

Management of a Penetrating Orbital Trauma from an Unusual Foreign Body with Associated Eye Injury

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Abstract

The aim of this article is to describe the principles that should guide the management of an orbital trauma with ocular injury through an updated review of the literature and the study of a clinical case involving an 80-year-old woman who presented with a penetrating orbital wound due to a wooden foreign body with a closed ocular trauma. Satisfactory and stable results over time are determined by systematically analyzing and evaluating each aspect of the case following a surgical strategy based on the most current protocols.

Keywords: Foreign body, ocular injury, orbital trauma

INTRODUCTION

Penetrating orbital injuries constitute between 30% and 50% of all orbital traumas;^[1] within these cases, it has been found that one of every six patients presents with a foreign body.^[2,3] These types of injuries deserve special consideration because they can cause eye damage, damage to the orbital structures, and even brain damage^[3,4] and can lead to serious sequelae such as vision loss, which in turn can have medicolegal considerations.^[1,5,6] Most cases arise from unilateral injuries due to traffic accidents, assaults, accidental falls, or workplace accidents and are more frequent in men aged 20–40 years old.^[1,2,7] Among the more common clinical manifestations are palpebral trauma, proptosis, limitation of mobility, and palpebral edema.^[5,7] On ocular examination, there may be subconjunctival hemorrhage, corneal abrasion, hyphema, retinal detachment, globe rupture, or optic nerve injury.^[5,7,8]

Diagnosis is based on clinical data, careful exploration of the orbital and ocular regions, examination of visual function, and radiological study using computed tomography (CT).^[4,9,10]

The treatment of these injuries is usually considered an emergency and should be resolved in the first several hours, potentially requiring multidisciplinary collaboration.^[4,5,10,11]

In this clinical case, the management of an acute and severe orbital lesion is systematically described and analyzed in order to maximize recovery potential and minimize complications.

CASE REPORT

An 80-year-old woman presented with a left orbital penetrating wound caused by a strange wooden body after a casual fall in the forest. A general assessment of the patient was initially performed (Glasgow Coma Scale score: 14/15).

Upon initial exploration, a penetrating wooden foreign body was observed in the orbit at the inferomedial level with an anfractuous wound and palpebral laceration that made it impossible to open [Figure 1]. A complete orbital CT study was performed (Siemens Somatom Definition Flash, Erlangen, Germany), in which a nonmetallic foreign body located in the lower portion of the left orbit causing a fracture collapse of the orbital floor with displacement of the eyeball to the top was observed that maintained its normal sphericity. This body had an approximate length of 6 cm, being 5 cm inside the orbit and reaching the sinus [Figure 2]. There was no evidence of intracranial involvement and due to the position of the globe, it was not possible to perform an assessment of visual function. The patient was examined by

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How to cite this article: Fernández-Ferro M, Fernández-Fernández M, Fernández-Sanromán J, Costas-López A, López-Betancourt A. Management of a penetrating orbital trauma from an unusual foreign body with associated eye injury. *Ann Maxillofac Surg* 2019;9:214-7.

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10.4103/ams.ams_25_19

an ophthalmologist and a maxillofacial surgeon. She received antibiotic prophylaxis (amoxicillin-clavulanic acid), tetanus toxoid, and corticosteroids (methylprednisolone). Under general anesthesia, careful extraction of the foreign body was performed. The integrity of the ocular globe was explored, confirming that it was a closed ocular trauma with good tension (via digital tonometry), good wall integrity, negative fluorescein staining, and a preserved anterior chamber, without signs of perforation and an intact fundus.

The entrance wound was enlarged with a subciliary incision to approach the floor. Cleaning of the ocular bed was performed via careful removal of the fragments and the devitalized tissue [Figure 3].

Subsequently, the orbital floor was reconstructed with a large left preformed titanium mesh (MatrixMidface Preformed Orbital Plates, DePuy Synthes, West Chester, Pennsylvania, US) fixed with two self-drilling titanium screws of size 1.5 mm × 6 mm (MatrixMidface System, DePuy Synthes, West Chester, Pennsylvania, US). Finally, the soft tissues were repaired [Figure 4].

In the immediate postoperative period, the wounds evolved adequately, and there was good ocular motility without diplopia. The patient received the following postoperative medication: systemic antibiotic (amoxicillin-clavulanic acid) for 7 days, systemic steroid (methylprednisolone) for 3 days, and topical antibiotic (ciprofloxacin 0.3% eyedrops) and topical cycloplegic (cyclopentolate 1% eyedrops) for 7 days.

At the ophthalmological level, she presented with subconjunctival hemorrhage in evolution, an intraocular pressure of 16 mmHg, mild corneal edema, and a corticonuclear cataract; no phacodonesis was observed, and the fundus was normal. No visual acuity loss related to the traumatism was observed. A control orbital CT examination was performed in which changes were observed due to foreign body removal with adequate mesh reconstruction [Figure 5]. Clinical follow-up proceeded without visible complications and maintenance of good stability from a functional and esthetic point of view for 6 months [Figure 6].

DISCUSSION

The management of an open orbital trauma by a foreign body that remains *in situ* at the site of the injury, with possible ocular involvement and involvement of other orbital or adjacent structures, can be very demanding for even experienced professionals. Systematic evaluation of the case is the most important principle.^[1,4,10] The incidence of associated eye injury may range from 0.7-10.8% if only severe injuries, such as vision loss, are included^[6,12,13] and up to 90.6% if the most minor injuries, such as subconjunctival hemorrhage, are included.^[5]

In the management of these injuries, several considerations must be involved. On the one hand are injuries derived from the trauma itself and on the other hand are those related to the

nature of the foreign body, with inorganic substances being the most frequently identified and organic foreign bodies, such as wood, being less common.^[2,5,14] First, as in any trauma, the basic principles of advanced life support must be followed, including the administration of systemic antibiotics and tetanus prophylaxis.^[2,5,14] The use of corticosteroids may be indicated as they reduce posttraumatic and postoperative edema, but an associated improvement in visual results has not yet been definitively demonstrated in cases of optic neuropathy.^[10,12] Second, an exploration of the orbital and ocular area and assessment of visual function must be performed,^[5,14,15] all with timely imaging analysis, with CT being the most commonly used and reliable test.^[3,9,11] Third, the patient must be transferred to the operating room, under general anesthesia, to complete the ophthalmologic exploration, with careful removal of the foreign body via an enlarged wound with the most appropriate incisions and subsequent orbital repair.^[2,5,14] Decisions should be made in a consensual manner by a multidisciplinary team.^[4,5,10,11] As the available literature emphasizes, the foreign body should be left in place until the preoperative planning of the case is completed, and the extraction of the foreign body should always be performed under direct visualization in the operating room. Early withdrawal of a foreign body in an inadequate environment may be accompanied by increased morbidity.^[1,4,10]

The treatment of orbital fractures in the event of an ocular injury remains a controversial issue because it is not always possible to perform a complete ophthalmological evaluation, which makes it difficult to predict what the visual prognosis will be and determine the most appropriate clinical management strategy.^[13] It is essential, when the case allows it, to recognize the degree and possible irreversibility of the ocular lesion prior to surgery because it is generally considered that the ocular lesion generally has priority over orbital repair.^[6,15] However, some authors have noted in their studies that visual loss is mainly associated with eye injuries after trauma, especially when it is a high-energy trauma, and not with primary repair of fractures,^[12,13] with decreased visual acuity being the main predictor of ocular injury and a retrobulbar hematoma adjacent to the ruptured globe being the most frequent cause of blindness.^[6,12,15] The treatment strategy is usually primary repair of the globe when possible and delayed bone repair; in cases where the globe is preserved, it is recommended to not delay orbital repair when there is hope of a visual recovery.^[5,13]

In the case of a penetrating orbital trauma with nondisplaced or slightly displaced fractures without functional repercussions, a small, inert, foreign body may go unnoticed and be well tolerated, and its elimination would therefore not be indicated.^[3,4] In contrast, foreign bodies of an organic nature are usually poorly tolerated, regardless of their size; may cause clinical cellulitis, fistulas, or abscesses;^[2,11,14] and may be difficult to detect in conventional CT studies because wood usually appears as a low-density image imitating an orbital pneumatosis.^[1,3,8] Magnetic resonance imaging (MRI) is not

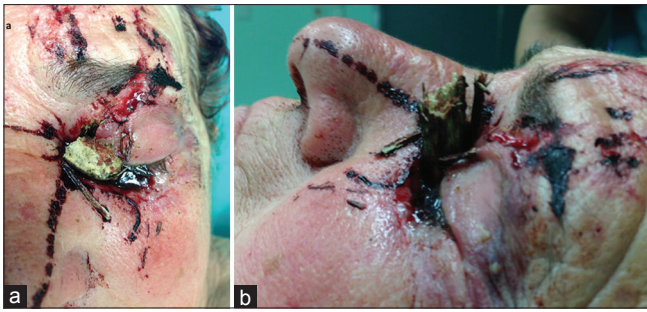


Figure 1: (a) Frontal image of the left intraorbital wooden foreign body, (b) side image



Figure 3: Detail of the wooden foreign body



Figure 5: Frontal image immediately postoperatively

indicated and can even be counterproductive if there is the possibility of a metallic foreign body.^[5,8]

It is commonly reported that, in light penetrating injuries by wood that initially go unnoticed, definitive diagnosis can be deferred until an orbital inflammatory process takes place that surrounds the foreign body and is accompanied by a fistula. In these cases, the antecedents take on greater relevance, and combined CT and MRI analysis may be indicated.^[1,3,8]

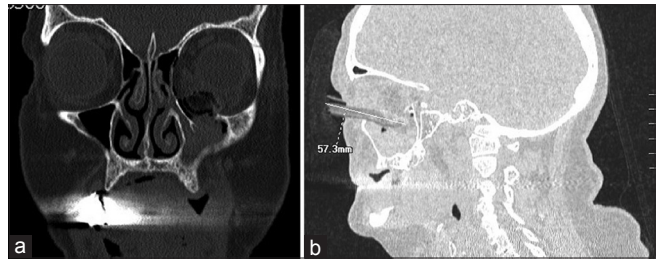


Figure 2: (a) Preoperative computed tomography image with coronal section showing a defect in the orbital floor, (b) sagittal section showing details of the foreign body

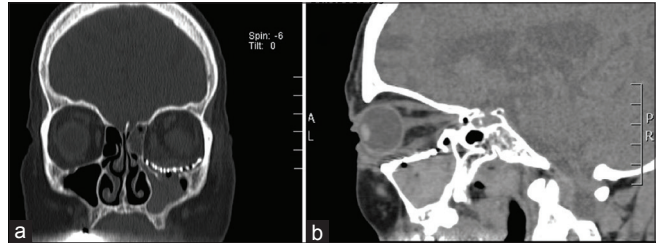


Figure 4: (a) Postoperative computed tomography image with a coronal section with orbital floor reconstruction, (b) sagittal view of the reconstruction

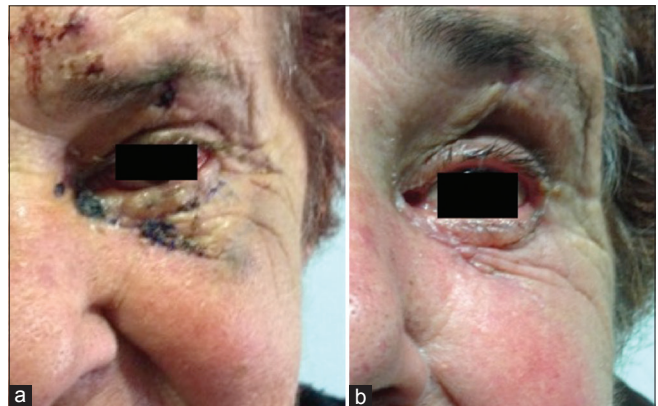


Figure 6: (a) Frontal image 15 days postoperatively, (b) postoperative control image at 6 months

CONCLUSION

In the presence of a penetrating orbital trauma in which there is a possible ocular injury, a systematic evaluation and methodical assessment of all aspects of the case must be performed systematically, following an orderly protocol, with all clinical decisions made in agreement by a multidisciplinary team.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflict of interest

There are no conflicts of interest.

REFERENCES

1. Gonullu ME, Filinte GT, Cardak NG, Kucuk S, Akoz T. The surgical strategy for the intraorbital foreign bodies. *J Craniofac Surg* 2016;27:1785-8.
2. Shelsta HN, Bilyk JR, Rubin PA, Penne RB, Carrasco JR. Wooden intraorbital foreign body injuries: Clinical characteristics and outcomes of 23 patients. *Ophthalmic Plast Reconstr Surg* 2010;26:238-44.
3. Chen J, Shen T, Wu Y, Yan J. Clinical characteristics and surgical treatment of intraorbital foreign bodies in a tertiary eye center. *J Craniofac Surg* 2015;26:e486-9.
4. Dekker AP, El-Sawy AH, Rejali DS. An unusual transorbital penetrating injury and principles of management. *Craniofac Trauma Reconstr* 2014;7:310-2.
5. Jamal BT, Pfahler SM, Lane KA, Bilyk JR, Pribitkin EA, Diecidue RJ, *et al.* Ophthalmic injuries in patients with zygomaticomaxillary complex fractures requiring surgical repair. *J Oral Maxillofac Surg* 2009;67:986-9.
6. Johnson NR, Singh NR, Oztel M, Vangaveti VN, Rahmel BB, Ramalingam L. Ophthalmological injuries associated with fractures of the orbitozygomaticomaxillary complex. *Br J Oral Maxillofac Surg* 2018;56:221-6.
7. Malik AH, Shah AA, Ahmad I, Shah BA. Ocular injuries in patients of zygomatico-complex (ZMC) fractures. *J Maxillofac Oral Surg* 2017;16:243-7.
8. Li J, Zhou LP, Jin J, Yuan HF. Clinical diagnosis and treatment of intraorbital wooden foreign bodies. *Chin J Traumatol* 2016;19:322-5.
9. Patel SN, Langer PD, Zarbin MA, Bhagat N. Diagnostic value of clinical examination and radiographic imaging in identification of intraocular foreign bodies in open globe injury. *Eur J Ophthalmol* 2012;22:259-68.
10. Schreckinger M, Orringer D, Thompson BG, La Marca F, Sagher O. Transorbital penetrating injury: Case series, review of the literature, and proposed management algorithm. *J Neurosurg* 2011;114:53-61.
11. Hamilton A, Meena M, Lawlor M, Kourt G. An unusual case of intraorbital foreign body and its management. *Int Ophthalmol* 2014;34:337-9.
12. Magarakis M, Mundinger GS, Kelamis JA, Dorafshar AH, Bojovic B, Rodriguez ED. Ocular injury, visual impairment, and blindness associated with facial fractures: A systematic literature review. *Plast Reconstr Surg* 2012;129:227-33.
13. Vaca EE, Mundinger GS, Kelamis JA, Dorafshar AH, Christy MR, Manson PN, *et al.* Facial fractures with concomitant open globe injury: Mechanisms and fracture patterns associated with blindness. *Plast Reconstr Surg* 2013;131:1317-28.
14. Taş S, Top H. Intraorbital wooden foreign body: Clinical analysis of 32 cases, a 10-year experience. *Ulus Travma Acil Cerrahi Derg* 2014;20:51-5.
15. Ross M, El-Haddad C, Deschênes J. Ocular injury in orbital fractures at a level I trauma center. *Can J Ophthalmol* 2017;52:499-502.