CASE REPORT
TRAUMA
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TRAUMATIC ATLANTO-OCCIPITAL DISLOCATION WITH IMPROVEMENT OF NEUROLOGICAL DEFICIT: CASE REPORT

LUXAÇÃO TRAUMÁTICA ATLANTO-OCCIPITAL COM MELHORA DO DÉFICIT NEUROLÓGICO: RELATO DE CASO

LUXACIÓN ATLANTO-OCCIPITAL TRAUMÁTICA CON MEJORÍA DEL DÉFICIT NEUROLÓGICO: INFORME DE UN CASO

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ABSTRACT

Traumatic atlanto-occipital dislocation is a rare, severe, and usually fatal injury. In this paper, we report the case of a 28-year-old patient with multiple trauma, who suffered an atlanto-occipital dislocation (AOD) associated with rotatory dislocation at C1-C2, condyle fracture and traumatic brain injury resulting from a car accident, with a cardiopulmonary arrest at the accident site. The patient had motor and sensory deficits, suffering other complications of clinical severity during hospitalization. After two years of surgical treatment follow-up, the patient had a complete recovery of neuromotor and sensory functions. This case demonstrates that neurological recovery with minimal sequelae is possible, even after an unfavorable prognosis resulting from a severe injury with a high risk of death as this kind of trauma. It is essential for health professionals to have the ability to identify and treat AOD, ensuring improved clinical outcomes, reducing mortality and morbidity, and providing a better life to affected patients. ***Level of Evidence IV; Cases Series.***

Keywords: Fracture Dislocation; Spine; Clinical Evolution.

RESUMO

A luxação traumática atlanto-occipital (LTAO) é uma lesão rara, grave e com alto índice de mortalidade. Neste artigo relatamos o caso de um paciente de 28 anos, politraumatizado, que sofreu uma LTAO associada à luxação rotatória em C1-C2, à avulsão de côndilo e ao traumatismo crânio encefálico decorrente de acidente automobilístico, com relato de uma parada cardiorrespiratória no local do acidente. O paciente deu entrada no serviço com déficit motor e sensitivo, sofrendo outras intercorrências de gravidade clínica durante a internação. Após dois anos do tratamento cirúrgico, o paciente evoluiu favoravelmente com completa recuperação das alterações neuromotoras e sensitivas. O caso apresentado demonstra que é possível a recuperação neurológica com sequelas mínimas, mesmo após um prognóstico desfavorável decorrente de uma lesão grave e o elevado risco de morte decorrente desse tipo de trauma. É essencial que os profissionais de saúde estejam aptos a identificar e tratar a LTAO, garantindo uma melhorar dos resultados clínicos, redução da mortalidade e morbidade, além de proporcionar uma melhor qualidade de vida aos pacientes afetados. ***Nível de Evidência IV; Série de casos.***

Descritores: *Fratura-Luxação; Coluna Vertebral; Evolução Clínica.*

RESUMEN

La luxación traumática atlanto-occipital (LTAO) es una lesión grave, poco frecuente y con una elevada tasa de mortalidad. En este artículo presentamos el caso de un paciente politraumatizado de 28 años que sufrió una LTAO asociada a luxación rotatoria en C1-C2, a la avulsión de cóndilos y traumatismo craneoencefálico como consecuencia de un accidente de tráfico, con parada cardiorrespiratoria en el lugar del accidente. El paciente presentaba déficits motores y sensoriales y sufrió otras complicaciones clínicas graves durante su hospitalización. Luego de dos años de tratamiento quirúrgico, el paciente evoluciona favorablemente con recuperación completa de las alteraciones neuromotoras y sensitivas. El caso presentado demuestra que la recuperación neurológica con mínimas secuelas es posible, incluso después de un pronóstico desfavorable debido a una lesión grave y al alto riesgo de muerte derivado de este tipo de traumatismos. Es esencial que los profesionales sanitarios sean capaces de identificar y tratar la LTAO, garantizando mejores resultados clínicos, una reducción de la mortalidad y la morbilidad, y una mejor calidad de vida para los pacientes afectados. ***Nivel de Evidencia IV; Series de casos.***

Descriptores: *Fractura-Luxación; Columna Vertebral; Evolución Clínica.*

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INTRODUCTION

Traumatic Atlanto-occipital Dislocation (TAOD) is a rare injury with a high mortality rate, both immediately or close to the moment of trauma and during hospitalization, due to the severity of the trauma, associated injuries, and neurological deficits.[1] TAOD is difficult to diagnose, especially in patients with a lowered level of consciousness, highlighting the importance of correct out-of-hospital care with Advanced Trauma Life Support (ATLS), adequate transportation, and accurate diagnosis by the attending medical team in the initial assessment, especially in accidents involving high-energy trauma.[2] Anterior displacement of the skull about the spine occurs when the alar ligaments and the tectorial membrane are severed. Rupture of these ligamentous structures between the occiput and the atlanto-axial complex results in TAOD.[3]

TAOD is classified according to Traynelis,[4] and three radiographic parameters can be used to define TAOD: 1) the rule of 12 described by Harris et al.,[5] in which the sum of the distances between the basion tip of the odontoid and the basion posterior line of the odontoid should be less than 12 mm in normal individuals; 2) Wackenheim 's line,[6] which extends distally along the posterior surface of the clivus and should tangulate the tip of the odontoid in normal individuals; 3) Powers' ratio,[3] obtained through the ratio between two lines: the distance between the basion and the posterior arch of the atlas and the distance between the opisthion and the anterior arch of the atlas, which in normal individuals is 0.77.

There are few reports of TAOD in the literature, and the vast majority of survivors have various neurological deficits. Immediate respiratory support in those who have suffered post-trauma cardiorespiratory arrest is the essential step for survival.[7] The treatment of choice, due to the high instability of this injury, is surgery using occipito-cervical arthrodesis.[8]

In this article, we report the case of a young patient polytraumatized by a high-energy mechanism who suffered TAOD, presented with cardiorespiratory arrest at the scene of the accident, and was referred to a tertiary emergency hospital with adequate support and transportation. He underwent late surgical treatment due to inadequate clinical conditions, and his neurological and sensory deficits recovered during follow-up.

Case Report

A male patient, 28 years old, was a victim of a car rollover and was found ejected from the vehicle. He was admitted to a public emergency hospital on a rigid board, wearing a cervical collar and reporting cardiopulmonary arrest at the scene of the accident. He was admitted to the trauma ward in a serious general condition and intubated at the scene of origin. The assessment revealed a subtrochanteric fracture of the left femur, severe head trauma, and occipital-cervical dissociation associated with a fracture of the lateral mass of C1 on the right and the occipital condyle. The TAOD was of the anterior type, classified as Traynelis[4] type 1, and the avulsion of the right condyle was classified in Anderson and Montesano[9] as type 3, confirmed by a CT scan. (Figure 1)

On admission, left transtibial traction was performed, and he was referred to the Intensive Care Unit (ICU), where he remained for 16 days. On the 13th day of hospitalization, after his general clinical condition had improved, a posterior occipito-cervical arthrodesis was performed via a posterior cervical access at C0-C4, using a skull plate with an occipito-cervical fixation system. Screws were inserted bilaterally into the C3 and C4 lateral masses, and a skull plate with two screws was attached to the external occipital protuberance with molded bars and fixed with washers. (Figure 2)

Three days after surgery, he was discharged from the ICU and sent to a ward bed with auxiliary oxygen support via tracheostomy. He was conscious, lucid, and oriented but showed motor and sensory deficits in his upper and lower limbs and abduction deficit in his left eye. During his hospitalization, he also underwent surgical treatment of the left subtrochanteric fracture with a locked intramedullary femoral nail. The patient developed a recurrent respiratory infection and also acquired mild acute flu-like syndrome due to COVID-19, prolonging his hospital stay and ending up with a total of 45 days in hospital. At hospital discharge, he had a strength grade of 3 on the Medical Research Council (MRC) scale in the upper and lower limbs and Frankel B.

Two years after the trauma (Figure 3), during outpatient follow-up, the patient showed signs of bone healing, slight cervical kyphosis,

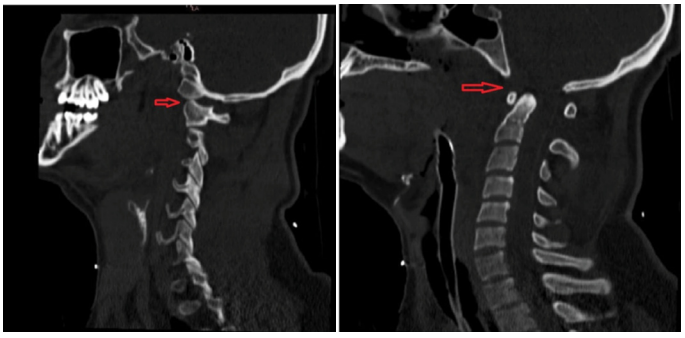

Figure 1. Preoperative CT scans of patients with TAOD.

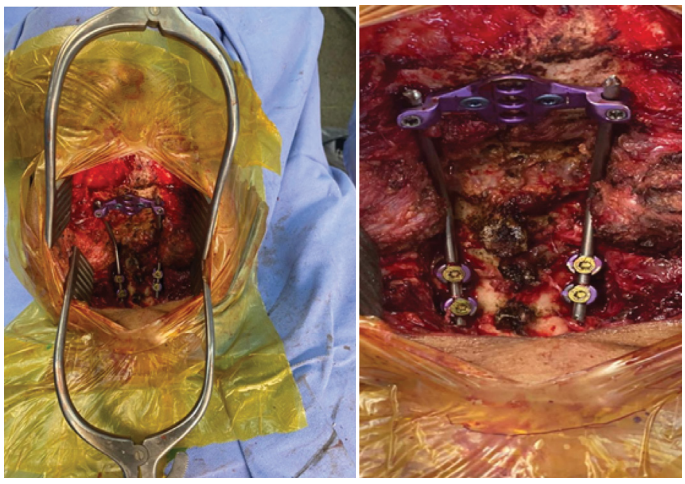

Figure 2. Photographic records of the insertion of screws in the C3 and C4 lateral masses and fixation of the skull plate with two screws in the external occipital protuberance with molded bars and washers.

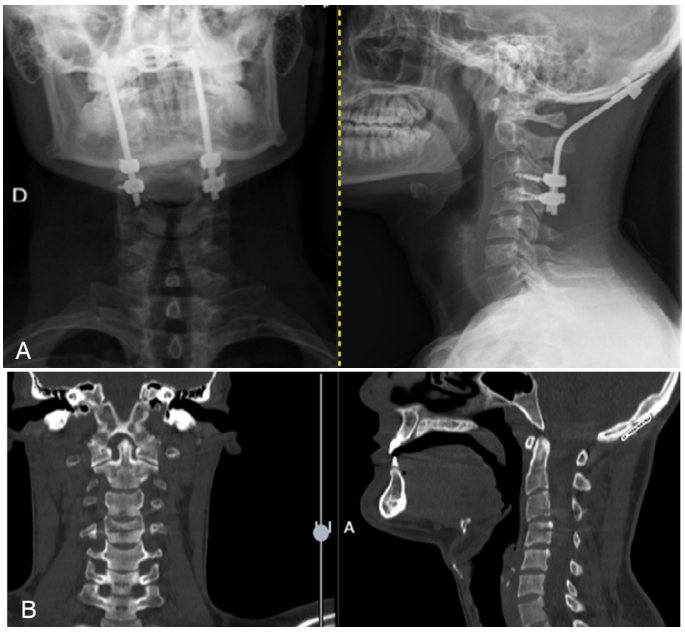

Figure 3. X-ray (A) and CT scan (B) taken two years after the trauma.

no clinical complaints of loss of mobility, walking without support, and preserved strength in all limbs. He currently works as a manual laborer, with no complaints related to cervical trauma but only limited rotation as a result of the surgical treatment. Physical examination showed total flexion-extension of the cervical spine with no pain and a healed surgical wound.

DISCUSSION

Advances in the immediate care of patients who are victims of automobile accidents, the increase in diagnostic options, and the greater experience of surgeons are associated with a reduction in the mortality rate related to TAOD.[10] Fard et al.[11] evaluated the prognostic factors for survival in patients with traumatic atlanto-occipital dislocation and observed that age, gender, polytraumatic injury, and Traynelis classification were not significant indicators for predicting mortality in patients with TAOD. However, the chance of death was eight times higher in the presence of head trauma, reaching 57%. In patients with injuries to the cervical spine, 20 to 30% of those obtained are associated with TAOD.[12] Patients who survive TAOD often have severe neurological deficits, hemiplegia, and quadriplegia.[13] The patient in question only had a deficit in the abduction of the left eye, which may be the result of a lesion to the optic nerve or at some point in the optic pathways as a result of the trauma.

As for treating TAOD, surgical fixation for occipital-cervical fusion is the most commonly used technique in 56.5% of cases, followed by cervical immobilization (10.8%).[1] Although a large proportion of patients undergoing surgical fixation present abnormal findings on imaging tests and neurological impairment,[12] in the case reported here, the patient did not complain of neuromotor sequelae to the spine two years after TAOD, even though the initial prognosis was not very favorable for his rehabilitation.

In recent literature, Rief et al.[7] reported the case of a 59-year-old man who suffered cardiac arrest after a car accident with a diagnosis of TAOD and an unfavorable outcome due to suspected tetraplegia and respiratory incapacity. After 22 days of intensive care and four surgical interventions, the patient was awake and oriented, breathing spontaneously and moving his arms and legs. After two months of clinical treatment, the patient reported being able to carry out all his daily activities without limitations. The present report and the case described by Rief et al.[7] demonstrate that a good neurological outcome is possible even after combining TAOD and multiple lesions.

CONCLUSION

The presented case proves that it is possible to achieve neurological recovery with minimal after-effects even after an unfavorable prognosis due to a serious injury and high risk of death as a result of such trauma. It is crucial for healthcare professionals to diagnose and treat TAOD to improve clinical outcomes and reduce mortality and morbidity.

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