Thoracolumbar Injury Classification and Scoring System

ALEXANDER VACCARO, M.D., PH.D.

Thomas Jefferson University Hospital, Philadelphia, Pennsylvania

To the editor: The thoracolumbar junction is uniquely predisposed to injury as a result of the significant forces exerted over the relatively short spinal segment as the spine transitions from a kyphotic thoracic posture to a lumbar lordosis. In the transitional thoracolumbar segment (T10–L2) the body’s center of gravity moves from anterior to posterior relative to the anterior spinal column, with the load consequently shifting from the anterior column to the posterior elements. In this transitional region the thoracic ribcage no longer serves as a buttress, and the lumbar spine has not yet transitioned to its full lordosis, with a concomitant shift of the load to the more sagittally oriented facets.2

Historically there have been multiple descriptive and mechanistic classification systems for thoracolumbar injuries. These systems have evolved with an increased understanding of spinal biomechanics afforded by advances in clinical imaging. The goal of a classification system is to facilitate accurate description and communication of the salient features of an injury between investigators and clinicians; consequently, any classification system must be validated for inter- and intraobserver reproducibility. To be of clinical utility, the information conveyed in a classification system should aid the physician in guiding treatment.

Due to the complexity of existing classification systems, concerns about inter- and intra-observer reproducibility, the lack of inclusion of neurological status, and the need for clinical guidelines, the Spine Trauma Study Group developed a classification system for thoracolumbar injuries that builds on concepts from prior systems with an aim to be more applicable to clinical decision making. The goal was to develop a system that is easy to use, easy to communicate, incorporates key decision making considerations, and facilitates clinical decision making.

The Thoracolumbar Injury Classification and Severity Scale (TLICSS) assesses each injury according to its morphological characteristics, the integrity of the posterior ligamentous complex, and neurological status of the patient. The severity of the injury and consequent treatment recommendations are guided by assigning a point score to each of these features.4,5 Injuries are classified by morphological characteristics as compression fracture (1 point), burst fracture (2 points), translational or rotational injuries (3 points), or distraction injuries (4 points). The posterior ligamentous complex is assessed on MR images or CT scans and classified as intact (0 points), suspected injury (2 points), or confirmed injury (3 points.) Neurological status is assessed as intact (0 points), nerve root injury (2 points), complete neurological injury (American Spinal Injury Association scale Grades A, 2 points), incomplete neurological injury (American Spinal Injury Association scale Grades B, C, and D) or cauda equina (3 points.) The scores in each category are summed to yield the overall severity score, ranging from 1 to 10. Injuries with a severity score of ≤3 are likely candidates for nonoperative treatment, while injuries with a severity score of ≥5 probably require surgical stabilization. Injuries with a severity score of 4 are indeterminate with regard to the need for surgical intervention, and treatment considerations are based on clinical qualifiers. Clinical qualifiers include extreme kyphosis, marked spinal collapse, lateral angulation, open fractures, soft tissue compromise, adjacent rib fractures, inability to brace, multisystem trauma, severe head injury, and sternum fracture. An earlier version of this classification system (Thoracolumbar Injury Severity Scale) also considered injury mechanism, but it was found that mechanism of injury had the greatest interobserver variability. Consequently, this factor was removed from the system and the focus was turned to the morphological characteristics of the injury.3

The 2 cases of a unilateral thoracolumbar facet dislocation presented by Reddy and colleagues are illustrative of the utility of the TLICSS system. The patient in Case 1 had a TLICSS score of 9: 3 (translational/rotational) + 3 (disrupted posterior ligamentous complex) + 3 (cord/medullary conus injury, incomplete). The patient in Case 2 also has a TLICSS score of 9, but with additional clinical qualifiers. A severity score of 9 probably necessitates surgical intervention in the absence of precluding clinical qualifiers. As the authors noted, resection of the facet was necessary to achieve reduction in both cases, and it is important to emphasize this. Conceptually these fractures can be viewed as a failure of the posterior ligamentous complex, which allowed a flexion-distraction force to dislocate the facet with consequent spondylolisthesis. At presentation, the injury morphology was one of lateral spondylolisthesis resulting from lateral facet dislocation, and the posterior ligamentous instability is highlighted by the anterolisthesis in Case 2 when the patient was positioned prone on a Jackson table.
The TLICSS scheme should be viewed not as a numerical categorization of fracture severity, but as a system to guide the clinician in the critical evaluation of the key factors that have been found to contribute to biomechanical and neurological stability. An exhaustive categorization of thoracolumbar injuries by mechanism and type inevitably results in such a degree of complexity that it becomes clinically unwieldy. By classifying fractures instead by a standardized, validated, critical evaluation of the factors crucial to structural and neurological integrity, the clinician is given a basis on which to initiate surgical decision making. It has been demonstrated that with the high degree of interobserver variability in describing injury mechanisms, different observers may arrive at different fracture classifications based on other established systems. What Reddy et al. suggest is a paradigm shift away from an all-inclusive categorization system to a system that describes how the fracture behaves clinically; both injuries the authors present are clearly unstable and necessitate surgical management.

The TLICSS system was designed with an emphasis on recognized salient features that guide the clinical management of these difficult injuries. The impetus for this system was in part the realization that attempts to develop an all-inclusive classification scheme were too complicated and of limited clinical utility. Although the TLICSS system has been validated from a reproducibility standpoint, long-term follow-up data will be needed to validate it in terms of outcomes.

References

Response

PAUL PARK, M.D.
JAYPAL REDDY SANGALA, M.B.B.S.
FRANK LA MARCA, M.D.

Department of Neurosurgery, University of Michigan, Ann Arbor, Michigan

In this article, we present an unusual type of lumbar injury. Although a traumatic lateral spondylolisthesis with a unilateral locked facet is unlikely to be frequently encountered, thoracolumbar injuries are common and management can be controversial. In classifying thoracolumbar injuries, the Denis system and the more comprehensive Academy of Orthopedics classification are 2 commonly used methods. Neither system, however, provides recommendations on management. In order to guide management with a consistent and easy to use scheme, the Spine Trauma Study Group has proposed the TLICSS. Unlike other classification systems, the neurological status in addition to injury morphological characteristics and integrity of the posterior ligamentous complex are included in the TLICSS system to produce a numerical score that indicates injury severity and can help guide decision making. In our experience, application of the TLICSS system has been straightforward and reproducible. The TLICSS score also appears to correlate well with the need for surgical versus nonsurgical management as illustrated in the 2 cases we present.

DOI: 10.3171/SPI.2008.8.08560