

Surgical Pearls for Retained Intraocular Foreign Bodies

BY RAJVARDHAN AZAD, MD (OPHTH), FRCSEd, FICS, FAMS

In this issue of Retina Today, Rajvardhan Azad, MD (Ophth), FRCSEd, FICS, FAMS, describes his technique for surgical removal of retained intraocular foreign bodies.

We extend an invitation to readers to submit pearls for publication in Retina Today. Please send submissions for consideration to Dean Elliott, MD (dean_elliott@meei.harvard.edu); or Ingrid U. Scott, MD, MPH (iscott@hmc.psu.edu). We look forward to hearing from you.



— Dean Elliott, MD; and Ingrid U. Scott, MD, MPH

Intraocular foreign bodies (IOFBs) are present in up to 40% of traumatic ocular injury cases.¹ Surgical removal of an IOFB is perhaps the most unpredictable surgery, especially in the presence of media haze, requiring intense preoperative workup and patient counseling. An IOFB can further be complicated by endophthalmitis, retinal detachment, and metallosis, warranting prompt IOFB removal.² Although historically a subset of inert or glass IOFBs was managed conservatively, with the advent of modern day vitrectomy systems, conservative management is largely avoided.

PREOPERATIVE ASSESMENT

It's important to consider all open-globe injuries to have an IOFB until proven otherwise, especially in patients with a history of drilling, hammering and grinding.³ It is imperative to determine the time of injury, mode of injury, and the composition of the expected IOFB. After performing a comprehensive workup and determining the type of IOFB, the surgeon should place special emphasis on the entry wound and decide if a first sitting surgical wound closure is required.

Next, all efforts to rule out endophthalmitis should be made, and localization of the IOFB should be performed. If the IOFB is not visible due to cataract, hemorrhage, or exudates, then imaging should be done. While x-ray and ultrasonography may be ordered for medicolegal documentation, a computed tomography scan goes a long way in localizing the IOFB and should be performed routinely when sonography is inconclusive.⁴ Non-contrast

computed tomography not only demonstrates the location of an IOFB but also provides information regarding the IOFB's dimension, helping the surgeon to determine the best route of extraction.

Pars plana vitrectomy (PPV) for IOFB is associated with several potential complications such as postoperative endophthalmitis, retinal detachment, and metallosis. Hence, patient counseling is very important. IOFBs at the macula or near the optic nerve head carry very grave prognoses. The patient should always be informed about the risk of a posterior pole impact site, the possibility of non-removal if a large part of the IOFB is external, and the requirement of pars plana lensectomy if only limbus removal is possible.

SURGICAL TECHNIQUE

IOFBs should be removed as early as possible. Previously, anterior subchoroidal or subretinal foreign bodies of the posterior segment were removed via the external route. In addition, small metallic foreign bodies with clear media were removed with external magnets kept at the port without vitrectomy.

We prefer to use encirclage in all IOFB cases, as it decreases the risk of postoperative proliferative vitreoretinopathy and retinal detachment.⁵ The wound should be secured if open or weakly apposed, and a standard 3-port PPV is performed. Twenty-gauge surgeries have been preferred in the past, but currently, 23-gauge procedures are often performed. It should be noted that both foreign body forceps and intraocular magnets



Figure 1. Encapsulated IOFB with surrounding siderosis.

require 19-gauge ports; hence, the port sites must be extended, which is easily done in 20-gauge surgery.

If the IOFB or capsule is impacted in the retina or there are other retinal breaks, the surgeon may choose to laser these areas before inducing a posterior vitreous detachment (PVD). Triamcinolone-assisted PVD induction is performed, and small IOFBs located at the vitreoretinal interface are often seen moving along with the posterior hyaloid. Perfluorocarbon liquid should be injected over the macula as soon as the PVD is induced to avoid iatrogenic subretinal hemorrhage at the macula and to decrease the possible traumatic impact of a foreign body falling on the macula at the time of removal.

Encapsulated IOFBs can be removed together with the capsule. However, in the presence of fibrotic adhesions observed with longstanding IOFBs, the capsule must be incised with the help of either the vitrectomy cutter or MVR blade to create an opening large enough to allow prolapse of the foreign body. All vitreous surrounding the IOFB should be removed before embarking on removal. Meticulous port-site vitrectomy should also be performed.

Localizing the IOFB

Although most often IOFBs can be visualized relatively easily, sometimes in eyes with hazy media (such as in eyes with endophthalmitis, vitreous hemorrhage, or anterior foreign bodies) visualization may be difficult. In such cases, imaging can reveal the location and dimensions of the IOFB. Scleral indentation should be performed, and even elective PPL in eyes with a clear lens may be considered if anterior foreign bodies are lodged in the pars plana.



Figure 2. IOFB with cilia.

Extraction of the IOFB

Extraction of the IOFB is a very crucial step associated with numerous potential complications. Metallic foreign bodies can be removed with the help of intraocular and extraocular magnets. After enlarging the scleral wound with an MVR knife sufficient for a 19-gauge instrument, the intraocular magnet is introduced into the eye and the foreign body is directly grasped with the magnetic pull. The magnet is then slowly withdrawn toward the scleral site under direct visualization, and the assistant then places a stronger extraocular magnet at the margin of the sclerotomy. Thin and small foreign bodies may be removed relatively easily, while it is advisable to enlarge the sclerotomy site further and even introduce forceps in the sclerotomy to keep its mouth wide open to allow safe removal of larger IOFBs.

In the event of a foreign body getting stuck at the port, the metallic foreign body is often entangled in the ciliary body due to the strong pull of the extraocular magnet, and it can usually be extracted safely by gentle maneuvering with forceps and the magnet itself. Similar steps can be followed if the limbus is the chosen site for removal. If the IOFB slips back into the vitreous cavity during attempted removal, the surgeon may repeat the steps carefully or opt for foreign body forceps.

Non-magnetic foreign bodies require removal with forceps, a variety of which are now available. Most commonly, diamond-coated straight forceps are used. The surgeon should first enlarge the wound site to a size suitable for the forceps. The forceps are introduced and opened only when sufficiently near the foreign body. Attempts should be made to grasp the foreign body in the way that allows for easiest IOFB removal. This can be done with the help of an illuminator, by aligning the IOFB such that the thinnest part is removed through the sclerotomy site.

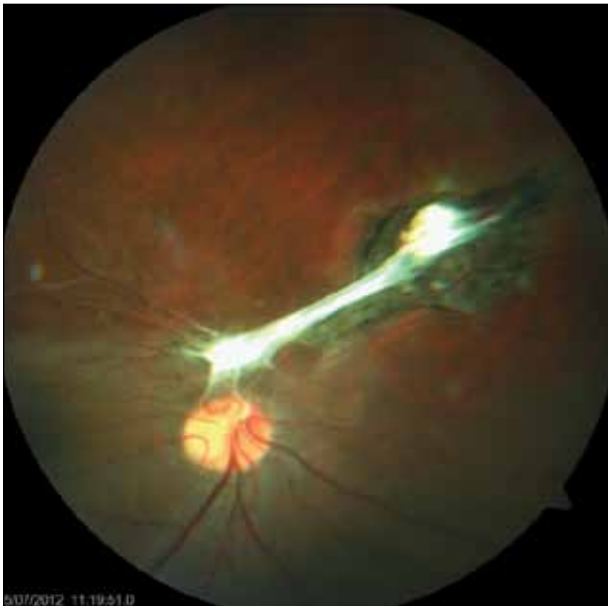


Figure 3. IOFB with associated epiretinal membrane.

It should be noted that forceps often get magnetized if kept close to magnets, which may render IOFB maneuverability difficult. In addition, the sleeve of the forceps can get stuck, so it is best to check for smoothness of the instrument before introducing it in the eye. Port-site vitreous can get entangled in this sleeve of the forceps, so it is best if a thorough vitrectomy is performed and instrument exchanges are minimized. Removal of the IOFB can be performed safely as described previously (apart from the use of magnets). If successful alignment cannot be performed or if the IOFB gets stuck at the port site, a “handshake” technique may be employed; this technique consists of introducing another forceps from the opposite port to grasp the IOFB in the anterior vitreous for removal.

During IOFB extraction, the surgeon should remember that because the sclerotomy has been enlarged, the globe may tend to collapse due to hypotony. The infusion pressure may, therefore, need to be increased, and the sclerotomy may need to be sutured partially as soon as the foreign body has been removed. The IOFB should then be safely preserved and handed over to the patient for medicolegal purposes.

After extracting the IOFB, careful inspection of the port sites should be performed to assess for possible port site complications such as retinal breaks, and they should be managed accordingly. All full-thickness retinal breaks should be treated with laser retinopexy. The surgeon may opt to complete a fluid-air exchange and may perform gas or oil injection as indicated. The ports and peritomies are then closed, and careful postoperative care is provided.

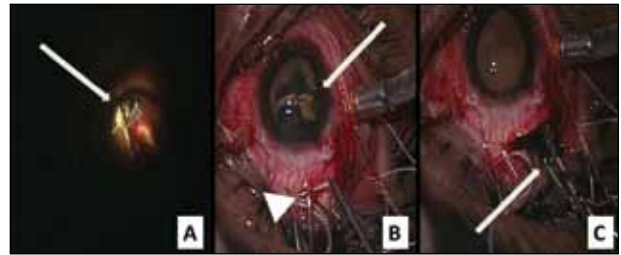


Figure 4. Steps in IOFB extraction, showing (A) gripping of IOFB with forceps (arrow); (B) prolapse of IOFB into anterior vitreous cavity (arrow) and sclerotomy extension with MVR blade (arrow head); and (C) extraction of IOFB with the help of an external magnet at the posterior lip of the sclerotomy (arrow).

CONCLUSION

The following pearls will promote success in the challenging cases of IOFB extraction:

- Careful and complete patient workup;
- Management of the wound site and optimal timing of surgery;
- Complete and port site vitrectomy, followed by dissection of the IOFB from traction/capsule;
- Safe and slow IOFB extraction, followed by inspection of the port sites; and
- Thorough patient counseling. ■

Rajvardhan Azad, MD (Ophth), FRCSEd, FICS, FAMS, is the Chief of Ophthalmology at the Dr. R.P. Centre for Ophthalmic Sciences at the All-India Institute of Medical Sciences and an ophthalmic adviser to the Union Health & Family Welfare Ministry and the Armed Forces Medical Services. Dr. Azad states that he has no financial relationships to disclose. He may be reached at rajvardhanazad@hotmail.com.



Dean Elliott, MD, is Associate Director of the Retina Service, Massachusetts Eye and Ear Infirmary, Harvard Medical School, and is a Retina Today Editorial Board member. He may be reached by phone: +1 617 573 3736; fax: +1 617 573 3698; or at dean_elliott@meei.harvard.edu.

Ingrid U. Scott, MD, MPH, is a Professor of Ophthalmology and Public Health Sciences, Penn State College of Medicine, and is a Retina Today Editorial Board member. She may be reached by phone: +1 717 531 8783; fax: +1 717 531 5475; or at iscott@hmc.psu.edu.

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