTAL (MAXIMUM) ☐ + ☐ = ☐ (25) (25) (50)

L2	☐	☐	Hip flexors
L3	☐	☐	Knee extensors
L4	☐	☐	Ankle dorsiflexors
L5	☐	☐	Long too extensors
S1	☐	☐	Ankle plantar flexors

Voluntary anal contraction (Yes/No) ☐

LOWER LIMB TOTAL (MAXIMUM) ☐ + ☐ = ☐ (25) (25) (50)

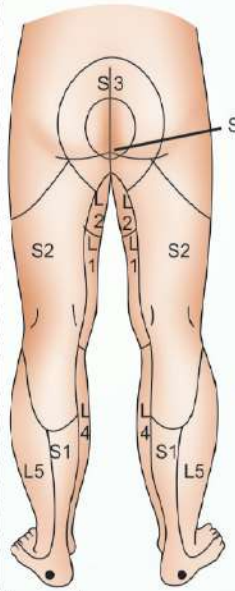
TOTALS *TOTALS (MAXIMUM)* ☐ + ☐ = ☐ (56) (56) (56) (56)

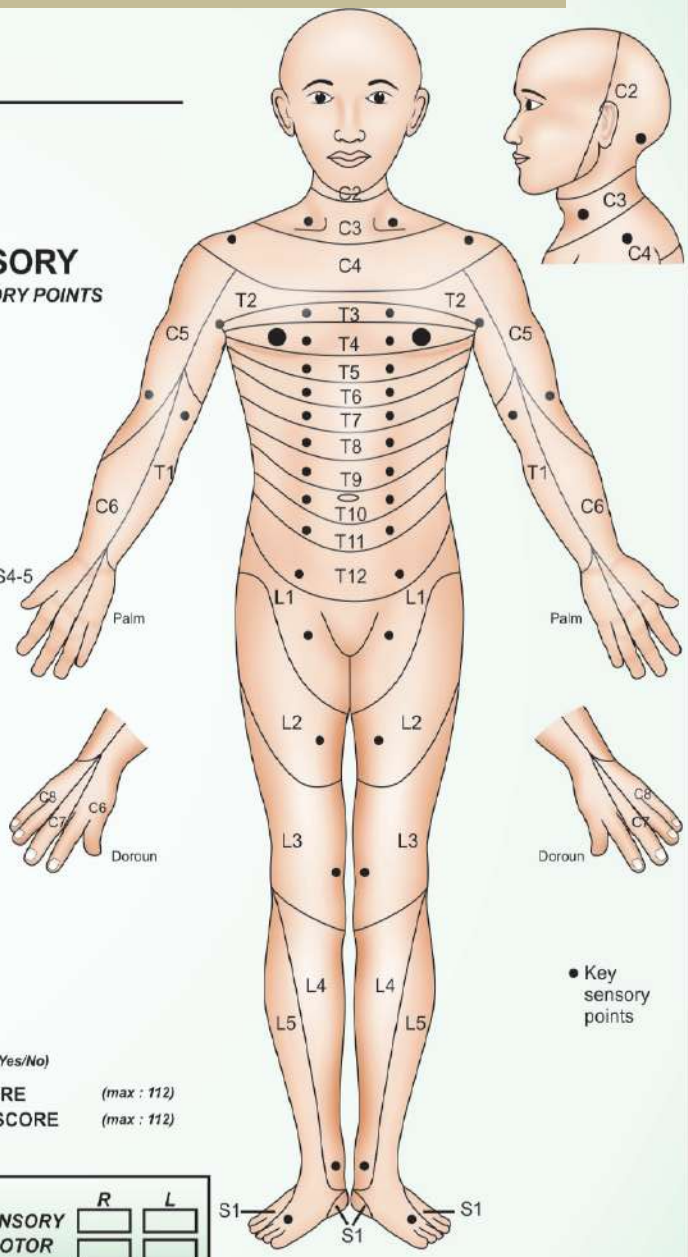
SENSORY

KEY SENSORY POINTS

0 = absent
1 = Impaired
2 = normal
NT = not testable

	LIGHT TOUCH R	*LIGHT TOUCH* L	*PIN PRICK* R	*PIN PRICK* L
C2				
C3				
C4				
C5				
C6				
C7				
C8				
T1				
T2				
T3				
T4				
T5				
T6				
T7				
T8				
T9				
T10				
T11				
T12				
L1				
L2				
L3				
L4				
L5				
S1				
S2				
S3				
S4-5				





☐ Any anal sensation (Yes/No)

PIN PRICK SCORE (max : 112) ☐

LIGHT TOUCH SCORE (max : 112) ☐

NEUROLOGICAL LEVEL — SENSORY R ☐ L ☐ — MOTOR R ☐ L ☐

The most caudal segment with normal function

COMPLETE OR INCOMPLETE? ☐

Incomplete Any senecry or motor function in S4-S5

ASIA IMPAIRMENT SCALE ☐

ZONE OF PARTIAL PRESERVATION — *SENSORY* R ☐ L ☐ — *MOTOR* R ☐ L ☐

- ***A-Complete**: No motor or sensory function*
- ***B-Incomplete:** Sensory function below neurological but no motor function*
- ***C-Incomplete:** Motor function is preserved ,more than half the muscles < 3/5.*
- ***D-Incomplete:** Motor function is preserved ,muscle grade >=3/5.*
- ***E-Normal:** Sensory and motor functions are normal.*

Imaging modalities

- X-ray
- CT scan
- MRI

X-Ray

- Never hesitate to take X-ray of a painful spinal segment
- Unconscious pt
- Facial injury
- 80% - detection rate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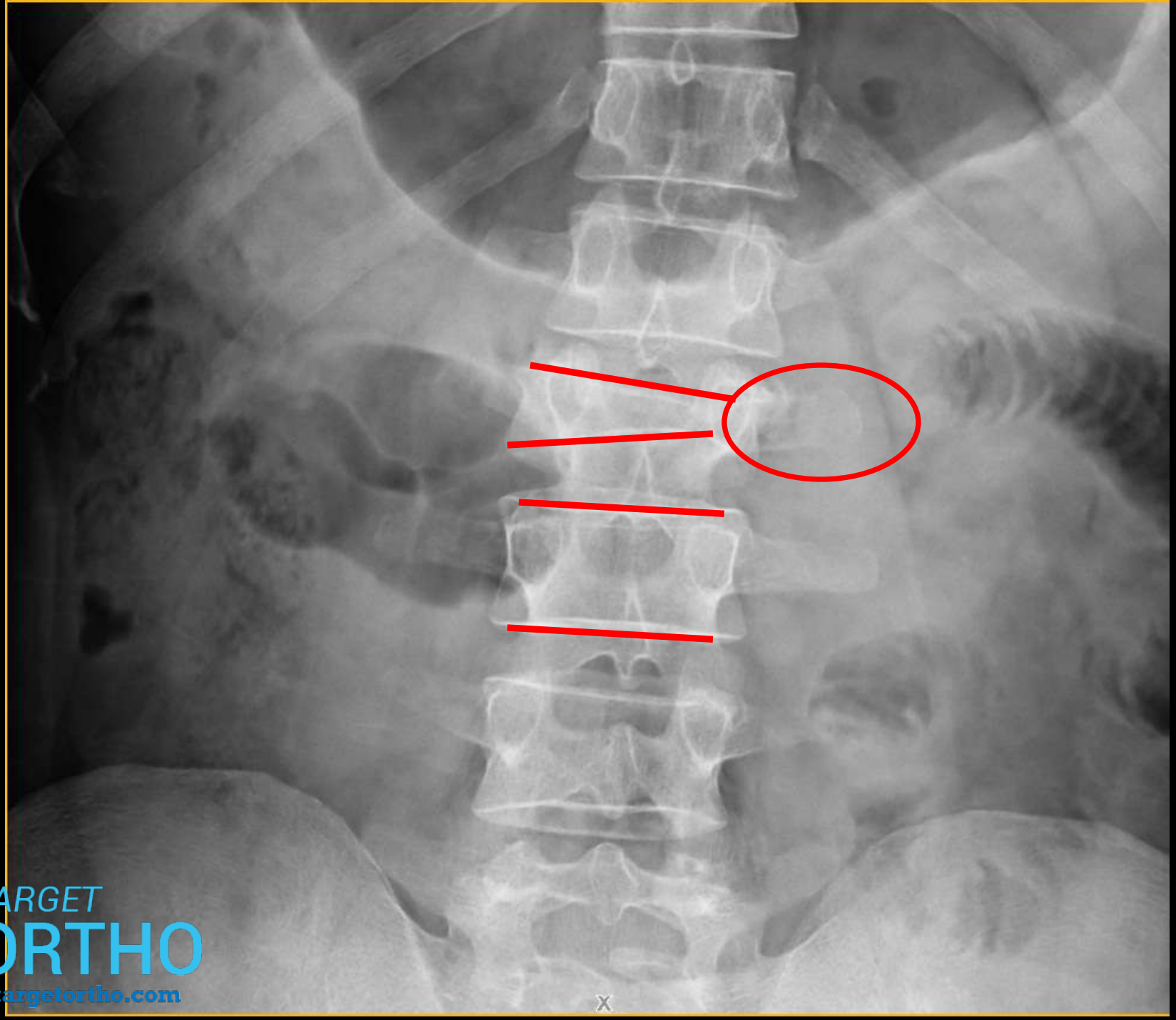

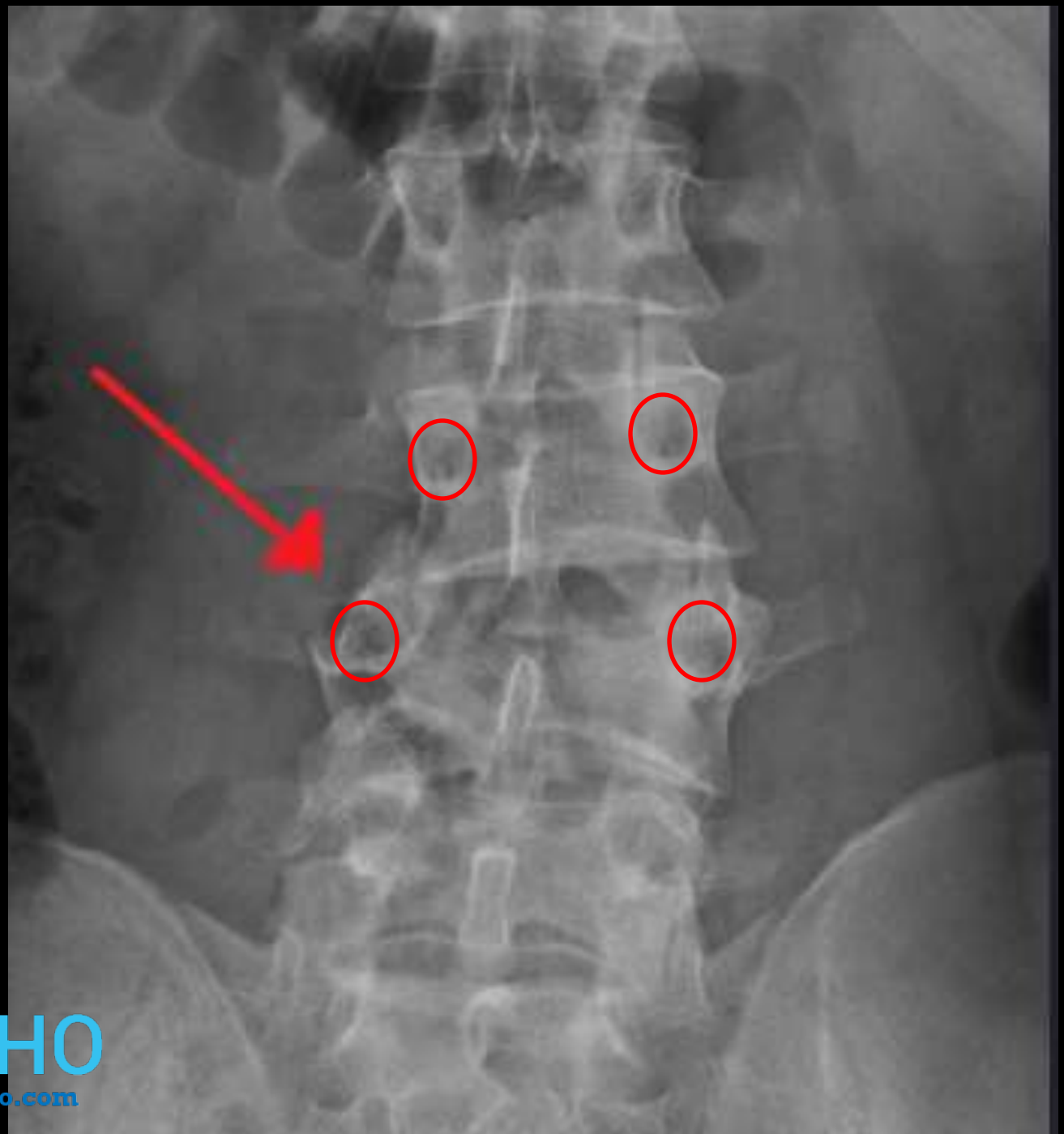

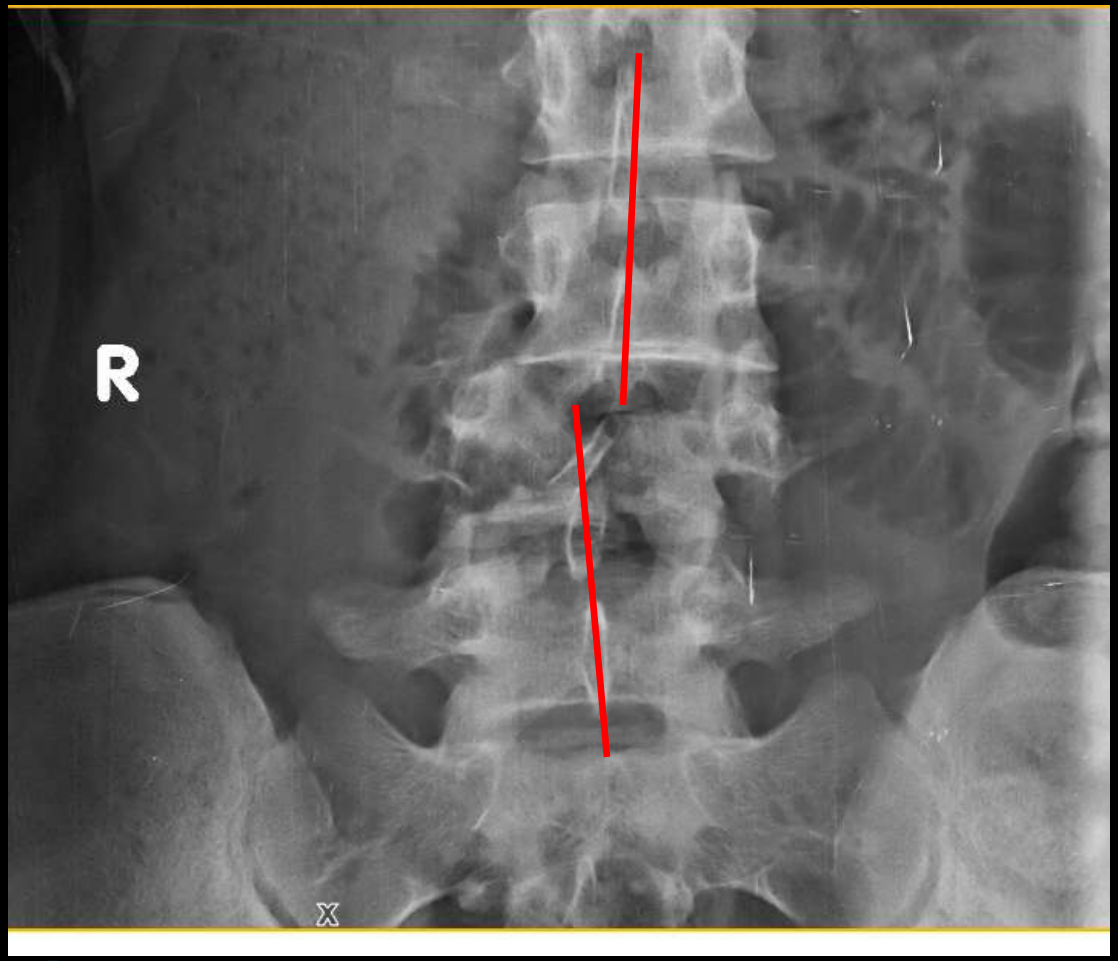

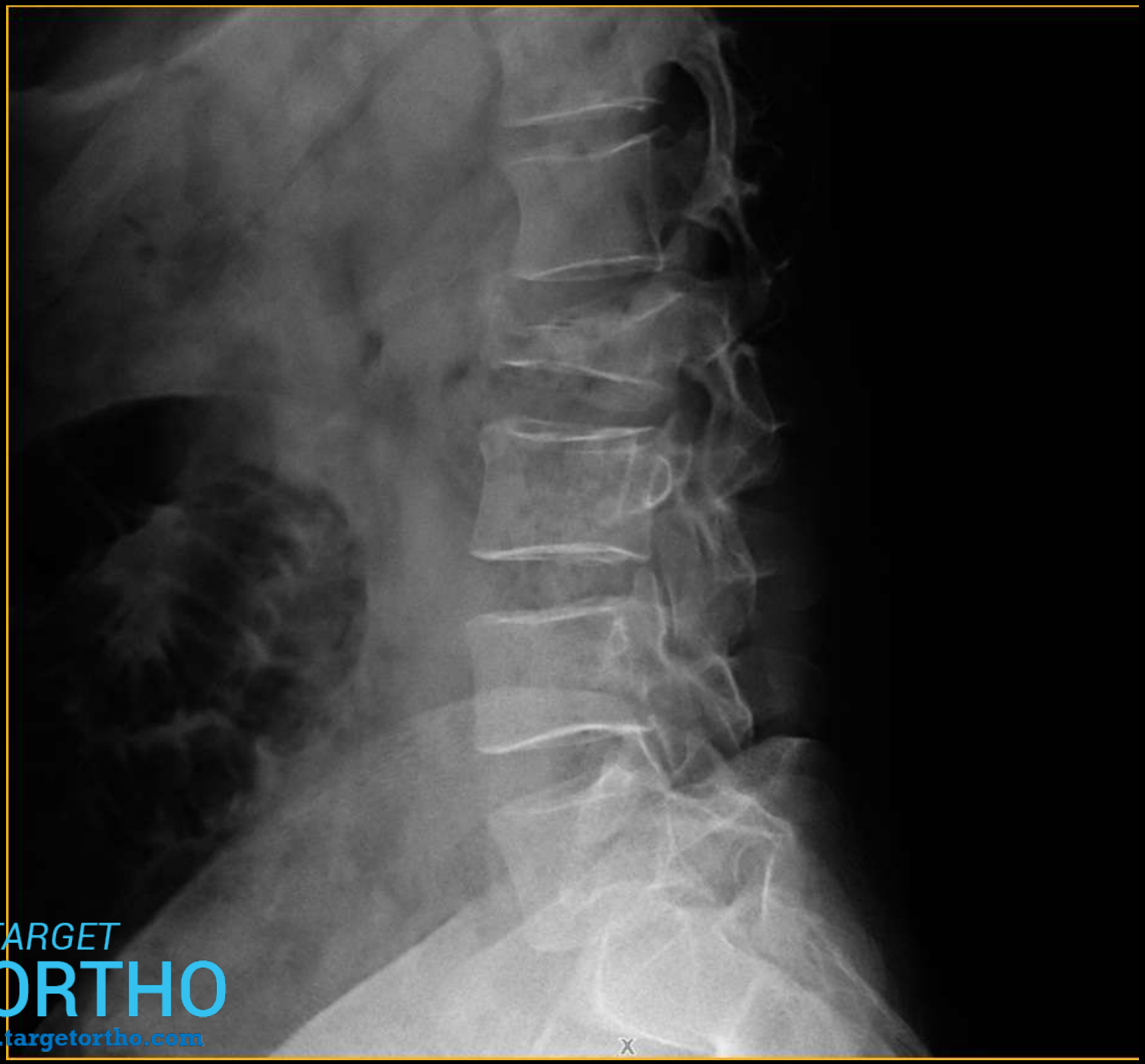


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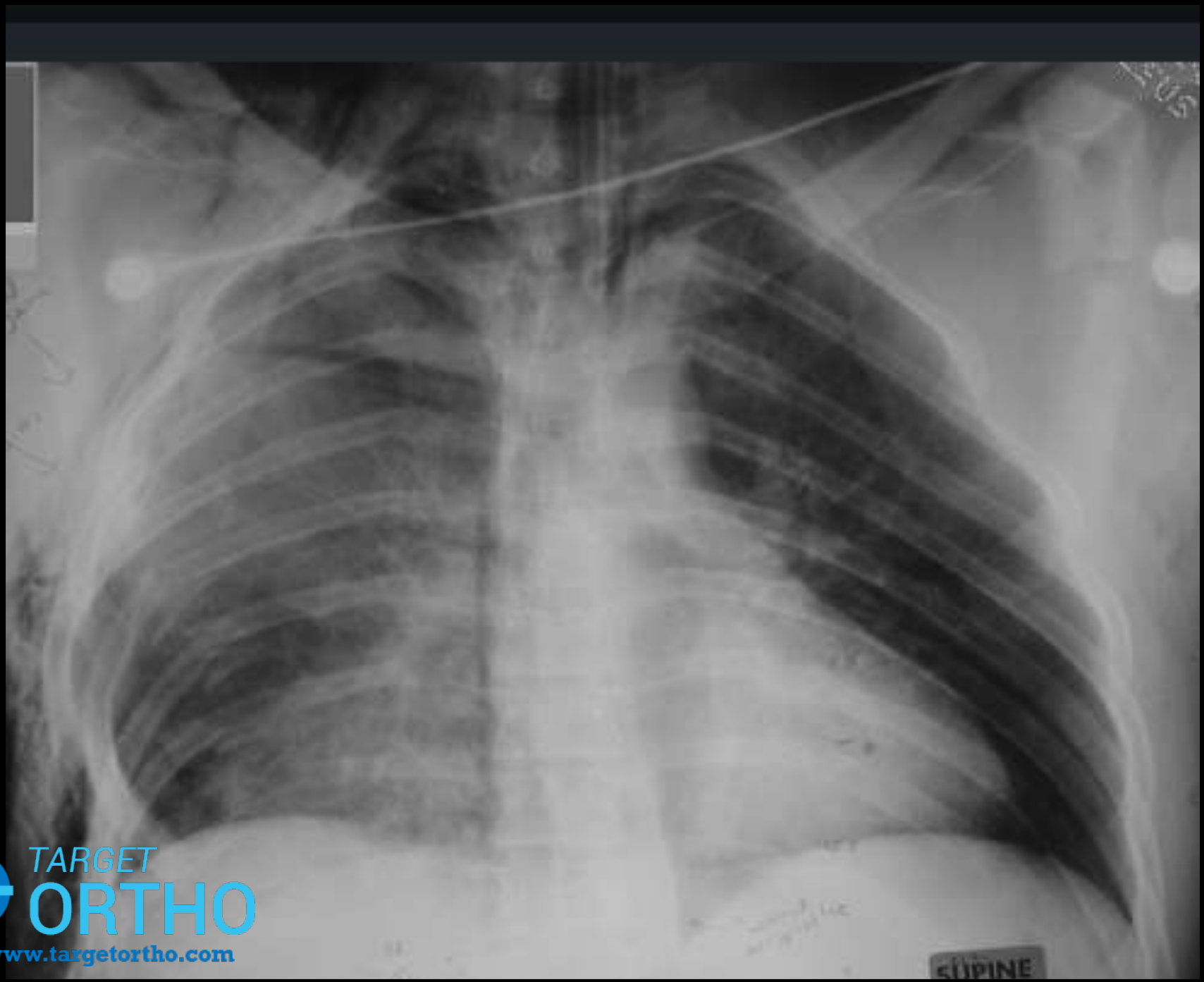
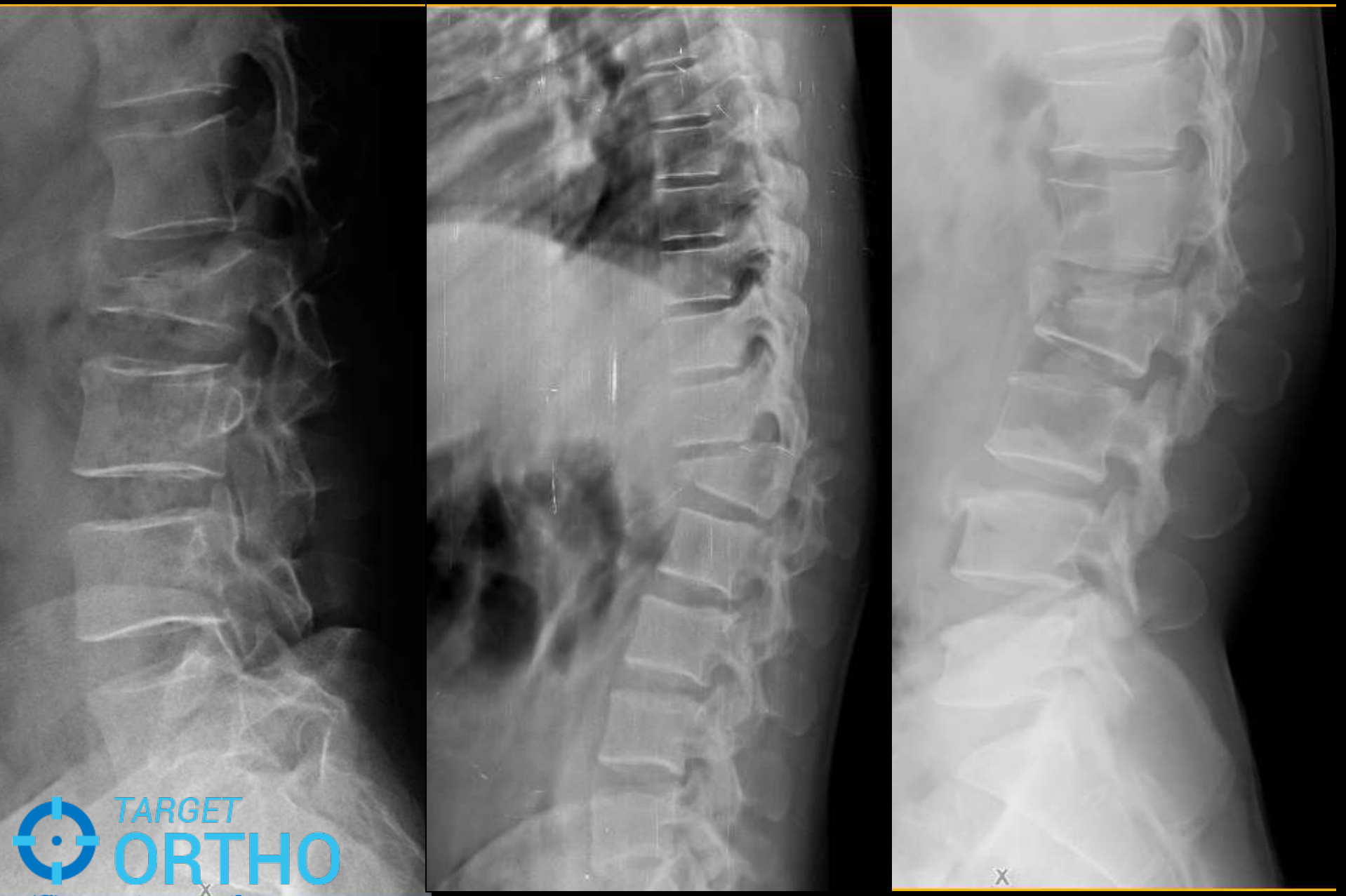


MRI & CT

- All patients with neurological defecit
- Normal neurology – Xray suggestive of unstable fracture

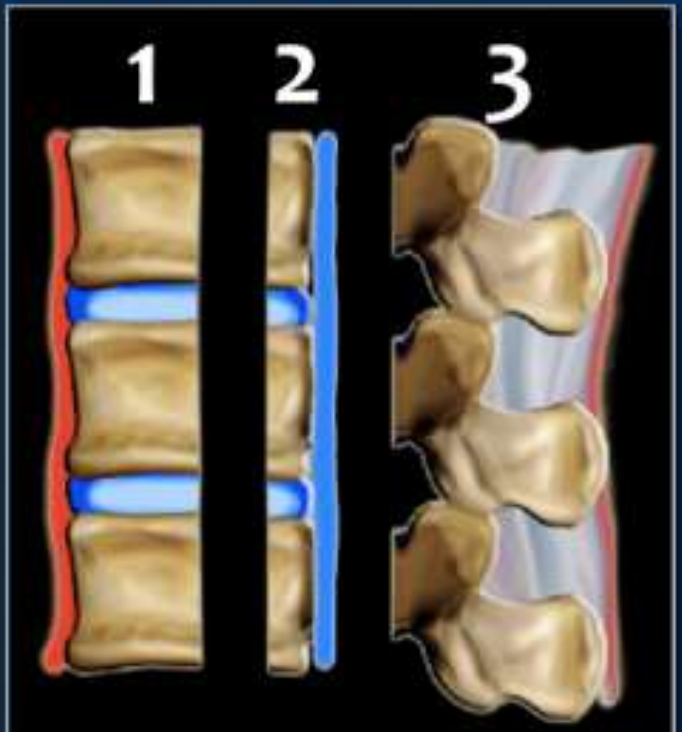
Radiographic Criteria for Instability

- Kyphosis > 20°
- Loss of > 50% anterior vertebral body height
- Multiple adjacent compression fractures with significant spinal deformity
- Spinal dislocation of the posterior elements (i.e., facet dislocation)



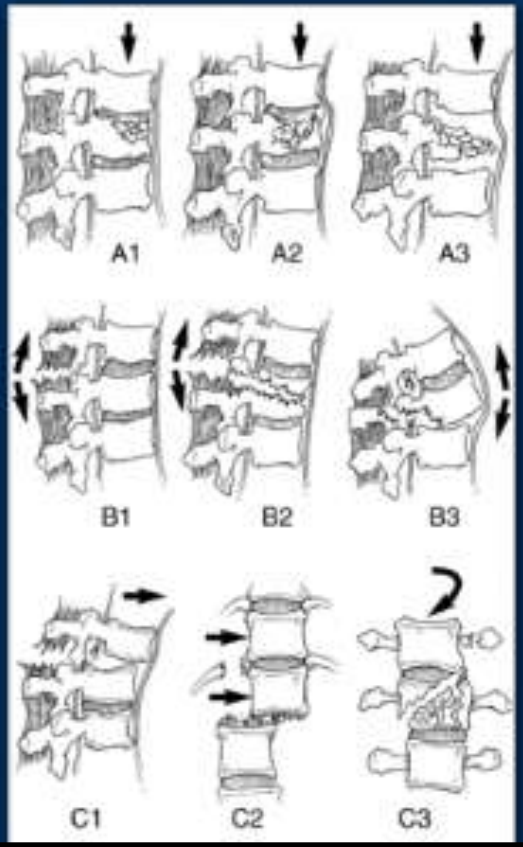
Denis

3-column classification



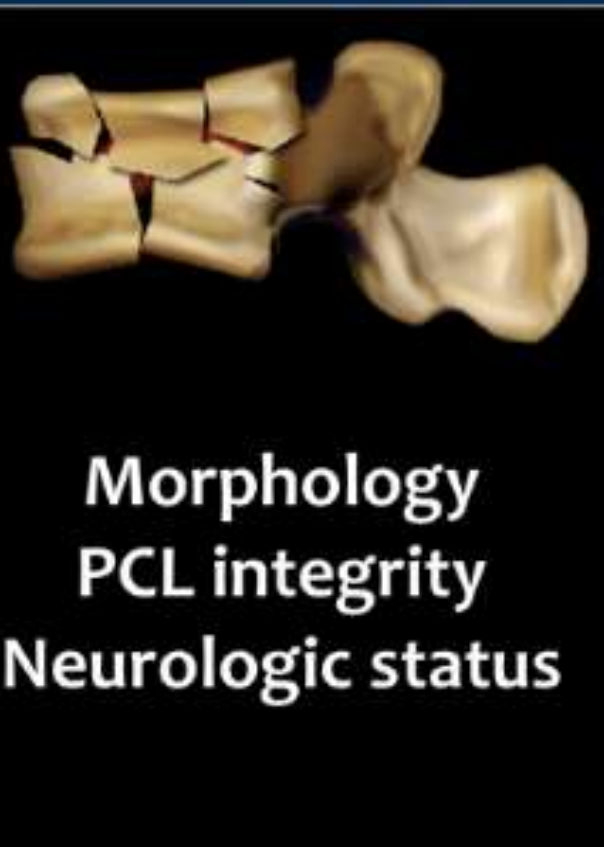
AO

classification



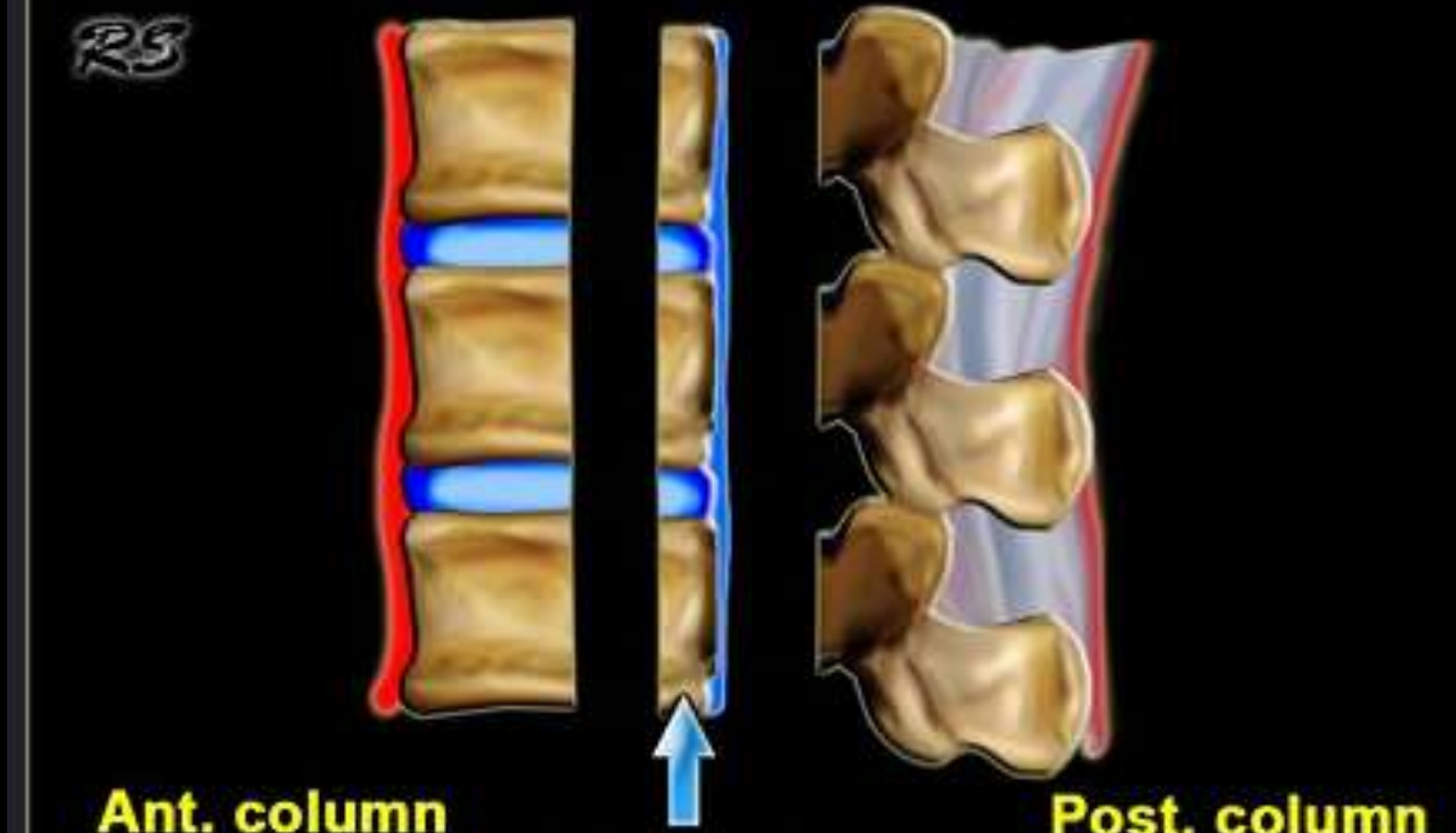
TLICS

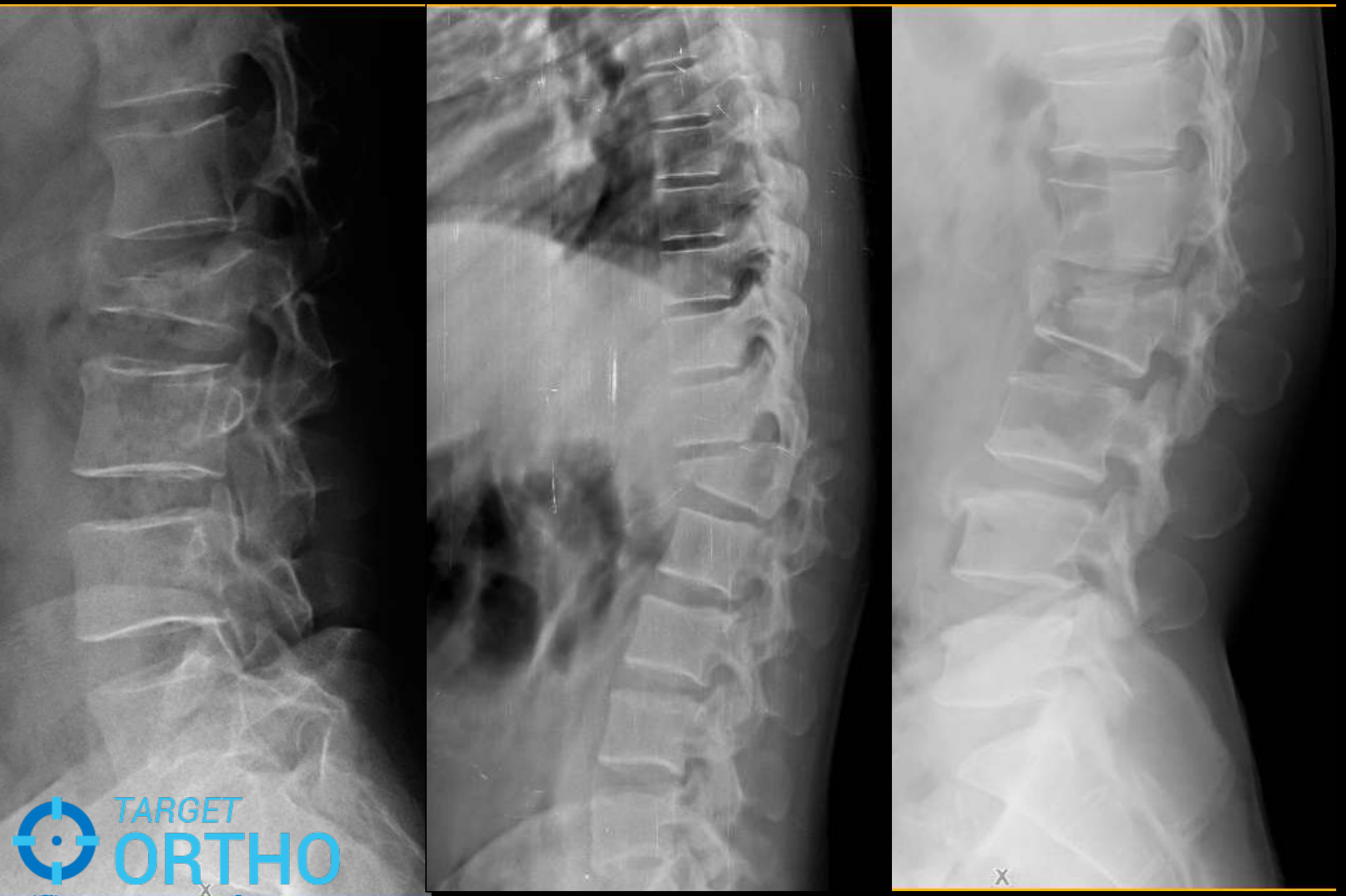
classification



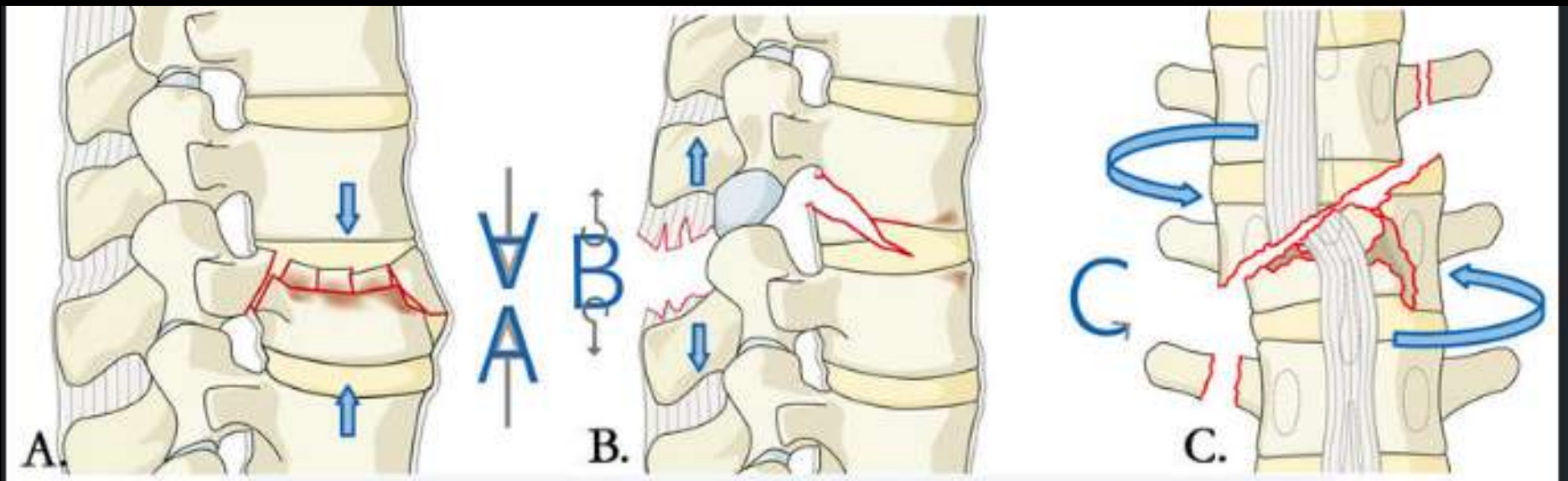
Morphology
PCL integrity
Neurologic status

Denis 3 column classification



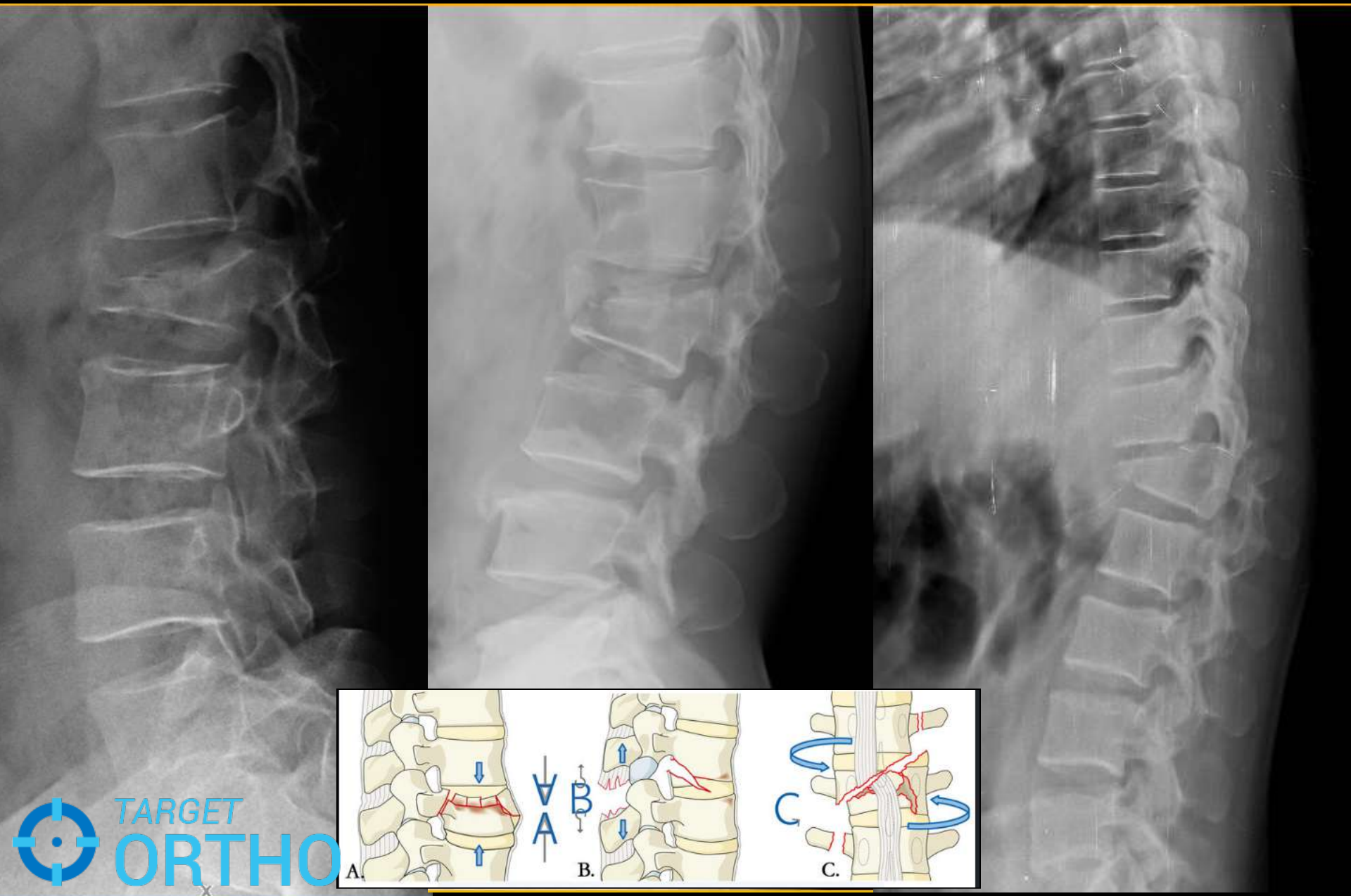


AO classification



Classification A B C

Compression injuries=shortening	→ type A
Distraction injuries=lengthening	→ type B
Torsional injuries=rotation	→ type C

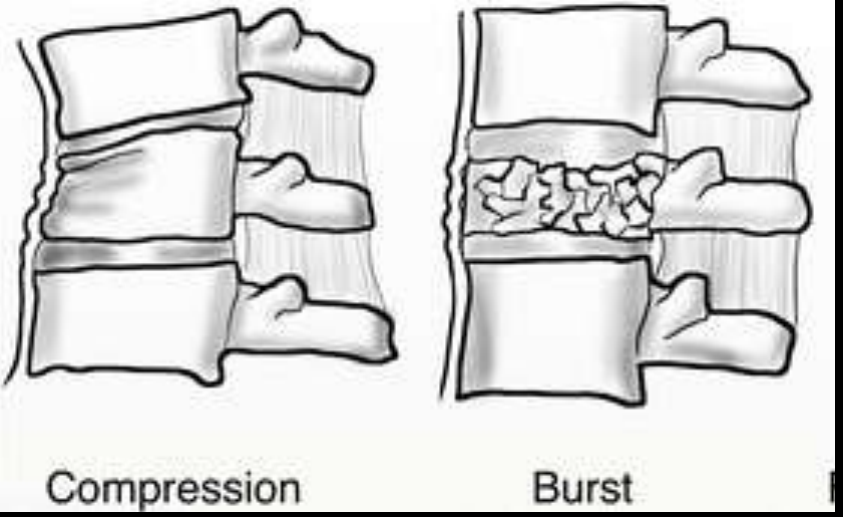


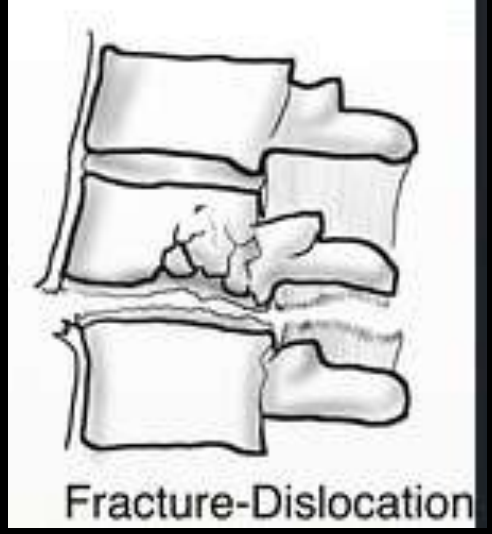
Thoracolumbar Injury Classification and Severity Score

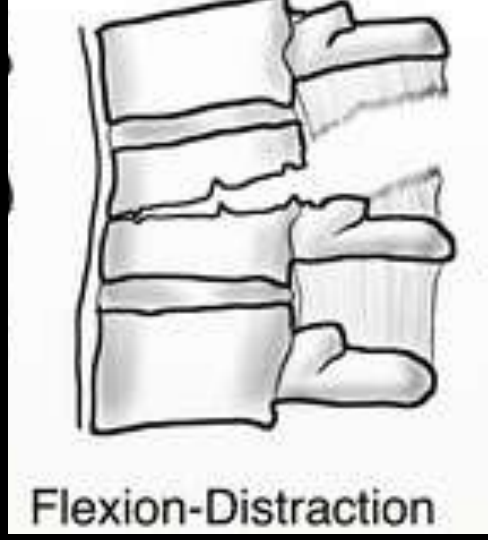
	POINTS
FRACTURE MECHANISM	
Compression fracture	1
Burst fracture	1
Translation/rotation	3
Distraction	4
NEUROLOGICAL INVOLVEMENT	
Intact	0
Nerve root	2
Cord, conus medullaris, incomplete	3
Cord, conus medullaris, complete	2
Cauda equina	3
POSTERIOR LIGAMENTOUS COMPLEX INTEGRITY	
Intact	0
Injury suspected/indeterminate	2
Injured	3

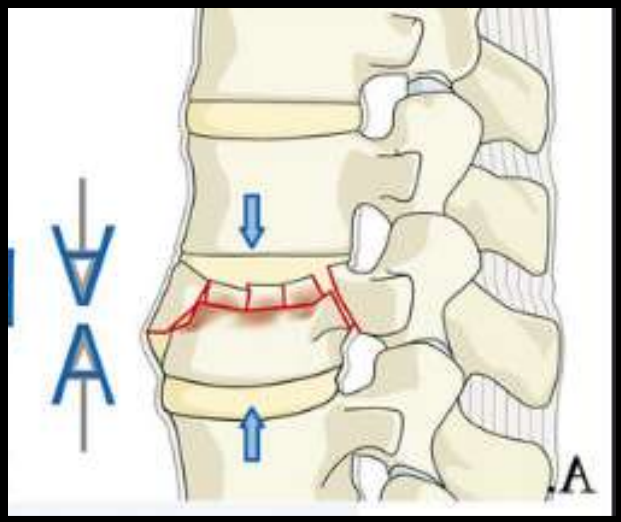
TLICS 3 independent predictors

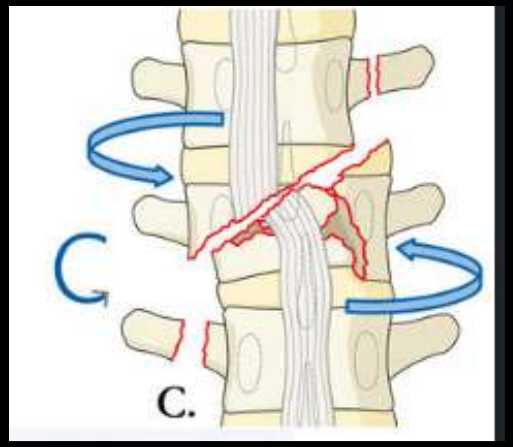
1	**Morphology** immediate stability	- Compression - Burst - Translation/rotation - Distraction	1 2 3 4	- Radiographs - CT
2	**Integrity of PLC** longterm stability	- Intact - Suspected - Injured	0 2 3	- MRI
3	**Neurological status**	- Intact - Nerve root - Complete cord - Incomplete cord - Cauda equina	0 2 2 3 3	- Physical examination
Predicts		- **Need for surgery**	0 – 3 4 > 4	- nonsurgical - surgeon's choice - surgical

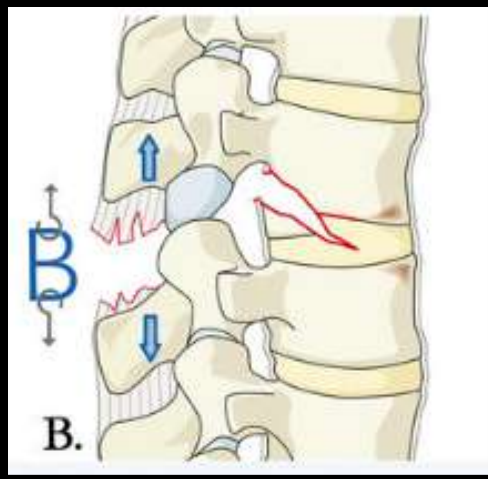








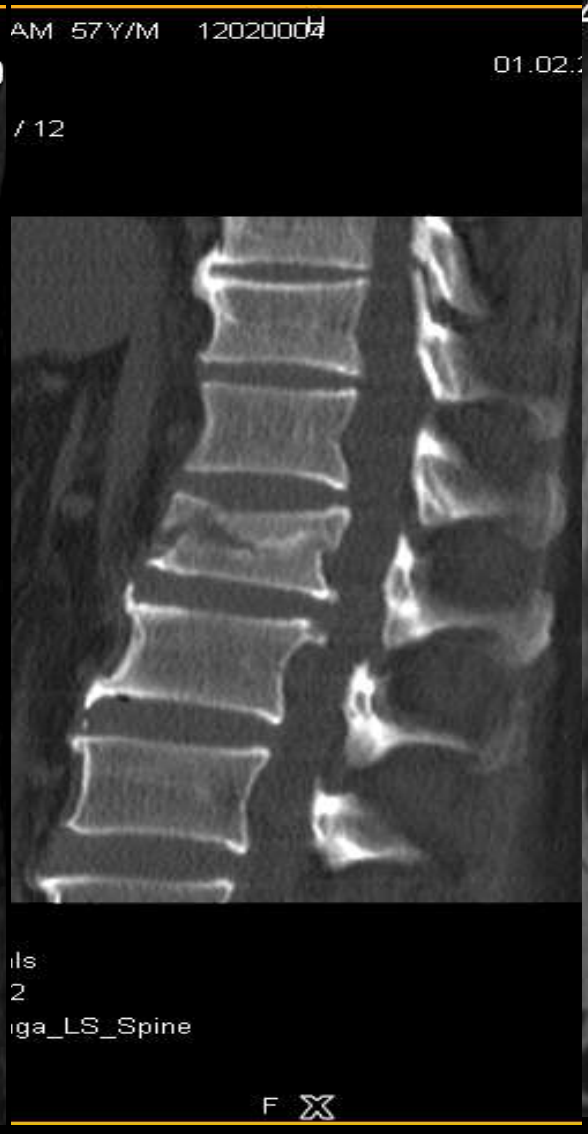


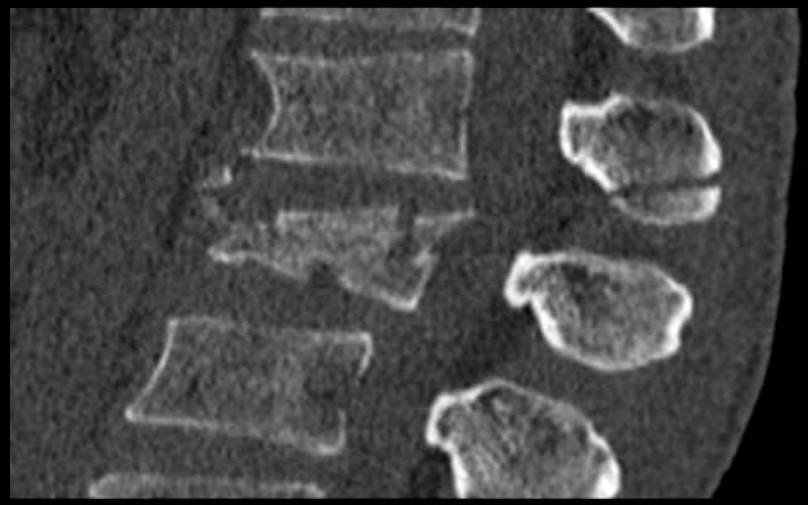


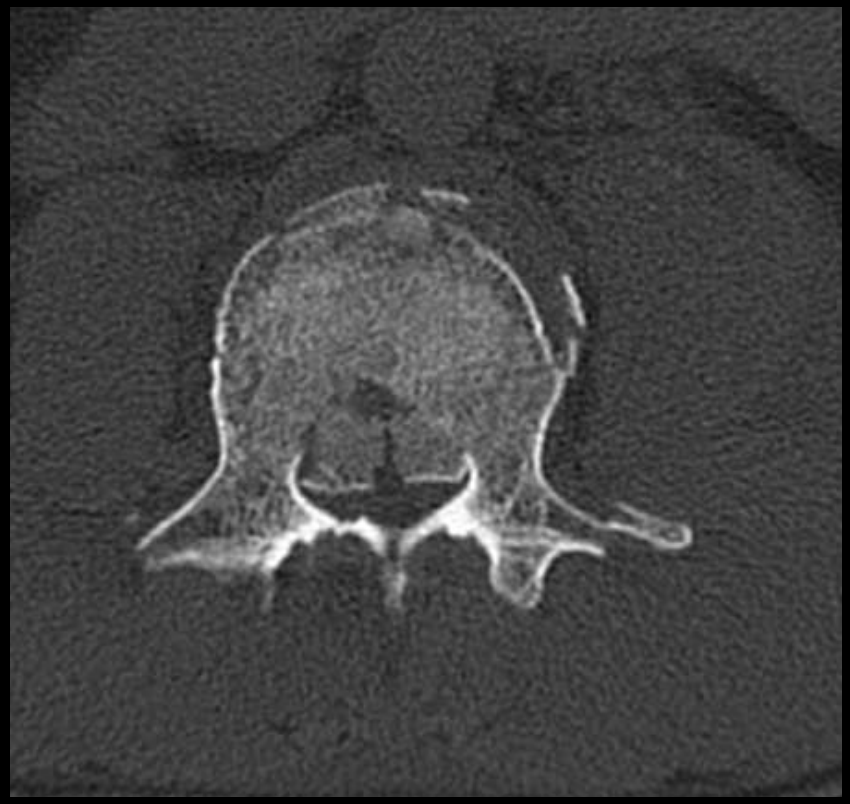
1 2

3

4

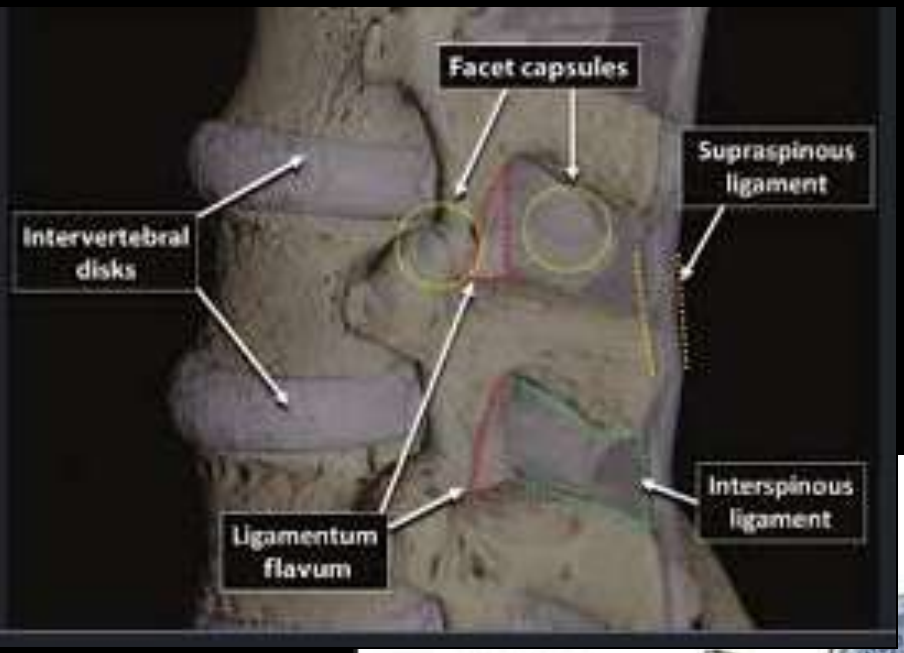






TLICS 3 independent predictors

1	**Morphology** immediate stability	- Compression - Burst - Translation/rotation - Distraction	1 2 3 4	- Radiographs - CT
2	**Integrity of PLC** longterm stability	- Intact - Suspected - Injured	0 2 3	- MRI
3	**Neurological status**	- Intact - Nerve root - Complete cord - Incomplete cord - Cauda equina	0 2 2 3 3	- Physical examination
Predicts		- **Need for surgery**	0 – 3 4 > 4	- nonsurgical - surgeon's choice - surgical



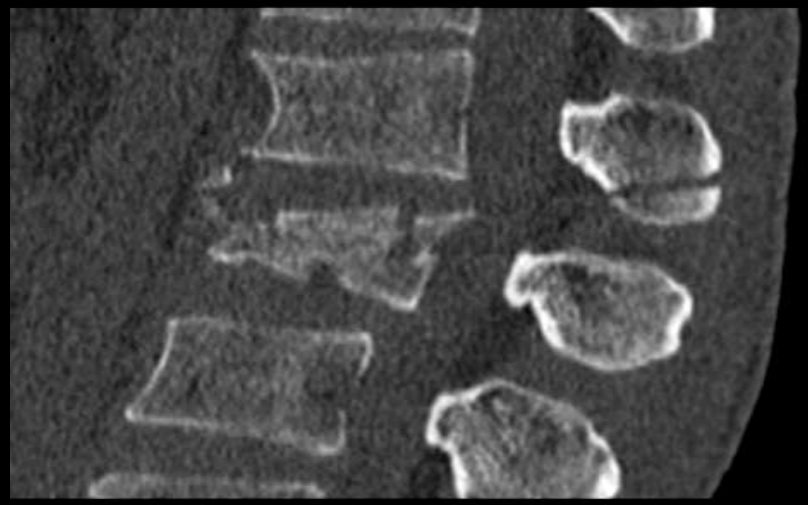
Posterior Column

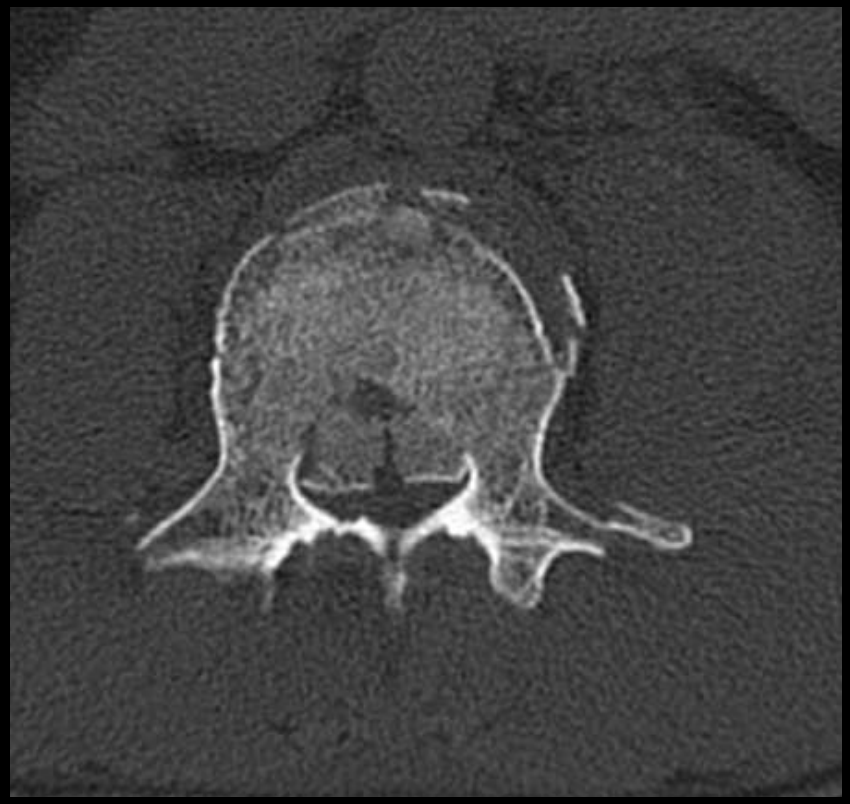
Posterior Ligamentous Complex

1. Ligamentum flavum
2. Interspinous ligament
3. Facet capsule
4. Supraspinous ligament

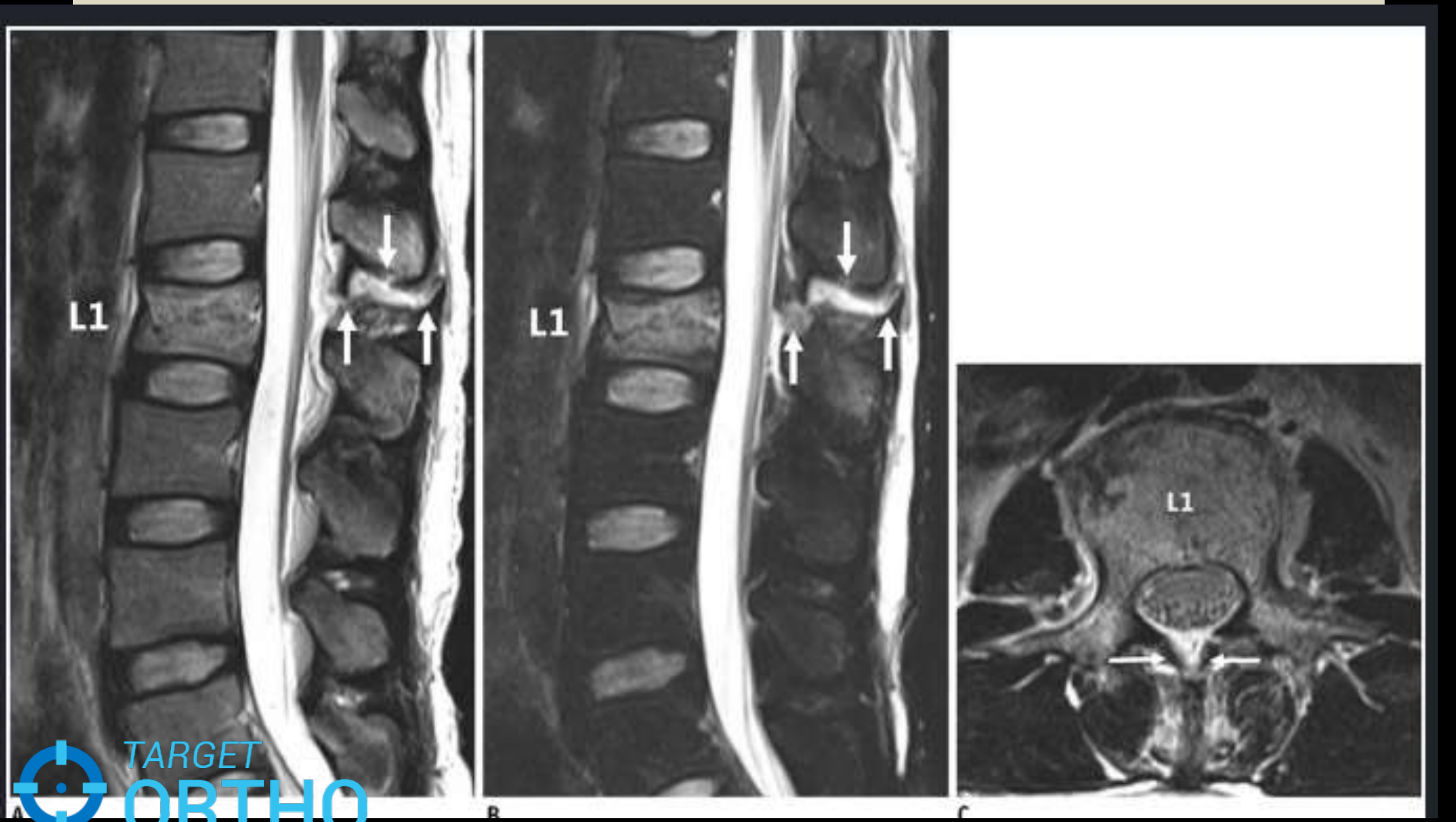
PLC integrity
Injured -3

- Palpable ligamentous gap between the spinous processes
- splaying of the spinous processes (widening of the interspinous space)
- diastasis of the facet joints/facet perch/subluxation
- translation of one vertebral body on another

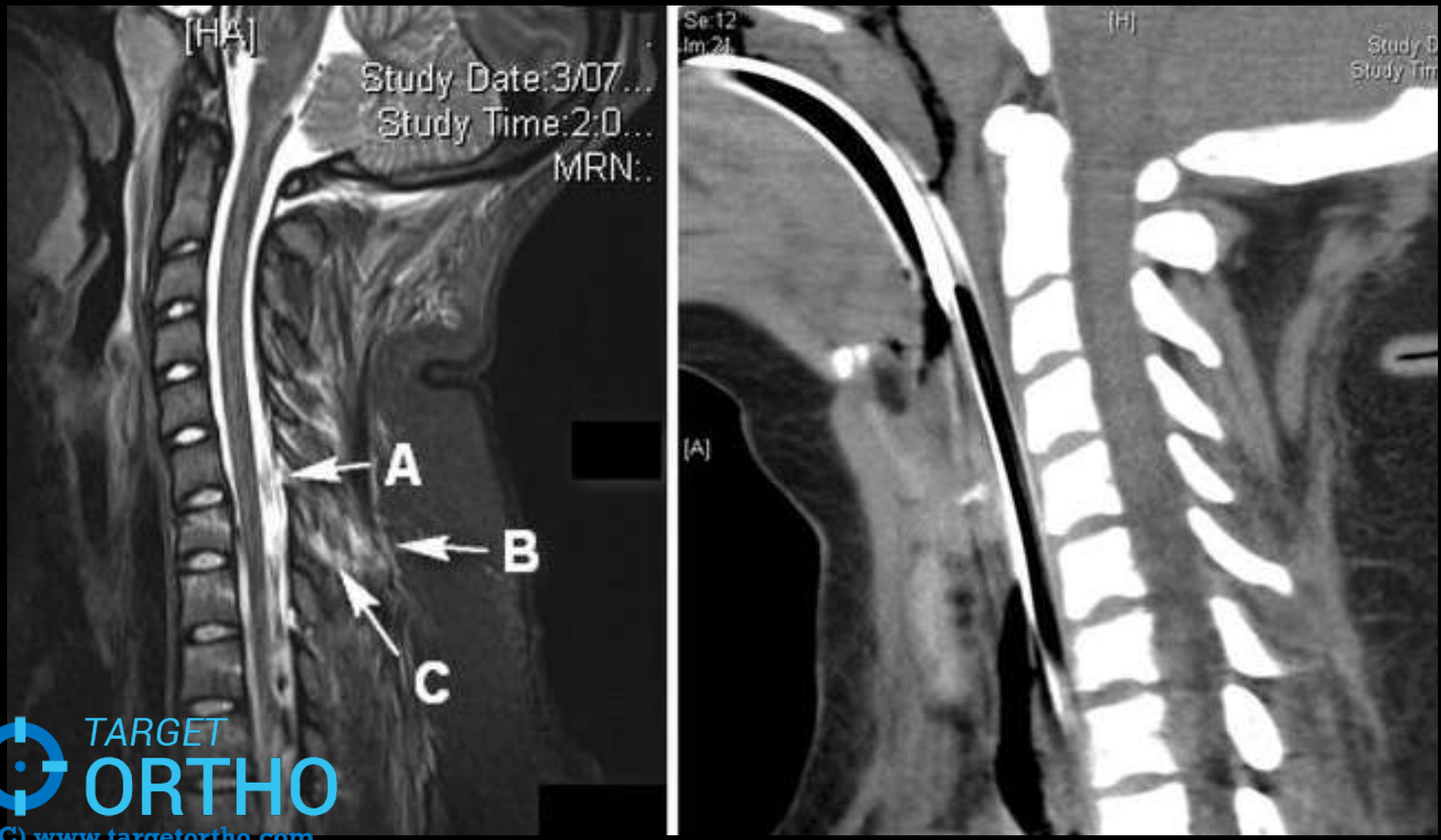




PLC injury-Suspected
2

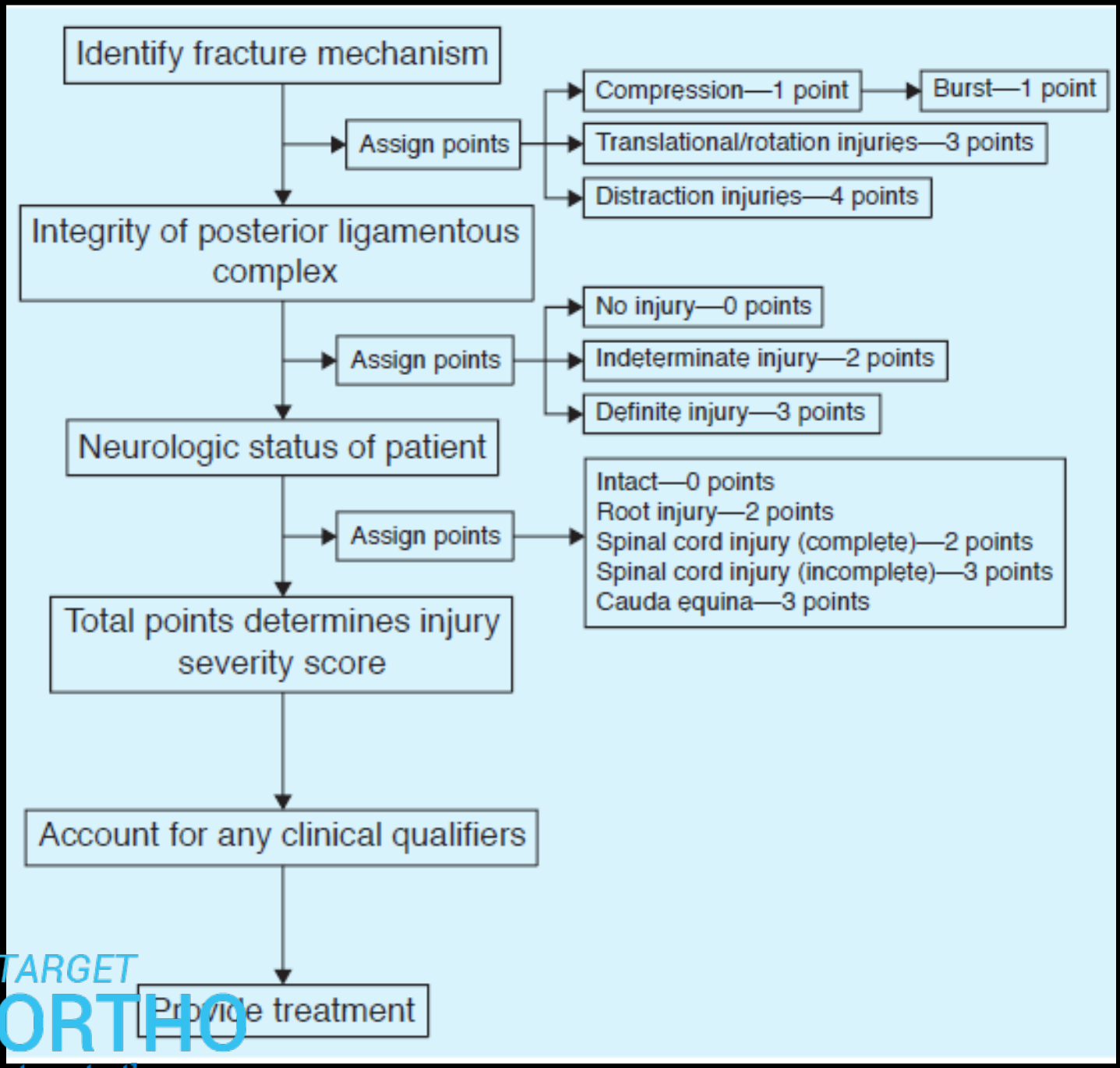


MRI signal intensity change only



Neurology

TLICS	3 independent predictors			
1	**Morphology** immediate stability	- Compression - Burst - Translation/rotation - Distraction	1 2 3 4	- Radiographs - CT
2	**Integrity of PLC** longterm stability	- Intact - Suspected - Injured	0 2 3	- MRI
3	**Neurological status**	- Intact - Nerve root - Complete cord - Incomplete cord - Cauda equina	0 2 2 3 3	- Physical examination
Predicts		- **Need for surgery**	0 – 3 4 > 4	- nonsurgical - surgeon's choice - surgical



Treatment

TLICS addresses three different categories of spine stability:

- Immediate mechanical stability, suggested by injury morphology
- Long-term stability, indicated by PLC status
- Neurologic stability, indicated by the presence or absence of a neurologic deficit

TLICS Treatment Guidelines for Spine Injury

TLICS Score	Treatment Recommendation
0–3	Nonsurgical
4	Nonsurgical or surgical
≥5	Surgical

Management

- No bed rest
- Conservative treatment for stable fractures
- Surgical treatment for unstable fractures

Goals of Nonoperative Treatment

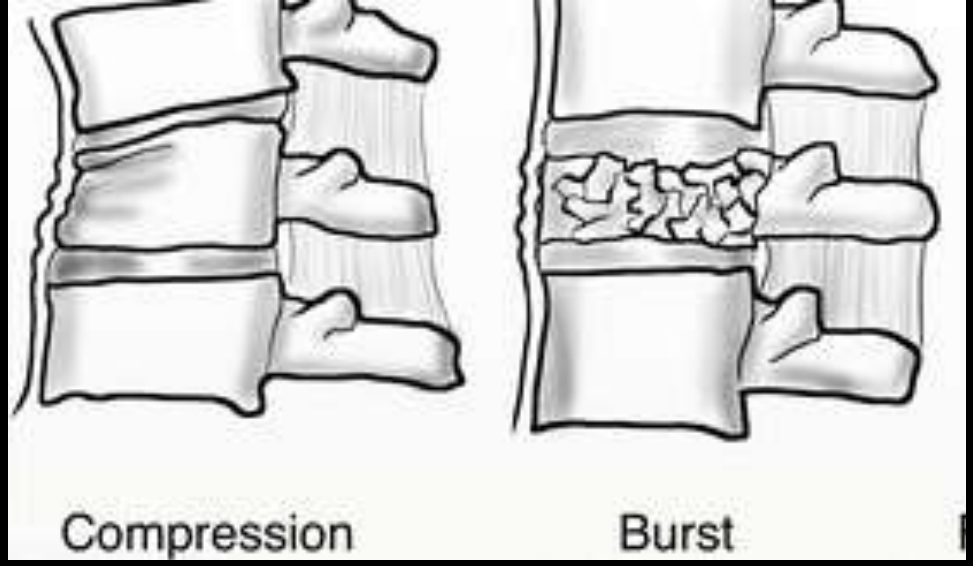
- Preserve neurological function
- Minimize deformity progression
- Decrease pain
- Restore Function

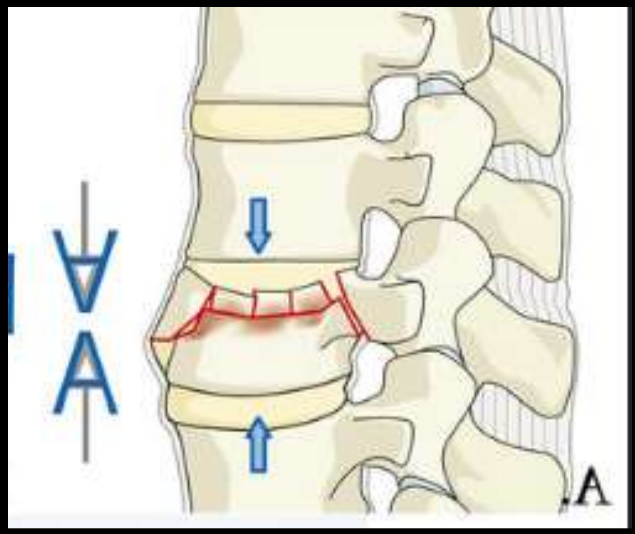
ASSUMES THE SPINE IS *STABLE*

How Do We Achieve These Goals?

Surgical management

- For all unstable fractures
- Posterior pedicle screw fixation
- Decompression – if neurological defecit is there





- Kyphosis > 20°
- Loss of > 50% anterior vertebral body height
- Multiple adjacent compression fractures with significant spinal deformity

Posterior short segment fixation with pedicle screws

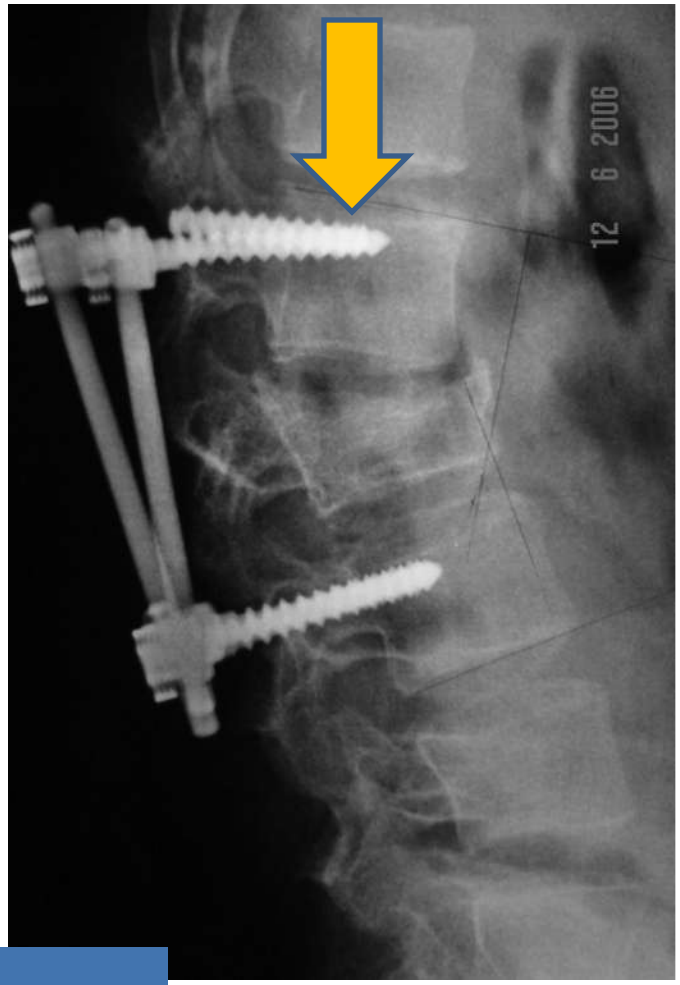
Axial load.

↓

Cantilever effect.

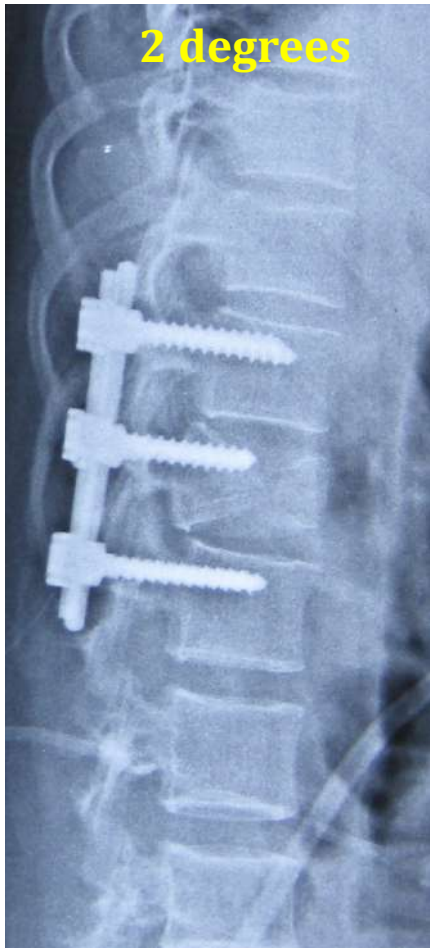
↓

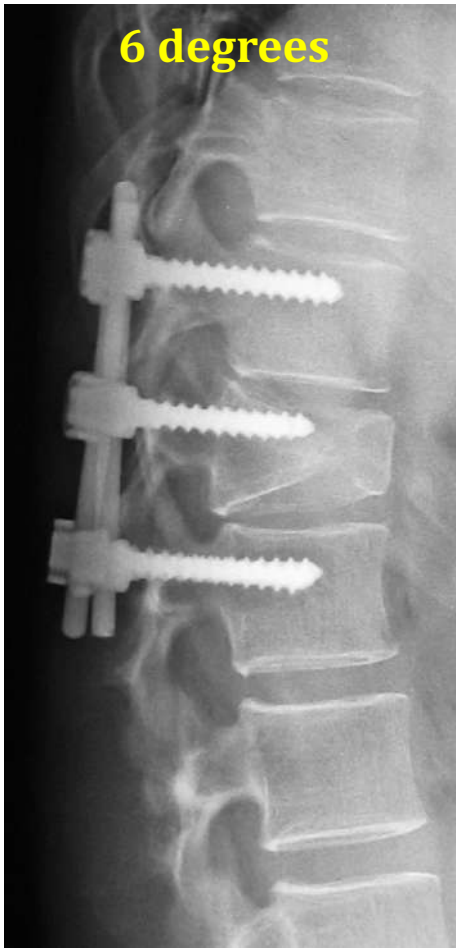
High rates of failure.



McLain, Robert F.; Sparling, Edward; Benson, Daniel R.
[illegible] Issue: Volume 75-A(2), February 1993.

T12 unstable burst fracture

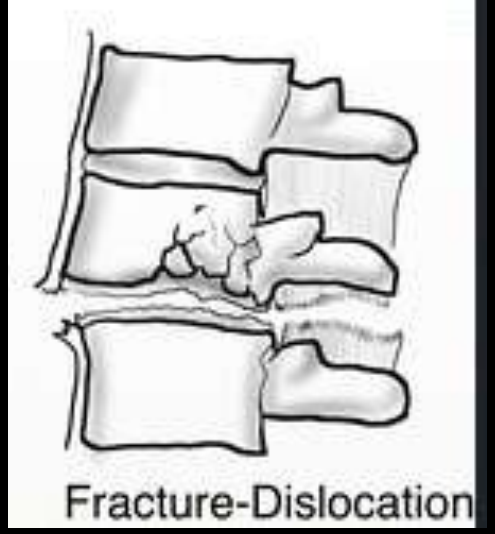


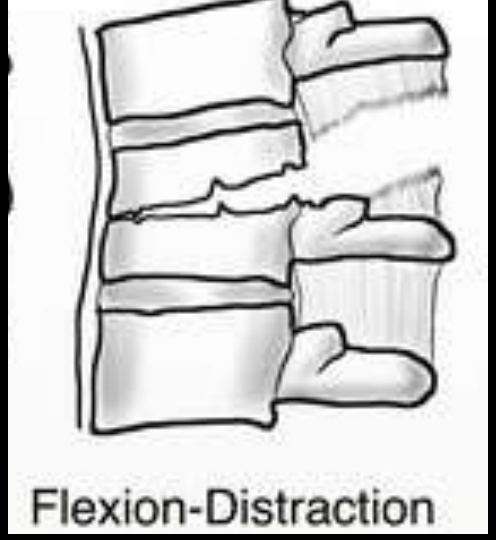


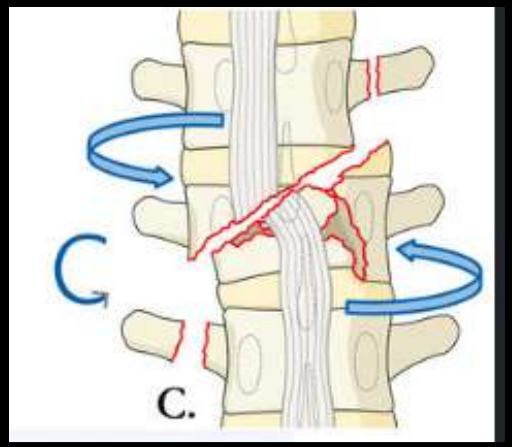
PRE-OP

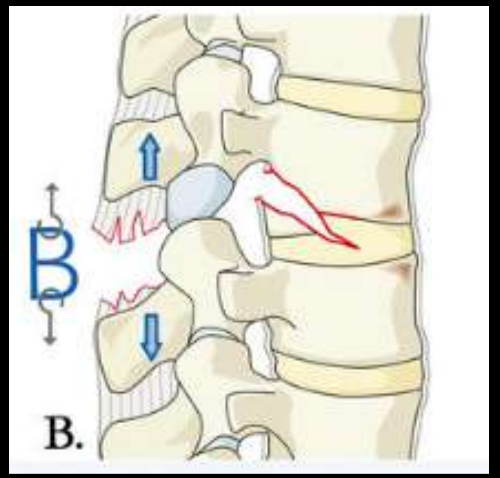
POST-OP

18 MONTHS FU









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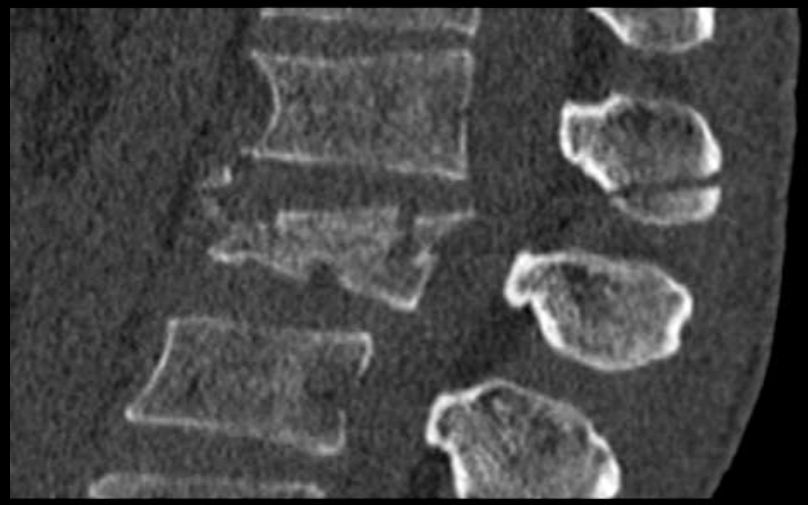
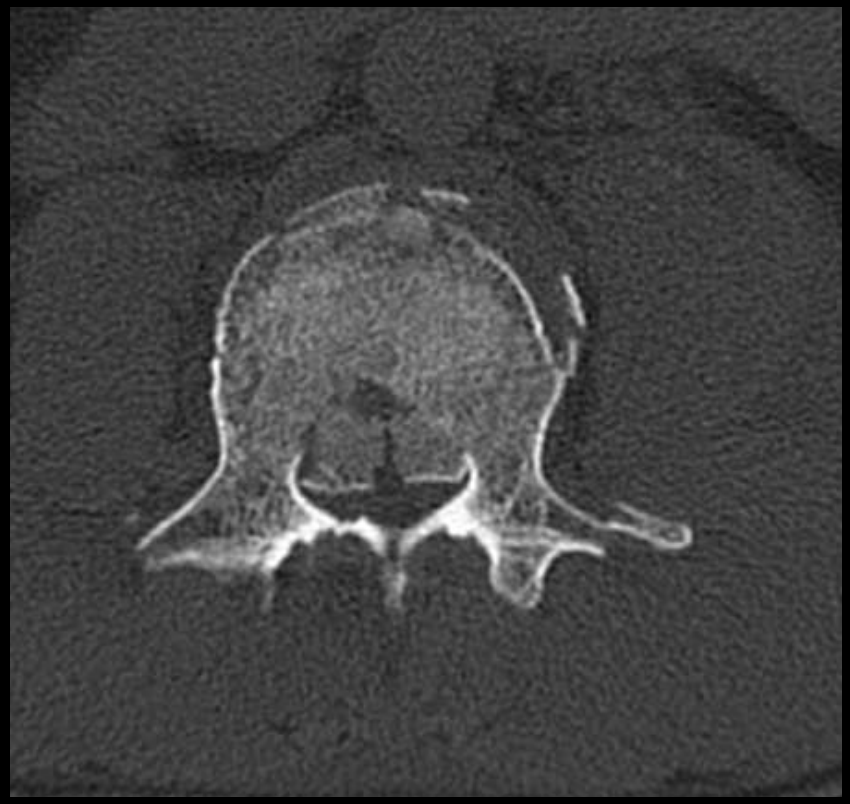
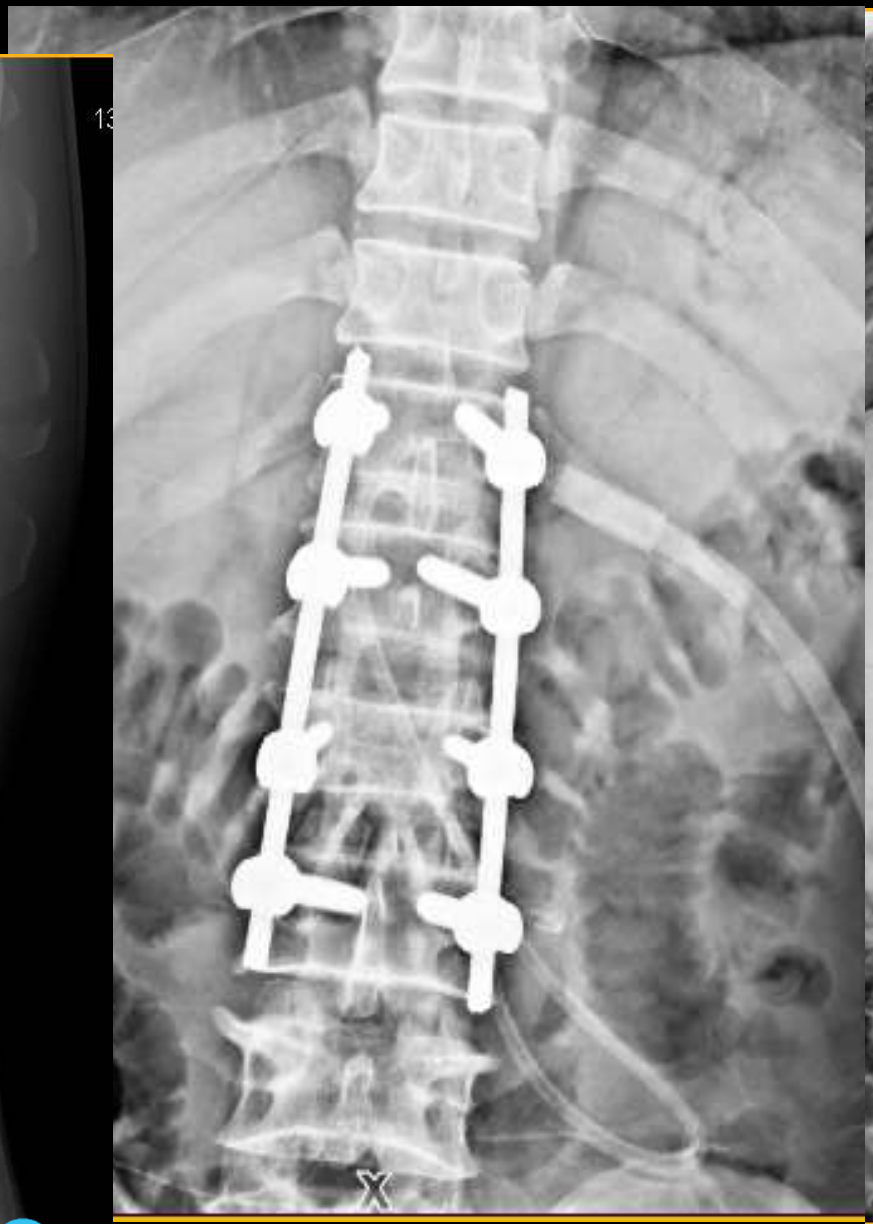
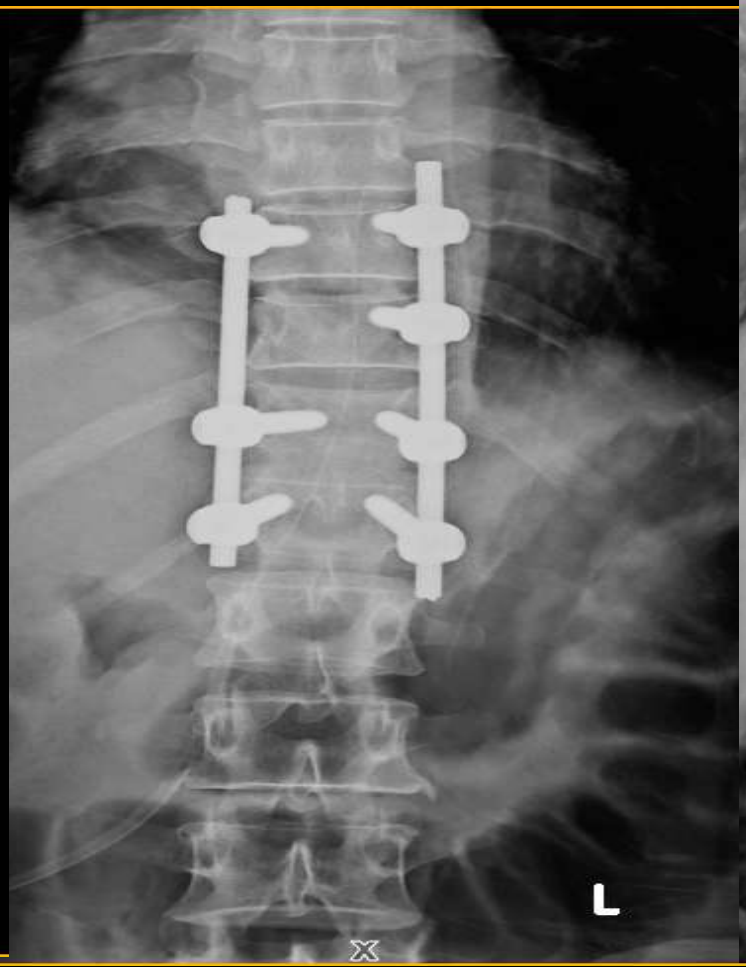




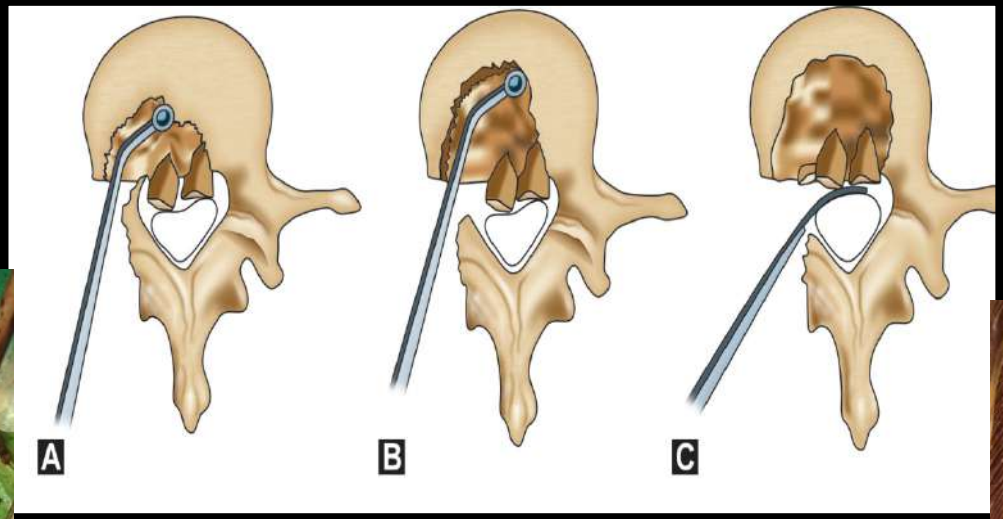


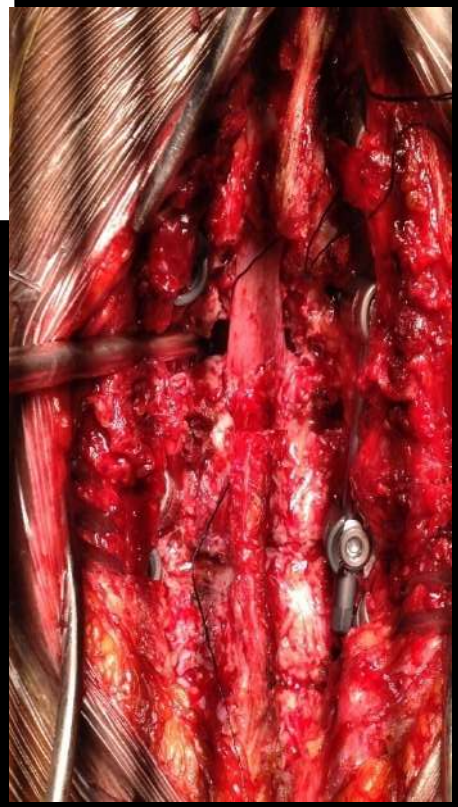


Anterior approach

- Retropulsed fragment compressing the cord
- No PLC injury

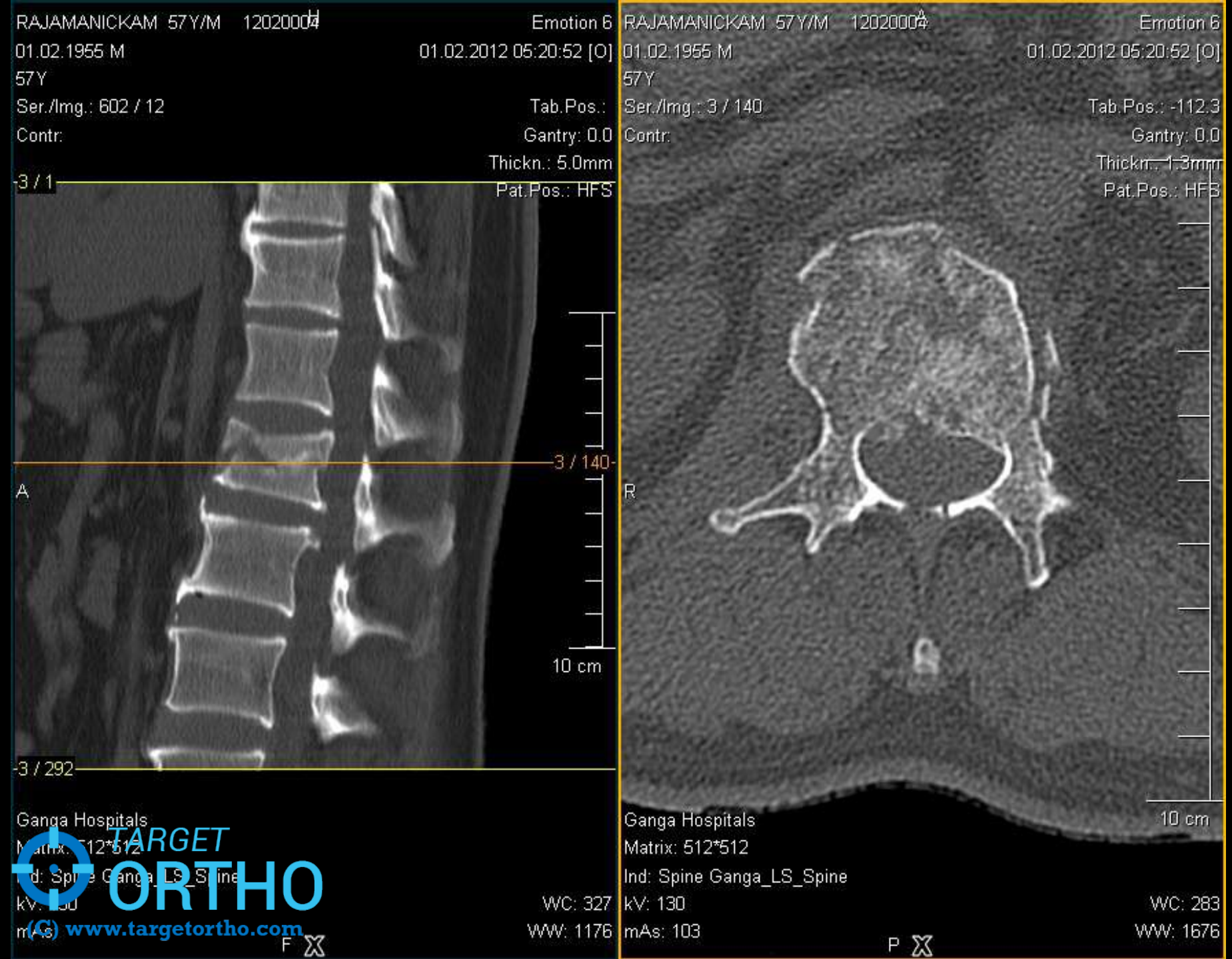
Case-1 Transpedicular approach



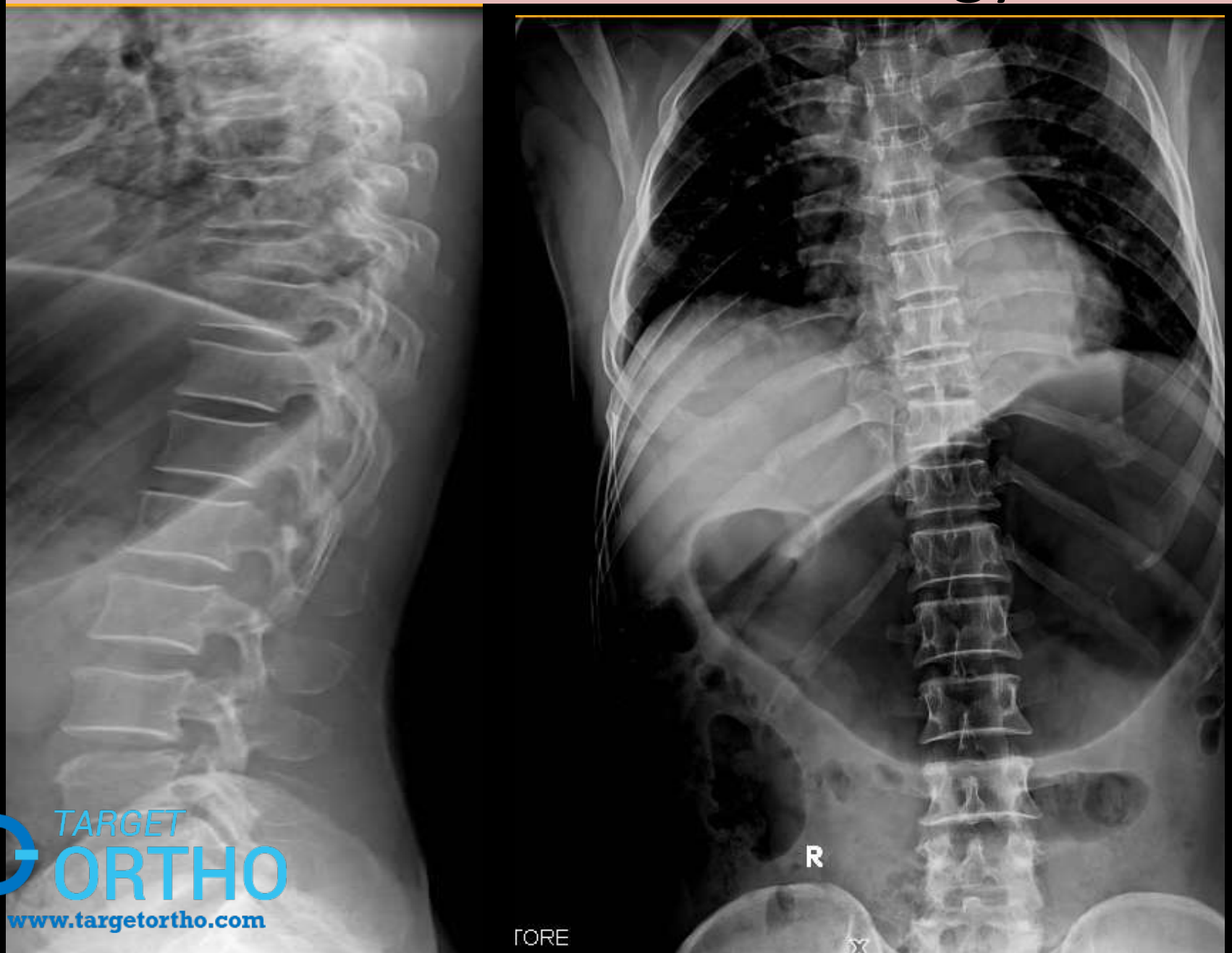


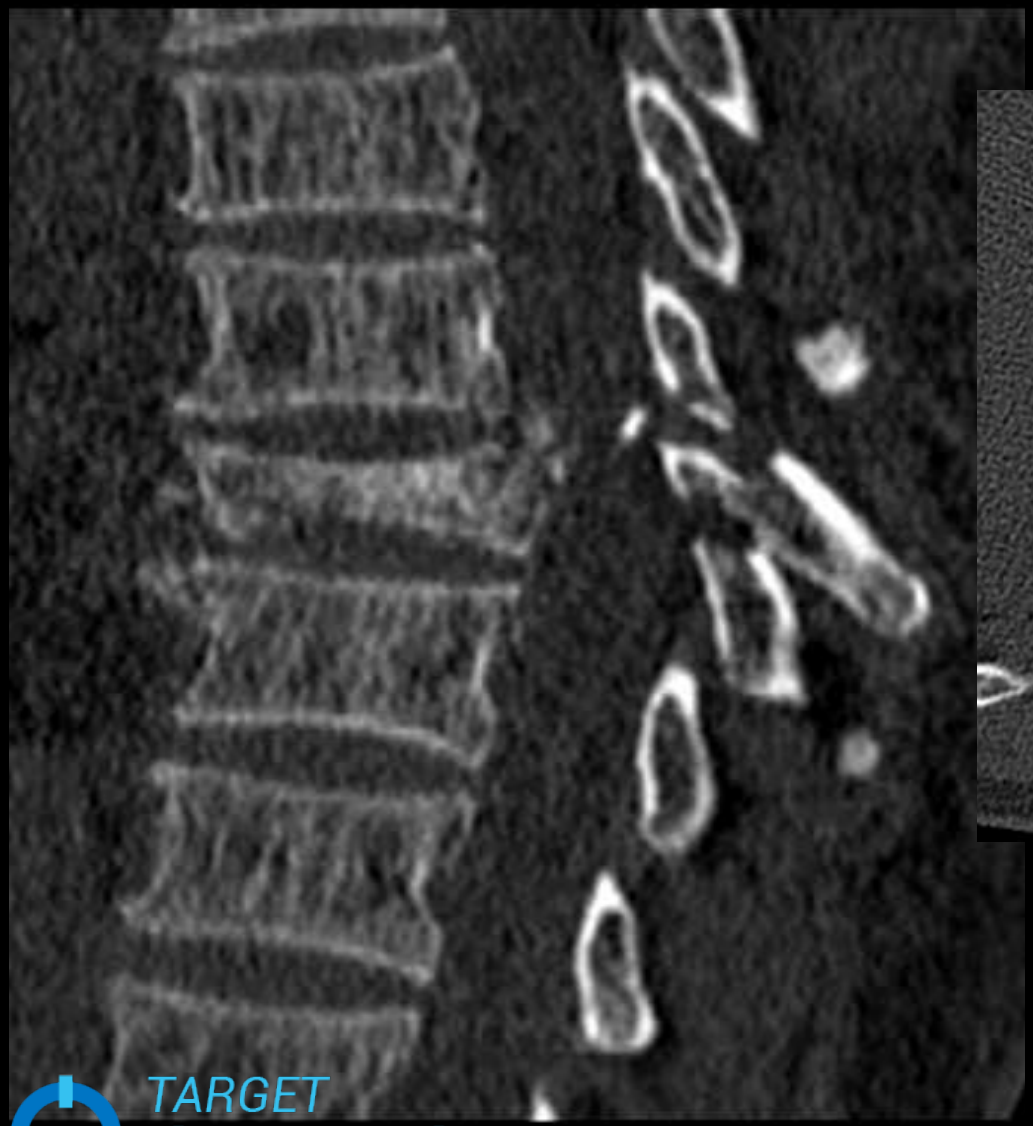
Fracture spine

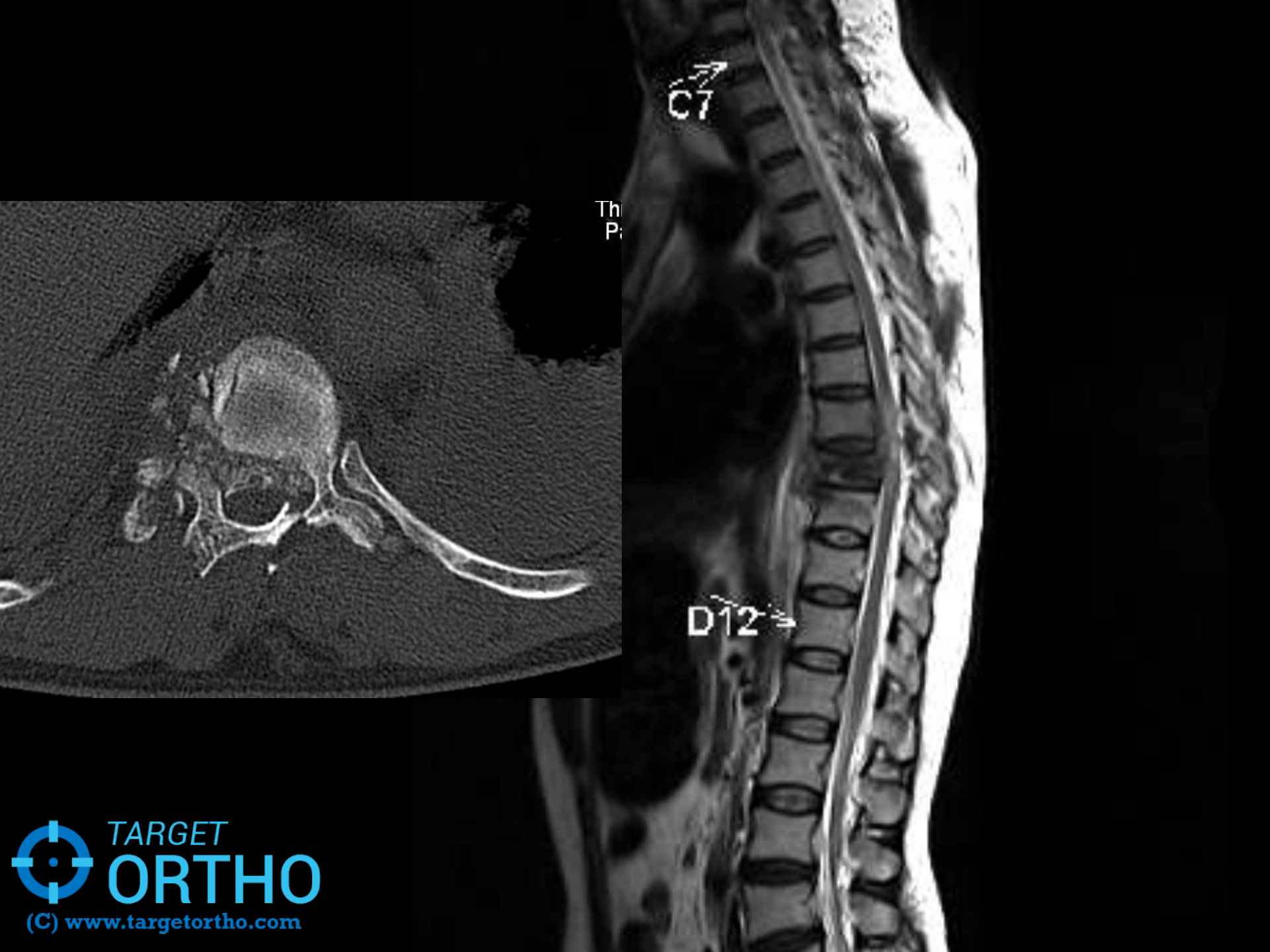
57/m L1 burst # ASIA E



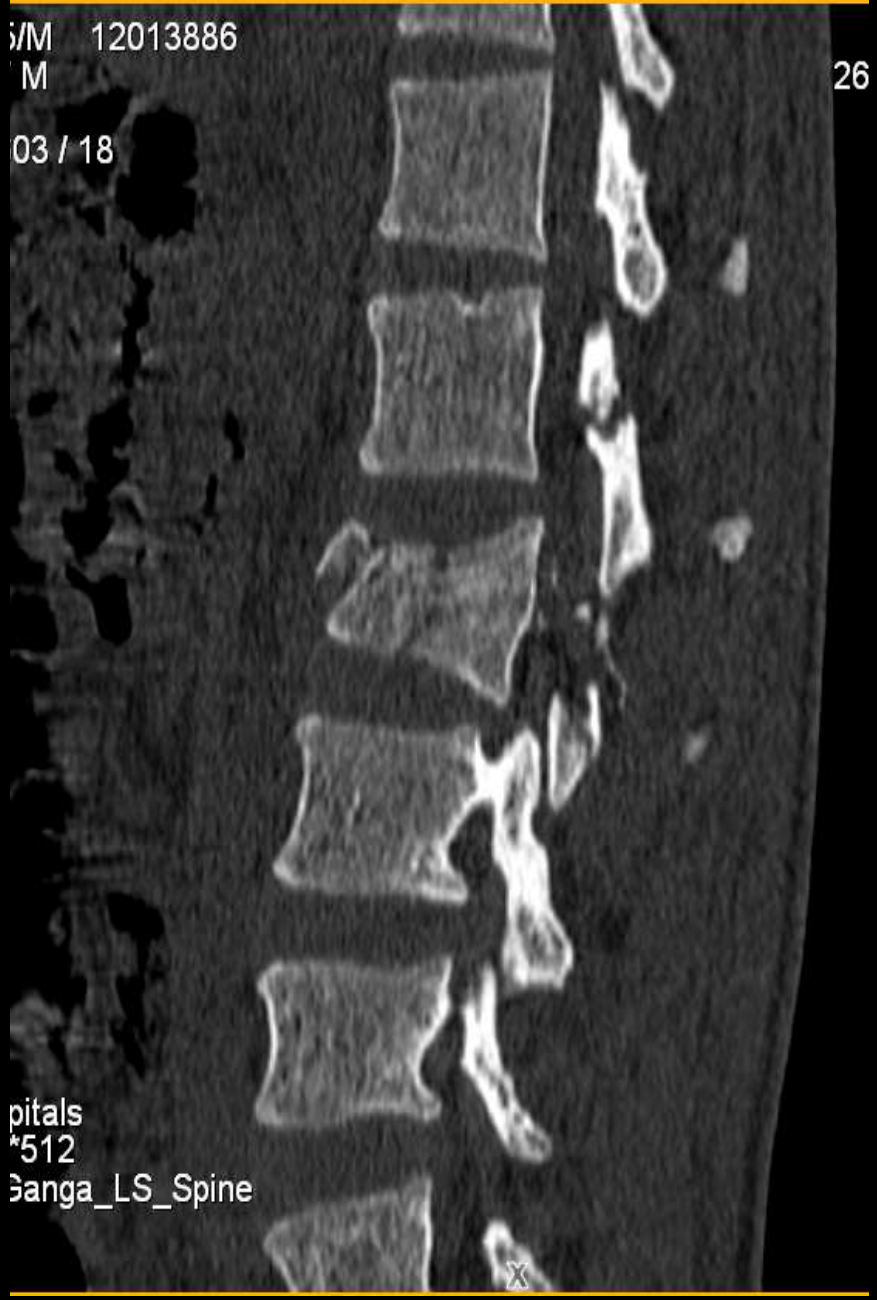
T9 # - ASIA – C neurology

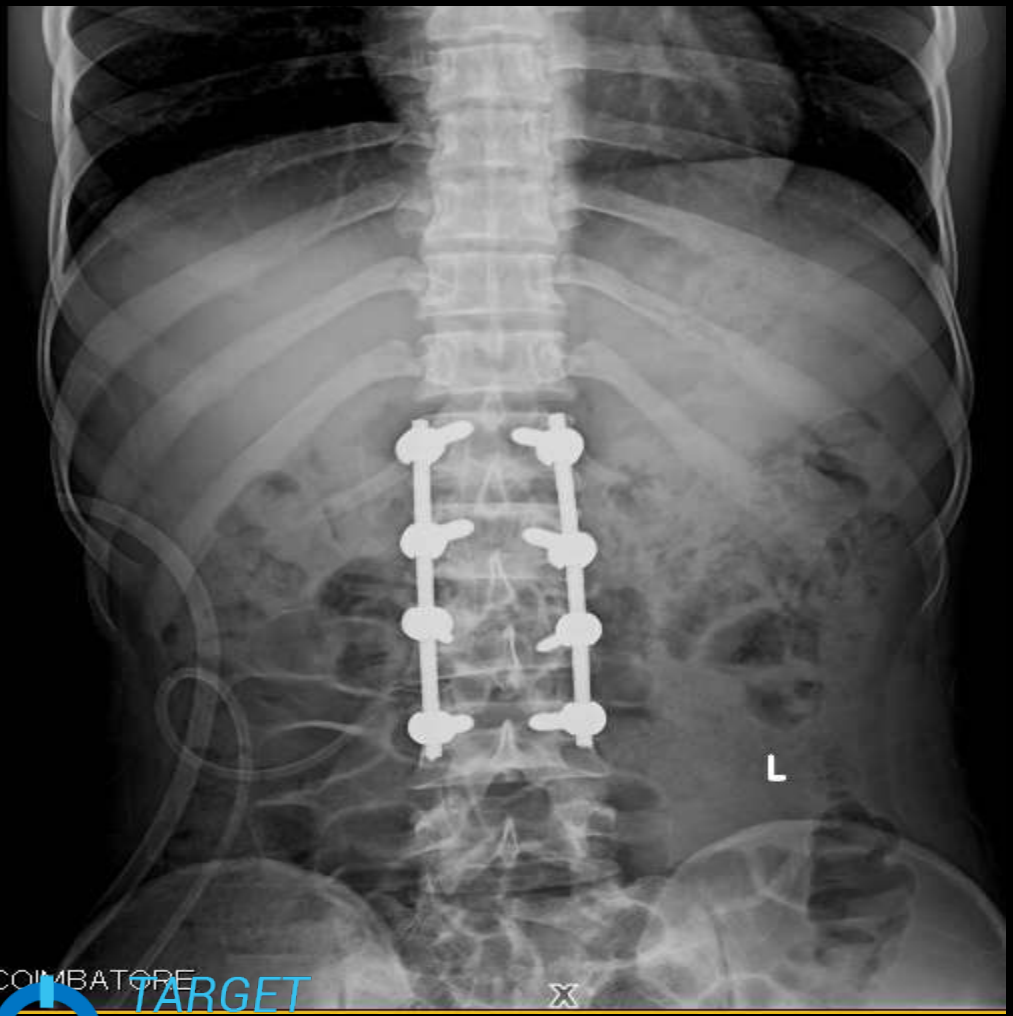




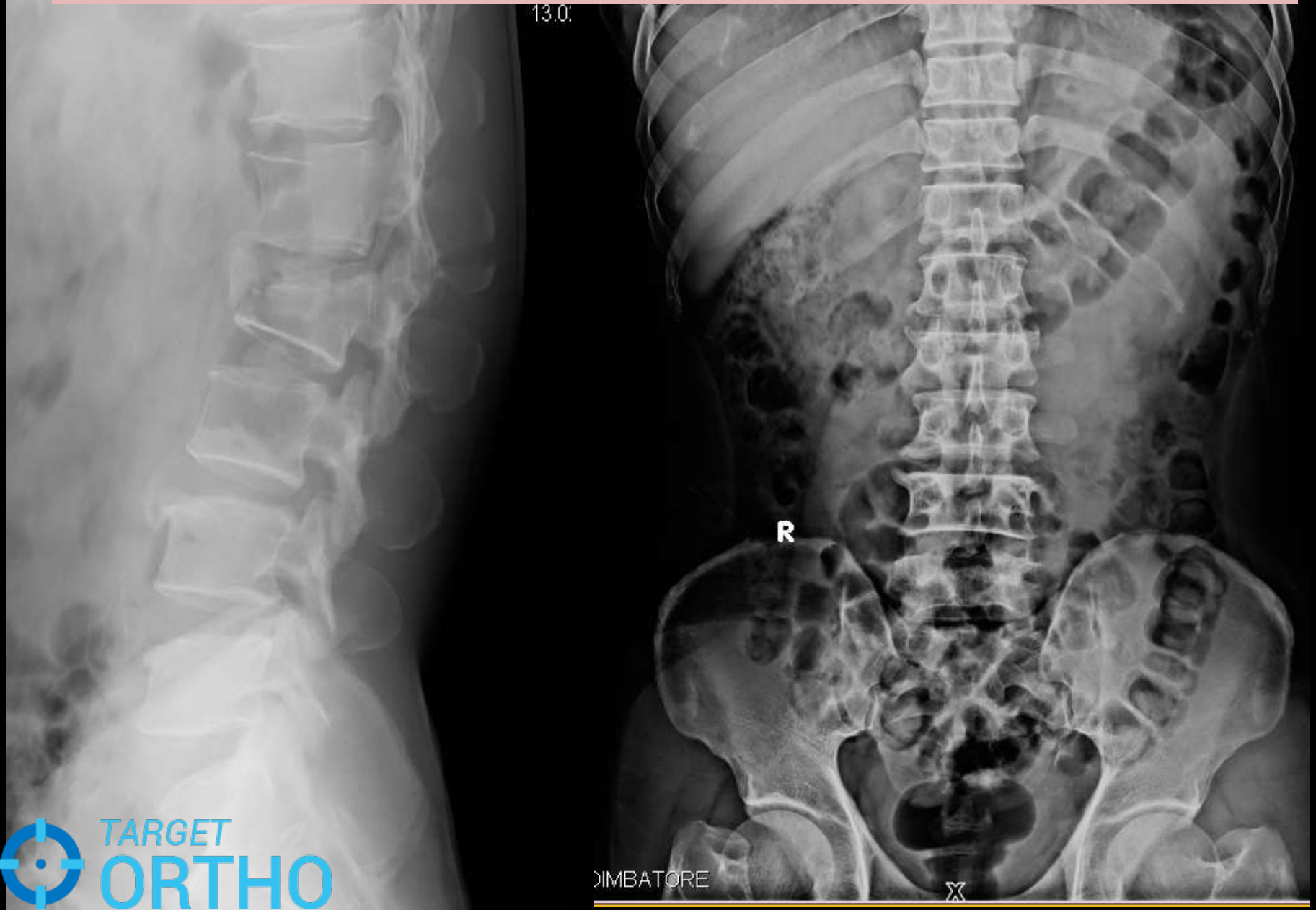


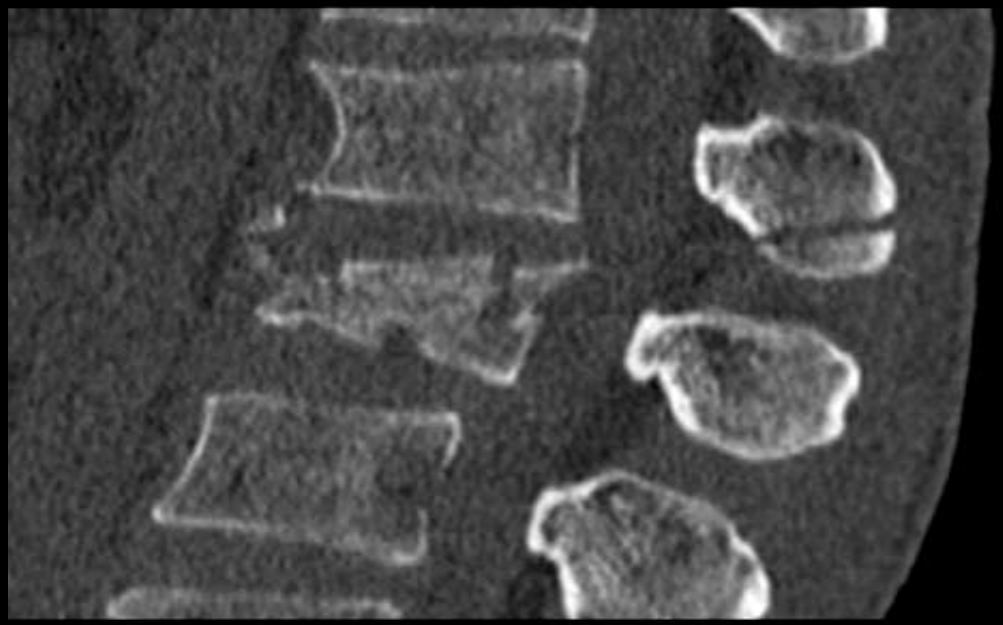
L1 # - Normal neurology





L2 FRACTURE- normal neurology





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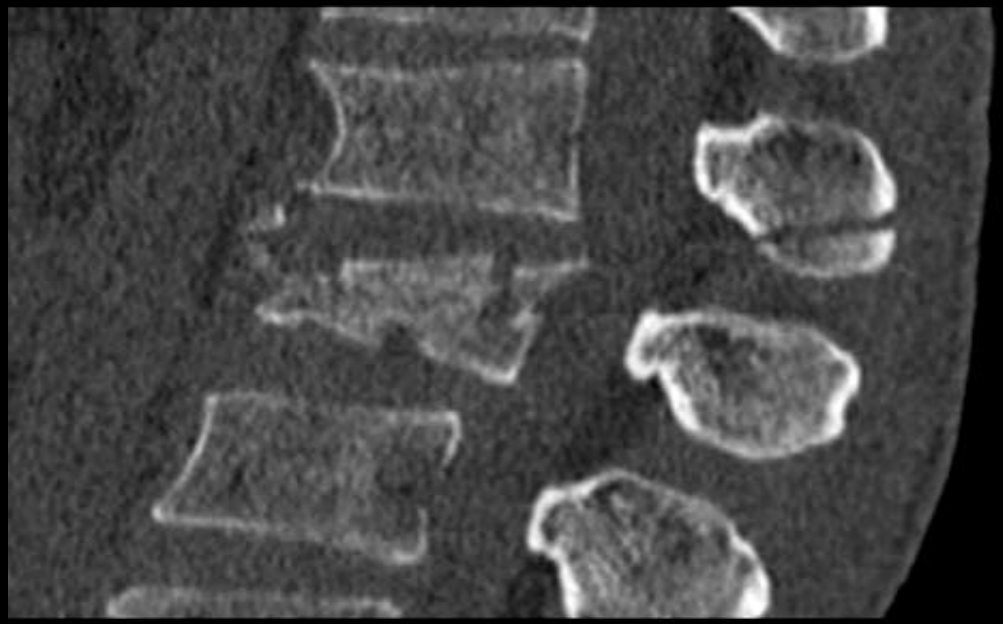
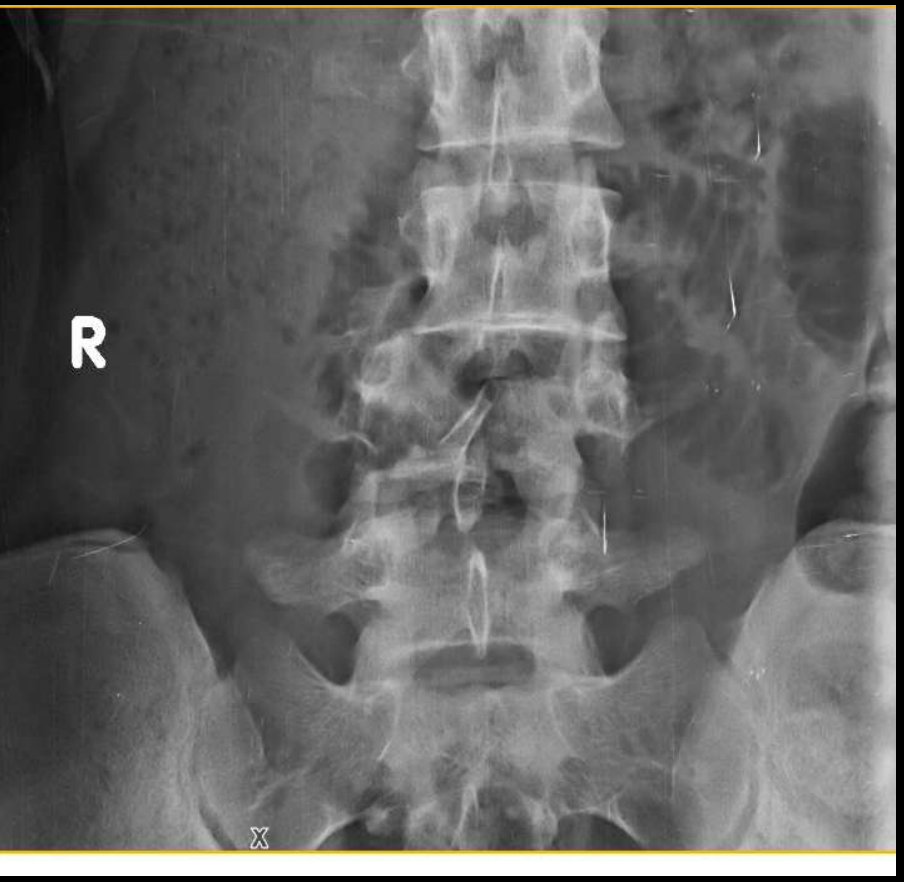
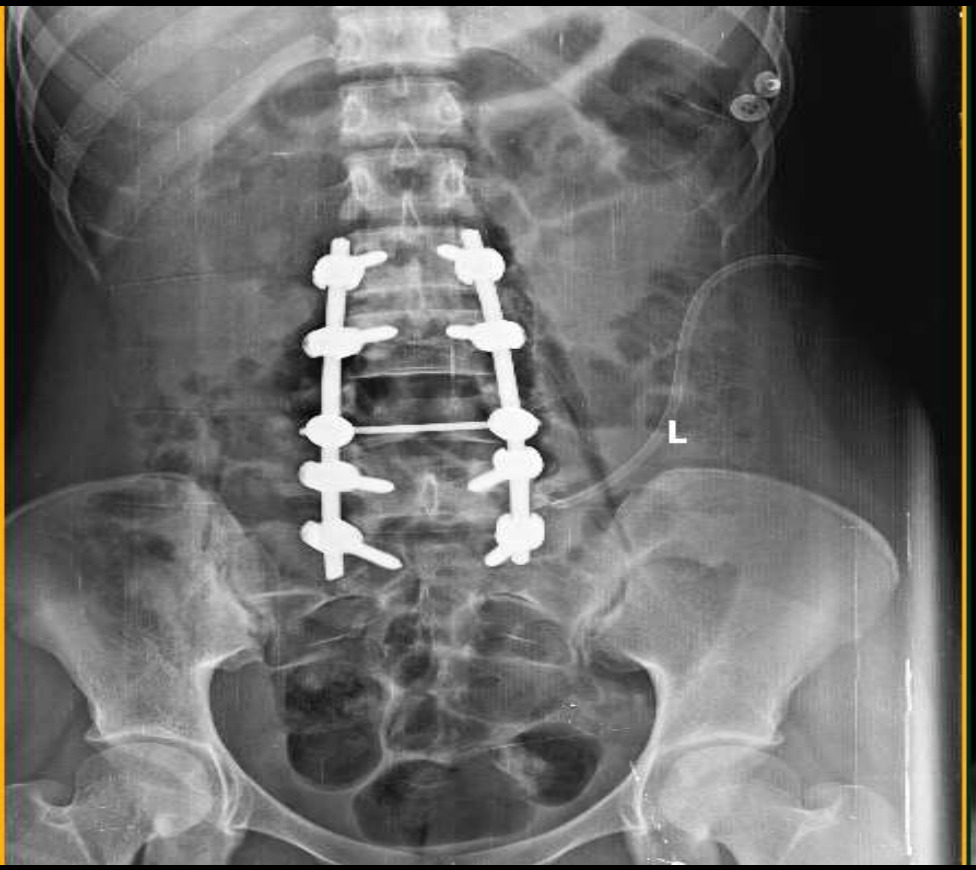


S_Spine

- 17 / F
- L4 FRACTURE
- ASIA - A NEUROLOGY
- Alleged history of RTA due to hit by 4 wheeler while standing



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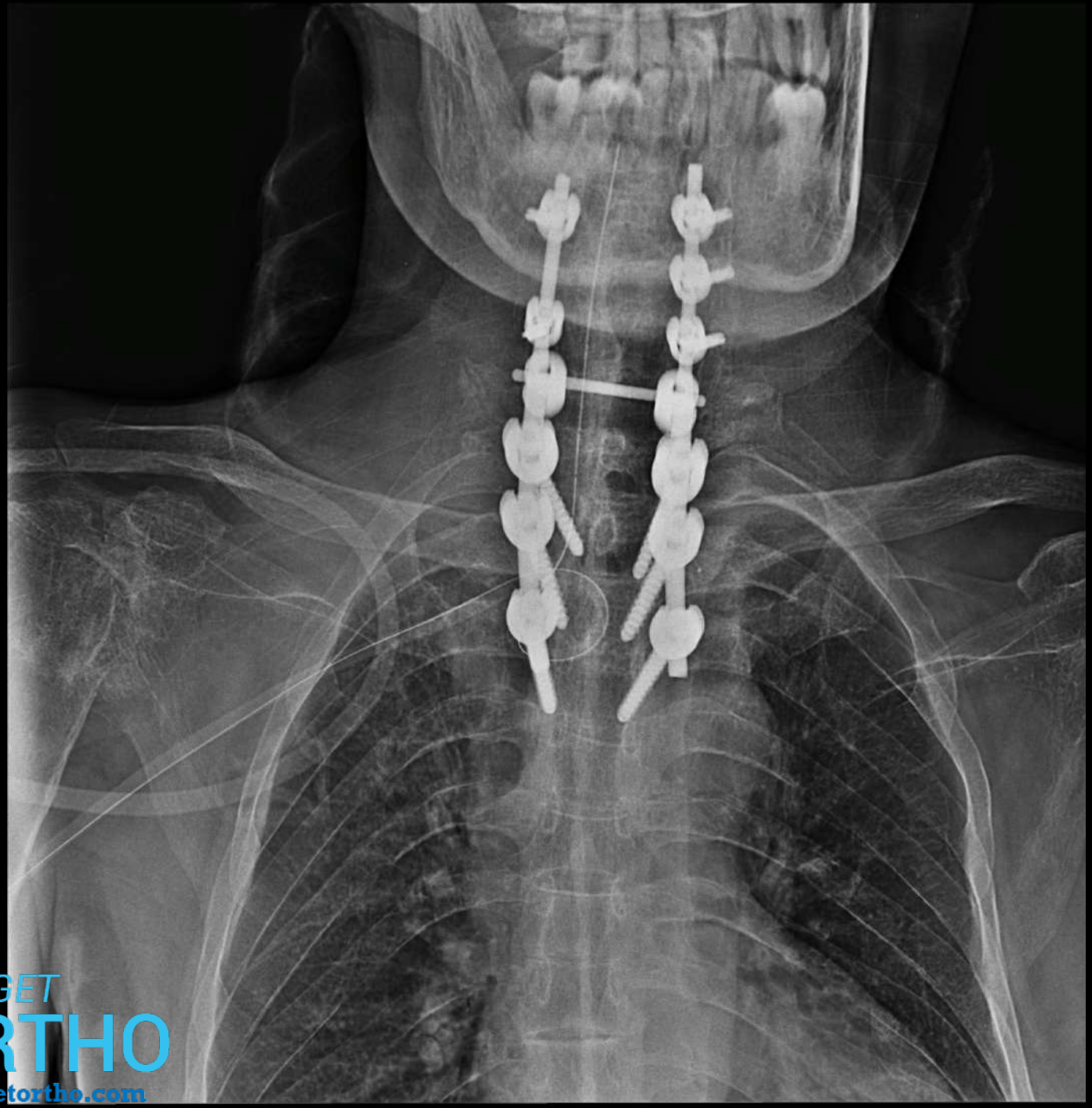

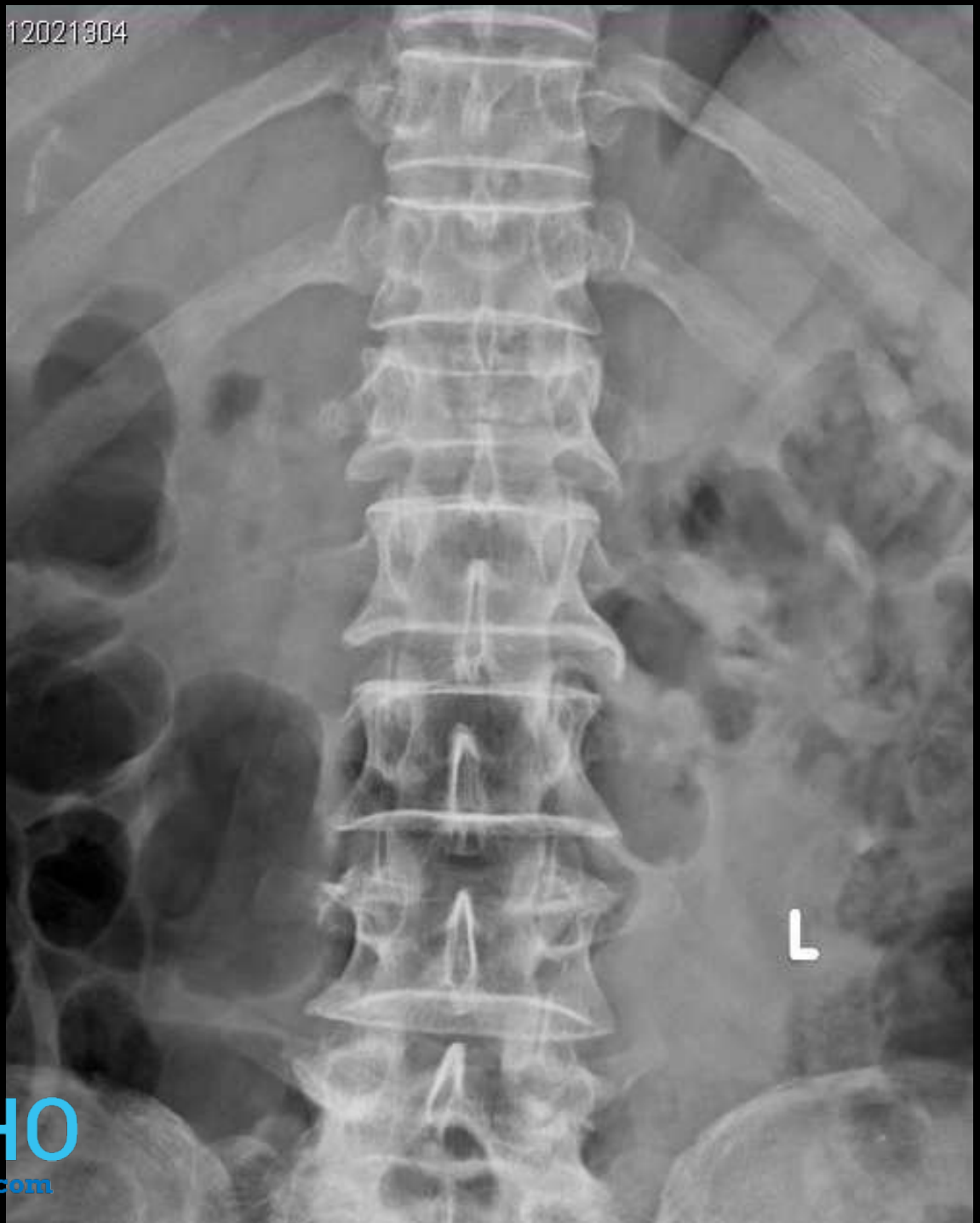

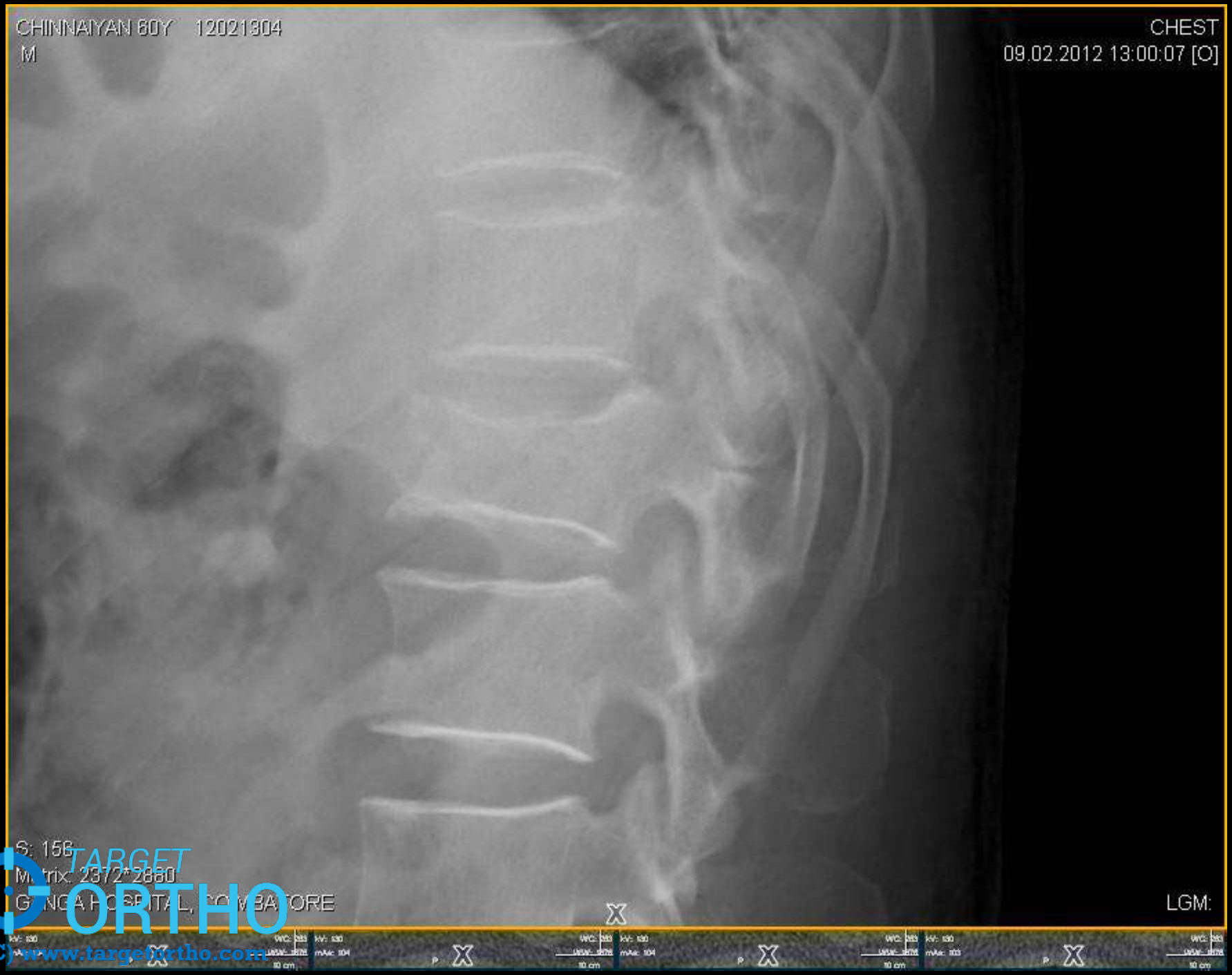

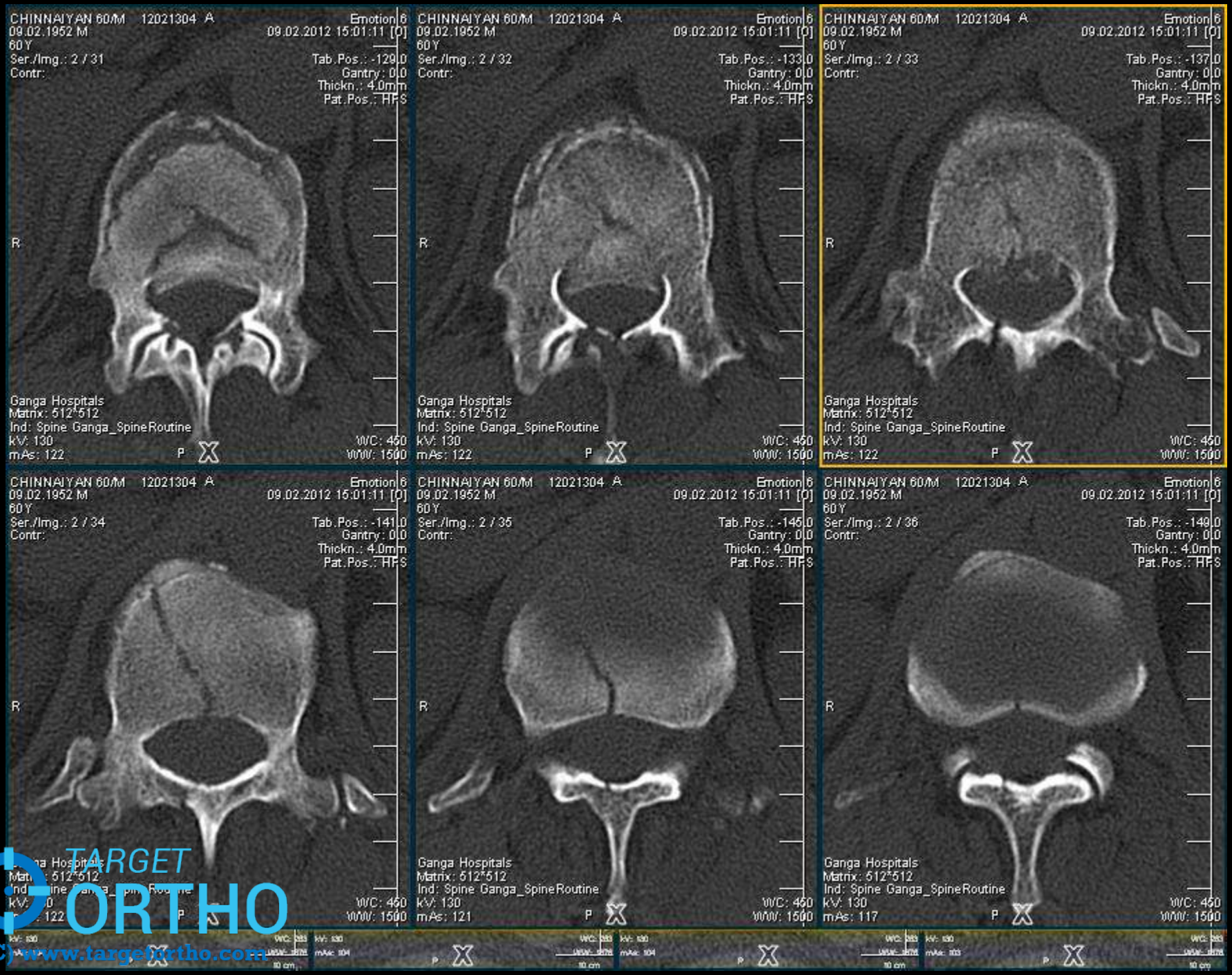

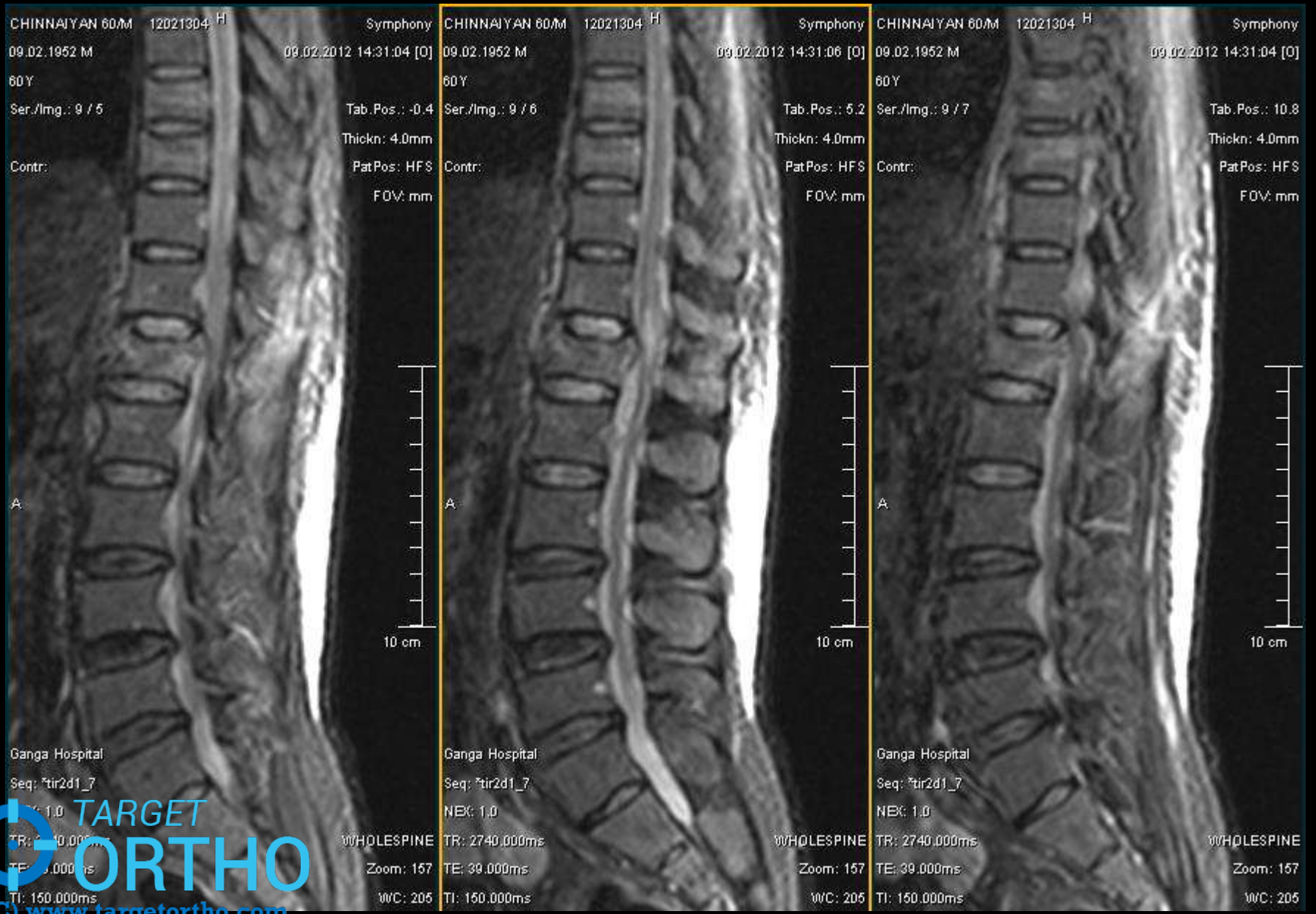

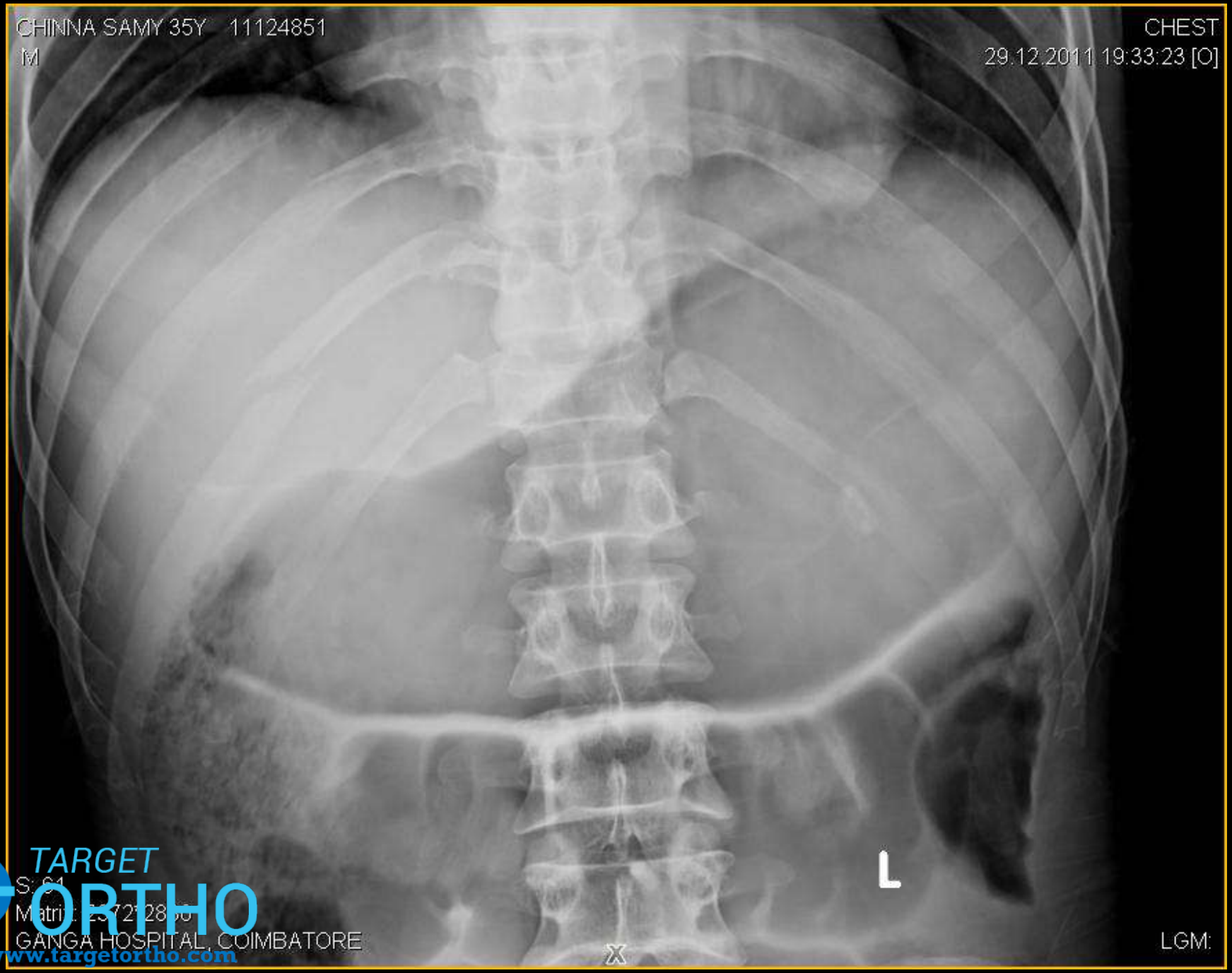

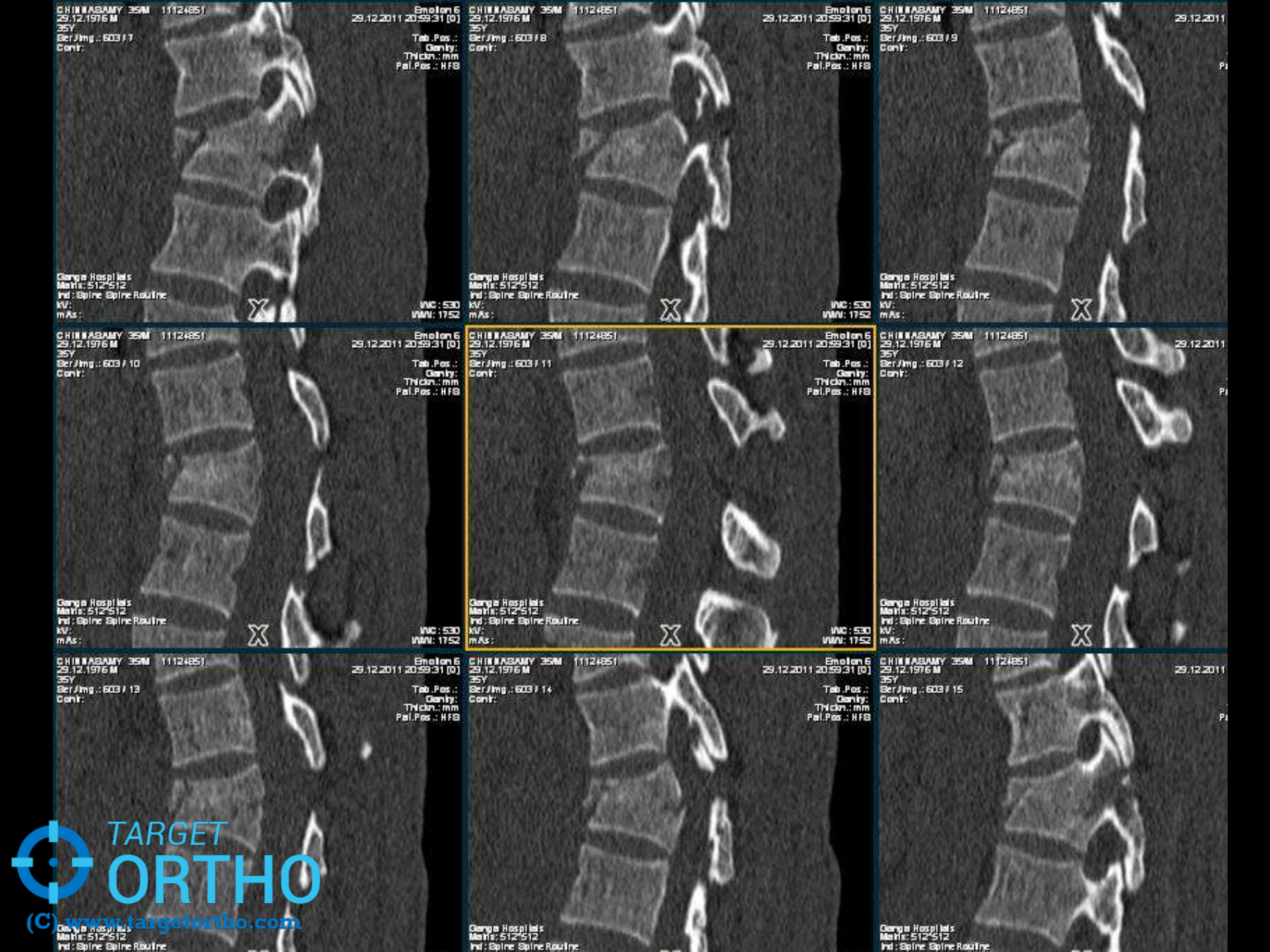

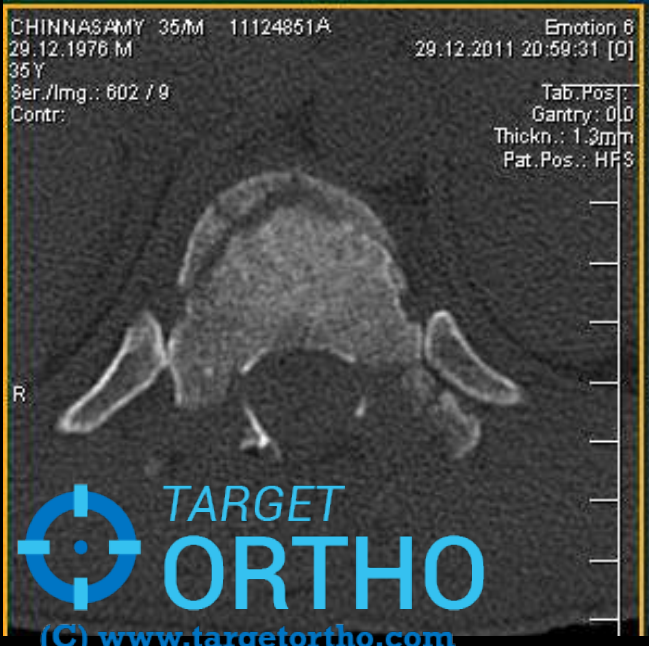

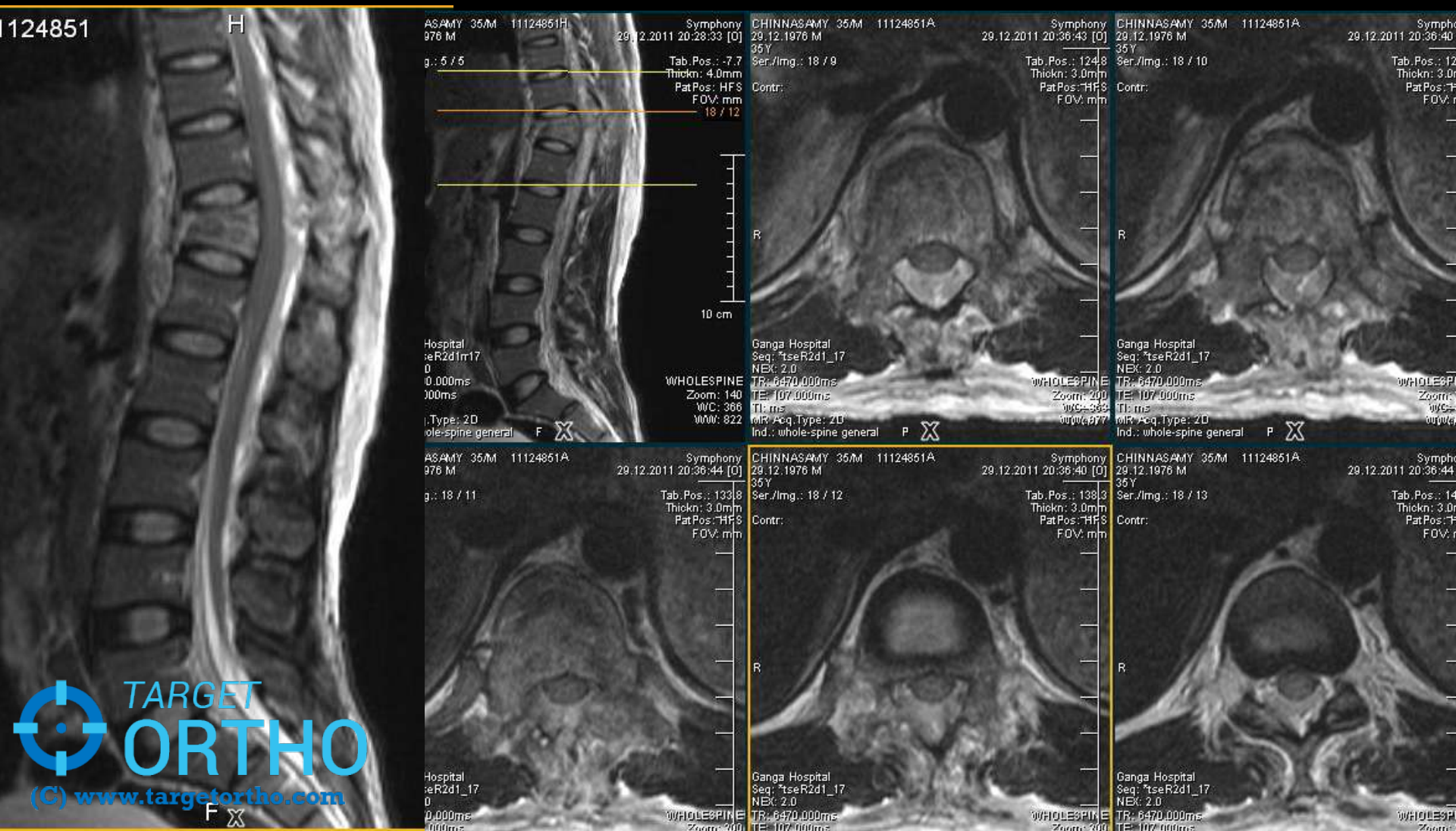
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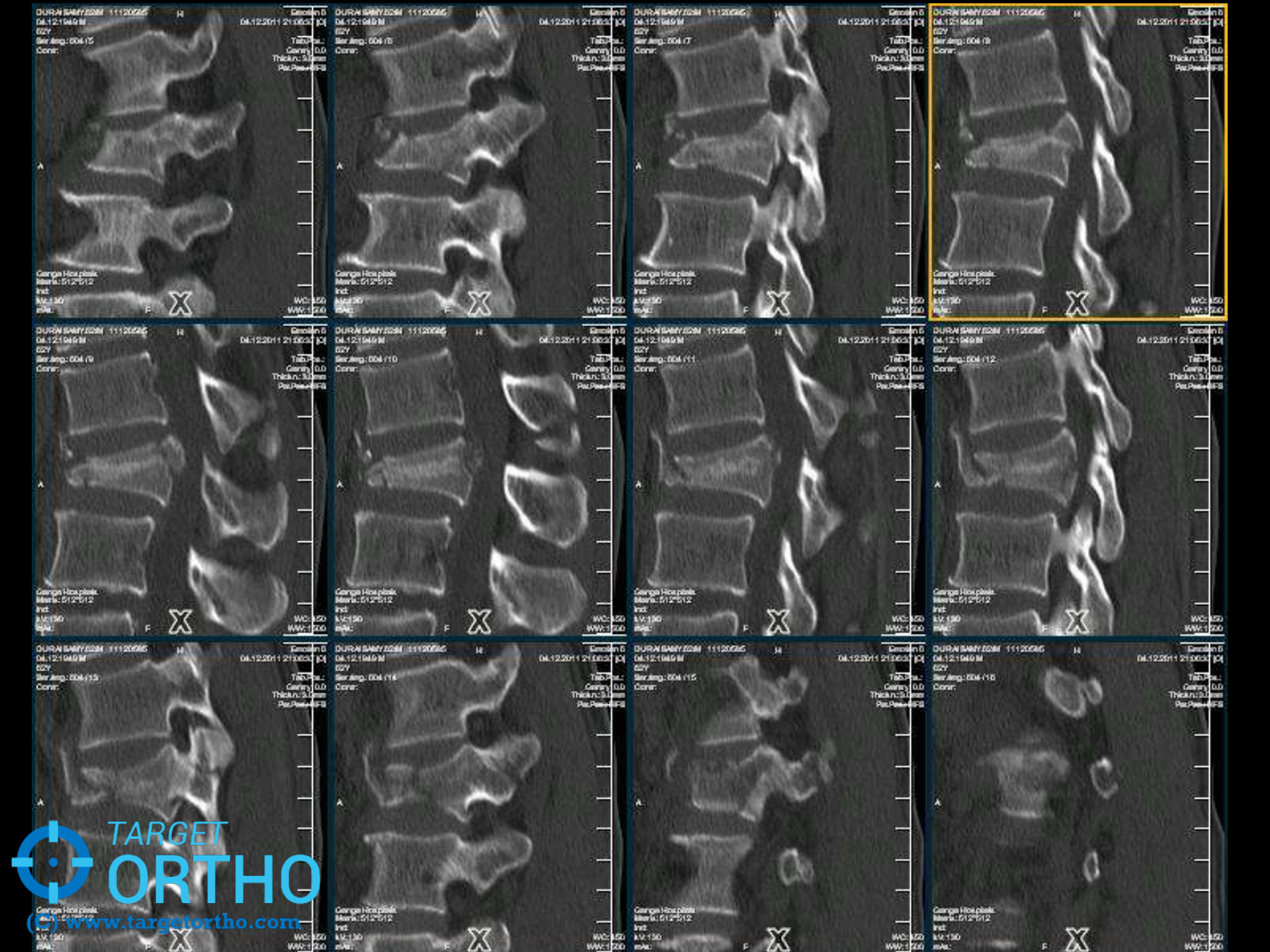


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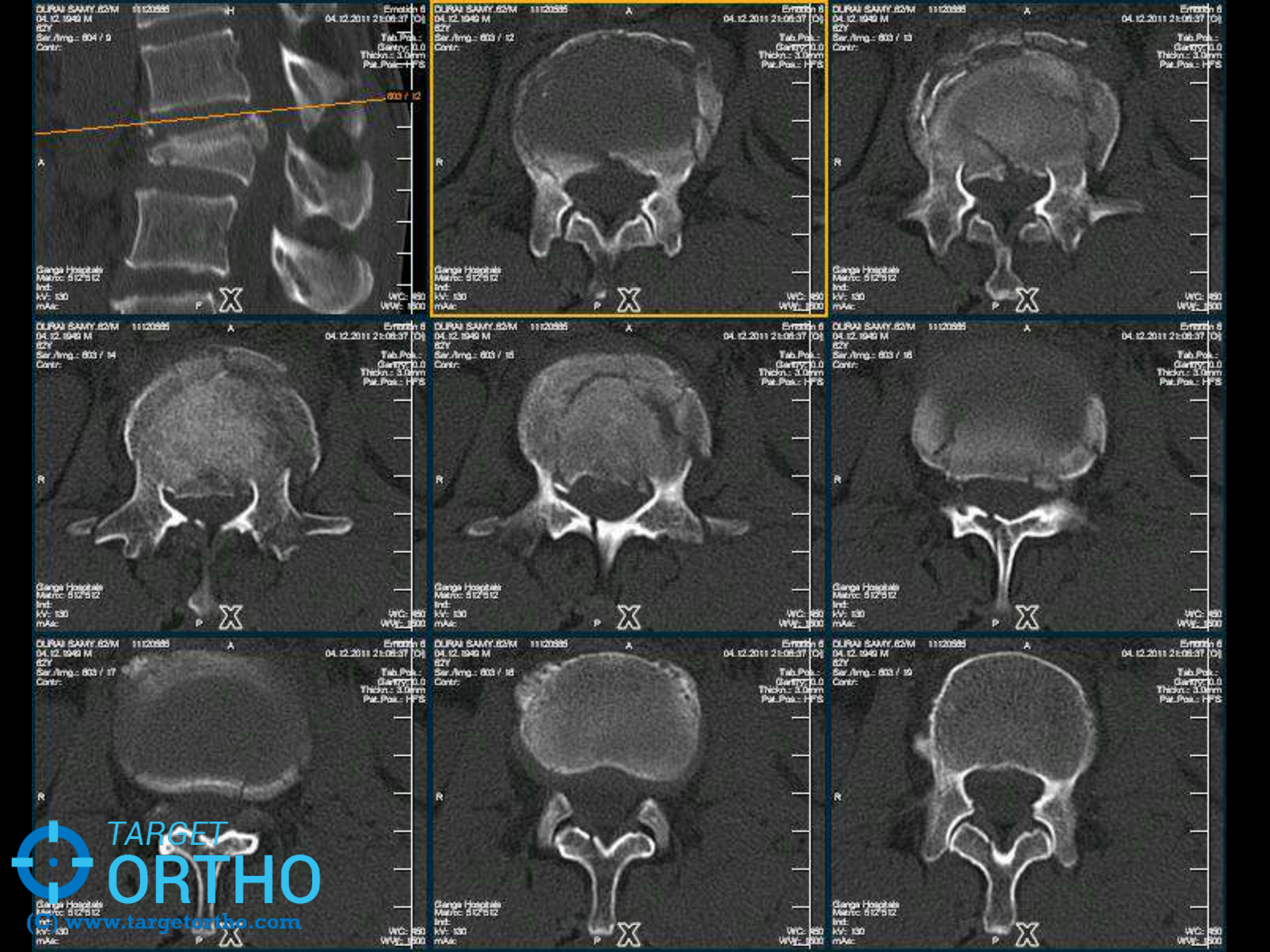
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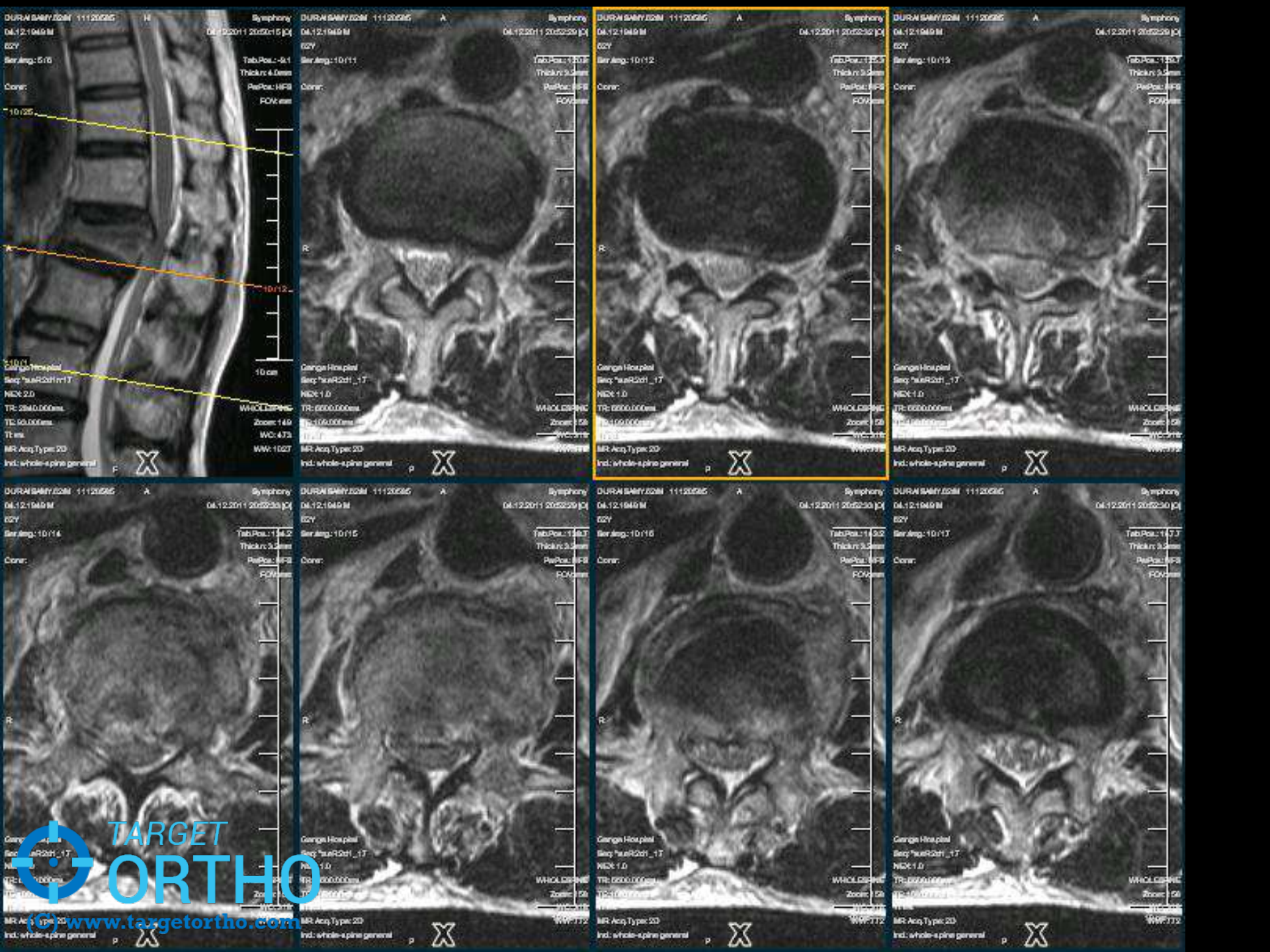
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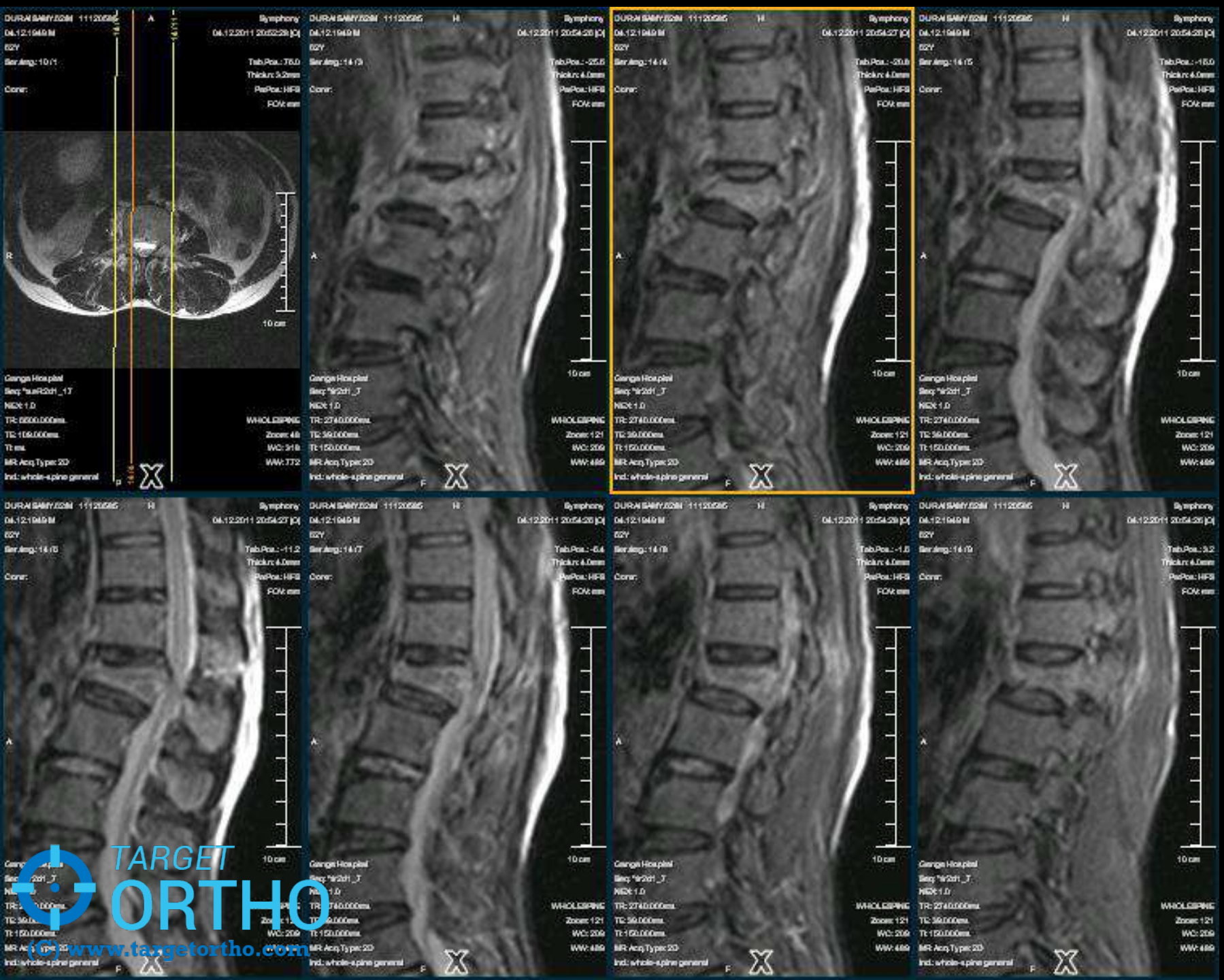
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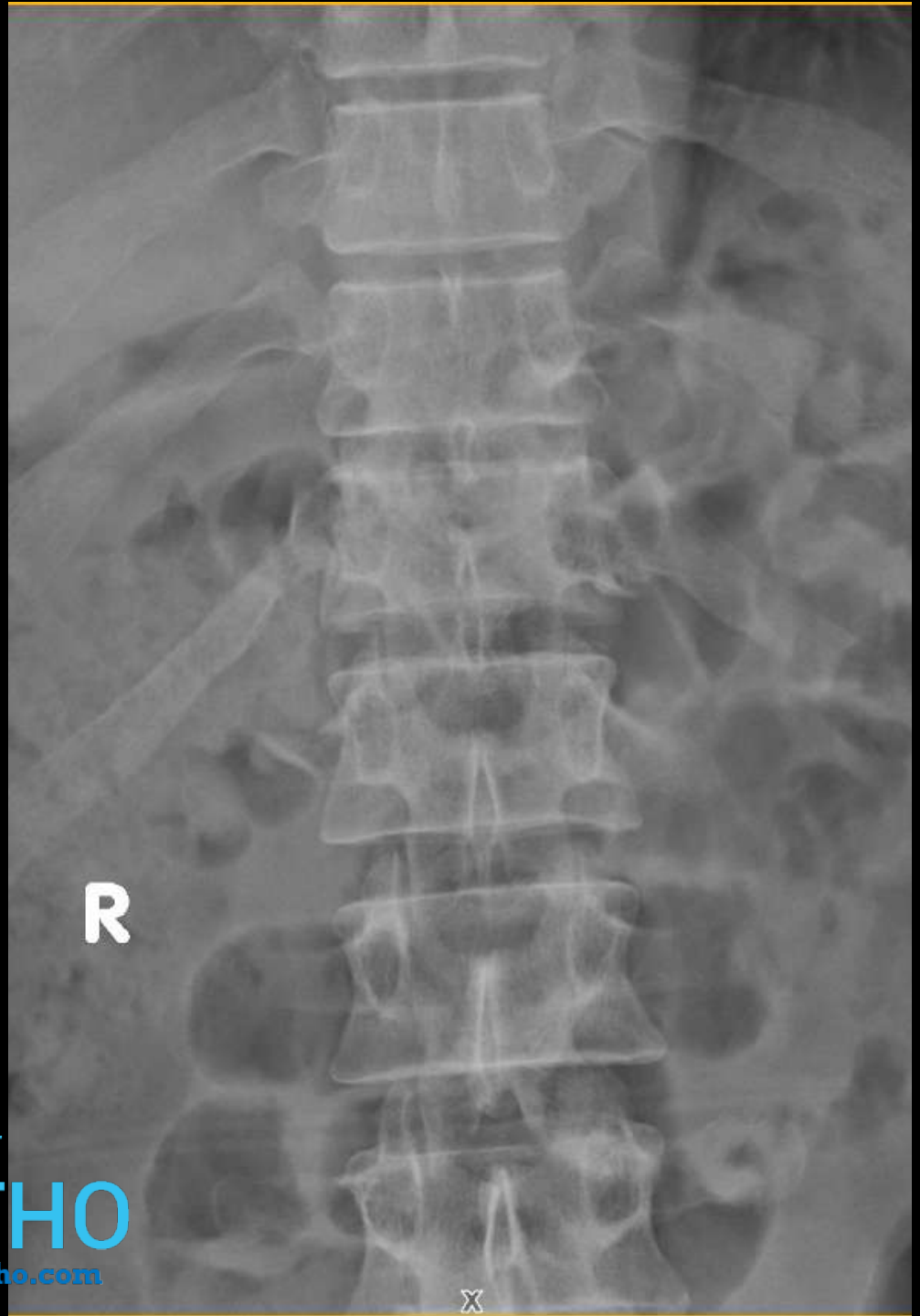


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