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C5-C6 Traumatic Spondylolisthesis Associated with Facet Dislocation Without Neurological Deficit, Case Report

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Abstract

Introduction: Treatment for instability of the cervical spine is a controversial topic due to the number of adjacent structures in this area, timely identification of cervical injuries and timely treatment along with immediate stabilization is indisputable, to improve success. of the patient's clinical evolution.

Objective: To present an atypical case of a patient with facet incongruence of C5 and C6 at neurological level E, who underwent a 360° approach and was discharged from ASIA E with adequate clinical evolution.

The case: a 31-year-old male patient is presented who began his illness on September 10 of 2023, suffers motorcycle accident, in which the mechanism of injury was by reach, upon arrival at the emergency room, the ATLS protocol was carried out in the emergency area to stabilize the patient. Subsequently, a series of trauma was performed, showing that the lateral x-ray of the cervical spine showed facet incongruity at the level of C5-C6 with anterior displacement from C5 to C6.

Keywords: Cervical Dislocation, ASIA, 360° Approach; Neurological; Trauma

Introduction

Traumatic cervical dislocations are associated with 35% of spinal cord injuries at the cervical level.

i. They are considered catastrophic due to the vascular or neurological compromise they can cause.

ii. They represent 10% of all traumatic spinal column injuries.

Spondylolisthesis associated with facet dislocation of the cervical spine without neurological deficit from a clinical point of view is rare and may go unnoticed due to little or no associated neurological symptoms. Its treatment is controversial, 4 because it involves adequate assessment and planning to establish the most appropriate surgical strategy (anterior and/or posterior approach) in order to avoid iatrogenic injuries during reduction. We present the case of a patient with traumatic spondylolisthesis of C5-C6 + facet dislocation without neurological deficit (ASIA E) who underwent a 360º approach with satisfactory clinical evolution.

Ethical approval and informed consent

The Hospital's Local Research and Research Ethics Committee granted ethical approval for the study. The authors requested written informed consent from the patient for the presentation of this case, always maintaining anonymity and confidentiality.

Case Presentation

This is a 31-year-old male patient with no significant history who was referred to our hospital unit after a high-impact car accident. He was initially treated in a 1st level rural medical unit, where he received primary care and subsequently referred to a 3rd level care hospital of the Secretary of Health of the State of Puebla, where upon admission a clinical radiological diagnosis of C5-C6 traumatic spondylolisthesis was made. Meyerding's GIII + right C5-C6 unfacet dislocation without neurological deficit was performed, as well as complementary cabinet studies with the following findings. The radiographic examination in lateral

projection of the cervical spine demonstrated joint incongruity at the level of C5-C6 with anterior displacement of 50% Meyerding's GIII (Figure 1). Simple computed tomography (CT) of the cervical spine shows a solution of continuity at the level of the right facet of C6 with a simple non-displaced line, traumatic spondylolsthesis of C5-C6 of approximately 50% of it, without evidence of bone continuity solution of the vertebral body, spinous and transverse processes. On physical examination, the neurological assessment based on the ASIA Classification was "E", as the patient presented preservation of muscle strength 5/5 on the Daniels Scale and bilateral sensitivity 2/2 and normoreflexia below the injury. Rest of studies within normal parameters. The following diagnoses were integrated: AO injury: C5-C6: C, C6 A0, F4, N:0 M:1; 7- point SLICS classification, ASIA E. Because it was an unstable injury, despite not presenting neurological deficit, surgical treatment was performed through an anterior and posterior cervical approach, to prevent further displacement and secondary neurological deterioration.

Figure 1: Ap and Lateral Radiograph of Cervical Spine.

Technique description

The following were used: 8 polyaxial screws to lateral cervical masses, 2 titanium bars, 1 crosslink, 1 PEEK box, anterior cervical plate, and 30 cc bone matrix, 15 cc bone chip. The surgical procedure was performed under general anesthesia in two stages performed on the same day, under fluoroscopy. It begins with a conventional posterior cervical approach on the midline until the C5, C6 cervical spine is identified, suboperiosteal dissection to expose lateral cervical masses. Under fluoroscopy, 4 screws are placed to lateral masses of 3.5 x 12 mm at the level of C5 and C. 6, hemilaminectomy and right partial facetectomy of C5 and C6 (Figure 2), gentle reduction of the segment is performed axially with the help of 2 reducing forceps and a Penfield dissector, taking care not to hyperextend it. The system is fixed with 2 60 mm bars and prisoners, subsequently scarification and arthrodesis with bone graft, followed by plane closure, ending the first surgical period. The patient is placed in the supine position, a right anterior approach is performed, blunt dissection through planes until the cervical spine is identified; C5-C6 discectomy with Hartman clamp, platforms are scarified with a spoon, test and subsequent 8 mm PEEK cervical cage are placed, subsequently placement of the anterior cervical plate (Figure 3), adequate placement was confirmed by intraoperative fluoroscopy (Figures 4 & 5) Penrose-type drainage is placed and closure is performed, ending the second surgical act. After 3 days of hospital stay for analgesic management, antibiotics and monitoring of neurological status, discharge was decided due to improvement.

Discussion

Trauma to the cervical spine is considered an orthopedic emergency, requiring immediate attention, the cervical spine consists of 7 vertebral bodies. C1 (atlas) articulates with C2, this being considered the axial column, and from C2 to C7 is considered the subaxial column, presenting in these spaces a lordosis at rest, they function to maintain physiological movement and protect neuronal elements, in a traumatic mechanism, soft tissue bony structures (mainly the posterior ligamentous complex). Cervical joint incongruities present a bimodal distribution (10% of spinal column injuries) and the mechanism of injury is associated with the patient's age and work performance. Traffic accidents continue to be the most common cause, followed by falls. in height, unlike

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facet dislocations that are secondary to a flexion-distraction mechanism [1-3]. The diagnosis of these cervical injuries is complex, given the high number of anatomical structures and biomechanics found in that area, the immediate identification of these pathologies favors timely treatment for the patient's clinical improvement [4]. Determining the exact classification using the global validation of the AO Upper Cervical Spine Injury System proved to be a useful weapon for use in the treatment of cervical injuries [5]. However, to carry out this adequate classification, complementary clinical studies are required, as well as their availability for use when identifying the diagnosis, the use of computed tomography and magnetic resonance imaging are used as a diagnostic complement for these pathologies [6]. Magnetic resonance imaging is considered the gold standard to identify injuries in both bone structures and soft tissues. The use of this diagnostic complement even helps to identify unilateral and bilateral facet dislocations of the subaxial spine, identifying associations of damage to soft tissues, in A 2001 study concluded that unifacet injuries do not present injuries to the posterior longitudinal ligament, unlike bilateral injuries that present injuries to the anterior and posterior longitudinal ligaments and the left facet capsule [7].

Figure 2: Posterior Transoperative Approach.

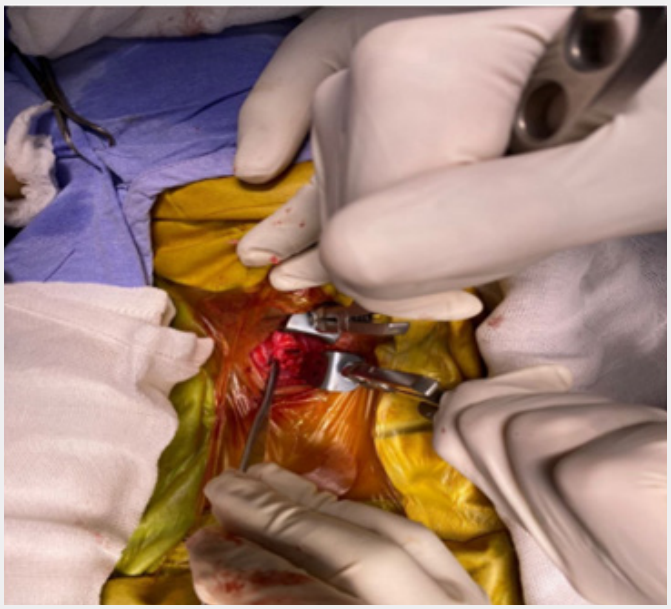

Figure 3: Transoperative Anterior Approach.

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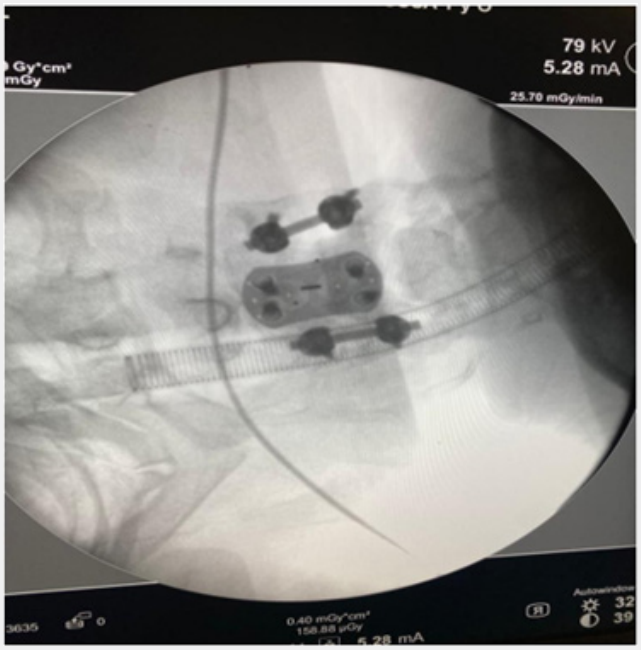

Figure 4: Transoperative Anteroposterior Projection.

Figure 5: Transoperative Lateral Projection.

In Our hospital environment, which is considered a highly concentrated hospital due to a high flow of spinal trauma patients and is a reference place in the center of the country, it is important to understand that because it is public in nature, we sometimes have deficiencies in resources and therefore material for our patients, we are limited in terms of the resources and implants used in surgeries, as well as in the imaging studies to which it is possible to have access. Our clinical case had the management implemented from the emergency room to the taking of basic and advanced studies for the planning of our patient by our institution.

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Approximately 35% of closed spinal cord injuries occur in the neck, which requires the development of diagnostic and management algorithms for these patients that initially include treatment compatible with life support for traumatic ATLS, as studies have so far demonstrated. images based on Nexus criteria. (neurological deficit, midline cervical stiffness, altered mental status, intoxication, or interferential pathology) Ligament failure occurs at two levels: posteriorly between the fractured vertebrae above and anteriorly between the fractured vertebrae below. It is important to decide whether to treat cervical dislocation in an anterior or posterior direction. The primary goal of any surgery is to achieve anatomical reduction, spinal decompression, and avoid instability through proper fusion.

The SLICS scoring system can determine the type of treatment consists of three main categories:

i. Lesion morphology,

ii. Integrity of the disc ligamentous complex,

iii. Neurological status.

These three aspects are fundamental for the description, treatment and prognosis of trauma; Patients with a score less than 4 may require conservative treatment, an indeterminate score of 4 is determined by the surgeon, and older patients may require surgical treatment. Within our hospital unit, when deciding on surgical intervention, the next step is to evaluate the preoperative plan, planning, type of fixation, type of material and surgical approach. The anterior approach has the advantages of easy access, less blood loss, minimal surgical trauma, and lower infection rates; It is mainly indicated when it involves injuries to the anterior region of the spine and without evidence of ligament complex injury. Early decompression can improve the patient's outcome and is preferred before 24 hours. With reference to our clinical case, new branches of research emerge, such as: the use of traction prior to surgery, use of corticosteroids and correlations with pre- and post-surgical neurological deficit against functional scales in the follow-up of patients (Figure 6).

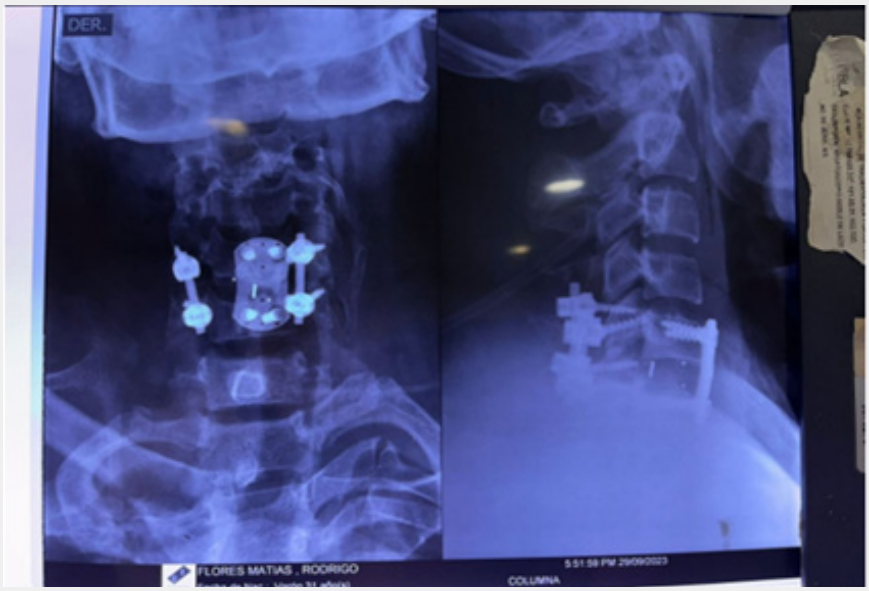

Figure 6: Post-Surgical Radiography.

This type of injury, as already mentioned, is 35% catastrophic; however, our patient, despite not having been initially received or having specific knowledge of trauma kinematics, can infer that there was no flexion-compression mechanism, therefore What is believed to be this type of injury without deficit occurs due to a rotation mechanism that could cause the fracture of the facet and consequently caused the displacement secondarily, generating an axis of instantaneous rotation that did not compromise the neurological structures. Rotational subluxation injuries occur when torsion (rotational vectors) is generated around the longitudinal axis of the cervical, thoracic, and subaxial spinal muscles. This can cause a rotational subluxation of C1 or C2. It is apparently the weakest link in the occipital-C1-C2 ligament complex. This is confirmed by a significant rotation movement. Permissive motion around a direct axis of rotation that is more lateral (e.g., across the facet joints) can result in contralateral unilateral rotational subluxation. The loss of anatomical integrity throughout the subaxial spine is relatively monotonous. Compared to upper cervical spine injuries they are less variable in the number of definable injury patterns and types. Dennis

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describes the different types of structures and describes the failure modes. Its refraction factor limitation scheme is the most used today. This largely applies to the entire subaxial cervical spine. Different from the Dennis scheme and related schemes (e.g., AO schemes). The types of damage described here are based on the mechanism of injury, the criteria for determining the type of fracture are compression and rotation of the canal, the presence of bone or disc fragments in the canal, as shown in the Dennis diagram However, the Dennis concept should not be abandoned which describes the three columns used to determine mechanical stability. The way the load is applied determines in part the timing of the applied vector [8]. Subaxial spinal cord injuries correspond to the defined area between the C3 to C7 vertebrae and involve skeletal and ligamentous anatomy, resulting in a variety of fracture patterns and varying degrees of neurological deficit. Because the structure and function of the C1-C1 segment are very different from the structure and function of the C2-C7 region, they are administered separately in clinical practice [8,9]. Subaxial injuries of the cervical spine occur in 2.4 to 3.7% of blunt trauma patients, with the most frequently affected site being C5-C7, which represents approx. 50% and are more common than occipital injuries. -C2 has a ratio of 2:3. Fractures and dislocations are the most common, and the C5-C6 segment is the most affected, compared to the C7-T1 segment, more cases require open fixation [10] Car accidents, falls, violent crimes, and sports injuries are the leading causes of cervical spine injuries [11,12]. urgery is appropriate for cases with progressive cits and spinal canal damage. It may also be appropriate in cases of mild neurological deficit, but severe spinal canal damage; Such surgical decisions can be supported by classification systems, such as the so-called Subaxial Cervical Spine Injury Classification System, abbreviated SLICS [13,14]. When determining surgical treatment, anterior or posterior stabilization may be chosen for the treatment of subaxial spinal injuries. The choice between anterior and posterior approach should be based on the type of injury, but there is currently no clear consensus. Depending on the type of injury and the biomechanical conditions of the cervical spine, choose one type or both; However, the goal should always be anatomical reduction, decompression of the spine, and avoiding instability, while preserving the patient's initial range of motion and joint range of motion. Rehabilitation [15,16].

Conclusion

Spinal cord trauma is considered an orthopedic emergency. There are few classification systems on which the spine surgeon can rely when choosing early surgical treatment. The integrity of the ligaments is essential, given that they are grouped in the stability of the cervical spine, short-term treatment of these injuries can present short-term clinical improvements in patients.

Level of evidence: IV

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Conflict of Interest

NO author has a proprietary interest in this report.

The authors state that this is an original case report that does not require signed informed consent from the patient; but verbal consent was requested. The authors state that nowhere in the manuscript is personal data of the patients mentioned, and these data have been collected anonymously and confidentially. The authors declare that there is no conflict of interest for this manuscript and that the present research was carried out with the researchers' own resources and the affiliated Hospital Unit. The authors declare that this manuscript has not been previously published or simultaneously submitted to any other journal for publication and all authors accepted the article in its current state and agree with what is expressed in it.

Contributions

Dr. Pablo Gerardo Lima Ramírez, specialist in traumatology and orthopedics. High specialty in spine surgery (Co-author), follow-up and patient care.

Dr. Luis Armando Martínez Benito. Traumatology and orthopedics resident. (Co-author), follow-up and patient care.

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monitoring and patient care.

Dr. Gilberto Ramon Gutiérrez Grajales; patient follow-up and care, collection of patient information, follow-up of results, writing of the manuscript.

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