INTRODUCTION

Ocular trauma is one of the commonest causes of visual impairment. Ocular injuries make up to 10% of all the injuries, in spite of the fact that it makes only 0.27% of the body surface. The uncontrolled nature of initial trauma and unpredictable anatomic and visual outcome are important in ocular traumatology. Intraocular foreign bodies (IOFBs) represent a subset of ocular injuries that present complex surgical challenges for removal of the intraocular foreign bodies successfully while preserving the vision, restore ocular architecture and prevent the complication. The rapid growth of industry, unavailability of protective measures and increased number of road traffic accidents has increased the incidence of a foreign body in the eye. Intraocular foreign bodies are common among males of low socio-economic status and the most affected age group is under 40 years. In Pakistan, incidence of IOFBs is highest in NWFP and the most affected age group is also under 40 years. Job-related injuries are the commonest (80%) cause of intraocular foreign bodies.

Most commonly encountered foreign bodies are iron, steel, copper, zinc, aluminum, nickel and lead. Other foreign bodies comprise of stone, coal, glasses, plastic, vegetable matter, wood, cotton and fibres. The hammer-chiseling injury is the most common cause of the IOFB in adults. Intraocular foreign body mostly causes damage to the eye by mechanical ways, introduction of infection and specific chemical reaction in the intraocular tissues.

Posterior segment IOFBs while traversing the vitreous, create a track in the vitreous. Another track is created if it is removed by transscleral magnet extraction via pars plana without vitrectomy. This track causes fibrosis and

ABSTRACT

Objective: To assess the visual outcome and complications after removal of posterior segment retained intraocular foreign bodies through pars plana approach.

Study Design: Case series.

Place and Duration of Study: Department of Ophthalmology, Jinnah Postgraduate Medical Centre, Karachi, from May 2005 to May 2006.

Methodology: Fifty patients with history of ocular foreign body were admitted through outpatient department and emergency. History, visual acuity, ocular and general examination was done. The foreign body was localized with the radiograph of the skull and ultrasonography. Primary repair was done in patients with open wounds. Pars plana vitrectomy, magnetic or forceps extraction of foreign body was done as required visual outcomes and complications were noted.

Results: Among the 50 patients, there were 45 (90%) males and 5 (10%) females. Average age of the patients was 31.52 ±9.52 (ranging from 20 to 50) years. The pre-operatively visual acuity finger counting to perception of light was 78% cases. The best corrected final visual acuity was 6/6 in 1 (2%) patient, 6/9 in 5 (10%) patients, 6/12 in 5 (10%) patients, 6/18 in 3 (6%) patients, 6/24 and 6/36 in 4 (8%) patients each, 6/60 in 4 (8%) patients, finger counting in 8 (16%) patients, hand movement in 4 (8%) patients, projection of light in 9 (18%) patients and no projection of light in 3 (6%) patients. The postoperative complications were corneal opacity in 8 (16%) patients, anterior chamber inflammatory reaction in 6 (12%) patients, increased intraocular pressure in 1 (2%) patient, silicone oil in anterior chamber in 1 (2%) patient, macular scar in 7 (14%) patients, cystoid macular edema in 1 (2%) patient, endophthalmitis in 4 (8%) patients, retinal detachment in 11 (22%) patients and phthisis bulbi in 3 (6%) patients.

Conclusion: Acceptable visual results were achieved after the removal of posterior segment intraocular foreign bodies by vitrectomy. However, multiple complications can be encountered which require meticulous postoperative care.


INTRODUCTION

Ocular trauma is one of the commonest causes of visual impairment. Ocular injuries make up to 10% of all the injuries, in spite of the fact that it makes only 0.27% of the body surface. The uncontrolled nature of initial trauma and unpredictable anatomic and visual outcome are important in ocular traumatology. Intraocular foreign bodies (IOFBs) represent a subset of ocular injuries that present complex surgical challenges for removal of the intraocular foreign bodies successfully while preserving the vision, restore ocular architecture and prevent the complication. The rapid growth of industry, unavailability of protective measures and increased number of road traffic accidents has increased the incidence of a foreign body in the eye. Intraocular foreign bodies are common among males of low socio-economic status and the most affected age group is under 40 years. In Pakistan, incidence of IOFBs is highest in NWFP and the most affected age group is also under 40 years. Job-related injuries are the commonest (80%) cause of intraocular foreign bodies.

Most commonly encountered foreign bodies are iron, steel, copper, zinc, aluminum, nickel and lead. Other foreign bodies comprise of stone, coal, glasses, plastic, vegetable matter, wood, cotton and fibres. The hammer-chiseling injury is the most common cause of the IOFB in adults. Intraocular foreign body mostly causes damage to the eye by mechanical ways, introduction of infection and specific chemical reaction in the intraocular tissues.

Posterior segment IOFBs while traversing the vitreous, create a track in the vitreous. Another track is created if it is removed by transscleral magnet extraction via pars plana without vitrectomy. This track causes fibrosis and
may lead to retinal tear, vitreoretinal traction and rhegmatogenous or tractional retinal detachment that may require a second surgery for retinal detachment. To avoid this complications pars plana vitrectomy combined with forceps or electromagnet is the preferred approach.9

Vitrectomy is also advocated because it provides a direct view and controlled removal of the IOFBs. During vitrectomy removal of blood from vitreous cavity prevents inflammatory and fibriene reaction response that may lead to traction sequlae in the posterior segment and allows an improved view of retina facilitating treatment of retinal breaks.10 Prophylactic scleral buckle placement with pars plana vitreous surgery for IOFB may reduce the risk of late onset retinal detachment.11 Various complications after a pars plana vitrectomy approach range from mild non-progressive that do not effect the vision to severe complications resulting in blindness, discomfort or cosmetically unacceptable appearance.

The purpose of this study was to determine visual outcomes and complication after removal of intraocular foreign body through pars plana vitrectomy approach.

**METHODOLOGY**

This study was carried out in the Department of Ophthalmology, Jinnah Postgraduate Medical Centre, Karachi, over a period of one year from May 2005 to May 2006. Fifty cases having magnetic or non-magnetic posterior segment IOFB were included in this study.

The inclusion criteria was magnetic or non-magnetic posterior segment IOFB. The exclusion criteria was those eyes in which vision was absent and those with endophthalmitis, macular hole, and optic nerve damage.

After admission, a detailed history and general, physical and ocular examination was carried out. Patient's age and gender with particular reference to the cause of trauma were recorded. All patients had to undergo routine examination including visual acuity testing, adnexal inspection, pupillary examination, slit lamp biomicroscopy to detect wound of IOFB entry. The location of foreign body in the posterior segment was carried out by direct fundoscopy whenever ocular media was clear, otherwise X-ray of the orbit, B-scan and CT-scan was performed for exact localization of foreign body.

The patients with open entry wound were operated for primary repair under local or general anaesthesia, then the surgical procedure (pars plana vitrectomy) was performed.

Postoperatively topical antibiotic, steroid and mydriatic eye drops were administered. Oral steroids were given in some cases, where severe fibrinous reaction developed. Patients were followed up to 3 months after surgical procedure. On each follow-up visit, detailed examination was performed which included distance visual acuity and near visual acuity. Subjective or objective refraction was done to determine the best correct visual acuity. Anterior and posterior segments were examined to see complications postoperatively and documented.

Data was analyzed using SPSS 10. Relative descriptive statistics, frequency and percentage etc. were computed for presentation of visual outcome and complications postoperatively. Numeric variable like age, hospital stay etc. were presented by mean ± standard deviation. Marginal homogeneity test was applied with significance taken at p <0.05.

**RESULTS**

Among the 50 patients, there were 45 (90%) males and 5 (10%) females. The age of patients ranged from 20-50 years (mean 31.52 ± 9.50 years). The cause of the injury was hammer and chisel in 24 (48%) patients, 10 (14%) patients were injured by pieces of glass, 6 (12%) patients by stone and 5 (10%) patients due to explosion, while 5 (10%) patients experienced trauma during grinding or working on lathe machine. Thorn/wood piece was the cause of injury in 2 (4%) patients and 1 (2%) patient was victim of gunshot injury. The time interval between injury and presentation was one day to 45 days (mean 7.42±7.91). None of the patients was using ocular safety measures at the time of injury. Pre-operatively visual acuity was perception of light in 17 (34%), hand movement in 9 (18%), finger counting in 13 (26%), visual acuity of 5/60 in 1 (2%), 6/60 in 6 (12%), 6/36 in 1 (2%), 6/24 in 1 (2%), 6/18 in 1 (2%) patient and 6/12 in 1 (2%) patient. Overall pre-operative visual acuity ranged from finger counting to perception of the light in 78% cases (Table I).

The site of entry of foreign body in the eye was corneal in 30 (60%) patients, scleral in 18 (36%) and corneoscleral junction in 2 (4%) patients. Traumatic cataract was present in 33 (66%) patients. Most cases

| Table I: Comparison of pre-operative and postoperative visual acuity. |
|-----------------------|-----------------------|-----------------------|
| Visual acuity         | Pre-operative n (%)   | Postoperative n (%)   |
| 6/6                   | 0 (0%)                | 1 (2%)                |
| 6/9                   | 0 (0%)                | 5 (10%)               |
| 6/12                  | 7 (14%)               | 5 (10%)               |
| 6/18                  | 3 (6%)                | 3 (6%)                |
| 6/24                  | 1 (2%)                | 4 (8%)                |
| 6/36                  | 1 (2%)                | 4 (8%)                |
| 6/60                  | 9 (18%)               | 4 (8%)                |
| 5/60                  | 1 (2%)                | 0 (0%)                |
| FC +ve                | 13 (26%)              | 8 (16%)               |
| HM +ve                | 9 (18%)               | 4 (8%)                |
| PL +ve                | 17 (34%)              | 9 (18%)               |
| NPL                   | 0 (0%)                | 3 (6%)                |
| Total                 | 50                    | 50                    |

VA = Visual acuity; Pts = Patients; No. = Number; FC +ve = Finger counting positive; HM +ve = Hand movement positive; PL +ve = Projection of light positive; NPL = No projection of light.
presented with primary repair already done. Intraocular foreign bodies were metallic in 35 (70%) patients and non-metallic in 15 (30%) patients. B-scan was done in all patients showing vitreous haemorrhage present in all cases. In 29 (58%) cases, foreign body were found to be impacted in the retina; in 16 (32%) patients, it was in the vitreous, while 5 (10%) cases presented with foreign body at the vitreous base. The best corrected final visual acuity was 6/6 in 1 (2%), 6/9 in 5 (10%), 6/12 in 5 (10%), 6/18 in 3 (6%) patients, 6/24 in 4 (8%) patients, 6/36 in 4 (8%) patients, 6/60 in 4 (8%) patients, counting fingers in 8 (16%) patients, hand movements in 4 (8%) patients, projection of light in 9 (18%) patients and no projection of light in 3 (6%) patients (Table I).

Comparison with pre-operative visual acuity as compared with postoperative visual acuity showed that 31 (62%) patients had improved, 14 (28%) patients had no change in visual acuity, while 5 (10%) patients showed worse visual acuity. However, a significant number of patients had improved (p<.0001). The pre-operative and postoperative complications were detected in more than one eyes leading to poor visual prognosis. Retinal detachment was the most common complication which developed in 11 (22%) patients. Second common complication was recurrent vitreous haemorrhage which was seen in 10 (20%) patients. Corneal opacity was found in 8 (16%) patients, 7 (14%) patients developed macular pucker while 12% patients developed anterior chamber inflammatory reaction. Hyphema was present in 4 (8%) patients and same number of patients were victim of endophthalmitis. Phthisis bulbi was seen in 3 (6%) patients. Choroidal detachment and cataract due to surgical trauma were present in 2 (4%) patients each. There were few complications like raised intraocular pressure, silicone oil in anterior chamber and cystoid macular edema, which was found in 1 (2%) patient each.

**DISCUSSION**

The retention of intraocular foreign body is an uncommon but serious injury. It occurs mainly in males from poor socio-economic families in prime years of their life. Intraocular foreign bodies also pose a major therapeutic challenge to the ophthalmic surgeon because of unpredictable final anatomic and functional results. The treatment of intraocular foreign body is not only difficult but also very expensive.

The factors which determine final outcome are size, shape, nature and final location of foreign body. There are few factors which severely affect visual status, which are: the site of entry of the foreign body, injury to lens, retina, iris and vitreous haemorrhage, time interval between the injury and removal of foreign body and endophthalmitis. In this study, patients' age ranged from 20-50 years. Lai and Moussa also showed similar finding. The intraocular foreign body is often an occupation related injury. In this study, job-related injuries were commonest (70%) cause of intraocular foreign bodies. Monu and Badescu had shown that intraocular foreign body is work related in 66% of cases. The lower incidence of work-related intraocular foreign body in Western countries is probably due to availability of safety measures. The most common injury is caused by hammer and chisel. In this study, hammer-related injury was responsible in 48% of patients. Lai and Moussa confirmed this (64.1%).

The most common intraocular foreign bodies are metallic in nature. In this study, metallic foreign body was present in 70% cases. Ahmadieh et al. and Karel also showed the same. The visual acuity at presentation is generally very poor. In this study, the visual acuity was counting finger to perception of light in 39 (78%) cases. This is due to corneal laceration, cataract, hyphema or vitreous haemorrhage. The visual acuity was precisely recorded as it is important from medicolegal point of view.

The wound of entry may be corneal or scleral in location. In this study, the wound of entry was scleral in 36% cases, corneal in 60% cases and comeoscleral in 4% cases. The corneal entry of foreign body developed cataract formation. The wound of entry were repaired as early as possible, if opened. In majority of cases, the wound of entry are usually self-sealed. In this study, the wound of entry was self-sealed in 60% cases and opened in 40% cases.

In this study, cataract was presented in 33 (66%) cases. The cataract was removed at the time of pars plana vitrectomy. Although most of the foreign bodies entering the eyes are sterilized by the heat produced by its very high velocity, even then there are always chance of infective endophthalmitis. In this study, endophthalmitis was present in 4 (8%) cases. Chaudhry et al. also found clinical evidence of endophthalmitis in 44 eyes (7.5%) out of 589 eyes. Intravitreal injection of vancomycin 0.1 ml was given.

Posterior segment intraocular foreign bodies are usually associated with vitreous haemorrhage and retinal detachment. In this study, postoperatively, retinal detachment was present in 11 (22%) and phthisis bulbi in 3 (6%) cases. Demirean et al. also showed the retinal detachment in 10 (14.3%) and phthisis bulbi in 3 (4.3%) out of 39 eyes. Ahmad et al. had found that the prognosis in eyes with intraocular foreign body and rhegmatogenous retinal detachment was guarded.

In this study, the foreign body was localized with radiograph of skull, ultrasonography for suitable vitreoretinal status and finally computed tomography was done in 2 cases. Deramo et al. also showed ultrasound biomicroscopy as effective in detecting and localizing occult foreign bodies after ocular trauma.
In this study, the intraocular foreign body was either magnetic or non-magnetic was removed by pars plana vitrectomy with the help of endomagnetic or intraocular foreign body forceps. Finally, prophylactic endolaser was done at the surrounding area of intraocular foreign body to prevent retinal detachment. Prevention is better than cure, therefore, every step should be taken to reduce the incidence of intraocular foreign body.

CONCLUSION

Intraocular foreign body, though not common, is an important cause of visual impairment. Posterior segment intraocular foreign body removal through pars plana vitrectomy produced good anatomic and visual functional results.

REFERENCES