

Treatment of Facet Injuries in the Cervical Spine



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KEYWORDS

- Cervical spine facet injury • Prereduction MRI • Closed reduction of displaced cervical facet injury
- Surgical approach

KEY POINTS

- Numerous classification schemes have been developed to characterize subaxial cervical spine injury. The most recent schemes, such as the Subaxial Cervical Spine Injury Classification System (SLIC) and the AOSpine Subaxial Cervical Spine Classification System, take into account morphology, discoligamentous integrity, and neurologic status.
- Closed reduction of facet dislocations can be performed safely in alert, examinable patients, although concerns about the small risk of neurologic injury secondary to disk herniation justify conducting a prereduction MRI.
- Unilateral facet fractures with minimal displacement and no neurologic deficit can be managed operatively or nonoperatively, although the evidence suggests that better radiographic and clinical outcomes are achieved with surgical treatment.
- Anterior and posterior approaches can both be used successfully for the surgical management of facet injuries, and each has advantages and disadvantages. The anterior approach is well tolerated, allows one to address a disk herniation, and provides a high union rate with good sagittal alignment. The posterior approach allows for easier open reduction and biomechanically superior fixation.

INTRODUCTION

Cervical spine facet injuries comprise a spectrum of injuries ranging from undisplaced unilateral facet fractures to severely displaced bilateral facet fracture-dislocations. The likelihood of neurologic deficit increases in proportion to the energy of the mechanism and the severity of injury to the spinal column. Many classification systems have been developed to characterize cervical spine injuries. The more recent AOSpine subaxial cervical

spine injury classification system is based on morphology and additional descriptors for facet injuries, neurologic status, and patient-specific modifiers. Several questions remain controversial regarding the management of cervical facet fractures. These questions include the following:

- What is the risk of neurologic injury during a closed reduction of a facet dislocation?
- Is surgery or conservative management preferable for isolated facet fractures?

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- What is the optimal surgical approach (anterior, posterior, or combined) for the surgical management of facet injuries?

This article reviews the epidemiology, imaging, classification, and treatment of cervical facet injuries; controversial aspects of management are highlighted and supporting evidence is discussed.

EPIDEMIOLOGY

The annual incidence of subaxial cervical spine fracture is 10/100,000.¹ These fractures account for approximately 65% of fractures and 75% of all dislocations in the vertebral column. Within the subaxial cervical spine, most injuries occur at either C5-C6 or C6-C7.²⁻⁴ Facet dislocations account for 5% to 10% of all cervical spine injuries.⁵ Isolated, nondisplaced or minimally displaced fractures of the facets account for fewer than 5% of all cervical injuries.⁶ Neurologic injury occurs in up to 85% to 90% of patients with bilateral facet dislocation.⁷

CLASSIFICATION

Reliable classification systems for spinal injuries are important for communication among care providers and for facilitating research. An ideal classification system would have the characteristics of being comprehensive, reproducible, and a guide to treatment. Establishing such a system is challenging, and as such, numerous subaxial cervical spine injury classification systems have been developed over the years. The older systems, such as that of Allen and colleagues⁸ and Harris and colleagues,⁹ focused on the mechanism of injury. Such systems are challenged by the difficulties in extrapolating the exact mechanism of injury from static radiographic imaging. Newer systems have focused less on mechanism and more on injury morphology and have attempted to incorporate the status of the neurologic elements, given that neurologic injury often drives treatment decisions. Such systems include the Subaxial Cervical Spine Injury Classification System (SLIC)¹⁰ and the most recently described AOSpine subaxial cervical spine injury classification.¹¹

The Allen and Ferguson system was described in 1982 and classified cervical spine injuries into 6 categories based on the mechanism of injury.⁸ Each category was further subdivided into stages reflecting progressive severity of injury. A spectrum of facet injuries was included within the mechanistic category of “flexion-distraction” as follows:

Flexion-distraction stages (**Fig. 1**)

1. Facet subluxation
2. Unilateral facet dislocation
3. Bilateral facet dislocation with 50% displacement
4. Complete dislocation (100%) displacement

The SLIC was developed to facilitate treatment decisions by integrating data across the following 3 domains (**Table 1**)¹⁰:

1. Injury morphology
2. Integrity of the discoligamentous complex (DLC)
3. The neurologic status of the patient

The SLIC was the first classification scheme to consider the presence or absence of neurologic injury, which was recognized as being a major factor in treatment decision-making. The SLIC score is established by adding the scores from each subdomain, with the expectation that a higher score represents a more severe, unstable injury. An SLIC score of 3 or less suggested an injury amenable to nonoperative management; scores of 5 or greater suggested that surgical management was warranted. A score of 4 was “indeterminate” and represented an injury that could be managed surgically or nonsurgically depending on surgeon preference. Unilateral and bilateral facet subluxations/dislocations are technically within the “rotation/translation” injury morphology in the SLIC system and therefore get a score of at least 4; usually 2 more points are given for DLC injury, giving these injuries a score of 6 even in neurologically intact individuals. Hence, the SLIC system generally recommends surgical treatment of facet subluxations/dislocations, although in the presence of a facet fracture with little subluxation, the SLIC remains somewhat ambiguous in terms of the optimal treatment (**Fig. 2**).

Although SLIC included neurologic injury into the classification system and helped to guide treatment, it was hampered by disagreement over injury morphology (both bone and soft tissue) among practitioners.¹² With this limitation in mind, the AOSpine Trauma Knowledge Forum developed the AOSpine subaxial cervical spine injury classification system, first published in 2015.¹¹ This classification system is based on 3 injury morphology types: compression injuries (A), tension band injuries (B), and translational injuries (C). Unique to this system are descriptions for facet injuries, patient-specific modifiers, and neurologic status. The system has been shown to have good interobserver and intraobserver

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