

# Intraorbital foreign bodies: a case series of unfortunate events

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## Abstract

*Background:* Intraorbital foreign bodies (IOrbFB) are a common result of trauma and can cause significant ocular morbidity. When left in the orbit, they can remain asymptomatic or cause serious complications such as the loss of an eye.

*Case presentation:* We report 6 cases of IOrbFB treated in Hospital Serdang and their surgical outcomes. Two cases involved organic foreign bodies (wood) and 4 involved inorganic foreign bodies (3 cases of metal and 1 of glass). Both cases with organic foreign bodies had surgical removal in a delayed setting, while the inorganic foreign bodies were removed within 3 days of initial presentation. Five patients had a good visual outcome and only 1 patient had resultant blind eye due to involvement of the globe.

*Conclusion:* Loss of vision due to IOrbFB is usually a result of globe involvement. Early surgical exploration and foreign body removal affects the visual prognosis and outcome. Organic IOrbFBs pose a great challenge due to their diverse manifestations, thus tends to be missed during the initial visit. Delayed diagnosis can cause higher risk of orbital infections.

*Keywords:* intraorbital foreign body, ocular trauma

## Benda asing intraorbital: satu pengumpulan kes peristiwa malang

### Abstrak

*Latar belakang:* Benda asing intraorbital (IOrbFBs) di mana kehadiran bahan asing di dalam ruang orbital akibat trauma yang bertanggungjawab dalam morbidity mata yang teruk. Kehadiran benda asing ini di dalam orbit sama ada tidak menghasilkan sebarang gejala ataupun menyebabkan komplikasi yang serius termasuk kehilangan penglihatan.

*Pembentangan kes:* Kami membentangkan 6 kes yang dirawat dan dibedah di Hospital Serdang. Dua kes melibatkan bahan organik iaitu kayu manakala bahan bukan organik adalah besi (3 kes) dan kaca (1 kes). Kedua-dua kes yang melibatkan bahan asing organik rawatan pembedahan dijalankan agak lewat manakala kes melibatkan bahan bukan organik pembedahan dilakukan dalam masa tiga hari. Lima pesakit berjaya dikekalkan penglihatan yang baik tetapi seorang pesakit kehilangan penglihatan yang kekal.

*Kesimpulan:* Kehilangan penglihatan akibat kehadiran benda asing di dalam orbit adalah akibat kecederaan pada bola mata. Rawatan dan pembedahan yang awal membantu dalam pengekalan penglihatan yang baik. Kehadiran benda asing yang organik di dalam orbit merupakan cabaran utama dalam rawatan disebabkan kepelbagaian manifestasi klinikal dan mungkin terlepas pandang dari menerima rawatan awal. Kelewatan membuat diagnose yang tepat boleh menyebabkan risiko jangkitan kuman.

*Kata kunci:* benda asing intraorbital, trauma okular

### Introduction

Ocular trauma poses a significant risk of blindness. Intraorbital foreign bodies (IOrbFBs) are an uncommon result of ocular trauma. Although typically caused by a high-velocity injury, it may also be a result of trivial trauma. The composition and nature of IOrbFBs present as a challenge since misdiagnosis and delay in management may lead to devastating ocular morbidity. For a better understanding, we present the presentation and management of 6 cases of IOrbFB treated in our tertiary hospital.

## Case presentation

This is a retrospective review of 6 patients diagnosed with IOrbFB following a history of ocular trauma. They all presented to our tertiary hospital in Serdang, Malaysia.

### Case 1

A 23-year-old man presented with pain and blurred vision in the left eye following a history of being hit by a metal ball while playing with a slingshot 6 days prior. Relative afferent pupillary defect (RAPD) was negative with bilateral vision of 6/9. Examination of the left eye noted a sutured laceration wound over the medial aspect of the upper lid with presence of subconjunctival haemorrhage and chemosis medially. Fundus examination showed presence of commotio retina. Computerised tomography (CT) scan of the orbit revealed a round metal foreign body at the medial aspect of orbit towards the posterior medial wall (Fig. 1). The patient underwent anterior orbitotomy and removal of the metal foreign body, measuring 1 cm in diameter and located extraconal of the left medial orbit. Postoperatively, RAPD in the left eye was positive with visual acuity (VA) of 6/12.

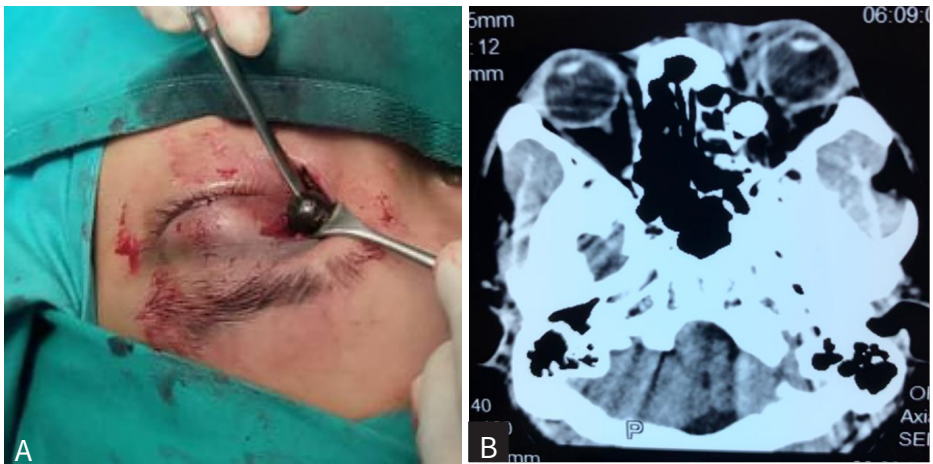


Fig. 1. (a) Intraoperative finding of a metal ball removed from the orbit. (b) CT scan finding of a round foreign body located at the medial aspect of the left orbit towards the posterior medial wall.

### Case 2

A 69-year-old woman from Sarawak was referred to our centre for IOrbFB in the right eye. She had fallen on a wooden shelf 2 months prior and had sustained a laceration wound of the upper lid that was treated by a general practitioner. The patient then developed preseptal cellulitis 1 week post trauma. Culture and sensitivity test of the pus collected from the wound showed *Enterobacter xiangfangensis*. The patient



*Fig 2. (a) CT scan shows hyperdense foreign body in the extraconal space of the right medial orbit with surrounding inflammatory phlegmon. (b, c) Intraoperative finding of wooden foreign body protruding from the punctum.*

was treated with intravenous antibiotic for 1 week. The preseptal cellulitis resolved, but the right upper lid remained swollen at the 1-month follow-up. CT of the orbit showed a suspicious hyperdense foreign body in the extraconal space of the right medial orbit with surrounding inflammatory phlegmon and possible adjacent osteomyelitis.

The patient was treated with another week of antibiotics and sent to our centre for surgical intervention. Examination showed negative RAPD in the right eye with a VA of 6/18. There was mechanical ptosis and a medial mass in the right upper lid, which was fluctuant with presence of punctum. The surrounding upper lid skin was erythematous. The patient underwent anterior orbitotomy of the right eye and foreign body removal. Intraoperatively, a wooden foreign body, 2 cm in length x 1 cm in diameter, that had penetrated the ethmoid sinus protruded from the punctum (Fig. 2). No pus discharge was noted. Postoperatively, VA remained at 6/18.

**Case 3**

A 44-year-old man was referred from Ipoh to our centre for IOrbFB in the right eye. The patient had a history of cutting grass with a mower 2 days prior to presentation. He sustained a corneoscleral laceration wound and vitreous haemorrhage in the right eye which had been treated at his primary hospital. CT scan of the orbit noted a superotemporal IOrbFB in the right eye. Vision upon arrival to our centre was light perception. The patient underwent lateral orbitotomy, orbital exploration, and IOrbFB removal. Postoperatively, RAPD was positive with VA of hand movement.

**Case 4**

A 35-year-old man was referred for IOrbFB removal in the left eye. The patient had a history of upper lid laceration, traumatic mydriasis, and traumatic optic neuropathy in the left eye due to self-inflicted trauma 3 months prior. Initial CT of the brain noted retro-orbital collection with large/mottling air pockets compressing/stretching the left optic nerve, causing oedema/optic neuritis. He was initially treated with intravenous steroids but had subsequent recurrent admissions for repeat orbital decompressions and was therefore treated with intravenous antibiotics.

Subsequently, an MRI of the orbit showed an intraorbital lesion noted in the inferior aspect of the left orbit with retro-orbital extension to the orbital apex (3.5 x 2.7 x 1.5 cm). The left optic nerve was displaced medially. There was a non-enhancing linear, tubular-like hypointense lesion (2.3 cm in length) surrounding a rim of hyperintensity traversing in lateral orientation within the intraorbital lesion. The patient presented to our centre with VA 6/60 and positive RAPD. The left eye showed non-axial proptosis with slight esotropia and swelling of the lower lid. Extraocular movement was restricted in all gazes. Surgical removal the intraorbital foreign body found a lower lid mass measuring 2.0 cm x 1.5 cm, with thin wood material measuring 2 cm in length. There was necrotic and fibrotic tissue between the skin and septal area extending up to the apical region. Postoperative VA was 6/36.

**Case 5**

A 25-year-old mechanic presented with pain and blurred vision in the right eye following foreign body entry while hammering beneath a car. The patient presented to our centre within 2 hours of injury with VA of 6/12 and no RAPD. Examination noted the right eye chemosed nasally with a metal rod embedded superonasally at 1 o'clock. The patient underwent surgical removal of IOrbFB in the right eye. Intraoperatively, a metal rod measuring 1.2 cm was found embedded just before the insertion of medial rectus. The metal rod was removed with partial indentation of sclera. Postoperative VA was 6/12 and the patient defaulted follow-up.

### Case 6

A 28-year-old man was referred to our centre for IOrbFB in the right eye following a motor vehicle accident a few hours prior. He sustained severe bleeding from facial injuries and was intubated at the primary hospital for airway protection. VA could not be obtained. There was a large laceration wound extending vertically from the forehead to the right alar region involving the medial half of the eyebrow, upper lid, medial canthal tendon, and lower lid. CT scan of the brain at the primary hospital noted an IOrbFB in the right eye. The patient underwent surgical IOrbFB removal, whereby a glass measuring 3 cm x 2 cm shard was noted to be embedded just medial to the right globe. Postoperative VA was 6/12.

## Discussion

Diagnosing and managing IOrbFBs is frequently challenging. The presenting features of retained IOrbFBs include clinical signs of orbital cellulitis, orbital haematoma, proptosis, impaired motility, diplopia, orbital abscess, and optic neuropathy/atrophy.<sup>1</sup> Moreover, in high-velocity injuries, penetrating lid or orbital injuries should always raise a suspicion of IOrbFB.<sup>2</sup>

The most common presentation in our cases was the presence of eyelid lacerations following trauma, which serve as an entry point for foreign bodies. These cases may often be regarded as simple laceration wounds and treated by the emergency department or general practitioner, leading to a delay in diagnosis as demonstrated by Case 2 with a wooden IOrbFB.

The nature and composition of the foreign body also plays a crucial role in diagnosis and management. IOrbFBs can be metallic (*e.g.*, iron, aluminium, lead), inorganic non-metallic (*e.g.*, plastic, glass, rock, concrete), or organic (*e.g.*, wood, thorns, bones).<sup>3</sup> Although the patient's history may be helpful, radiological imaging plays a vital role. CT is considered the gold-standard imaging technique for acute IOrbFB<sup>4</sup> due to its high sensitivity for foreign body detection and null risk of dislodging a ferromagnetic foreign body.<sup>5</sup>

However, plastic, wood, and fish bones are radiolucent on CT, which poses a challenge.<sup>4</sup> One clue to detect organic foreign bodies (*e.g.*, wood) on CT is the presence of inflammatory reaction surrounding the foreign body, which appears as a hyperdense signal on T2-weighted images.<sup>4</sup> This was demonstrated in Case 2 with wooden IOrbFB, whose CT scan showed hyperdense foreign body with surrounding inflammatory phlegmon.

Wooden matter can also be mistaken for air on CT.<sup>6</sup> This occurred in Case 4 with wooden IOrbFB, whose initial CT scan noted retro-orbital collection with large air pockets. The diagnosis of IOrbFB was delayed for 3 months post trauma given that repeated CT scans were unable to identify the wooden foreign body. Therefore, MRI may prove to be valuable in cases of organic foreign bodies, as

wood is hypointense to orbital fat on MRI.<sup>7</sup>

Surgical removal of IOrbFBs is not without careful consideration of its benefit and risks of iatrogenic injury to orbital structures. Organic IOrbFBs cause marked inflammatory response and cause severe secondary orbital infections at higher rates compared to inorganic IOrbFBs.<sup>3,8</sup> Therefore, organic foreign bodies should always be removed. This was the case in both of our wooden IOrbFB patients, who developed complications such as preseptal cellulitis and orbital abscess causing compartment syndrome.

On the other hand, inorganic foreign bodies have a lower rate of infection, especially metal, which is often inert to the orbital soft tissues. Therefore, surgical removal of inorganic foreign bodies depends on their composition and location. The decision to remove may be weighed by early infection, inflammation incited by copper, migration/extrusion, and toxicity such as siderosis from iron.<sup>6</sup> Metallic foreign bodies should be removed when the patient requires an MRI in the future which was demonstrated in all of our metallic IOrbFB cases. Location also plays a role. Posteriorly located inorganic foreign bodies may be treated conservatively since surgery may incite significant ocular morbidity.

The risk of complications from surgical intervention is low, as shown in a review by Finkelstein *et al.* that found no decrease in vision related to 18 patients who underwent surgical intervention.<sup>9</sup> Fulcher *et al.* also concluded that surgical intervention had minimal visual consequences in a study where 33 out of 34 patients maintained their vision. Visual loss only occurred in 1 patient after removal of a metallic foreign body from the optic nerve sheath to prevent siderosis.<sup>3</sup> However, in both reports surgical removal was performed mostly for anteriorly located foreign bodies. In our case series, only 1 patient had resultant blind eye due to involvement of the globe, while the remaining 5, who had anteriorly located IOrbFBs, had good visual outcome.

## Conclusion

Detail management and appropriate imaging is required in all suspected cases of IOrbFB. Organic IOrbFBs pose a great challenge due to their diverse manifestations and low detection rate on CT scan, which tend to be missed during the initial visit. Delayed diagnosis can cause higher risk of orbital infections.

Surgical removal has low risk in anteriorly located IOrbFBs. Loss of vision is usually a result of globe involvement. Posteriorly located inorganic IOrbFBs can be managed conservatively. Therefore, management strategies should be tailored to each patient.

## Declarations

### Informed consent for publication

The patients and/or their guardians have provided informed consent for publication of the clinical data and images contained in this case series.

### Competing interests

None to declare.

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