Original Article

Management of Intraocular Foreign Body in Tertiary Care Hospital

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Purpose: To share the experience of managing fifty cases of intraocular foreign body in a tertiary care hospital.

Material and Methods: The study was conducted in LRBT Free Base Eye Hospital Eye Karachi from January 2008 to December 2010. We retrospectively reviewed the record of fifty patients of intraocular foreign body who underwent pars plana vitrectomy for foreign body removal. In this study twenty eight (56%) patients had self sealing wound which did not need primary repair, rest of twenty two (44%) patients' needed primary surgical intervention to restore ocular integrity. After initial management all patients underwent pars plana vitrectomy for foreign body removal. Minimum follow up was 6 months while mean follow up was 15 months.

Results: There were fifty eyes of fifty patients, all males with age ranging between 20 and 50 years who had sustained ocular trauma, mostly involving anterior as well as posterior segments, and few involving only the posterior segment. Preoperative visual acuity was PL to 6/60 in 68% patients and 6/60 to 6/12 in 32% patients, whereas; postoperative visual acuity at final follow up was 6/12 to 6/60 in 64% of patients and 6/60 to PL in 36% of patients.

Conclusion: intraocular foreign body is a common occupational injury of the eye. Timely management of removal of intraocular foreign body and meticulous follow up improves visual acuity.

Trauma can result in a wide spectrum of tissue lesions of the globe, optic nerve and adenexa, ranging from the relatively superficial to vision threatening. The Birmingham Eye Trauma Terminology (BETT) classifies each injury type in a comprehensive system (Fig. 1)[1]. Penetrating injuries are three times more common in males than in females, and typically occur in the younger age group. Extent of damage caused by flying foreign bodies is determined by their kinetic energy[2]. Intraocular foreign bodies account for almost 40% of penetrating ocular injuries[3]. Most foreign bodies lodge in the posterior segment[4]. Intraocular foreign body cause a significant and unique type of trauma that requires skillful investigation and an early intervention.

The earliest cases of intraocular foreign body were removed through a corneal incision using an external magnet[5]. Intraocular foreign body survival techniques progressed over time to removal through the pars plana using an external magnet[6]. Metallic intraocular foreign body, removed by magnetic extraction was associated with a high incidence of intraocular damage[7]. With the development of pars plana vitrectomy (PPV), both magnetic and nonmagnetic intraocular foreign bodies could be removed from the vitreous cavity[8].

Intraocular foreign body removal was originally localized using scout films of the orbit. This technique has long been replaced by improvements in ultrasonography and computed tomography (CT) technology[9,10].

MATERIAL AND METHODS

The study was conducted in LRBT Free Base Eye Hospital Eye Karachi from January 2008 to December

2010. We retrospectively reviewed the record of fifty patients of intraocular foreign body who underwent pars plana vitrectomy for foreign body removal. Patients with previous history of retinal detachment surgery, corneal disease, glaucoma, any other intraocular disease, diabetes mellitus, and hypertension are excluded from the study.

A performa was used to record demographics, the etiology of injury; the type of material that may have entered the eye such as metallic (magnetic/ nonmagnetic), nonorganic (stone), organic (plant/ wood), or autologous (bone / cilia); time elapsed since injury, vaccination for tetanus, time elapsed since last meal, and allergy to any medicine.

Complete ophthalmic examination was carried out. B scan ultrasonography was deferred until the primary globe repair was completed to evaluate the retina and choroid. CT was used where necessary.

In this study twenty eight (56%) patients had self sealing wound which did not need primary repair, and who underwent pars plana vitrectomy for foreign body removal within two weeks of injury. The remaining twenty two (44%) patients' required primary surgical intervention to restore ocular integrity within a day or two. Subsequently these patients underwent pars plana vitrectomy for foreign body removal within two weeks. Minimum follow up was 6 months while mean follow up was 15 months.

Surgical Technique

The preoperative testing such as medical history and CT scan will usually suggest the composition and size of the intraocular foreign body. Size is the most important factor in determining the instrumentation for IOFB removal. Magnetic metallic intraocular foreign bodies less than 1×1×1 mm in dimension were removed using the Alcon Grieshaber Sutherland (NG-712.0012) IOFB magnet and larger foreign bodies were removed with Alcon Grieshaber Sutherland (NG-335.00) intraocular forcep. Non- magnetic intraocular foreign bodies were also removed with the above mentioned forcep.

RESULTS

The study included fifty eyes of fifty patients, all males with age ranging between 20 and 50 years who had sustained ocular trauma, mostly involving both the anterior as well as posterior segments and a few involving just the posterior segment and who were managed between January 2008 to December 2010. Minimum follow up was 6 months while mean follow up was 15 months. Type of injury and entry site are shown in table 1. Cataract developed preoperatively in twenty nine (58%) patients. Foreign body removal by enlarging an incision through the pars plana and vitrectomy with 23G was done in 38 (76%) patients, whereas; foreign body removal through a limbal incision and vitrectomy with 23G was done in 12 (24%) patients. Foreign body was localized in mid vitreous in 9 (18%) patients, at retina beyond the equator in 31 (62%) patients, between equator and macula in 6 (12%) patients, on macula in 4 (8%) patients. Cataract was removed in all 29 patients but intraocular lens was implanted in 22 (75.86%) patients and rest 7 (24.13%) patients left aphakic. Preoperative and postoperative visual acuity is shown in table 2. Postoperative complications were retinal detachment in 3 (6%) patients, vitritis in 4 (8%) patients, cystoid macular edema in 6 (12%) patients, and intraocular lens decentration in 2 (4%) patients and endophthalmitis in 1 (2%) patient.

Table 1:

Type of Injury		Entry Site	
Hammer / Cheisel	32	Hammer / Cheisel	32
Blast injury	8	Blast injury	8
Battery explosion	4	Battery explosion	4
RTA glass piece	6	RTA glass piece	6

Table 2:

Preoperative Visual Acuity n (%)		Postoperative Visual Acuity n (%)	
PL to 6/60	34 (68)	PL to 6/60	34 (68)
6/60 to 6/12	16 (32)	6/60 to 6/12	16 (32)

DISCUSSION

Ocular trauma associated with retained intraocular foreign bodies (IOFB) constitutes a significant proportion (18-40%) of all ocular injuries requiring surgical management[11]. Visual outcomes after intraocular foreign body injury can vary depending on other concomitant globe injuries. Preoperative visual acuity is usually reduced by traumatic cataract or vitreous hemorrhage. These two media opacities are

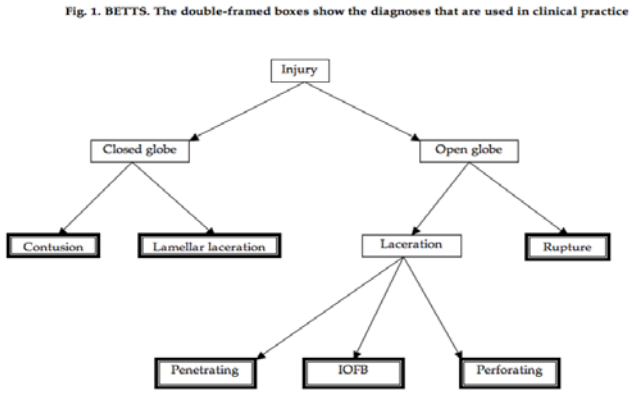

Fig. 1: BETTS. The double framed boxes show the diagnoses that are used in clinical practice

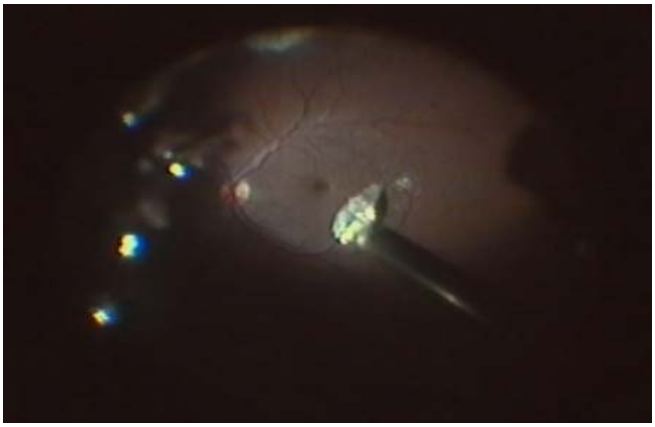

Fig. 2: Intraocular foreign body at the posterior pole being lifted by a magnet.

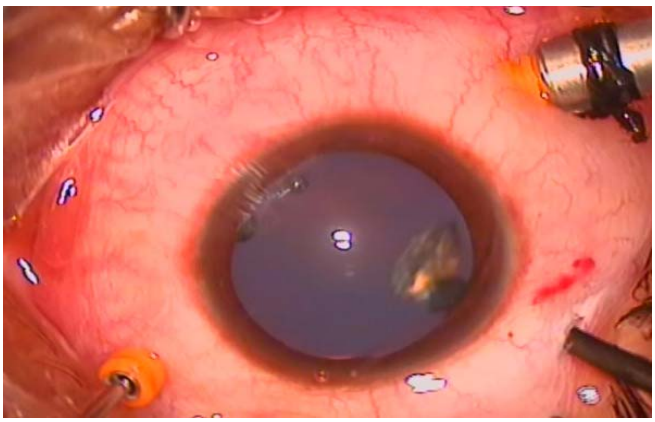

Fig 3: Intraocular foreign body being removed through the enlarged sclerotomy incision

removed during intraocular foreign body removal. The major contributing factors for long term poor visual acuity are traumatic optic neuropathy, corneal scarring, residual effects of post traumatic endophthalmitis, and suprachoroidal hemorrhage as well as proliferative vitreoretinopathy (PVR) causing irreparable chronic retinal detachment. The most common type of intraocular foreign body injury involves a small corneal laceration with traumatic cataract and vitreous hemorrhage in more than 50% of these cases. These intraocular foreign body injuries have excellent visual recovery with most obtaining best corrected visual acuity ≥ 20/40[12,13]. In this study 36% patients had post-operative final visual acuity ranging between 6/60 to PL, the contributing factors for poor visual acuity in decreasing order of frequency were corneal scarring, aphakia, retinal detachment, endophthalmitis and traumatic optic neuropathy.

Corneal scarring and astigmatism are significant factors for vision loss after an intraocular foreign body injury. A hard contact lens or penetrating keratoplasty may be needed for visual rehabilitation[14]. Aniridia IOL can be used to manage traumatic aniridia with symptomatic photophobia[15]. Traumatic optic neuropathy can be followed using visual field or multifocal visual evoked potential testing[16].

In this study, 76% patients had foreign body removal by enlarging the sclerotomy incision, and 24% patients through a limbal incision. In this study most common type of injury was with hammer/chisel accounting for 64% of the cases, and most common site of entry was cornea 52%; 64% of the patients had visual acuity ranging between 6/12 to 6/60, where as Warrasak S et al showed 72.22% patients had visual acuity ranging between 20/20 to 20/60.[17] In another study 65.96% patients achieved visual acuity of 20/400 or better[18]. In this study post operative retinal detachment was seen in 6% of patients whereas; Weissgold DJ et al reported post operative retinal detachment in 15.38% of patients[19]. The rate of preoperative retinal detachment associated with an intraocular foreign body has been reported at 31%[12]. Intraocular foreign body removal associated with a retinal detachment can be extremely complicated, especially with subretinal intraocular foreign bodies located away from the entry site of the IOFB. Postoperative intra ocular foreign body related retinal detachment can also contribute to poor visual outcome, with large intra ocular foreign body and endophthalmitis as the strongest predictive factors[20]. In this study postoperative endophthalmitis occurred in 2% of patient, where as Zhao SH et al reported in 6.25% of patients with endophthalmitis[18]. Post

traumatic endophthalmitis has historically averaged 4% to 8% of all intra ocular foreign body injuries, with up to 30% in rural settings[21].

Thus, timely management, absence of risk factors for post traumatic endophthalmitis (including delay in primary closure, delay in IOFB removal, disruption of the crystalline lens, and sustaining ocular trauma in rural setting), and close follow up improves visual outcome after removal of intraocular foreign body.

CONCLUSION

Ocular trauma due to intraocular foreign body requires urgent surgical management. Based on the findings of the current study, prompt removal of the intraocular foreign body results in favorable improvement in visual acuity.

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