

## Management of Retained Intraocular Foreign Body: Our Experience

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### Abstract

**Purpose:** To show our results of removal of RIOFB successfully from the eye with good anatomical and functional outcome.

**Method:** Retrospective study of 4 patients. RIOFB localised preoperatively by clinical examination and also by imaging modalities. Main outcomes include anatomic and visual outcomes, and both intraoperative and postoperative complications were recorded.

**Result:** All were young males. Two had RIOFB embedded in posterior segment, were operated for pars plana vitrectomy with endolaser and silicone oil injection. One patient had foreign body lodged in sclera with partial extension into pars plana, operated and foreign body was removed. Other patient had RIOFB stuck to the iris was removed by limbal tunnel. In all 4 cases we could maintain the useful visual function and anatomical integrity.

**Conclusion:** Early & timely surgical intervention can save the anatomical integrity and preserve useful vision in all cases and prevent from siderosis bulbi.

**Keywords:** RIOFB, vitrectomy, endolaser, foreign body

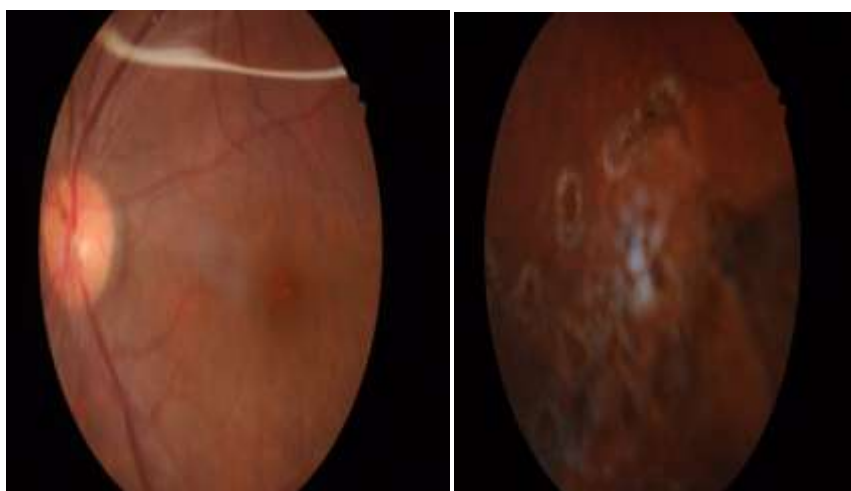
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### I. Introduction

Retained intraocular foreign body (RIOFB) often poses a challenging clinical situation for diagnosis as well as management in current ophthalmic practice. A detailed history, physical examination of the patients and some radioimaging investigations are essential to assess the damage to the eye and for finding out the exact location of RIOFB before removal from the eye. We herewith report our clinical experience of managing such 5 cases of RIOFB in the text.

#### Case Series

**Case 1 :** A 32 year male presented in our outpatient department with chief complaint of decreased vision in left eye for 25 days.



**Figure 1:** Postoperative fundus picture of a 32 year male patient of RIOFB showing attached retina and silicone oil reflex (above left) and laser spots at the site of foreign body lodgement area (above right)

Patient had history of trauma in left eye while working with hammer and chisel 25 days back. Patient also complained of watering and pain for few days. Ocular examination with slit lamp showed traumatic cataract but no foreign body in cornea or anterior chamber, suggested foreign body could be in posterior segment. Left eye visual acuity at the time of admission was finger counting up to 1 metre. X ray and CT scan were done which revealed intraocular foreign body in posterior segment impacted deep in retina. Firstly patient was operated to remove cataract and then pars plana vitrectomy was done and foreign body removed with intraocular magnet. Endolaser was done around exit wound in retina to prevent later possible occurrence of retinal detachment from this site, lastly silicone oil was injected. Post operative patient was given oral prednisolone and topical prednisolone acetate drops, gatifloxacin eye drops, 2% homatropine and brimonidine+timolol eye drops with strict prone position for 15 days. After 3 months of follow up patient is maintaining the left eye vision of 6/18 with attached retina (Figure 1).

#### **Case 2**

A 23 years old young male came to our OPD complaining of injury in Left eye while breaking stones with hammer chisel few hours back. Ocular examination showed corneal tear with iris prolapsed. Traumatic cataract was developed in crystalline lens with presenting vision perception of light and accurate projection of rays. X ray was done due to suspicion of any IOFB, and revealed radio-opaque shadow in Left eye. Corneal tear was repaired same day. Later to confirm the presence and exact position of IOFB and to rule out any complications caused by IOFB CT scan and B scan was done which showed posterior segment RIOFB. After 12 days pars plana lensectomy with vitrectomy and foreign body was removed through anterior route (limbus superiorly) due to large size of the foreign body. Endolaser done over break in retina and silicone oil was injected in the vitreous cavity. **cataractous lens was also removed and IOL was placed.** Post operatively patient was given oral prednisolone and topical prednisolone acetate drops, gatifloxacin eye drops, 2% homatropine and brimonidine+timolol eye drop, and he was advised to sleep in prone position for 15 days. After a month of follow up, fundus is normal with lasered area and vision finger counting 4 meters.

#### **Case 3**

A 40 years old male presented with left eye watering, pain and redness for 1 day. He told about history of left eye injury while working 1 day back with hammer and chisel. Left eye vision 6/18. Ocular examination with slit lamp revealed entry wound over cornea. AC was formed with no aqueous leak. Foreign body lodged in iris at 3 o' clock position. X ray was also done which revealed foreign body. Posterior segment showed no abnormality on Indirect Ophthalmology. Patient was operated and foreign body was removed with the forceps from side port. After 1 month of follow up patient has 6/9 vision.

#### **Case 4**

A 18 years old male presented in our outdoor with history of decreased vision in left eye for 3 months.



**Figure 2:** Preoperative photograph of a 18 year old male patient showing a subconjunctival large foreign body embedded in pars plana ciliary body area of eye

He also complained of redness, watering and foreign body sensation in left eye for few days. He gave history of injury while crushing stones 3 months back. On eye examination there was congestion and subconjunctival hemorrhage in superior temporal quadrant in left eye. Vision was finger counting half metres. B scan showed resolving vitreous hemorrhage. Patient was operated, exploration was done after peritomy in superotemporal quadrant and 21 mm foreign body piece was removed from sclera (Figure 2). Foreign body was embedded in pars plana region sclera with partial projecting in vitreous cavity for that repairing of scleral perforation was also done. There was no intra and post operative complication noted.

#### **Case 5**

A 50 years old male patient presented with loss of vision in left eye for 15 years. Even Perception of light was absent. Patient gave history of left eye injury 15 years back while working in mining factory. On examination it was congested phthysical eye. Tension was less than 4 mmHg. Slit lamp examination showed mild corneal haze with multiple descemet's membrane folds, multiple shining golden crystals in AC, iris neovascularisation more than 270 degree, and clotted blood in AC. Ultrasonography B scan revealed retinal detachment with sub retinal fluid and a calcified foreign body in vitreous cavity suggestive of siderosis bulbi for that nothing was possible regarding vision point of view now.

## **II. Discussion**

Ocular trauma is the leading cause of blindness in teenage and young adult males [1]. In our study also all the patients were young males, and the most common cause of injury was working with hammer and chisel. Intraocular foreign body may traumatize eye with its mechanical effect, introduce infection or may exert toxic effect on ocular tissues. The final resting place of and damage caused by IOFB depend on factors like size, shape and momentum of object at the time of impact. Many substances like plastic, glass, silver, gold are inert. However, iron and copper undergo dissociation and results in siderosis and chalcosis respectively. In assessing the prognosis in eyes with intraocular foreign bodies, the extent of the initial injury and resultant structural damage are the most crucial indicators. Previous studies have found that eyes with retained anterior segment foreign bodies fared better than those with posterior location and that eyes with smaller intraocular foreign bodies fared better than those with larger foreign bodies. The presenting visual acuity is the strongest predictor of final visual acuity in patients with intraocular foreign bodies. Additional factors predictive of a poor visual outcome included the presence of an afferent pupillary defect, vitreous hemorrhage, retinal detachment, and prolapse of intraocular contents. Failure to promptly diagnose and manage a retained intraocular foreign body increases the risk of endophthalmitis and potential for loss of vision and the eye. The risk of endophthalmitis and proliferative vitreoretinopathy is decreased if the intraocular foreign body is removed early.

In the management of RIOFBs, 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 management of intraocular foreign bodies depends largely on the location of the foreign body and the nature of the foreign body material, this is, whether the intraocular foreign body is magnetised. Chow and colleagues found no statistically significant difference in final visual outcome when comparing an internal versus external approach (external magnet) for removal of metallic intraocular foreign bodies.[2]

The surgical techniques available to remove retained IOFBs have increased with the routine availability of vitreous surgery[3-12]. A trend toward 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, abdicating the more traditional techniques of magnetic removal or scratch-down sclerotomy over the foreign body.

In our series, 75% of the IOFBs were located in the vitreous or retina/choroid. Vitrectomy was the most commonly used method (50%) 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. Magnetic removal of IOFBs is a technique that has been used for over 100 years.[13] In one case of our series, IOFBs embedded in the sclera and partially in vitreous cavity was removed through the pars plana using the magnet and forceps. The advantage of this technique is that it is relatively simple and violates the vitreous less than a complete vitrectomy. Another technique we used in selected cases where the foreign body was embedded in the retina/choroid posterior to the equator was to localize the foreign body precisely by indirect ophthalmoscopy and removed the IOFB by pars plana vitrectomy and foreign body removal by use of intraocular magnet. The importance of wearing protective eyewear cannot be overemphasised for workers performing high risk activities such as hitting metal on metal. Hammering injuries were the most common cause (80per cent). Hammering injuries involving high-speed, small, sharp metal fragments typically cause minimal corneal damage and as in our case, the wound can be selfsealing. Vision loss ultimately results from scarring of

the cornea, cataract, endophthalmitis, retinal detachment and the longer-term risk of siderosis bulbi (deposition of ionised iron in the intra-ocular tissues, resulting in toxicity).[14]

Endophthalmitis has been estimated to occur in 0% to 10.7% of patients with retained IOFBs [15-17]. We were fortunate to have no cases of endophthalmitis in our series. Risk factors for developing endophthalmitis in RIOFB are, delay in primary repair, disruption of the crystalline lens, and a rural setting.[18-20] The most common organisms isolated in post-traumatic endophthalmitis are Staphylococcus species and Bacillus species, and mixed infections are not uncommon.[21] There have been several previous studies suggesting that early vitrectomy and removal of IOFB reduces the risk of infectious endophthalmitis and proliferative vitreoretinopathy.[22,23] However, some surgeons suggest that delaying vitrectomy in eyes without evidence of infection decreases the chance of intraoperative bleeding and allows spontaneous separation of the posterior hyaloid.[24] In eyes that have established endophthalmitis, the main incentive for performing early vitrectomy and removal of IOFB is no longer an issue. Despite this, there is a general consensus that immediate vitrectomy should be carried out in patients presenting with endophthalmitis and retained IOFB, to remove the IOFB, the presumed nidus of infection and debulk inflammatory debris in the vitreous. However, surgery in an eye with active endophthalmitis is technically difficult, visualization of the IOFB is often problematic and a vitreo-retinal service may not be immediately available. Also, the role of pars plana vitrectomy in endophthalmitis has been challenged by the Endophthalmitis Vitrectomy Study results, whereby vitrectomy is only beneficial in eyes with bacterial endophthalmitis following cataract surgery with perception of light vision.[25]

Siderosis bulbi is very rarely seen in clinical practice. This sight-threatening condition is caused by the presence of an iron containing IOFB that degrades and has an affinity for epithelial surfaces, therefore affecting virtually all ocular tissues: iris, ciliary non-pigmented epithelium, lens and retinal pigment epithelium. Its effects include iris heterochromia, pupillary mydriasis, brown deposits on the anterior lens capsule, cataract formation and lastly retinal pigment degeneration. The most common presentation is due to decreased visual acuity.

Plain X-rays in frontal and lateral views with the eye in up- and down-gaze are useful in diagnosis but a computerised tomography (CT) with fine cuts through the orbit is required to accurately localise a metal foreign body. B scan can also be helpful for localising the foreign body and to find out any complications caused by RIOFB. **Magnetic resonance imaging (MRI) in patients with retained metal particles is absolutely contraindicated as the particle could dislodge and cause further intraocular damage.**

A direct comparison of studies reporting the visual results of patients with IOFBs is difficult because of the variability of circumstances involved with ocular trauma. The results of this series compare favourably with other reports of visual outcome after injury involving a retained IOFB. In 1982, Brinton et al [26] reported the results of 38 eyes with IOFBs, of which 63% achieved functional success, meant from a presenting acuity of light perception or worse to more than 5/200. In 1983, de Juan et al [27] reported the results of patients with penetrating ocular injury, 88 of them had retained IOFBs. Sixty-five percent of these patients achieved a visual acuity of 5/200 or more. Williams et al [28] reported the results of 105 eyes with retained IOFBs in 1988. Sixty percent of these patients achieved a final visual acuity of 20/40 or better, which was similar to earlier reports by Johnston in 1971 [29] and Percival in 1972 [30]. In our series also, we were able to maintain anatomical integrity in 100% of cases with significant improvement of vision in all of them. However, we couldn't do anything for the fifth case who presented to us late & already developed siderosis bulbi due to non-removal of the metallic RIOFB earlier where it was treated before.

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