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Letter to Editor: Nonoperative Management of Isolated Thoracolumbar Flexion Distraction Injuries: A Single-Center Study

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To the Editor: We read the article by Butler et al with interest.¹ This retrospective single-center study compares the outcomes of 14 patients who were treated operatively and 13 patients treated nonoperatively for nondisplaced thoracic or lumbar B1 injuries according to AO Spine classification.¹ The study demonstrated no significant difference between operative and nonoperative treatment regarding Cobb angle, complication rates, time to return to work, and back pain remission.¹ We have a few comments to make while acknowledging the authors' efforts in this work.

According to the AO Spine classification, B2 injuries are segmental injuries that disrupt the posterior ligamentous complex (PLC) and require surgical treatment due to their low healing capability.² B1 injuries are purely transosseous, monosegmental injuries, which are more amenable to nonoperative treatment due to their higher bony healing potential.^{3,4} Nevertheless, it is commonly noted that nonoperative treatment may be effective for certain B1 injuries but can result in painful pseudoarthrosis and kyphosis in certain instances.^{5,6} The thoracolumbar AO Spine injury severity score mirrored this argument: B2 should be treated operatively, while B1 could be treated either operatively or nonoperatively.⁵

B1 injuries are typically considered to involve the spinous process fracture (SPF) or horizontal laminar fracture (HLF). By contrast, B2 fractures involve interspinous widening (ISW) or facets, implying PLC injuries.² In our experience, B2 injuries are frequently misclassified as B1 injuries for a variety of reasons. First, ISW can be easily overlooked due to a lack of agreed-upon cut-off values or the insensitivity of supine computed tomography (CT) compared with standing x-rays.⁷ Second, subtle facet subluxation or facet fracture due to HLF extending across the articular process can be easily overlooked, especially on x-ray images.⁸

Finally, an oblique or avulsion SPF will invariably damage the supraspinous ligament, qualifying as a B2 injury. Only 1 of the 50 cases classified as B1 injuries in the Swedish fracture registry turned out to be B1 on consensus reading by an expert panel.⁹

Another pertinent question is “what is the actual prevalence of PLC injury on magnetic resonance imaging (MRI) for B1 injuries?” Also, is it possible to predict it using specific characteristics? We have previously proposed CT criteria for PLC injury based on the number of positive CT findings: SPF, ISW, HLF, and facet malalignment.¹⁰ Two CT findings resulted in a considerably higher likelihood of PLC injury on MRI than a single CT finding (89% vs 33%). This suggests that SPF and HLF should be categorized as B2 when used in conjunction, while they should be classified as B1 when used separately. We also found that the likelihood of PLC damage on MRI correlates with specific features of HLF: displacement >2 mm, laminar and pedicle vs laminar only, and bilateral vs unilateral fractures.¹¹ Those characteristics should indicate B2 injuries rather than B1 injuries.¹¹ Presumably, displaced B1 injuries should be treated surgically not only because of their higher risk of failed reduction and nonunion but also their high risk of PLC injuries.

Apparently, the therapeutic dilemma concerning B1 injuries is further underscored by the lack of stringent criteria for distinguishing B1 and B2 injuries. This may result in denying necessary surgery for a proportion of unstable B2 injuries. Overall, B1 injuries should be considered only after carefully ruling out facet involvement and ISW. Isolated SPF or HLF, particularly those that are nondisplaced, unilateral, or laminar only, may warrant consideration of B1 injuries.¹¹ If those criteria are strictly followed, it will reduce the risk of misclassifying B2 injuries as B1 injuries and potentially lead

to B1 uniformly successful outcomes with nonoperative treatment for B1 injuries, as demonstrated in this study.¹

Finally, looking at the author's data in detail, they had a trend ($P = 0.07$) of a kyphotic alignment in the nonoperative group at the final follow-up, with a mean kyphotic alignment of -12.6° . This group was compared with the operative group (3.6°). Of note, the follow-up in the nonoperative group was shorter (10.8 weeks) when compared with the operative group (43.3 weeks; $P = 0.02$). Interpreting these data with caution may suggest that a longer follow-up or a large sample of patients would lead to a statistical difference in the groups, potentially suggesting some nondiagnosed PLC injury could be responsible for the kyphosis in the whole group but not treated in the nonoperative group. We congratulate the authors for their study.

REFERENCES

1. Butler R, Donley C, Mohammed Z, et al. Nonoperative management of isolated thoracolumbar flexion distraction injuries: a single-center study. *Int J Spine Surg.* 2024;18(4):383–388. doi:10.14444/8619
2. Vaccaro AR, Oner C, Kepler CK, et al. AOSpine thoracolumbar spine injury classification system: fracture description, neurological status, and key modifiers. *Spine.* 1976;38(23):2028–2037. doi:10.1097/BRS.0b013e3182a8a381
3. Reinhold M, Audigé L, Schnake KJ, Bellabarba C, Dai LY, Oner FC. AO spine injury classification system: a revision proposal for the thoracic and lumbar spine. *Eur Spine J.* 2013;22(10):2184–2201. doi:10.1007/s00586-013-2738-0
4. Miyanji F, Fisher CG, Keynan O, Wing PC, Boyd M, Dvorak MF. Flexion-distraction injuries of the thoracolumbar spine: health-related quality of life and radiographic outcomes. *Top Spinal Cord Inj Rehabil.* 2006;12(1):58–69. doi:10.1310/2VG7-9B1E-KXYH-F2KQ
5. Vaccaro AR, Schroeder GD, Kepler CK, et al. The surgical algorithm for the aospine thoracolumbar spine injury classification system. *Eur Spine J.* 2016;25(4):1087–1094. doi:10.1007/s00586-015-3982-2
6. Green DA, Green NE, Spengler DM, Devito DP. Flexion-distraction injuries to the lumbar spine associated with abdominal injuries. *J Spinal Disord.* 1991;4(3):312–318. doi:10.1097/00002517-199109000-00008
7. Aly MM, Al-Shoaibi AM, Aljuzair AH, Issa TZ, Vaccaro AR. A proposal for a standardized imaging algorithm to improve the accuracy and reliability for the diagnosis of thoracolumbar posterior ligamentous complex injury in computed tomography and magnetic resonance imaging. *Glob Spine J.* 2023;13(3):873–896. doi:10.1177/21925682221129220
8. Aly MM, Al-Shoaibi AM, Abduraba Ali S, et al. Which morphological features of facet diastasis predict thoracolumbar posterior ligamentous complex injury as defined by magnetic resonance imaging? *World Neurosurg.* 2023;171:e276–e285. doi:10.1016/j.wneu.2022.12.010
9. Blixt S, Burmeister F, Mukka S, et al. Reliability of thoracolumbar burst fracture classification in the Swedish fracture register. *BMC Musculoskelet Disord.* 2024;25(1). doi:10.1186/s12891-024-07395-0
10. Aly MM, Al-Shoaibi AM, Alzahrani AJ, Al Fattani A. Analysis of the combined computed tomography findings improves the accuracy of computed tomography for detecting posterior ligamentous complex injury of the thoracolumbar spine as defined by magnetic resonance imaging. *World Neurosurg.* 2021;151:e760–e770. doi:10.1016/j.wneu.2021.04.106
11. Aly MM, Al-Shoaibi AM, Al Fattani A, Aljuzair AH. Diagnostic value of various morphological features of horizontal and vertical laminar fractures for posterior ligamentous complex injury of the thoracolumbar spine as defined by magnetic resonance imaging. *World Neurosurg.* 2021;153:e290–e299. doi:10.1016/j.wneu.2021.06.109

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