

Burst Fractures in the Thoracolumbar Junction: What Do We Know About Their Treatment?

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Dear Editor,

The thoracic and lumbar spine (from T1 to L5) is the most common sites of traumatic spinal injuries, especially in the thoracolumbar transition (T11-L2), a junctional area between the mobile lumbar and the rigid thoracic spine (1, 2). The most common causes of trauma are motor vehicle accidents in younger adults and fall in older patients (3). About 160,000 of injuries occur every year in the US, with an important social and economical impact because of the productive years lost and its high morbidity, such as paraplegia, important disability and other associated organs lesions (3, 4).

Classification of TL trauma is important to compare different treatment modalities as well as for scientific purposes. Historically, some classical schemes deserve comments. The concept of spinal stability based on the Denis three column model was widely accepted by the time it was proposed (5). In his model, an unstable spine was defined when the fracture compromised of both anterior and middle column, as occurs in burst fractures. Lately, in 1994, Magerl et al. proposed a comprehensive classification of thoracolumbar fractures that was used by the AO spine study group for many years. Due to its complexity and low reliability it was recently revised by Vaccaro et al. (6), who proposed a new AO Spine system, to improve morphological description. In this new system, TL trauma was grouped in three main morphological groups: type A) compression (failure of anterior structures under compression), type B) tension band disruption (anterior or posterior) and type C) displacement/ translation.

Treatment of TL trauma consists basically of two options: conservative (with a brace or not) or surgical stabilization, to restore spinal alignment, decompress the spinal cord and nerve roots and also restore spinal stability. To guide treatment, injury morphology characteristics are of paramount importance. However, other variables may

influence surgical treatment. In this context, a severity score known as Thoracolumbar Injury Classification System and Severity Score (TLICS) was proposed (7). This system considers the evaluation of injury morphology, neurological status and integrity of Posterior Ligamentous Complex (PLC) in the decision for the best treatment option. A score is obtained with the summation of each one of the three variables, and the final punctuation suggests the treatment: three or less points indicate that conservative treatment may be proposed, whereas with five points surgical treatment is recommended. Patients with four points may be managed both ways, according to surgeon's preference and patients' condition (other injuries, comorbidities, preferences, etc.) (7, 8).

Of note, most of the injuries, with a TLICS of less than five points, are compression or burst fractures without neurological deficits and without PLC injuries. However, with a score of less than five points, many authors criticized the TLICS because some of these injuries that were treated non-surgically may develop further deformity (generally kyphosis) or severe pain/disability (8-10). In this context, considering a historical review, many radiological features were suggested for an unfavorable outcome with non surgical treatment for burst fractures, even though they are based on low level of evidence/poor quality studies. Krompinger et al. proposed surgical treatment for burst fractures without neurological deficits when they were associated with a segmental kyphosis higher than 20°, had loosen more than 50% of their vertebral body height or had at least 50% of canal compromised by posterior wall fragments (2, 11). Mattei et al. proposed that burst fractures with severe comminution of the vertebral body will develop long term kyphosis due to the lack of anterior support (10). The lack of anterior support was also evaluated by the system proposed by McCormack et al. (12, 13), grading the degree of vertebral bone injury according to

the characteristics of bone fractures and vertebral body involvement.

In the last decades, other CT scan-based characteristics were associated with more severe burst fractures and potential injury of the posterior ligamentous complex, labeling such injuries according to some authors as “unstable” burst fractures. These characteristics are facet joint diastasis, splaying of the spinous process and minor dislocations (8, 14, 15). Although all these radiological features are potentially associated with a worse outcome, the evidences that indicate surgery are generally weak. Many systematic literature reviews, meta-analysis and ever-comparative clinical studies did not support their routine use for routine decision for surgical treatment in burst fractures without neurological deficits (4, 16-18).

Considering the lack of solid evidence for the best management of burst fractures without neurological deficits and the lack of solid radiological features to indicate surgery, some strategies may be adopted to treat these patients non-surgically as much as possible, but offering surgery for those who may need it (19). In neurologically intact patients, careful attention of vertebral dislocations is important, as well as potential posterior elements injuries, such as pars or pedicle fractures, facet subluxations or rotational injuries (20). In our practice, magnetic resonance imaging (MRI) is more important for patients whom we intend to treat non-surgically than for those for whom surgery is already indicated. Magnetic resonance imaging may show signs of severe injuries that would be underestimated in some cases using plain radiographs or CT scan. However, MRI changes must be interpreted together with CT scan, once its use isolated may lead to unnecessary surgeries (1, 4, 9, 14, 17, 19).

Finally, in our routine practice, after a CT scan and an MRI, in patients with burst fractures without deficits who will be potentially treated non surgically, we routinely perform a standing plain radiograph on lateral view before hospital discharge for the following reason: to evaluate the effects of patient weight load in the fracture spine, potentially revealing occult ligamentous injury, even in the setting of a “near normal” MRI (17, 21). If patients tolerate their pain in orthostasis and do not show any sign of evident acute instability, conservative treatment is established, with a close clinical and radiological follow up until fracture healing, generally in 8 to 12 weeks (22).

Understanding all the information involved in the management of burst fractures is important to avoid unnecessary surgery and potentially improve patients final outcome.

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