Retained Intraocular Foreign Body

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Intraocular foreign bodies represent up to 41% of all open globe injuries. While foreign objects can be composed of almost any substance, most common are metallic, as the majority of patients are injured while welding or hammering. Intraocular foreign bodies (IOFBs) may become embedded in any ocular structure, from the anterior chamber to the retina. 75% of the IOFBs lodge in the posterior segment. Retained intraocular foreign bodies most commonly result from occupational activities and predominantly involve males in 3rd to 4th decade.

There is an increased risk for endophthalmitis and toxicity by the IOFB material, as well as other considerations specific to its surgical removal.

When a patient presents with an open globe injury, a complete history is essential in establishing a diagnostic and therapeutic plan. First, any life-threatening injuries should be assessed and treated appropriately, particularly because of the risk of associated head trauma. Check and document the visual acuity and relative afferent pupillary defect. The measurement of intraocular pressure should be deferred if there is a large laceration or concern for a ruptured globe. It is not uncommon that, in cases of small projectile foreign bodies, such as those associated with hammering, the entry wound is small and can be self-sealing.

Investigations that can be done in case there is doubt, are as follows:

- CT scan with thin slices - gold standard
- B-scan Ultrasonography - sensitivity is user dependent.
- Plain X-ray orbits - screening modality.
- MRI contraindicated in suspected metallic IOFBs.

Management protocol may vary according to the time of intervention which may be early or delayed.

We report a case of a young male who presented to us within 1 hour of a hammer-chisel injury.

Case Report

A 29-year old male presented with chief complaint of pain, photophobia, watering of left eye since 1 hour following trauma. There was history of injury to the eye while working with hammer & chisel. The patient was evaluated for any other injuries apart from the ocular trauma. Prophylaxis against tetanus was given.

On ocular examination the patient had visual acuity of 6/9 in right and 6/9P in the left eye. There was a self-sealed full thickness linear penetrating wound.
full thickness linear penetrating wound on the cornea of left eye from 4 to 6 o’clock hours, approximately 3x1 mm (Figure 1).

The anterior chamber was of normal depth, cells as per SUN group classification was 3+ and flare was 1+. The pupil was D shaped (Figure 2) with sluggish reaction and there was no RAPD. Sectoral full thickness iris defect at 4 to 5 o’clock hour was observed. This made our index of suspicion high for a retained intraocular foreign body.

Anterior subcapsular opacity was appreciated inferiorly, as seen through the full thickness iris defect.

On fundus examination media were clear glow was present, disc was normal, a foreign body, floating in vitreous cavity was visualized (Figure 3). Macula was normal (Figure 4).

We performed a siedel test which was negative, the Intraocular pressure was 35mm with Tonopen. Right eye examination was within normal limits.

CT scan orbits were done which showed an Intraocular foreign body measuring 2.8x1.8mm (Figure 5).

We made a diagnosis of left side self-sealed full thickness corneal penetrating injury with traumatic cataract with retained intraocular foreign body. As per Ocular Trauma Classification Group Left Eye Open globe injury with intraocular foreign body with grade 1 Visual acuity without RAPD involving Zone 1 and an OTS Raw Score of 77 and an OTS score of 3. On the basis of the OTS score we were able to counsel the patient about the prognosis and the risks, along with the need for surgery.

Initial management was started, patient was given Inj. Ceftriaxone 1gm IV, mannitol infusion 350 ml IV over 45 mins, Tab. Acetazolamide 2 tab stat, moxifloxacin and homatropine 2% eye drops were instilled and the eye was patched.

Figure 2: Sectoral iris defect with D shaped pupil with localized inferior lenticular opacity.

Figure 3

Figure 4
The patient was NPO for the past 5 hours when he presented to us, so we planned for an urgent surgery and our plan being:

- Repair of corneal perforating injury
- Phaco-aspiration ± IOL Implantation
- Pars plana vitrectomy with endolaser with removal of intraocular foreign body ± silicone oil injection
- Intravitreal Antibiotics (Vancomycin + Ceftazidime) under GA with guarded visual prognosis.

Corneal perforation repair was done with 10-0 ethilon. A 23 G trocar entry was made inferotemporally to lower down the pressure, it was plugged during phacoemulsification. Clear corneal temporal phacoemulsification was carried out with low fluidic parameters. After removal of the nucleus a posterior capsular defect (Figure 6) was identified in the inferotemporal area at 4-6 clock hours corresponding to the iris defect (highlighting the path of the foreign body).

The corneal wound (made for phacoemulsification) was sutured with 10-0 Ethilon. Ports for 23 G pars plana vitrectomy were made, anterior vitrectomy was carried out. The foreign body which was floating had lodged into the retina and had created a retinal break with a localized detachment (Figure 7).

A complete vitrectomy was carried out along with removal of vitreous and its adhesions surrounding the foreign body, with induction of PVD with the help of tricort (Figure 8).

A separate sclerotomy was made superotemporally with the help of MVR blade measuring around 3 mm at 4 mm from limbus (Figure 9).

23 G ILM forceps was introduced through the separate sclerotomy and the foreign body was grasped & removed through the sclerotomy. The foreign body measured 3x2 mm approx (Figure 10).

Fluid air exchange was done through the retinal break. Retinal photocoagulation was done along the retinal break, 3 rows of laser barrage was done in the periphery. Silicone oil was injected. Scleral ports were closed with 8-0 vicryl.

Post-operatively the patient was started on Prednisolone acetate e/d 8 times/day, moxifloxacin e/d 4 times/day,
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homatropine e/d 3 times/day, brimonidine + timolol (combination) e/d 2 times/day, tab Ofloxacin 200 mg 2 times/day.

On 1st post-operative day VA was 2/60 with an IOP of 19 mm Hg. (Figure11)

At 2 weeks post-operative BCVA was 6/24 (+4.00/+4.00x180º), IOP was 16, retina was attached.

At 5 weeks follow up BCVA was 6/24P, localized epiretinal membrane was seen along the inferior vascular arcade superior to the site of retinal break. (Figure 12)

Further plan of management

1st Stage- Silicon Oil removal with ERM peeling with C3F8 injection.

2nd Stage- Secondary IOL implantation

Discussion

Classification of Open Globe Injury

1. Type of injury
   A. Rupture
   B. Penetrating
   C. Intraocular foreign body
   D. Perforating
   E. Mixed

2. Grade based on V/A at initial examination*
   Grade 1: greater or equal to 20/40
Ocular Trauma Score (OTS)

<table>
<thead>
<tr>
<th>Initial Visual Factor</th>
<th>Row Points</th>
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<tr>
<td>A. Initial visual acuity category</td>
<td>NLP - 60</td>
</tr>
<tr>
<td></td>
<td>LP to HM- 70</td>
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<tr>
<td></td>
<td>1/200 to 19/200- 80</td>
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<tr>
<td></td>
<td>20/200 to 20/50- 90</td>
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<tr>
<td></td>
<td>&gt; 20/40- 100</td>
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<tr>
<td>B. Globe rupture</td>
<td>-23</td>
</tr>
<tr>
<td>C. Endophthalmitis</td>
<td>-17</td>
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<tr>
<td>D. Perforating injury</td>
<td>-14</td>
</tr>
<tr>
<td>E. Retinal detachment</td>
<td>-11</td>
</tr>
<tr>
<td>F. Afferent papillary defect (Marcus Gunn pupil)</td>
<td>-10</td>
</tr>
<tr>
<td>Raw score sum-sum of raw point</td>
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Grade 2: 20/50 – 20/100
Grade 3: 19/100 – 5/200
Grade 4: 4/200 – light perception
Grade 5: no light perception**

3. RAPD
   Positive: RAPD Present
   Negative: RAPD absent

4. Zone of injury***, based on location
   Zone 1: Isolated to cornea (including corneo-scleral limbus).
   Zone 2: Limbus to 5mm posterior into the sclera.
   Zone 3: Posterior to anterior 5mm of sclera.

Timing of Primary Repair
The wound should be closed as soon as possible. Delay in closure could increase not just the risk of infection but also the opportunity for an explosive hemorrhage and extrusion of intraocular contents. Systemic and topical antibiotic therapy should be started as soon as possible. Tetanus prophylaxis should never be forgotten.

Figure 11: 1st POD fundus picture with lasered retinal break.

Figure 12
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Early removal of the IOFB at the time of primary repair has the following advantages: Single procedure, decrease in endophthalmitis rate, decrease in PVR rate. Many studies suggest that early Vitrectomy and removal of IOFB decreases the risk of infectious endophthalmitis and proliferative vitreoretinopathy. Unless the IOFB is removed and the wound repaired within 24hrs the patient’s risk of severe complications – such as endophthalmitis or vision loss – quadruples. Delay in IOFB extraction, presence of intraocular hemorrhage, preoperative retinal detachment are the predictive factors for anatomic failure (postoperative retinal detachment is considered as the anatomic failure). Good initial presenting VA, early surgical intervention to remove IOFB (within 24 hours) and PPV are predictive factors for good visual outcome.

Surgical options

- Vitrectomy and removal of IOFB by magnet or forceps.
- Un-impacted ferrous IOFB - strong intraocular magnet.

- For nonmagnetic foreign bodies proper forceps are used.
- Following IOFB removal, a thorough peripheral Vitrectomy should be performed, and posterior hyaloid should be removed.

References