Back-breaking Work: Thoracolumbar Injury Classification and Severity score

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LEARNING OBJECTIVES

1. Be familiar with the Thoracolumbar Injury Classification and Severity (TLICS) score.
2. Understand how to apply the TLICS scoring system to traumatic spine injury cases in your practice.

INTRODUCTION (2)

TLICS is a scoring and classification system developed by the Spine Trauma Study Group in response to limited prognostic value of other classification systems, which also generally do not suggest treatment pathways.

The **TLICS** score is based on **three** components:

1. Injury **morphology**
2. Posterior ligamentous complex **(PLC) integrity**
3. **Neurologic status** of the patient

A numerical score is calculated for each category, with a lower point value assigned to a less severe or less urgent injury and a higher point value assigned to a more severe injury requiring urgent management. **Each injured level is scored separately** and the highest score becomes the total TLICS score. The total score helps guide decision making about surgical versus nonsurgical management.

Familiarity with the TLICS will help radiologists who interpret spine trauma imaging studies to effectively communicate findings to spine trauma surgeons.

Table 1 (1)
The TLICS with Its Subcategories and Scoring

Injury Category	Point Value
Injury morphology	
Compression	1
Burst	2
Translation or rotation	3
Distraction	4
PLC status	
Intact	0
Injury suspected or indeterminate	2
Injured	3
Neurologic status	
Intact	0
Nerve root involvement	2
Spinal cord or conus medullaris injury	
Incomplete	3
Complete	2
Cauda equina syndrome	3

Table 2 (2)
TLICS Treatment Guidelines for Spine Injury

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

Score of **3 or lower** generally indicates **nonsurgical** approach with brace immobilization and active patient mobilization.

Score of **5 or higher** warrants **surgical** intervention with deformity correction, neurologic decompression if necessary, and stabilization.

Score of **4** indicates an **intermediate** zone where surgical or nonsurgical treatment may be equally appropriate. (3)

INJURY MORPHOLOGY

1. Compression
2. Translation/rotation
3. Distraction

Compression 1 pnt	Burst 2 pnts
	
· Simple compression · Wedge deformity	· Compression with retro-pulsion of superoposterior body fragment
Translation/rotation 3 pnts	**Distraction 4 pnts**
	
· Rotatory / shearing · Anterior or lat displacement · Facet joint displacement	· Horizontal fracture of posterior elements · Separation of posterior elements (4)

1. Compression descriptor is assigned when the vertebral body fails under axial loading

- Less severe form = simple compression fracture with buckling of the anterior wall of the vertebrae and accentuated kyphosis
- More severe form = failure of posterior cortex of the vertebral body between the pedicles with various degrees of retropulsion (burst fracture)

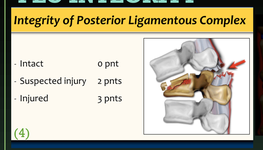
2. Rotation/Translation forces are primarily responsible for spinal column failure. More destruction of normal anatomy and more instability than compression. Note: "Translation" = "Dislocation"

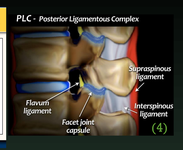
Findings:

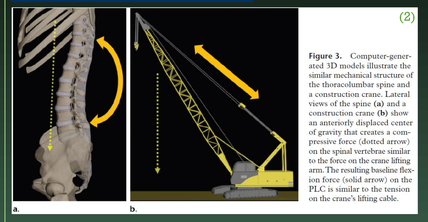
- AP film: horizontal separation of the spinous processes or acutely altered alignment of the pedicles above and below the level of the injury
- Axial CT: shift in the midline sagittal plane across the injury site
- Sagittal CT: provide detail to look for a facet jump or fracture

3. Distraction morphology is surmised when one part of the spinal column is separated from the other leaving a space in between.

PLC INTEGRITY







(2)

Figure 3. Computer-generated 3D models illustrate the similar mechanical structure of the thoracolumbar spine and a construction crane. Lateral views of the spine **(a)** and a construction crane **(b)** show an anteriorly displaced center of gravity that creates a compressive force (dotted arrow) on the spinal vertebrae similar to the force on the crane lifting arm. The resulting baseline flexion force (solid arrow) on the PLC is similar to the tension on the crane's lifting cable.

a. b.

CT features of PLC pathology are:

- Widening of the interspinous space
- Avulsion fractures or transverse fractures of spinous processes or articular facets
- Widening or dislocation of facet joints
- Vertebral body translation or rotation

MRI features of PLC pathology are:

Definite: *3 points*

- Loss of normal low signal intensity of the ligamenta flava or supraspinous ligaments on T1 and T2

Indeterminate: *2 points*

- Edema without clear rupture; high signal intensity of the interspinous ligaments or along the facet joints on T2 SPIR or STIR

NEUROLOGIC STATUS

Neurological status	
· Intact	0
· Nerve root	2
· Complete cord	2
· Incomplete cord	3
· Cauda equina	3 (4)

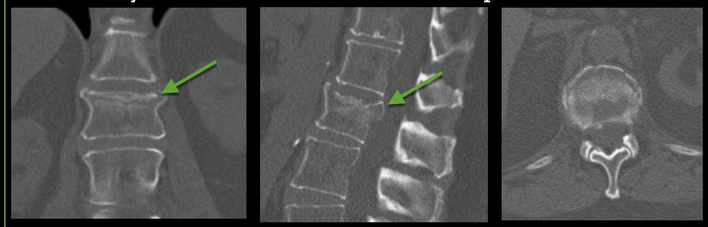
The radiologist should report the following (4):

- **Myelopathy** or **nerve compression**
- **Retropulsion** of a body fragment and the percentage of **narrowing** of the spinal canal
- **Epidural hematoma**

The **neurologic status** is described by clinicians in increasing order of urgency as (1):

- Neurologically **intact**
- Nerve **root** injury
- **Complete** (motor and sensory) spinal cord
- **Incomplete** (motor or sensory) spinal cord or **cauda equina** injury

CASE 1: 81 year old female with dementia who presents after fall.



Morphology: T9 compression fracture with **retropulsion** of superoposterior body fragment (burst fracture); **2 points**

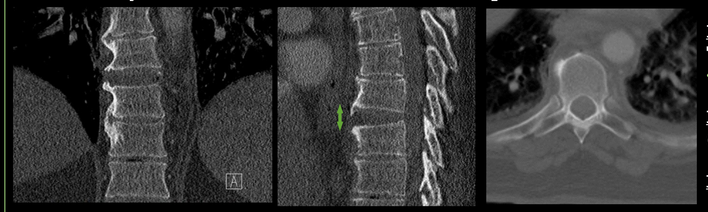
PLC integrity: No CT features of PLC pathology (no MRI performed); **0 points**

Neuro deficits: None; **0 points**

TLICS SCORE: 2 POINTS

CASE 1: **TLICS 2**, treated conservatively with bracing

CASE 2: 61 year old male restrained driver hit a parked truck at 80 miles per hour.



Morphology: Separation of anterior elements of T8 from T9, indicating a **distraction** injury of T8; **4 points**

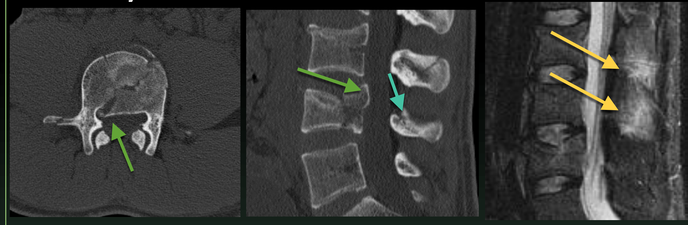
PLC integrity: No CT features of PLC pathology (no MRI performed); **0 points**

Neuro deficits: None; **0 points**

TLICS SCORE: 4 POINTS

CASE 2: **TLICS 4**, treated conservatively with bracing

CASE 3: 20 year old male fell 25 to 40 feet from a tree.



Morphology: L4 compression fracture with **retropulsion** of superoposterior body fragment (burst fracture), facet joints intact *(Note: it could be argued that the L4 spinous process fracture indicates distraction)*; **2 points** *(or 4 points)*

PLC integrity: CT and MRI features of PLC pathology, including spinous process fractures and high T2 signal intensity of interspinous ligaments; **3 points**

Neuro deficits: None; **0 points**

TLICS SCORE: 5 POINTS *(or 7 points)*

CASE 3: **TLICS 5** *(or 7)*, treated surgically with posterior fusion.

CASE 4: 42 year old male, car fell on him while working underneath.

Morphology:
Translation via bilateral "jumped" facets of T11 on T12 *(it can be argued that distraction is not the main feature of the fracture)*; **3 points**

PLC integrity:
Fracture of the T12 right articular facet, facet dislocation (as above), and almost 100% narrowing of spinal canal; **3 points**

Neuro deficits:
Complete cord; **3 points**

TLICS SCORE: 9 POINTS

CASE 4: **TLICS 9**, treated surgically with posterior fusion.

CONCLUSION: The TLICS is designed to depict the features important in predicting spinal stability, future deformity, and progressive neurologic compromise, and thereby facilitate appropriate treatment recommendations. In operative candidates, features of this classification system, such as posterior ligamentous complex (PLC) integrity and the neurologic status of the patient, serve to direct the optimal surgical approach.

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