

Subaxial Cervical Spine Trauma – Some insights about The New Classification System proposed by the AO Spine Study Group

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ABSTRACT

Recently, the AO Spine Study Group published a new classification for subaxial cervical spine injuries. We performed a critical analysis of this new system. The following difficulties were raised: (1) difficulties to differentiate type B from type C injuries; (2) the fact that all type C injuries had a facet modified F4 and vice-versa; (3) The difficult to differentiate a F1 from a F2 facet modified and (4) some cases really need an MRI for evaluating the spinal cord. In summary, although promising, the New AO Classification System for Subaxial Cervical Spine Trauma had some important structural flaws that will probably require further revisions. Clinical studies evaluating its safety and reliability are necessary prior to its worldwide adoption.

Key words: Classification; Subaxial; Cervical spine; AO spine

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REVIEW

Classification systems are of paramount importance to compare different treatment modalities, evaluate clinical outcomes and also provide the same language among health career providers^[1,2]. The subaxial cervical spine comprises the segments from C3 to C7, which has a similar vertebral morphology and can be grouped together to facilitate classification and treatment^[1,2]. Recently, in 2015, the AOSpine Knowledge Forum, proposed a new classification system for subaxial cervical spine injuries^[3]. This new system was proposed to offer spinal surgeons a new perspective to better classify these injuries.

The CT scan based classification system groups injuries in three main morphologies: Group A - with compression injuries but with intact tension band; Group B – injuries with failure of the posterior or anterior tension band through distraction without translation or dislocation and, finally, type C - including injuries with displacement or translation and also some degree of separation of the spinal elements^[3]. Group A has five subtypes (A0,1,2,3,4), B (B1,2,3) has three and C just one. Additional descriptors were proposed for facet injuries, neurological status and patient-specific modifiers. Similarly to the SLIC, a previous classification system proposed by the Spine Trauma Study Group for subaxial cervical trauma, which had some studies attesting its reliability and safety for clinical use, the new AO system includes the neurological status, an important prognostic factor to help in the decision-making process of choosing the best treatment (conservative versus surgical management)^[3,4,5,6].

Considering facet modifiers, the system proposed a four degree severity score: F1 – a line fracture of less than 40% of the lateral mass or < 1 cm, F2 – a fragment of > 1 cm or > 40% of the lateral mass or displaced facet fracture, F3 – a floating lateral mass (disrupting the pedicle and lamina) and F4 - subluxation or perched/ dislocated facet joint. Neurological status is classified as: N0 – neurologically intact patients, N1 – patients with transient neurological deficit, N2

- radiculopathy, N3 - incomplete spine cord injury, N4 - complete spinal cord injury and Nx – neurologically undetermined (patients who cannot be examined due to head injury, intoxication, intubation, or other conditions). Finally, some patient-specific modifiers were proposed that can influence clinical decision-making: M1 - partial posterior capsuloligamentous complex injury, M2 - critical disk herniation, M3 - stiffening bone disease (such as Diffuse Idiopathic Skeletal Hyperostosis, Ankylosing Spondylitis, among others conditions) and M4 – signs of vertebral artery injury. To validate the classification, 10 raters from AOSpine group classified 30 random cases, with a final intraobserver and interobserver kappa index of 0.75 and 0.64 respectively, meaning a substantial agreement^[3].

Although the new system is promising, studies attesting a good reliability and safety outside the proponent authors' institutions are necessary prior to its adoption. In this context, we have applied this system in our institution and we had some difficult in the following topics: (1) To differentiate type B from type C injuries, once almost all injuries we had seen with anterior or posterior tension band injury had some degree of translation and/ or dislocation as well; (2) In our perception, almost all type C injuries were associated with a facet modifier F4 and vice-versa; (3) The differences from a facet injury of subtype 1 for a subtype 2 are minimal, which may decrease the system reliability; (4) Although this was a CT based system, we had some cases with severe neurological injury and injuries classified as type A0, such as in patients with cervical stenosis or an acute disc herniation. This emphasizes the importance of neurological status in the treatment decision-making process and the importance of magnetic resonance image in most cases; (5) Finally, the neurological status is different from the proposed by the American Spine Injury Association (ASIA) Impairment Score (AIS), a well-established classification for spinal cord injury^[7].

In summary, although promising, the New AO Classification System for Subaxial Cervical Spine Trauma had some important structural flaws that will probably require further revisions. Clinical

studies evaluating its safety and reliability are necessary prior to its worldwide adoption.

CONFLICT OF INTERESTS

There are no conflicts of interest with regard to the present study.

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