Giant Intraocular Foreign Body

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Abstract

IOFBs are an important cause of blindness and visual morbidity especially in the working age group. Metallic foreign bodies are the most common. Ocular imaging lays an important role while evaluating a case of IOFB. The imaging modalities commonly used are B-scan ultrasonography (USG), X-ray, and computed tomography. Three port pars plana vitrectomy (PPV) with removal of IOFB through limbal or scleral incision is the most common approach. Silicone oil tamponade is used in cases with retinal detachment, proliferative vitreoretinopathy, or endophthalmitis.

Keywords

IOFB · Vitrectomy · PVR

12.1 Introduction

Intraocular foreign bodies (IOFBs) occur in 18–41%of open trauma [1]. IOFBs are an important cause of blindness and visual morbidity especially in the working age group [2]. Due to variations in the clinical presentation, associated complications and outcomes, management of IOFB presents a major challenge to the ophthalmologist. The injury to the eye could be due to mechanical effect, associated infection, or specific reaction [3]. IOFB can be chips of iron or steel, stone, glass, lead pellets, copper, spicules of wood, etc. Of these, metallic IOFBs are most common followed by organic material and nonmetallic material [1]. Visual prognosis is dependent on several factors such as age, length of wound, time between injury and repair, and complications such as relative afferent pupillary defect (RAPD), retinal detachment and endophthalmitis.

12.2 Case Report

A 34-year-old male presented with the history of penetrating ocular trauma with gun pellet in the right eye. He had undergone primary corneal tear repair with iris reposition and anterior chamber wash locally in his right eye. He was currently using topical antibiotics, lubricants, cycloplegics, and systemic antibiotics.

On examination, right eye vision was hand movement close to face and left eye was 6/6 on Snellen's chart. On slit lamp examination, corneal sutures were in place and rest of the cornea appeared clear. Anterior chamber was well

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formed and showed +2 cell reaction, posterior synechiae was noted from 9 to 11 o' clock. A traumatic cataract with pigments on the anterior lens capsule was noted. Posterior segment was not visible in the right eye due to the traumatic cataract (Fig. 12.1). The ocular examination of the other eye was within normal limits.

B-scan ultrasonography of the right eye showed multiple hyperechoic reflections in the vitreous cavity suggestive of vitreous hemorrhage (Fig. 12.2). Computed tomography scan of the orbit revealed a metallic foreign body in the right eye near the optic nerve head (Fig. 12.3). Flash electroretinogram showed right-sided marked diffuse reduction in photoreceptor function and pattern ERG findings were suggestive of reduced function of right macular photoreceptors (Fig. 12.4). The patient was underwent phacoemulsification with posterior chamber intraocular lens implantation with 23 Gauge pars plana vitrectomy with IOFB removal with silicone oil injection with endolaser under local anesthesia. Extremely guarded visual prognosis and need for possible multiple surgeries were explained to the patient. IOFB was removed through a superior pars plane sclerotomy using a basket type IOFB forcep.

On first postoperative day, hand movement vision was present in the right eye. Intraocular lens was seen in situ. Retina was attached with an oil filled vitreous cavity. At 1 month follow-up, the vision in the right eye had improved to finger counting at 1 m, the cornea was clear, intraocular lens was in place, and the retina was attached (Figs. 12.5 and 12.6). No emulsification of silicone oil was noted. The patient was advised close follow-up.

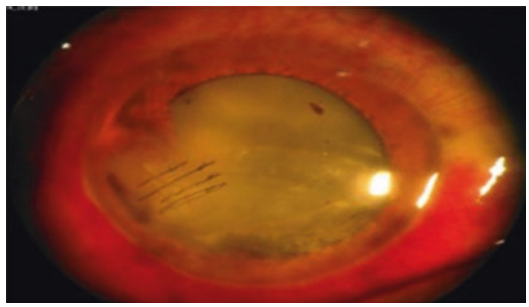


Fig. 12.1 Anterior segment photograph showing sutured corneal entry wound with posterior synechiae and traumatic cataract

Fig. 12.2 B-scan ultrasonography suggestive of vitreous hemorrhage

12.3 Preoperative Evaluation

12.3.1 History

A detailed history is important while evaluating a patient with IOFB. Details about the time from injury to presentation, mechanism of injury which would help in identifying the type of IOFB, presence of visual symptoms, and any prior treatment should be obtained. Assessment of any concomitant, potentially life threatening condition is also crucial. For medicolegal purposes, it is also important to note if the injury

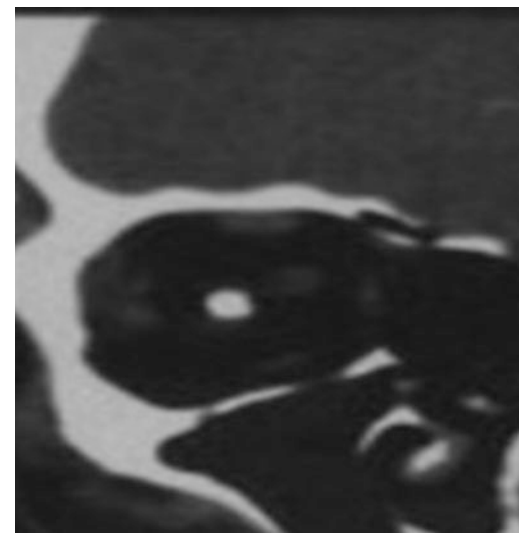
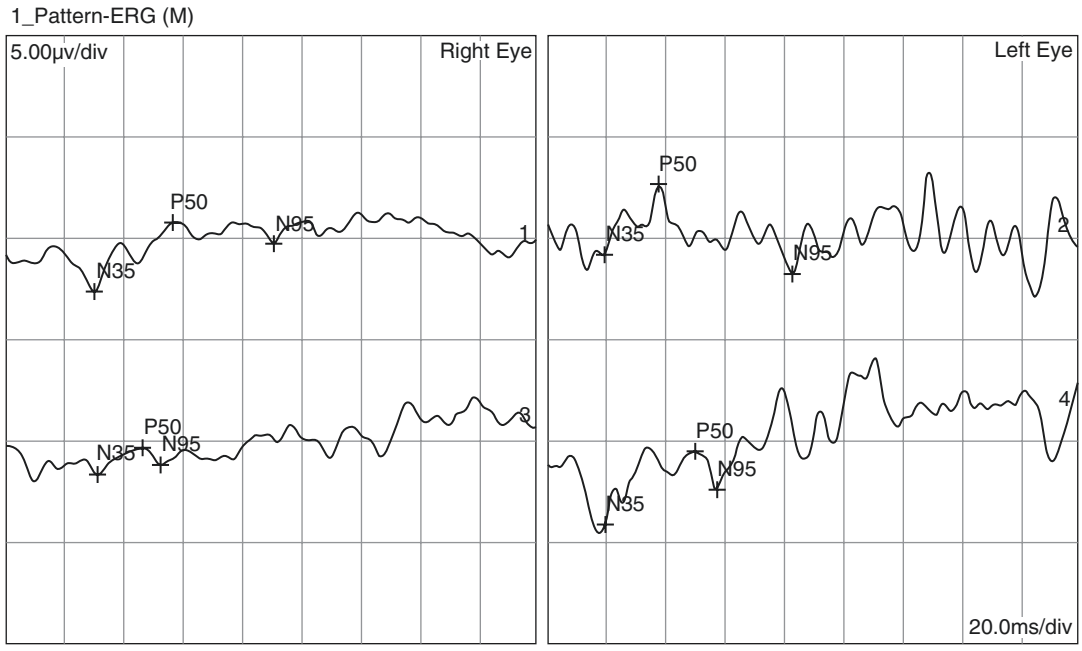


Fig. 12.3 CT scan of right orbit showing metallic intraocular foreign body



Normals	25-45	40-60	85-105	1.00µV-8.00µ	2.00µV-10.00µ
Channel	**N35 [ms]**	**P50 [ms]**	**N95 [ms]**	**N35-P50**	**P50-N95**
1 R-1 48 min	29.9	56.7	90.9	3.42µV	1.06µV (!)
3 R-1 48 min	31.0	46.5	52.5 (!)	1.29µV	805nV (!)
2 L-2 48 min	20.1 (!)	38.4 (!)	83.8 (!)	3.46µV	4.45µV
4 L-2 48 min	20.1 (!)	50.7	58.1 (!)	3.63µV	1.90µV (!)

Fig. 12.4 Pattern ERG showing reduced P50 and N95 responses as compared to the left eye

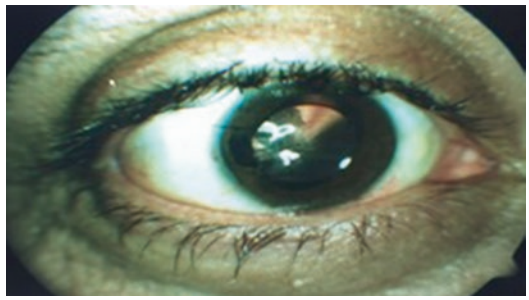


Fig. 12.5 Anterior segment photograph on 1 month post-operative follow-up

occurred in the workplace and if protective eyewear was used at the time of injury.

12.3.2 Examination

After proper history taking, documentation of visual acuity and RAPD should be done. Intraocular pressure measurement is usually deferred in cases of open globe injuries. Examination of the periocular area must be done to look for any laceration, superficial FB, orbital fractures, etc. Slit lamp evaluation of the anterior segment should then be performed. Any laceration of the conjunctiva, cornea, or sclera should be noted. Anterior chamber should be evaluated for presence of hypopyon, hyphema, fibrin, cells, or lens material. Presence of peaked pupil is suggestive of an open globe injury. Lens should be examined for zonular dialysis, cataractous changes, and breach in the lens capsule. Fundus evaluation should be done to look for any pathology such as vitreous hemorrhage, retinal tear, retinal detachment, choroidal detachment, choroidal rupture, or presence of posterior exit wound. IOFB can be located in the vitreous, ciliary body, retina, choroid, or the posterior sclera and hence these areas must be carefully examined. However, scleral depression should be avoided if globe rupture is suspected to avoid

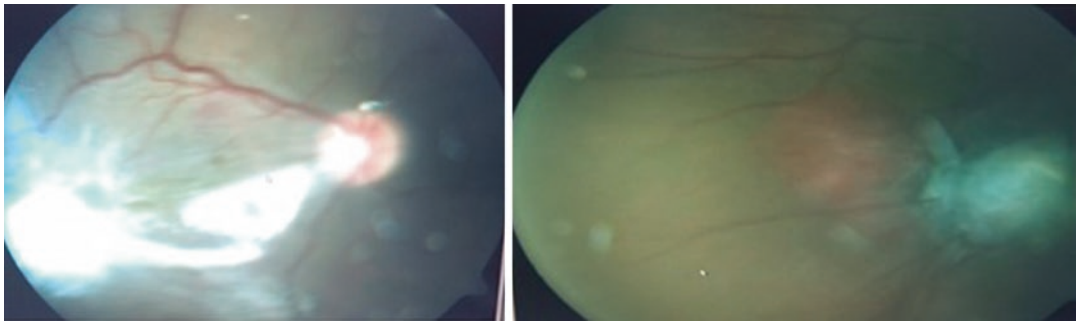


Fig. 12.6 Posterior segment photograph on 1 month postoperative follow-up

expulsion of intraocular contents. Presence of media opacities such as hyphema, cataract, and vitreous hemorrhage can obscure the view of the fundus. Imaging modalities are needed in such cases to detect the presence of IOFB.

12.3.3 Imaging

Ocular imaging lays an important role while evaluating a case of IOFB. The imaging modalities commonly used are B-scan ultrasonography (USG), X-ray, and computed tomography (CT). The modality of imaging used to appropriately visualize the foreign body depends on its composition.

Plain X-ray can be used to identify several IOFB materials such as metal, glass, and slate. However they do not provide the exact localization of the IOFB. Therefore, non-contrast CT with thin cuts (1 mm) and axial, coronal, and sagittal views is the preferred imaging modality. It provides the exact localization of the IOFB and also provides information about other trauma sequale such as orbital fracture, retrobulbar hemorrhage, and any intracranial injury. CT scan can identify most IOFBs well. Wooden and plastic foreign bodies are poorly identified [1]. Wooden IOFBs are hypodense and may be mistaken for air or fat [4]. Magnetic resonance imaging should be avoided in cases of open globe injury due to the concern for a ferromagnetic IOFB.

12.4 Preoperative Care

Appropriate preoperative management is required to prevent spread of infection. Tetanus immunization history should be obtained, and tetanus toxoid or tetanus immune globulin should be administered if necessary. Broad-spectrum systemic and frequent topical antibiotics should be started. Oral levofloxacin is known to have adequate ocular concentration and hence can be used in such cases [5].While awaiting surgery a rigid ocular shield (fox shield) should be placed over the injured eye to prevent further damage. IOFBs should be removed as soon as possible (within 24 h) to reduce the risk of endophthalmitis and PVR. However, studies from Iraq have shown that primary closure of wound with systemic antibiotic and delayed removal of IOFB can result in similar visual outcomes [6].

12.5 Surgical Management

The first step in the management is the closure of the primary wound. Corneal wounds are easily identified and closed with 10-0 nylon suture. Scleral wounds can be concealed by the overlying conjunctiva. Presence of dense subconjunctival hemorrhage may point towards underlying scleral tear. Exploration is needed during surgery to identify the area of scleral tear.

Three port pars plana vitrectomy (PPV) with removal of IOFB through limbal or scleral incision

is the most common approach. 20G or 23G PPV can be performed. However port sites may need to be enlarged in small gauge surgeries as both the foreign body forceps and intraocular magnets require 19G ports. An encircling band may be used to decrease the risk of postoperative PVR [7].

Complete vitreous removal is the first step to prevent any retinal traction during IOFB removal. Triamcinolone assisted PVD induction can be performed. Vitreous around the IOFB and port site vitrectomy should be meticulously performed. Only when all the vitreous is removed, should one attempt to remove the IOFB. Perfluorocarbon liquid can be injected over the macula to prevent any iatrogenic damage.

Cases with coexisting lenticular damage or cases with IOFB lodged in the pars plana may require a pars plana lensectomy. Such cases can have the IOFB removed through a limbal incision. In cases where lens is preserved, IOFB can be removed by enlarging an existing sclerotomy. IOFB removal should be attempted after creating the wound for removal.

Metallic IOFB can be removed by intraocular magnet. Non-magnetic foreign bodies can be removed by forceps. Attempt should be made to grasp and align the IOFB in a way that its thinnest part is removed through the sclerotomy. A thorough peripheral retinal examination is essential after removal of IOFB to look for any tears. Laser should be performed at the site of the IOFB and any other retinal tear. Gas or oil tamponade can be used.

12.6 Postoperative Complications

12.6.1 Endophthalmitis

Vitreous culture should be performed if endophthalmitis is noted before or during surgery. Broad-spectrum intravitreal antibiotics such as vancomycin and ceftazidime should be used. In case of an organic IOFB, antifungals may be added. Silicone oil tamponade is preferred in patients with endophthalmitis. Prophylactic intravitreal antibiotics in the absence of endophthalmitis at the time of surgery may be considered as they have shown to decrease the rate of traumatic endophthalmitis [8].

12.6.2 Retinal Detachment

Retinal detachment is one of the serious complications of IOFB removal surgery. Risk factors for postoperative RD are endophthalmitis and IOFB larger than 4 mm in size [9]. Patients with RD at the time of IOFB removal surgery are also at an increased risk of postoperative RD due to increased chances of iatrogenic retinal break [1]. Silicone oil tamponade is preferred in such cases because of increased risk of PVR.

12.6.3 Proliferative Vitreoretinopathy

Proliferative vitreoretinopathy is one of the most common causes of secondary retinal detachment. Risk factors for PVR include size of IOFBs, size and number of retinal tears, and associated vitreous hemorrhage or choroidal detachment [1].

12.6.4 Sympathetic Ophthalmia

Sympathetic ophthalmia (SO) is a granulomatous panuveitis which occurs days to months after penetrating ocular injury or surgery in one eye. The incidence of SO is 0.2–0.5% after penetrating injury and 0.01% after intraocular surgery [10, 11]. Current treatment with steroids and immunosuppressive agents allow control of disease and retention of good visual acuity in the fellow eye [12]. Due to small risk and effective available treatment for SO, attempt should be made to defer enucleation and plan surgical repair after appropriate patient counseling, even in eyes with no light perception.

12.7 Personal Experience

The timing of surgery is important. Removal of IOFB should be undertaken at the earliest possible. It is also important to decide the site of removal of the IOFB. If lens is being spared, the sclerotomy may need to be enlarged to remove the IOFB. However in case of large and irregular IOFB, lens may need to be sacrificed to remove the IOFB through the limbal incision. Silicone oil is the tamponade of choice in IOFBs associated with retinal detachment.

12.8 Specific Challenges

Removal of large IOFB should be targeted in a way to minimize damage to other intraocular structures. Damage to retina due to slippage of large irregular IOFB can be prevented by use of PFCL. Management of concurrent retinal damage is also challenging. Retinectomy may be required at times due to presence of PVR. Any iatrogenic break should be identified and treated.

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