Traumatic Atlantoaxial Rotatory Subluxation in Adults. Report of Two Cases and Literature Review.

Subluxación atlantoaxial rotatoria traumática en adultos
Reporte de dos casos y revisión de la literatura.

Abstract

Atlantoaxial subluxation is defined as an instability of the atlas (C1) over the axis (C2), due to failure or rupture of the ligament complex in the C1-C2 joint. It occurs most frequently in childhood, due to atlantoaxial ligament laxity, a common condition at this age group and may have traumatic or nontraumatic causes. The clinical features of this entity are the presence of upper cervical pain, limitation of neck mobility, torticollis and muscle spasm. The treatment of rotatory subluxation should be individualized because there is no evidence in the literature showing the superiority of a particular therapeutic proposal. In this study we describe two cases of atlantoaxial subluxation of traumatic origin in adults and review the literature regarding the main aspects of this entity.

Key Words: atlantoaxial joint; cervical vertebrae; dislocation; spinal injuries.

Resumen

Subluxación atlantoaxial se define a una inestabilidad del atlas (C1) sobre el axis (C2), debido a un fallo o rotura del complejo del ligamento de la articulación C1-C2. Es más frecuente en la infancia, debido a la laxitud del ligamento atlantoaxial, una condición común en este grupo de edad y puede tener causas traumáticas o no traumáticas. Las características clínicas de esta entidad son la presencia de dolor cervical superior, limitación de la movilidad del cuello, torticollis y los espasmos musculares. El tratamiento de la subluxación rotatoria debe ser individualizado en porque no hay una evidencia en la literatura que muestra la superioridad de una propuesta terapéutica en particular. En este estudio se describen dos casos de subluxación atlantoaxial de origen traumático en adultos y se hace una revisión de la literatura respecto a los principales aspectos de esta entidad.

Palabras claves: Articulacion atlantoaxial; vertebra cervical; luxación; lesión vertebral.
Introduction

Atlantoaxial subluxation is defined as an instability of the atlas (C1) over the axis (C2), due to failure or rupture of the ligament complex in the C1-C2 joint. Rare in adults, several conditions associated with abnormalities in the atlantoaxial joint or ligament laxity course with a higher incidence of this entity, such as rheumatoid arthritis, Síndrome de Down, Síndrome de Marfan, Síndrome de Morquio e Síndrome de Grisel (1, 2), Down syndrome, Marfan syndrome, Morquio’s syndrome and Grisel’s syndrome (4, 8).

In this study we describe two cases of atlantoaxial subluxation of traumatic origin in adults and review the literature regarding the main aspects of this entity.

Case 1
A female patient, 27 years old, was victim of an accidental fall to the ground while holding her son on her lap. The patient acquired a vicious posture with head rotation to the right. She showed functional limitation and pain when attempting to raise head in neutral position.

She presented with the mental state preserved without motor deficit, ASIA E. A computed tomography (CT) scan of the neck was performed and showed atlanto-axial rotatory dislocation type II according to Fielding and Hawkins (Figure 1A). The patient was submitted to conservative treatment with Gardner Wells skull traction for 12 days. After dislocation’s reduction, a halo-vest immobilization was maintained for 03 months. After that, she presented without deficits or pain.

Case 2
A 32 years old man was victim of aggression. On admission he presented an intense bleeding in the upper airway due to face fractures and nine points in Glasgow Coma Scale. After intubation for airway protection CT scan of the brain was performed and showed no abnormalities.

Fielding e Hawkins a direita (figuras 2 e 3) The cervical spine CT scan revealed rotator subluxation type I Fielding and Hawkins’s classification (Figure 1B and 2A). The patient was immobilized with a Philadelphia neck collar during 15 days for deformity’s reduction (Figure 2B). After this period, he presented without pain or neurologic deficit.

Discussion

The atlantoaxial rotatory subluxation is a rare clinical condition that may have traumatic or nontraumatic causes (5). It occurs most frequently in childhood, due to atlantoaxial ligament laxity, a common condition at this age group (5). The first classical description of this entity was made by Corner in 1907 (5). The main non-traumatic origins include rheumatoid arthritis, Down syndrome, Marfan syndrome, Morquio’s syndrome, Grisel’s syndrome (4, 8).

The magnetic resonance imaging (MRI) findings suggest that the alar ligament injury is the most important cause for

Figure 1: Computed tomography of the cervical spine i axial acquisition, showing: A-rotary subluxation type II (Case 1); B-rotary subluxation type I (Case 2).

Figure 2A: Computed tomography reconstruction of the cervical spine showing the lateral dislocation of the axis in Case 2B - Computed tomography of the cervical spine in axial acquisition after treatment (CASe 2) demonstrating the normal position of the axis.
atlantoaxial subluxation \(^{(11,14)}\). In 1977, a retrospective study of 17 patients conducted by Fielding and Hawkins \(^{(6)}\) proposed a classification of this condition that is widely used currently in medical practice \(^{(4,6,10,11,13)}\). The rotary subluxation is classified into four types, based on the evaluation of atlanto-dental interval (ADI) view through the lateral cervical radiography. The type I lesion, the most frequently seen, is characterized by rotation without subluxation. The atlanto-dental interval is less than 3 mm, which is considered the limit of the normal physiological motion. In Type II lesions, there is a shift of the atlas over the axis between 3 to 5 mm, which potentially indicates a failure of the primary stabilizing component: the transverse ligament. In type III lesions, there is an atlanto-dental interval greater than 5 mm, implying a complete rupture of the transverse ligament and the contralateral alar ligament. The dislocation type IV is the less common type and corresponds to the displacement of the atlas over the axis. The latter lesion occurs in association with odontoid fractures or in patients with rheumatoid arthritis who have erosion of this structure. Fielding and Hawkins found that the atlanto-axial dislocation would occur at 65 degrees of rotation if the transverse ligament integrity is present. In case of injury of the transverse ligament associated with a displacement of 5 mm of the atlas over the axis, the shift will occur at 45 degrees of axial rotation \(^{(6)}\).

The clinical features of this entity is the presence of upper cervical pain, limitation of neck mobility, torticollis and muscle spasm. The spasm is an attempt to restore the neutral position and correction of the deformity. The patient presents with the classic “Cock Robin’s” position, which consisted of an axial rotation around 20-30 degrees, associated with lateral flexion of 20-30 degrees in the opposite direction of the rotation \(^{(6,8)}\). The cervical spine radiographies are mandatory in suspected alterations of atlantoaxial lesion, in order to measure atlanto-dental interval and seek for changes in the lateral mass. The CT scan in coronal sections shows asymmetry of the lateral masses relation to the odontoid. The lateral mass superiorly dislocated, shall be shown larger and closer to the midline, while the contralateral lateral mass appears more distant and smaller in diameter. Another indirect sign is the misalignment of the spinal processes. The three-dimensional CT reconstruction, allows a more detailed assessment of the craniocervical junction in compared to x-ray, being used more frequently in the evaluation of the injuries affecting the cervical spine. The treatment of rotatory subluxation should be individualized because there is no evidence in the literature showing the superiority of a particular therapeutic proposal.

The main factors that should be considered in the decision are the presence of neurological deficit, the integrity of the transverse ligament, the presence of odontoid fracture and other associated injuries. In injuries type II and III, Fielding and Hawkins \(^{(6)}\) propose C1-C2 arthrodesis after a failed skull traction and reduction. Crockard and Rogers in 1996 \(^{(3)}\) recommend facetectomy followed by fixation C1-C2 in these cases. Recently, Kim et al \(^{(10)}\), proposed open reduction and fixation with C1-C2 transpedicular screw, mentioning some advantages over other techniques. In lesions types I and II, skull traction reduction followed by external immobilization or even with the use of Philadelphia collar showed good performance in some cases \(^{(8,12)}\). Other authors consider that the lesions type I and II have considerable possibility of recurrence, thereby advocating the early C1-C2 fixation \(^{(7,10,11)}\).

**Conclusion**

These cases presented lesions types I and II, and obtained a satisfactory outcome in both with the non-operative therapy. We took into account biomechanical principles, functional and mortality associated with the given method. Regarding the few studies demonstrating the superiority of certain method in the treatment of traumatic rotatory subluxation, a careful individualized evaluation of each case is probably the most effective way to achieve therapeutic success.

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References


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