

Intraorbital Foreign Body: Clinical Presentation, Radiological Appearance and Management

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جسم غريب داخل حجاج العين: العرض السريري، المظهر الشعاعي والتدبير العلاجي

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الملخص: تدخل الأجسام الغريبة داخل حجاج العين عادة نتيجة الاصابات عالية السرعة مثل طلاقات الرصاص أو الحوادث الصناعية . ومن النادر حدوث هذه الحالة بعد اصابات بسيطة. يمكن أن تؤدي هذه الأجسام الغريبة الى مضاعفات خطيرة اسوأها فقدان البصر. هذا التقرير الاستعادي يلقي الضوء على حالتين مصابتين بدخول أجسام غريبة داخل العين تم اكتشافهما في مستشفى جامعة السلطان قابوس (سلطنة عمان) . من حيث الصفات السريرية والتصوير الشعاعي والتدخل الجراحي. تم تسجيل التفاصيل الدقيقة للحالتين مثل فحص حدة البصر والاجراء الجراحي وطرق العلاج. عمر المريضين الذين اصيبا في العين بأدوات حادة هو 10 و 9 سنوات على التوالي . وقد تم الكشف عن وجود الاجسام الغريبة داخل العين عن طريق الأشعة المقطعية للعين. حضر المريض الأول الينا مباشرة بعد الإصابة ولم تتأثر العين . حيث خضع لعملية جراحية فورا . وتعافى بعدها بصورة كاملة. أما المريض الثاني فقد حضر الينا متاخرا بأربعة أيام بعد الإصابة وتبين اصابته بالتهاب بآطن المقلّة . لذلك فقد المريض جميع وظائف العين المصابة. يجدر الإشارة هنا بان الأشعة المقطعية تلعب دورا مهما في تقصي الجسم الغريب في المقلّة وتحديد مكانه . كما ان سرعة ازالة الجسم الغريب جراحيا يؤثر بصورة ايجابية حيث يساعد على المحافظة على العين وتفادي مضاعفات الاصابة الخطيرة.

مفتاح الكلمات : اصابات العين . اختراق العين . تقرير حالة . سلطنة عمان .

ABSTRACT Intraorbital foreign bodies usually occur after a high velocity injury such as gunshot or industrial accidents; more rarely they occur following trivial trauma. A retained foreign body can give rise to serious complications, the most devastating of which is loss of the eye. This retrospective, interventional case report reviews the clinical features, radiological appearance and surgical management of two patients who presented at Sultan Qaboos University Hospital, Oman with intraorbital foreign bodies. Details of ocular history, preoperative ocular examination findings including visual acuity, surgical procedure and subsequent management were noted. The two patients, aged 10 years and 9 years old respectively, sustained orbital trauma with sharp objects. Both patients were found to have intraorbital foreign bodies that were documented clearly by computed tomography (CT) scans of the orbit. The first patient presented straight after injury, had no ocular involvement, underwent immediate surgical exploration and ended up with full recovery. The second patient presented to us after a delay of 4 days, and was found to have endophthalmitis. This patient ultimately lost all visual function in the affected eye. A CT scan is the modality of choice for orbital foreign body detection and localization. Early surgical exploration and foreign body extraction greatly influence the visual prognosis and final outcome.

Key words: Eye Injuries, penetrating; Case report; Oman.

AN INTRAORBITAL FOREIGN BODY IS AN important cause of ocular morbidity especially in the paediatric and adolescent age groups. The term refers to a foreign body that occurs within the orbit but outside the globe.¹ It usually occurs

after a high velocity injury such as a gunshot or an industrial accident, but even relatively trivial trauma can cause it.¹ Orbital foreign bodies are more commonly observed in males than in females and in younger than in older patients. They can be classified according to



Figure 1.1: Pre-operative face photos show moderate lid ptosis, normal position of the globe in primary gaze, and conjunctival hyperemia in left eye (1.1b), with marked limitation in adduction and abduction (1.1 a and c)

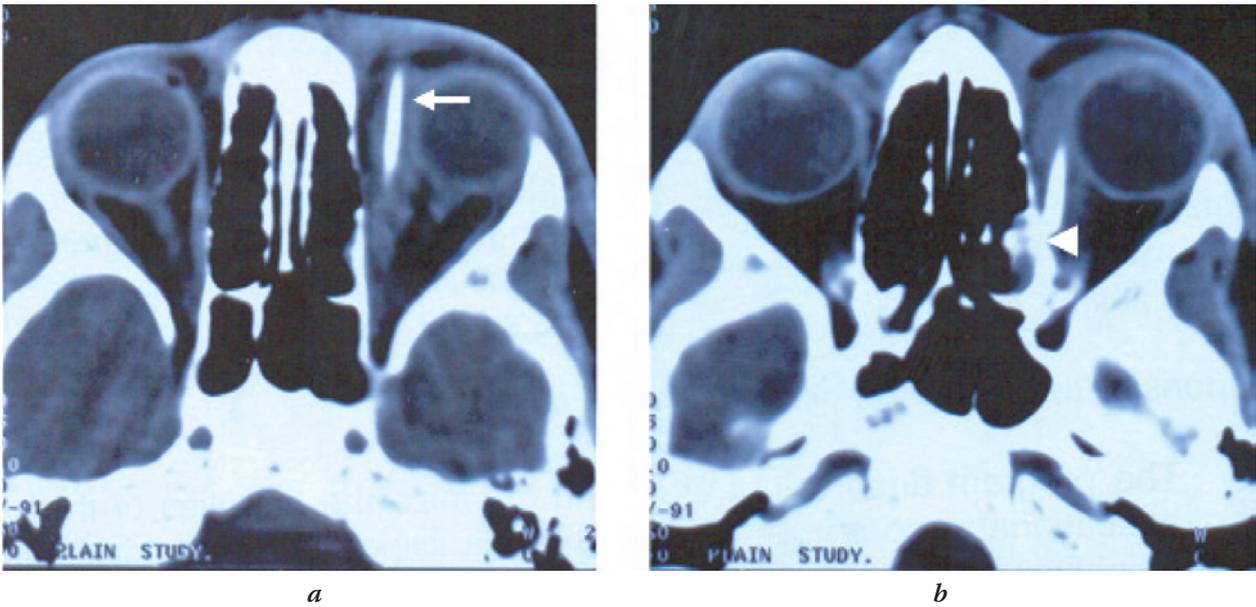


Figure 1.2: Computed tomography (CT) images of the orbits - Axial CT images through the orbits show: a) High density linear foreign body (straight arrow) within the medial rectus muscle of the left orbit; b) The medial rectus muscle is enlarged due to a hematoma. The distal tip of the foreign body is seen against the medial wall of the orbit (arrow head)

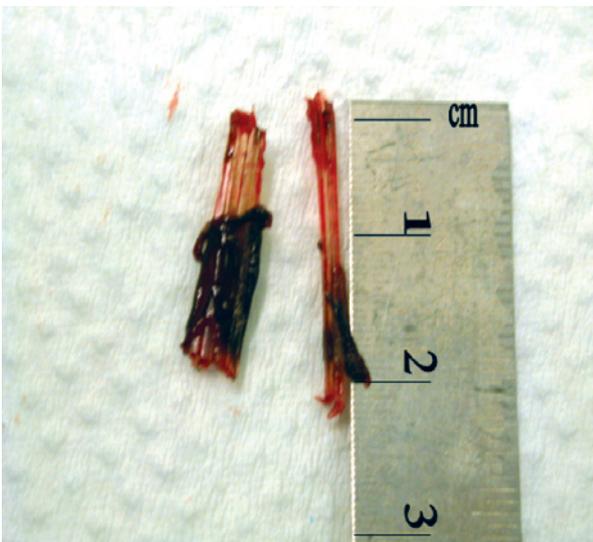


Figure 1.3: Foreign body (fish bone), the larger piece is 2.5cm, the shorter is 2.0cm

their composition into a) metallic such as steel; b) nonmetallic, which may be inorganic such as glass; c) organic such as wood or vegetable matter. In general, metal and glass are well tolerated, and if not causing any symptoms or signs, may be left in situ, while organic matter like wood and vegetable matters are poorly tolerated, elicits an intense inflammatory reaction, and need to be removed urgently.²

Surgery is planned based on certain aspects that include the nature of the intraorbital foreign body (poorly tolerated organic objects such as wood and vegetable matter, or well tolerated objects such as stone, glass, plastic, iron, steel and aluminum); location of the foreign body (anterior or posterior orbit), and presence of other injuries or foreign body-related complications (such as optic nerve compression, infections, and extraocular muscle involvement).³

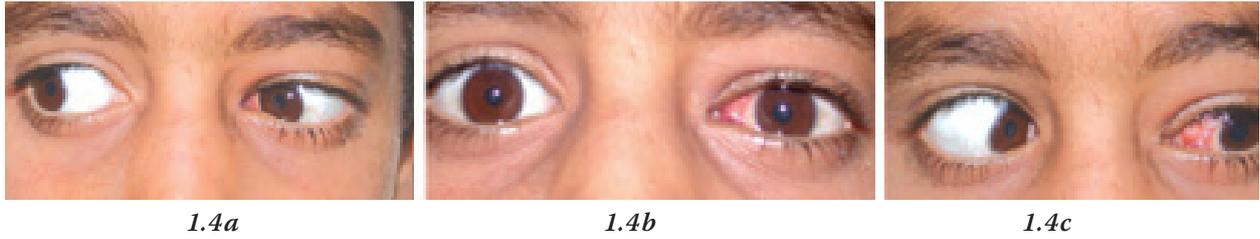


Figure 1.4: Face photo of same patient three days after intraorbital foreign body removal. Lid edema and ptosis are reduced (1.4b). Patient has mildly restricted adduction and abduction (1.4 a and c)

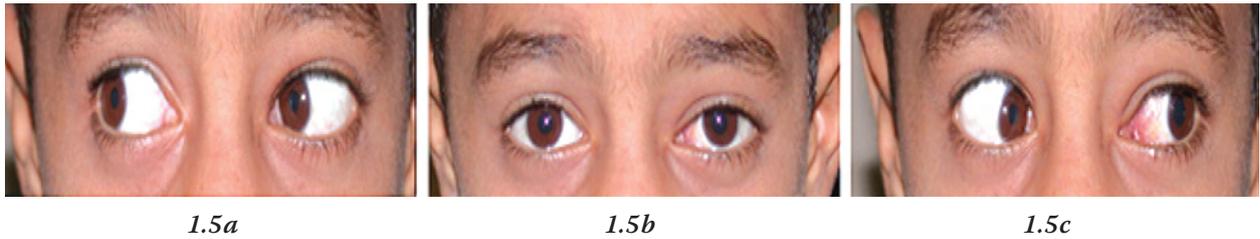


Figure 1.5: Two weeks post-operatively, the left eye looks normal in the primary position (1.5b). Patient has recovered normal adduction and abduction (1.5 a and c)

CASE REPORTS

The hospital charts of two patients who sustained orbital trauma, and who presented at the Ophthalmology Department of Sultan Qaboos University Hospital (SQUH), Oman, were retrospectively reviewed.

CASE 1

A 10-year-old boy presented with orbital trauma sustained when he was struck in the left eye while swimming by what he described as a flying fish. Ocular examination showed a best corrected visual acuity of 20/20 in the right eye and 20/25 with $-1.0 -0.75 \times 75^\circ$ in the left eye. Ophthalmic examination of his right eye was unremarkable. Examination of the left eye revealed ptosis and normal position of the globe in the primary gaze. There was lid oedema, conjunctival hyperemia, chemosis and a laceration over the insertion of the medial rectus muscle. Limitation of movements in adduction and abduction was noted [Fig1.1a-c]. The globe itself was intact and slit lamp biomicroscopy showed normal intraocular structures. Computed tomography (CT) scan of the orbits revealed the presence of a hyper-dense foreign body dissecting the medial rectus, penetrating the periosteum and embedded in the left medial orbital wall [Fig 1.2].

The child was admitted and commenced on intravenous ceftriaxone 1 gm daily and topical ofloxacin four times a day with a plan to intervene surgically. The

foreign body was approached through transconjunctival medial orbitotomy. Intraoperatively, the foreign body was found transecting all the way postero-medially towards the lacrimal bone. As it was very difficult to retrieve it in one piece, it was broken and extracted as two pieces (2.5 cm and 2.0cm in length) [Fig 1.3]. The globe was intact and the wound sutured with 6/0 vicryl suture.

Post-operatively, topical Tobradex® eye drops were administered four times a day. An uneventful recovery was observed; the patient maintained normal visual acuity and regained full ocular motility in all directions within 2 weeks following surgery [Figs.1.4 and 1.5].

CASE 2

A 9-year-old boy, who sustained trauma in the right eye with a pencil, presented to SQUH four days after the trauma. Initial management at a local hospital had included administration of topical antibiotics and steroids. Over the following days, he experienced increasing redness and reduced vision in the affected eye. At presentation, his left eye showed a visual acuity of 20/20 and normal intraocular findings. The ocular examination of right eye revealed visual acuity of light perception with good projection, and lid oedema (lower lid more than upper) [Fig. 2.1]. No wound of entry was detected.

Slit-lamp biomicroscopy revealed a hazy cornea,

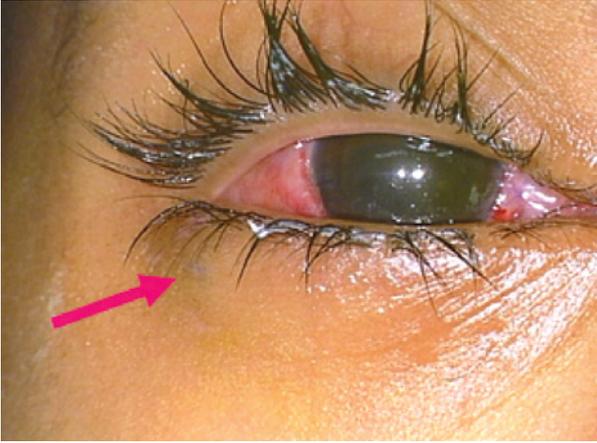


Figure 2.1: Photo of the right eye pre-operatively. It shows a swollen lower eyelid and an arrow pointing at possible location of foreign body in the lower lid

Table 1: Indications for surgery in patients with intraorbital foreign bodies

Indications
- Large or sharp-edged foreign body
- Signs of infection or inflammation
- Proptosis
- Restricted motility
- Chemosis
- Palpable orbital mass
- Optic nerve compression
- Abscess proved by imaging
- Enhancing foreign body in imaging
- Suspicion of a wood, vegetable matter or copper foreign body
- Fistula formation

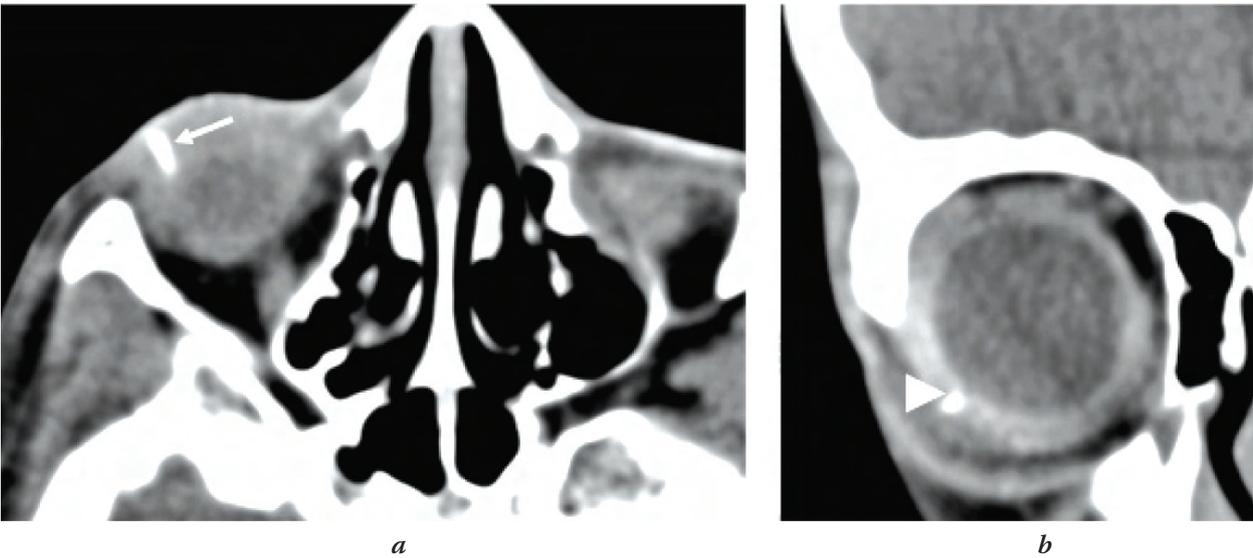


Figure 2.2: Computed tomography (CT) images of the orbits - Axial CT images through the orbits show: a) High density linear foreign body (straight arrow) within the medial rectus muscle of the left orbit; b) The medial rectus muscle is enlarged due to a hematoma. The distal tip of the foreign body is seen against the medial wall of the orbit (arrow head)

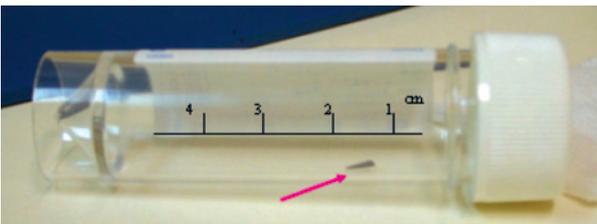


Figure 2.3: Foreign body: pencil tip, measuring 0.5 cm at its widest dimension



Figure 2.4: Face photo after foreign body extraction. The swelling has subsided and the wound has healed completely, leaving no deformity

anterior chamber filled with a fibrinous reaction and a

1-mm hypopyon, cataractous lens, and 3+ cells in the vitreous. Ophthalmoscopy revealed absent red reflex with no view of fundus details. B-mode ultrasound revealed medium amplitude echoes through out the vitreous with attached retina. A CT scan of the orbits showed a hyperdense foreign body embedded in the lateral 1/3 of the preseptal compartment of the right lower lid [Fig 2.2].

The child was admitted and received intravenous ceftriaxone 500 mg twice per day besides topical ofloxacin, Predforte[®] eye drops and prednisolone tablet 10 mg (0.5mg/kg) per day with a plan to intervene surgically. Intraoperatively, pars plana vitrectomy was performed to clear up the vitreous; endolaser photocoagulation was delivered to seal up the retinal hole and an intravitreal antibiotic injection was given. To remove the intraorbital foreign body the child underwent subciliary inferior orbitotomy, which revealed the presence of a pencil tip that had penetrated the orbital septum and was lying just in front of the inferior orbital wall [Fig 2.3 and 2.4].

Postoperatively, although the intraorbital foreign body was successfully removed, the eye went into secondary hypotony with a vision of no light perception as sequelae of endophthalmitis.

DISCUSSION

Two patients with orbital foreign bodies have been presented. Both patients gave a history of trauma with a sharp object (Case 1 while swimming and Case 2 while playing with a pencil). Both had foreign bodies located in their anterior orbit that were demarcated clearly by CT scans of the orbit. The first patient, who presented immediately, had no ocular involvement, underwent immediate surgical exploration and ended up with full recovery. The second patient presented to us after a delay of 4 days and was found to have endophthalmitis; extensive therapeutic (medical and surgical) measures could not save the sight in this eye. The presence of endophthalmitis in this patient is suggestive of globe penetration, but preoperative imaging as well as intraoperative exploration did not reveal evidence of ocular penetration. However, a possibility of partial scleral penetration and then subsequent migration of the foreign body and self-sealing of the scleral wound cannot be ruled out.

The history of penetrating eyelid or orbital injury should always raise the suspicion of an embedded intraorbital foreign body, particularly if it is a

high velocity injury. Clinically, the presentation varies, with the patient being asymptomatic or having visual disturbances (decreased vision, double vision), pain, or swelling. The nature of injury and foreign object can be elicited by detailed history. However, it is well-known that the severity of injury in penetrating trauma of the orbit is often underestimated in physical examinations.³ Therein lies the importance of a meticulous examination and radiological investigation.

Assessment through radiological images assists in the proper localization of the foreign body, estimation of its consistency and size, and evaluation of the response of surrounding orbital tissue. Additionally, it is useful in determining the integrity of the globe. The choice of imaging modality chiefly depends on the nature of the suspected foreign body. Plain film radiography is useful to localize radiopaque objects.^{4,5} However, plain films lack the capacity to demonstrate the object details, their exact location in relation to surrounding structures and tissue response or damage. Standardized ophthalmic ultrasonography (combination of standard A-mode and B-mode scanning) has been recommended as the imaging modality of choice during initial evaluation. Nevertheless, this diagnostic method requires specific expertise and technology that may not be available in many institutions.³ CT scanning has therefore been recommended as the imaging modality of choice in this situation.¹ Ideally, a CT scan of the orbit must be ordered. Thin axial and coronal views of 1.0-1.5 mm cuts of the orbit are extremely useful to delineate the shape and for determining the composition of the foreign body.^{6,8} However, despite being highly sensitive and specific for detection of foreign bodies, CT scans may produce false negative results, particularly if the size of the foreign body is less than 0.5mm, and especially in the case of wooden objects. These are better seen with magnetic resonance imaging (MRI). However, an MRI is contraindicated if the suspected foreign body is ferromagnetic.

Once an intraorbital foreign body is diagnosed, appropriate management includes culture of the wound (or foreign body if removed) and administration of antibiotic(s). Tetanus toxoid has to be administered according to the vaccination status.

In general, surgery to remove the foreign body is planned based on certain aspects, which are summarized in Table 1. In general, a posteriorly located foreign body may be observed if inert and not causing any complications, due to the risk of iatrogenic optic

neuropathy or diplopia. Similarly, small nonorganic foreign bodies may be left in the orbit.

CONCLUSION

Detection of intraorbital foreign bodies requires a high index of suspicion. Obtaining an accurate and detailed history is absolutely essential. A CT scan of the orbit is the imaging modality of choice for detection and localization of the foreign body. Early diagnosis, surgical exploration and extraction, when indicated, greatly influence the final outcome and at times the visual prognosis.

REFERENCES

1. Fulcher TP, McNab AA, Sullivan TJ. Clinical features and management of intraorbital foreign bodies. *Ophthalmology* 2002; 109:494-500.
2. Green BF, Kraft SP, Carter KD, Buncic JR, Nerad JA, Armstrong D. Intraorbital wood detection by magnetic resonance imaging. *Ophthalmology* 1990; 97:608-611.
3. Van Thong Ho, James F, McGuckin Jr, Smergel EM. Intraorbital wooden foreign body: CT and MR Appearance. *Am J Neuro Surg* 1996;17:134-136.
4. Finkelstein M , Legmann A, Rubin PAD. Projectile metallic foreign bodies in the orbit. *Ophthalmology* 1997; 104:96-103.
5. McGuckin JF Jr, Akhtar N, Ho VT, Smergel EM, Kubaeki EJ, Villafana T. CT and MR evaluation of a wooden foreign body in an in vitro model of the orbit. *Am J Neuroradiol* 1996;17:129-133.
6. Kunitomo DY, Kanitkar KD, Makar MS. Intraorbital foreign body, In: *The Wills Eye Manual : Office and emergency room diagnosis and treatment of eye diseases*. Fourth ed. Philadelphia: Lippincott Williams & Wilkins, 2004. p. 32-33.
7. LoBue TD, Deutsch TA, Lobick J, Turner DA. Detection and localization of nonmetallic intraocular foreign bodies by magnetic resonance imaging. *Arch Ophthalmol* 1988; 106:260-261.
8. Wilson WB, Dreisbach JN, Lattin DE, Stears JC. Magnetic resonance imaging of nonmetallic orbital foreign bodies. *Am J Ophthalmol* 1988; 105:612-617.
9. Simonton JT, Arthurs BP. Penetrating injuries to the orbit. *Adv Ophthalmic Plas Reconstr Surg* 1987; 7:217-227.
10. Nasr AM, Haik BG, Fleming JC, Al-Hussain HM, Karcioglu ZA. Penetrating orbital injury with organic foreign body. *Ophthalmology* 1999; 106:523-532.