

Prognostic Factors For Visual Outcome Following Intraocular Foreign Body Removal

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Abstract:

Objective: To determine the influence of prognostic factors on the visual outcome in patients who underwent vitrectomy for intraocular foreign body.

Methods: A retrospective study was conducted at the Ophthalmology Department, Lahore General Hospital Lahore, between 2017 and 2021. A sample size of 60 patients is estimated by using a 95% confidence level, 7% absolute precision with an expected percentage of 8.4%. The data of 62 patients who aged between 25 to 55 years and presented with open-globe injuries and retained IOFBs was collected by non probability purposive sampling technique.

Results: All the patients underwent 23-gauge pars plana vitrectomy with removal of IOFB. The final BCVA was improved by 02 letters or more on Snellen's acuity chart in 38 (61.29%) patients and remained the same in 21 (33.87%) eyes while in 03 (4.84%) cases it decreased. Despite the systemic antibiotics, 03 (4.83%) eyes ended up with endophthalmitis. None of the eyes were enucleated.

Conclusion: The prognosis of an IOFB injury is mostly uncertain due to a complex combination of parameters. The main prognostic factors related to better visual outcomes were initial BCVA, time to surgery (first week), initially attached retina and the scleral entry site. Prognostic factors for poor final VA related to IOFBs included poor initial VA, large IOFB size, posterior segment location, and preoperative retinal detachment. The main complication was endophthalmitis. *Al-Shifa Journal of Ophthalmology 2023; 19(2): 46-51. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

Particularly among people of working age, ocular trauma continues to be a leading cause of blindness and ocular morbidity¹. Penetrating ocular damage is usually accompanied by intraocular foreign bodies (IOFBs), which can enhance ocular morbidity. IOFBs (intraocular foreign bodies) are a subtype of ocular injuries that present difficult surgical challenges to remove the IOFB successfully while striving to preserve vision and restore ocular architecture^{2,3}. There are now more alternatives for handling these challenging cases thanks to improvements in microsurgical techniques⁴⁻⁷. IOFBs that have been retained often have a better prognosis than penetrating wounds caused by other sources⁸⁻¹¹.

Ocular injury caused by an IOFB depends on its velocity, size, nature, entry site, and impact. IOFB's Small and sharp size causes a small and linear perforation at the entry site. Such

perforations are easy to repair ²⁵. Large, irregular projectiles like stone particles cause a ragged and large wound at the entry site. They cause significant tissue damage and are difficult to repair. IOFBs generated at high speed generally lodge in the posterior segment of the eyeball. They can also ricochet inside the eye, causing injuries at multiple sites ²⁶.

The most typical kind of foreign bodies are metallic ²⁷. Foreign bodies made of iron and copper are extremely reactive. Metallosis can occur due to Fe and Cu. Metallic ions are released, and these ions deposit in the different ocular tissues.

Siderosis bulbi is the outcome of iron foreign body injury to the eye. It is a degenerative, pigmentary process brought on by the long-term retention of an iron IOFB. The trabecular meshwork, iris, retina, cornea, lens, and other epithelial tissues accumulate deposits of iron. The pigments are deposited in the endothelium or stroma of the cornea. Iron accumulation in the stroma and epithelium of the iris is observed, resulting in greenish-brown discoloration and iris heterochromia ^{28,29,30,31}.

Materials and Methods:

A retrospective study was carried out at the Ophthalmology Department of Lahore General Hospital between 2017 and 2021. For the study, a sample size of 60 patients was estimated using a 95% confidence level, 7% absolute precision, and an expected percentage of 8.4%. The data of 62 patients aged between 25 to 55 years with open-globe injuries and retained IOFBs were collected through non-probability purposive sampling techniques. The study included patients who had open globe injuries and retained IOFBs and were between the ages of 25 and 55. Patients who were taking medications such as antimicrobials, sedatives, anticonvulsants, diuretics, gold salts, and anti-diabetic drugs, those with a history of exposure to chemicals like ethanol, benzene, and arsenic, known cases of liver disease (as per medical record), patients with human immunodeficiency virus infection, patients

with autoimmune disorders such as systemic lupus erythematosus (as per medical record), patients who had been treated with H. pylori eradication therapy during the past 4 weeks, patients with thrombotic thrombocytopenic purpura (as per medical record), and gestational thrombocytopenia (as per medical record) were excluded from the study. Additionally, patients with thrombocytopenia after transfusion (as per medical record) were also excluded. After informed consent, a detailed preoperative examination was carried out. All the patients underwent 23-gauge pars plana vitrectomy with removal of IOFB. In 43 patients, the IOFB was removed during the first 24 hours after the accident. In 19 patients, who presented after the primary repair, the IOFB was removed later than 24 hours after the accident. Forceps removal was done in 43 (69.35%) eyes, Endo magnet was used in 12 (19.36%) of eyes while 07 (11.29%) foreign bodies were removed with a vitrectomy probe. The follow-up period was 05 years for 29 cases, and 03 years for 21 patients while 12 patients had a follow-up of 01 year. On each follow-up visit the best corrected visual acuity (BCVA) was noted.

Results:

This study included 62 patients. All the patients were males (100%). The mean age was 40 years. Metallic foreign bodies accounted for 49 (79.03%) cases and non-metallic foreign bodies were present in 13 (20.97%) eyes (Table 1). The entry wound was in the cornea in 24 (38.71%) cases, corneoscleral in 29 (46.77%), and scleral in 09 (14.52%) eyes (Table 2). The size of the IOFB ranged from 0.5 mm to 22 mm in its largest diameter, with a mean of 5.65 mm. The posterior segment was the most frequent location found in 35 (56.45%) eyes. Traumatic cataract was found in 35 (56.45%) eyes. Retinal detachment was found in 27 (43.54%) cases while 19 (30.64 %) eyes presented with vitreous hemorrhage. The final BCVA was

improved more than 02 letters on Snellen’s chart in 38 (61.29%) patients, remained the same in 21 (33.87%) eyes while decreased in 03 (4.84%) cases. [Table 3]

Despite the systemic antibiotics, 03 (4.83%) eyes ended up with endophthalmitis. None of the eyes were enucleated.

Table 1: Nature of foreign bodies

Metallic foreign Status	No.of Eyes	Percentage
Metallic foreign bodies	49	79.03%
Non-Metallic foreign bodies	13	20.97%
Total	62	

Table 2: Location of wound

Wound Status	No. of Eyes	Percentage
cornea	24	38.71%
corneoscleral	29	46.77%
scleral	9	14.52%
TOTAL	62	

Table 3: Visual acuity after intervention

BCVA Status	No.of Patients	Percentage
Improved	38	61.29%
Remained Same	21	33.87%
Decreased	3	4.84%
TOTAL	62	

Discussion:

Penetrating ocular injuries continue to be a common cause of blindness in the United States despite advances in microsurgical techniques. Ocular trauma is the leading cause of blindness in teenage and young adult males.¹² Penetrating injuries involving retained IOFBs represent a significant subset of ocular injuries. Injuries involving IOFBs often occur under circumstances in which the injury may have been prevented with the use of eye protection. In the management of IOFBs, the primary goals of the patient and the physician are to restore the ocular integrity

and obtain a good visual outcome. Secondary goals include minimizing intraoperative and postoperative complications and rehabilitating the patient in a timely manner. The surgical techniques available to remove retained IOFBs have increased with the routine availability of vitreous surgery.¹³⁻²²

The management of IOFBs of the posterior segment by vitrectomy has occurred in the past several years. Many surgeons advocate pars plana vitrectomy for IOFBs in the vitreous or retina/choroid. In our study, IOFBs were located in the vitreous or retina/choroid. Vitrectomy was the most

commonly used method of removing the IOFB. The advantages of vitrectomy include the ability to remove media opacities concomitantly, such as hemorrhage and cataract, and direct visualization of the IOFB for forceps or nonmagnetic removal. Endo-magnetic removal of IOFBs is one of the techniques used in IOFB Removal. IOFBs located in the vitreous cavity were removed after vitrectomy with an endo magnet in 12 eyes, in 43 eyes we used forceps removal while in 7 eyes vitrectomy was done to remove IOFB. Initial visual acuity was the most important predictive factor of visual outcome in patients with retained IOFBs. Previous studies have also identified the presenting visual acuity as an important predictive factor.^{13,14,16,17,23,24} The presence of retinal pathology was the primary reason for having a fair or poor visual outcome. Of the 62 eyes, 27 eyes had retinal detachments, and 19 had vitreous hemorrhage secondary to the foreign body and application of its results. Other factors predictive of good visual acuity include scleral entry site and time of surgery. Those who underwent surgery in the first week of IOFB retention have a better visual prognosis than those who underwent surgery later on. foreign body size is also an important prognostic factor. Ocular trauma continues to be a major cause of visual impairment.

Patient education, occupational safety, and advancement in microsurgical techniques continue to help improve outcomes of major ocular trauma. Intraocular foreign bodies contribute a significant component of ocular morbidity associated with open-globe injury. In this study, we identify several factors that may help to determine which patients risk for vision loss and globe loss. These factors may aid the clinician in counseling a patient regarding visual outcome

Conclusion:

The prognosis of an IOFB injury is for the most part uncertain due to a complex

combination of parameters. The main prognostic factors related to better were initial BCVA, time to surgery (first week), initially attached retina, and the scleral entry site. Prognostic factors for poor final VA related to IOFBs included poor initial VA, large IOFB size, posterior segment location, and preoperative retinal detachment. The main complication was endophthalmitis

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