Penetrating Orbitocranial Injury: Case Report

Ferimento penetrante cranio-orbitário: relato de caso

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RESUMO

Trauma penetrante orbitocranial é um episódio infrequente, que pode ocorrer através da penetração dos mais diversos corpos estranhos como faca, lápis e tesoura, que tendem a ir em direção ao ápice orbital, concedendo acesso à cavidade craniana, com potencial risco de lesão cerebral e mortalidade. É imprescindível a avaliação de imagens tomográficas para a exata localização do corpo penetrante, possibilitando a análise de todo o trajeto do objeto, devendo ser considerada também a possibilidade da realização de angiografia na avaliação inicial. A tentativa de remover o objeto penetrante fora da sala cirúrgica compromete a segurança do paciente, podendo ocorrer hemorragia profusa, já que na maioria dos casos, o objeto funciona como um tamponamento. Não havendo nenhuma urgência intracraniana, a injúria orbitária deve ser priorizada. Este artigo relata o caso de uma vítima de trauma facial com guidão de moto, havendo a penetração de corpo estranho através da cavidade orbitária até fossa craniana média, no qual foi realizada craniotomia para remoção do corpo estranho, evoluindo com déficit neurológico e óbito letal após 14 dias.

Palavras-chave: Traumatismos craniocerebrais, traumatismos cranianos penetrantes, corpos estranhos no olho.

ABSTRACT

Penetrating orbitocranial trauma is an infrequent episode, which may be caused by penetration of the most diverse foreign bodies such as knife, pencil and scissors that tend to take a direction into the orbital apex, with access to the cranial cavity and potential risk of cerebral lesion and mortality. It is essential to evaluate the tomographic images in order to establish the exact location of the foreign body, making it possible to check the entire trajectory of the object; also the possibility of performing an angiography should be considered for the initial analysis. The attempt to remove penetrating objects outside the operating room compromises patient’s safety; it may cause profuse hemorrhage since in most cases the object itself stops the hemorrhage. if there is no intracranial emergency, the orbital injury must be prioritized. This article reports the case of a patient submitted to facial injury by a motorcycle handlebar, in which the foreign body penetrated the orbital region into the cranial middle fossa.

Key words: Craniocerebral trauma, penetrating head injuries, eye foreign bodies.

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INTRODUCTION

Penetrating orbitocranial trauma is a potentially life-threatening injury. Knives are the objects most commonly used, however nails, spikes, iron rods, pencils, scissors, fan blades, and screwdrivers have been reported. Complications associated with orbitocranial injuries include infection (ocular infection, meningitis, meningoencephalitis and brain abscess), traumatic arteriovenous fistula, intracranial hemorrhage, cerebrospinal fluid (CSF) leak, epileptic seizures, and loss of mental and motor function due to severe damage to the brain parenchyma. Early diagnosis of brain injury due to orbitocranial trauma may prevent serious neurological dysfunction.

CASE REPORT

A 35-year-old patient was victim of facial trauma with motorcycle brake handspike in the orbital region. Upon arrival at the emergency room, the patient was unconscious and under mechanical ventilation. Physical examination revealed blunt metal instrument embedded horizontally in the left side of the face, involving zygomatic and orbital complex (Fig. 1A,1B). No additional facial bleeding or lacerations were present. Postero-anterior and lateral skull X-rays showed the foreign body (Fig. 1C,1D). CT scan showed a 14 x 2 cm instrument passing laterally through the globe into the orbital apex medially, penetrating about 8 cm into the frontal lobe up to the middle cranial fossa (Fig. 2A,2B).

A coronal flap craniotomy was performed by the neurosurgeon on call (Fig. 2C), in order to remove “the instrument” (Fig. 2D), followed by open debridement of the frontal lobe and dural repair. The frontal sinus was not violated. Ophthalmic injury, as assessed by the ophthalmology service, included a ruptured globe, anterior chamber hyphemia, and vitreous hemorrhage. Evisceration of the globe was performed in the following operation. After 14 days in the intensive care unit, the patient died due to sepsis.

DISCUSSION

The orbit is a quadrangular pyramid on a posteromedial axis. Objects entering close to the orbit tend to be funneled toward the apex. The upper orbital fissure or the thin upper orbital plate grants access to intracranial contents. The orbital depth is approximately 42 mm. A pointed object can easily reach and penetrate the dura mater.

Airways, breathing and circulation maintenance, and a thorough physical examination to determine associated injuries, are required as soon as the patient arrives at the emergency room. Assessment and treatment of injuries to the brain, cervical spine, chest, cardiovascular system and abdomen take precedence over any maxillofacial injuries.
The energy contained in a penetrating object is classified as low, medium or high. High-velocity injuries also cause secondary damage due to fragmentation of bone, which is shattered by the impact. These secondary injuries can cause more damage than the object itself. The presence of a roof fracture with dural laceration resulting in a CSF leak and the presence of pneumocephalus may increase the risk of brain abscess formation or meningitis.

Orbital penetrating injuries can also cause ocular motility disorders thorough a wide variety of mechanisms. Motility disturbances may ensue from damage to numerous structures, including the extraocular muscles and tendons that may be lacerated or completely sectioned by the penetrating injury. The damage is often accentuated by edema, ischemia, bleeding, and hematoma formation. Injury to the motor nerves in the superior orbital fissure, cavernous sinus, or intracranial cavity also reduces muscle contractility.

Internal carotid artery injuries may also result from transorbital penetrating wounds. Angiography should be considered in the initial evaluation. Without any doubt, an attempt to remove the embedded object outside the operating room would have jeopardized the patient’s safety. In most instances, the object acts as a tamponade, and severe hemorrhage may occur if it is displaced. The presence of pulsating exophthalmia suggests that extensive damage to the orbital roof may be present. Alternatively, distal control of the major vessels will also serve the same purpose, especially in the case of penetrating objects that are lodged in place.

Computed tomography CT provides excellent bone detail and moderate soft tissue detail within the orbitocranial region. If a bony injury is suspected, axial and coronal views should be obtained. Coronal CT provides a good view of the orbital floor, roof, and cribiform plate and allows detection of intracranial or sinus cavity penetration.

In the acute setting, magnetic resonance imaging (MRI) usually is less accessible, and in the case of intracranial foreign metallic body, it is contraindicated because of the potential risk for migration and further injury. In some cases, the outstanding soft tissue resolution of MRI in patients presenting with no metallic foreign body injury in CT scans the detection of any glass or wood foreign bodies and may help to distinguish an intrasheath optic nerve hemorrhage from a surrounding extradural hemorrhage.

Penetrating orbitocranial injury should be treated as two different conditions because two different systems are affected by the injury. If the intracranial event is not urgent, the orbital injury should be managed first. Careful debridement with dural closure as a tool for prevention of an infection has proven to be very important. Multilobar, transventricular, and brain stem injuries carry a higher mortality and morbidity rate than monolobar injuries.

REFERENCES


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