UNEXPECTED FINDING IN OCULAR SURFACE TRAUMA: A LARGE INTRAORBITAL FOREIGN BODY (BULLET)

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Summary: Sometimes intraorbital foreign bodies lead to unexpected findings. A 16-year old boy was referred due to ocular surface trauma. A conjunctival laceration was detected at the level of the left caruncle with associated left exotropia, reduced adduction as well as a preretinal hemorrhage along the nasal periphery of the fundus. A blow-out fracture of the medial orbital wall was suspected and a CT scan of the orbits was scheduled which revealed the presence of a large intraorbital foreign body. The removal of the intraorbital foreign body (which proved to be a bullet) and precautionary laser photocoagulation along the nasal periphery of the left eye were performed. Ocular surface trauma may reveal unexpected findings, such as an intraorbital foreign body, requiring investigation by a CT scan.

Key words: *Ocular surface trauma; Orbit; Foreign body; Bullet*

Introduction

Intraorbital foreign bodies are frequently encountered in clinical practice (1–4). Although the consequences from the presence of a foreign body within the orbit may be serious, sometimes their effects in the orbital and ocular tissues are much less severe than expected and depend on the location, size, chemical composition and associated damage to surrounding structures (1–4). Often history referring to the nature and mechanism of injury may be enough to suggest the presence of a foreign body in the periocular tissues (2, 3). However, there are cases where the presence of a foreign body may be difficult to guess, based on history or clinical examination (2, 3). We present a case of an adolescent who was referred to our Department for an ocular surface injury and who proved to also have a sizeable intraorbital foreign body (bullet). Our view is to stress the importance of a high level of suspicion for the presence of periocular foreign bodies even when history or clinical findings do not point directly at this condition.

Case Report

A 16-year old boy was referred to the outpatient service of the Department of Ophthalmology of the University General Hospital of Heraklion following an injury to the ocular surface of his left eye. According to history taking, the boy had received a blow to his left eye while playing with friends, a few hours before admission. Previous systemic and ophthalmic histories were non-contributory.

Upon examination, best corrected visual acuity (BCVA) of the right eye was 20/20 "sans correction" (sc), whereas BCVA of the left eye was "finger count 2 m". The intraocular pressure was 14 mmHg (right eye) and 10 mmHg (left eye). Slit-lamp biomicroscopy of the left eye was significant for a conjunctival laceration of about 7 mm along the caruncular area with associated conjunctival hemorrhage and chemosis (Figure 1A). The laceration was better visible with the eye in abduction (Figure 1B). The anterior chamber was deep with flare (+) and cells (++) and a relative afferent pupillary defect (RAPD) grade 2 (Grade 2+: An initial pupillary stall followed by greater redilation) was present. Fundoscopy of the left eye was significant for a low-grade vitreal hemorrhage. The optic disc was visible with clear margins and no edema. The examination of the far nasal

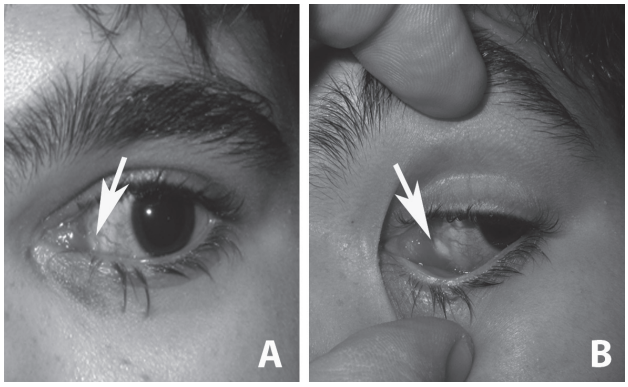

Fig. 1: A nasal conjunctival laceration along the caruncle (A), more obvious on abduction (B) is noted (white arrows)

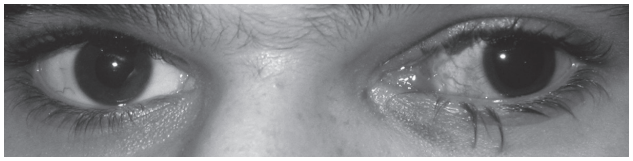

Fig. 2: The left eye displays an exotropia of about 30 diopters (A) with associated poor adduction (B)

periphery of the left eye revealed the presence of a large area of preretinal hemorrhage with adjacent areas of retinal edema. Orthoptic evaluation was significant for a left exotropia of about 30 diopters (Figure 2) with associated poor adduction of the left eye. Hertel exophthalmometry readings were 18 mm (right eye) and 17 mm (left eye).

Based on the reported circumstances of the injury, the nasal location of conjunctival laceration and the exotropia with poor adduction, a medial wall orbital wall fracture with possible involvement of the medial rectus muscle was suspected. Accordingly, a Computed Tomography (CT) scan of the orbits was scheduled. Surprisingly, the CT scan revealed the presence of a large foreign body (Figure 3), located at the medial part of the left orbit along the orbital floor (Figure 4A), in contact with the eyeball and medial rectus muscle (Figure 4B). Numerous beam-hardening artefacts were noted (Figure 5), implying that the object was metallic.

Fig. 3: A CT head scannogram showing the location of the foreign body

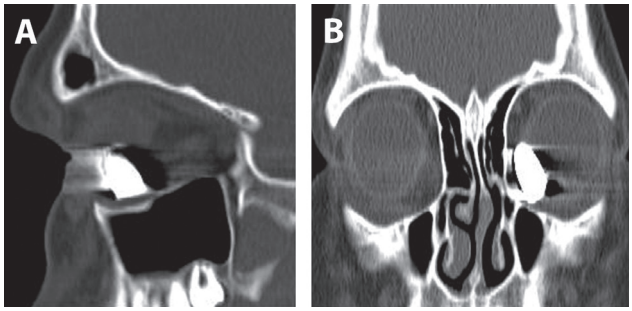

Fig. 4: A sagittal (A) and transverse (B) CT section, showing the position of the foreign body on the orbital floor and along the medial orbital wall

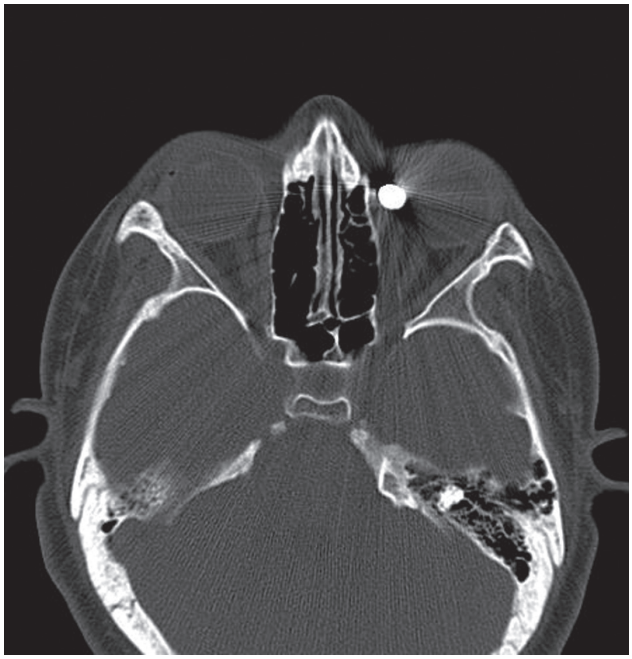

Fig. 5: A transverse CT section of the head, showing the high-signal foreign body at the medial orbital wall, associated with numerous beam-hardening artefacts (implying its metallic composition), shown as beams radiating from the foreign body

Taking into account the size of the foreign object, the lack of information on its exact chemical nature, the associated retinal injury, the proximity to the ocular walls (implying a possible scleral erosion or rupture) and the associated deficiency in ocular motility, a decision to remove the foreign body was taken. Under general anesthesia, a trans-caruncular incision was employed to access the foreign body, which proved to be a bullet impaled into the medial orbital wall (Figure 6A). The object was carefully mobilised (detached from the medial orbital wall, the medial rectus muscle and the sclera, which were found intact) and removed. The object proved to be

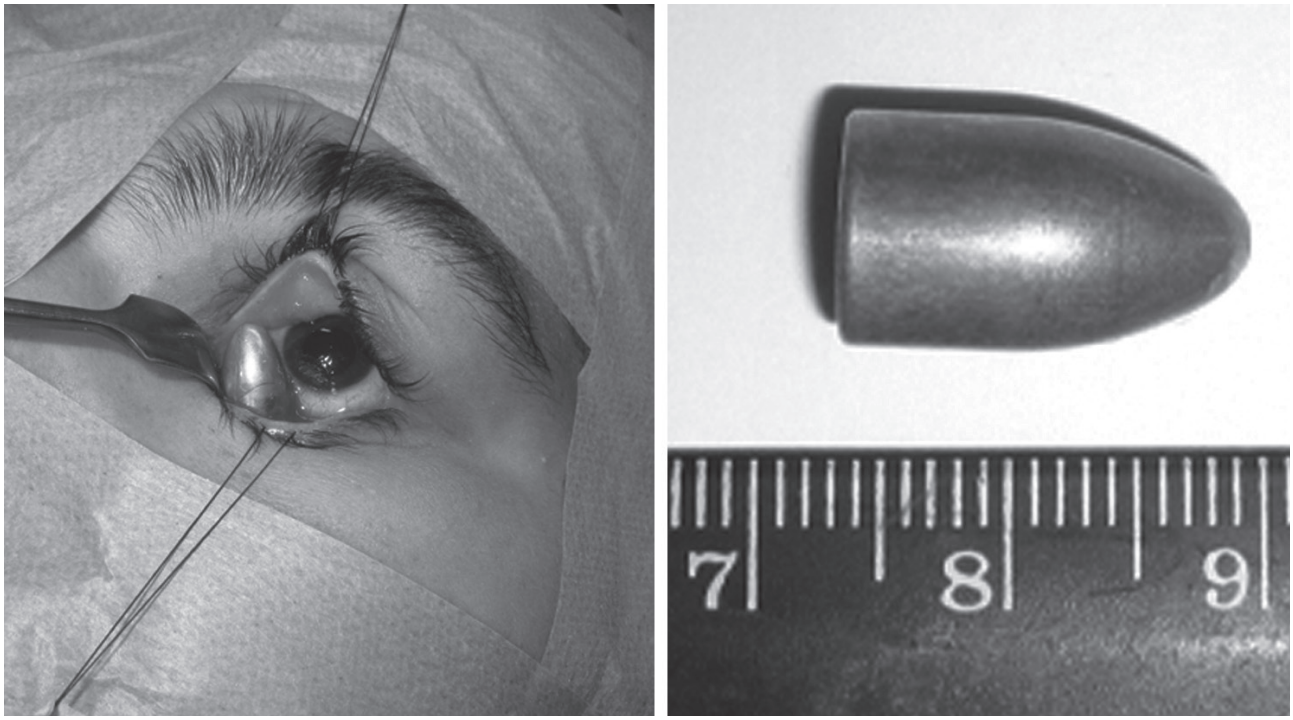

Fig. 6: Intraoperative view of the foreign body (bullet) while it is removed from the left orbit (A). The size and shape of the bullet is also shown (B)

a 9 mm caliber pistol bullet (17 mm-long) with a lead core and an alloy metal jacket (Figure 6B). By repeatedly asking the patient about the circumstances of his injury, he finally mentioned being shot.

Following the removal of the foreign body the patient also underwent a precautionary laser photocoagulation along the nasal retinal periphery to reduce the risk of a subsequent retinal detachment. A gradual recovery in ocular motility, resolution of vitreal hemorrhage and improvement in visual acuity to 20/200 sc were observed over the following weeks.

Discussion

As previous studies have reported, sometimes history or clinical examination alone may not suffice to raise the suspicion of a retained intraorbital foreign body (2, 3). This is why the importance of a CT scan in the evaluation of many peri-orbital injuries is highly stressed (5). Indeed, potentially life-threatening or vision-threatening consequences of retained intraorbital foreign bodies, such as pneumocephalus and presumed meningitis (5), optic nerve trauma and associated vision loss (6) or chronic sinus discharge (7), imply that the detection and adequate management for a foreign body embedded into the orbital tissues are mandatory. The case presented in this report was initially considered an ocular surface injury, based on the history and the conjunctival laceration. The reason for ordering a CT scan was the suspicion for an orbital blow-out fracture at the medial orbital wall, rather than the potential presence of an intraorbital foreign body. The exotropia and poor adduction had been initially attributed to a possible hematoma formation along the medial orbit, whereas and retinal lesion along the nasal periphery was attributed to either direct ocular trauma or, possibly, to damage by bone spikes. It was surprising, through, to find out how a sizeable intraorbital foreign body, such as a bullet, may find its way into the orbit through a small entry site (which was probably the conjunctival laceration observed) and not manifest by major clinical changes, such as exophthalmos or orbital cellulitis. In fact, if the object was smaller in size and had not intervened with ocular motility (raising the suspicion of a blow-out fracture of the medial wall, which was the basic indication to perform a CT scan), its presence might have gone unnoticed. The lack of deeper penetration of the projectile may be attributted to a variety of possible causes, including ricocheting on a surface before hitting the patient, shooting through intermediary object, shooting from very long distance, defective ammunition (such as expired gunpowder or lesser poweder load) or modified or home-made weapon, which could explain the loss of kinetic energy and lack of deeper tissue damage.

Once an intraorbital foreign body is discovered, the decision to remove it or observe it may depend on a variety of factors, such as its position (clinically silent objects

located into the deeper orbit or orbital apex may be left alone, since their removal *per se* might put vital structures at risk), chemical composition (many metals, plastic material and stones may be inert in the orbit whereas organic material, such as wood, has a higher incidence of complications), potentially infectious nature or clinical effects (such as displacement or damage to vital anatomical structures) (1–4). In the case presented in this report, the large size, associated clinical changes (such as the involvement with ocular motility), unknown chemical composition or infectious potential and the fear of erosion through the sclera (since the object was in contact with the ocular wall) were the reasons to decide its surgical removal. The removal itself proved easier than initially considered, since the large size of the object enabled easy and quick identification in the surgical field whereas the smooth surface enabled unobstructed mobilisation through the tissues once the object was detached from its bed at the medial orbital wall.

Findings from this report imply that in cases of even minor periocular or ocular surface injury, such as a simple conjunctival laceration, clinical investigation should rely less on history taking, which may be misleading, and more on imaging studies, such as a CT scan.

Conflict of Interest

None to declare.

Written informed consent was obtained from the patient and his parents for publication of this case report and accompanying images.

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