

Retained Intraocular Foreign Body Causing Ocular Siderosis: A Case Report and Literature Review

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Citation: Khor HH, SIM SY, Jason HO (2022) Retained Intraocular Foreign Body Causing Ocular Siderosis: A Case Report and Literature Review. Annal Cas Rep Rev: ACRR-310.

Received Date: 25th January, 2022; **Accepted Date:** 28th January, 2022; **Published Date:** 03rd February, 2022

Abstract

An intraocular foreign body (IOFB) is an ocular emergency that requires prompt treatment to prevent visual loss. In some cases, the IOFB is retained intraocularly, which may lead to development of ocular siderosis. Ocular siderosis is a rare ocular complication due to retainment of magnetic IOFB. It commonly presents with heterochromia, traumatic cataracts, and/or glaucoma. Here we present a 22-year-old fit and well gentlemen with a previously forgotten IOFB that eventually progressed to ocular siderosis.

He presented with recently worsening vision and acquired heterochromia. His right eye visual acuity was 6/60, while left eye was 6/6. Slit lamp examination showed right anterior subcapsular cataract with pigmentary lenticular deposits and pigmentary retinopathy with inferior retinal pallor.

His CT of his orbits and electrodiagnostic testing results confirmed ocular siderosis secondary to intraocular foreign body (IOFB) in the right eye. The patient proceeded to have right phacoemulsification with intraocular lens implant, pars plana vitrectomy and removal of the IOFB.

Two weeks post-operation, his right eye visual acuity improved to 6/12. His vision remained stable 6 months subsequently while repeat electrodiagnostic testing showed improved retinal function.

This case report highlights the importance of thorough investigation of any suspected retained IOFB, especially those with no obvious corneal injuries to prevent retained IOFB and halt the progression of siderosis. A brief literature review exploring retained IOFB and ocular siderosis is included in the Discussion section.

Keywords: *intraocular foreign body, ocular siderosis, heterochromia, traumatic cataracts, glaucoma. Slit lamp, anterior subcapsular cataract, pigmentary lenticular deposits, pigmentary retinopathy, inferior retinal pallor. Phacoemulsification, intraocular lens implant, pars plana vitrectomy.*

Background

Intraocular foreign bodies (IOFB) account for 18% to 41% of all open globe injuries¹. IOFB describes the penetration of unintentional foreign bodies into the eyes that are retained intraocularly. IOFB typically happens to young males with work-related injuries when they are metal grinding or hammering without any eye protections, causing small fragments to penetrate the eyes. The presentations are usually acute with identifiable injuries leading to prompt removal of the IOFB. However, delayed presentations may lead to further toxic or infective injuries from the IOFB, which complicates the management. We report a case of delayed presentation of IOFB in a young gentleman following ocular injury while working in his garden. His vision was deteriorating, and he has since developed acquired heterochromia. Investigations revealed an

intraocular foreign body causing him to develop ocular siderosis with traumatic cataract.

Aim: To report a case of IOFB with a brief review of the literature.

Method: The case notes of the patient were obtained and searched following obtaining of consent from the patient to publish the case anonymously. The case notes and the various investigations and assessments of the patient were collected in order to summarize the case. Internet data bases were searched including: Google, Google scholar, PUBMED, and Yahoo, to summarize a brief literature review on IOFB. The search words that were used included: Intraocular foreign body, ocular siderosis, siderosis bulbi, ocular metallosis, and endophthalmitis. Information that was obtained from 11 references were used to provide

information related to the background of the case and discussions related to IOFB.

Case presentation

A fit and well 22-year-old male construction worker presented to the eye clinic following a gradual decrease in his right eye vision over 2 years. He also noticed a complete change of his right iris colour. He did not have any significant past medical, drug or family history. His visual acuity at presentation were 6/60 (Right eye) and 6/6 (Left eye). Slit lamp examination of his right eye revealed a right anterior subcapsular cataract with pigmentary lenticular deposits (*Figure 1*) and pigmentary retinopathy with inferior retinal pallor (*Figure 2*). Left ocular examination was unremarkable.

It was an unusual presentation for acquired heterochromia and early onset cataracts. Upon further questioning, he recalled a previously undisclosed history of ocular trauma 2 years earlier. While cutting grass in his garden, he felt a foreign body enter his right eye. It was initially painful but got better with pain relief and time, hence he did not seek medical assistance then. The patient had computed tomography (CT) scan of his orbits (*Figure 3*) and Electrodiagnostics testing (*Table 1*), which confirmed a right ocular siderosis secondary to intraocular foreign body.

The patient underwent right phacoemulsification with intraocular lens implant, pars plana vitrectomy and removal of intraocular foreign body. Two weeks pursuant to his operation, his right visual acuity improved to 6/12. His vision remained stable during clinical review 6 months later and his repeat electrodiagnostic testing showed improved retinal function (*Table 1*).



Figure 1: Right anterior subcapsular cataract with pigmentary lenticular deposits

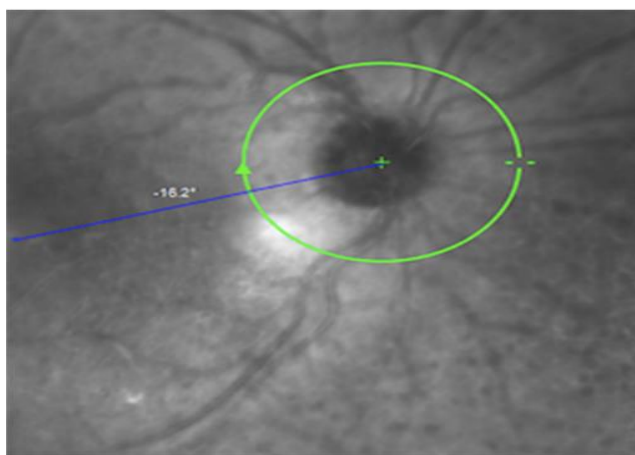


Figure 2: Red Free image of right fundus showing pigmentary retinopathy



Figure 3: CT orbits (Coronal and Axial Views) demonstrating intraocular foreign body in the right inferotemporal retina

Tests		Pre-operative (µV)	6 months post-operative (µV)
Pattern ERG	P50	Undetectable	0.8
	N95	Undetectable	2.2
Rod ERG		Undetectable	Undetectable
Strong flash ERG		a wave: 145 b wave: 140	a wave: 135 b wave: 105
Photopic 30Hz flicker ERG		Undetectable	Peak times: 27ms Amplitudes: 5
Single flash Cone		a wave: 10 b wave: 10	a wave: 5 b wave:10

Table 1: Electrodiagnostics testing performed incorporating the international standard (Espion system) pre- and 6 months post- removal of intraocular foreign body.

Discussion

In most of acute IOFB cases [1], most of the damage is due to the laceration or haemorrhage directly caused by the injury, which may lead to severe visual loss [2]. In cases of retained IOFB, there are further severe complications, the worst of it being endophthalmitis [3]. In this case, the initial trauma was not appropriately managed and the retained IOFB progressed to cause metallosis damage intraocularly, which then lead on to ocular siderosis.

Ocular siderosis occurs with magnetic IOFB, mainly copper and iron metals. The exact pathway is still unknown, but it is mainly attributed to the photoreceptors and retinal pigment epithelium being damaged by the hydroxyl radicals that are formed by the iron deposition, which also damages the retinal vessels and inner retinal layers consequently [4].

Ocular siderosis commonly presents with anterior subcapsular cataracts and iris heterochromia [5-7]. Secondary glaucoma can develop due to the iron deposits, causing an increase in albuminous aqueous production by the ciliary bodies and blockages of the trabecular meshwork, which then leads to increased intraocular pressure [8]. Damage to the posterior segment can lead to retinal detachment and clumping of the retinal pigment epithelium [6].

Symptomatic presentation of ocular siderosis can vary from 18 days post trauma up to a decade after the trauma [5,9]. Had our patient sought help promptly after the initial IOFB injury, he could have avoided all the complications of retained IOFB.

In patients where there is suspicion of IOFB, it is warranted that a full ocular examination from front to back is performed. Slit lamp examination through a dilated fundus may be sufficient to locate the IOFB if the vitreous is not opaque [10]. The important features to look out for include conjunctival lacerations, entry track marks, localised cataracts, iris transluminations, and vitreous haemorrhage.

Orbital CT scan without contrast is the gold standard for imaging, while electroretinography (ERG) provides information on any damage to the retina [4]. The location of IOFB in patients with siderosis is mainly found in the inferior vitreous or inferior retina [6,11]. The level of intraocular toxicity can vary depending on the size, site, iron content, and duration of IOFB deposition [5,11].

Prompt IOFB removal is warranted in patients with mobile foreign bodies in the vitreous, non-encapsulated foreign bodies in the retina, or diminishing ERG results [5,10]. Advocates for monitoring suggest a surgical intervention threshold of greater than 50% deterioration in the electroretinogram, as a proportion of small IOFB can resorbed spontaneously [7].

Post-operatively, visual improvement is reported in around 75% to 78% of patients [5,11]. Positive prognostic factors include stable or improved siderotic changes, and undamaged macula or optic nerve [5,10].

Conclusion

Ocular siderosis is a rare but sight threatening complication of retained magnetic IOFB. When assessing patients presenting with high velocity ocular injury, the inability to locate any corneal injuries or obvious IOFB should raise suspicion, and thorough ocular examination and imaging is warranted. Awareness and education among the high-risk groups including industrial workers regarding ocular personal protective equipment should be advocated to avoid work-related ocular traumas.

Consent

Written informed consent was obtained from the patient.

Conflict of interest

The authors declare that they have no conflict of interest.

Acknowledgement

We thank the patient and all the hospital staff for their hard work

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