

# Surgical Management of an Externally Protruding, Perforating Intraocular Foreign Body

by Ru-ik Chee, MD; and Felix Y. Chau, MD

The authors describe a complex perforating injury. There is an entrance wound, an intraocular foreign body, and an exit wound. The presence of an intraocular foreign body is not typical for a perforating injury, but this unique injury consists of a long, metallic foreign body that is embedded in the cornea and the retina and, therefore, spans the length of the globe. The surgeons cleverly address the lens and the vitreous prior to removing the foreign body by first performing lensectomy and vitrectomy. The surgeons then perform externalization of the foreign body in a controlled fashion by grasping and removing the foreign body from the exit site prior to pulling it out through the cornea.

Two important principles of trauma surgery are good visualization and prevention of hemorrhage. Visualization was limited due to the for-



Dean Elliott, MD

eign body protruding from the cornea, but as the video (*available at [www.healio.com/OSLIRetina](http://www.healio.com/OSLIRetina)*) shows, the surgeons were able to perform posterior maneuvers safely. They maintained a closed and pressurized eye for as long as possible, which limited the hemorrhage. As soon as the surgeons removed the foreign body, they carefully closed the large wound to maintain a closed system. They also removed as much vitreous as possible, which is also an important principle in trauma surgery.

The postoperative photograph demonstrates the excellent result, which is very impressive given the severity of the injury. This is an amazing outcome in a complex surgical case, and the authors are to be congratulated for their outstanding surgical planning, excellent technical abilities, and attention to detail. We can all learn from this beautiful video.

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Dean Elliott, MD  
Retina Service, Massachusetts Eye and Ear  
Boston, MA



Ru-ik Chee



Felix Y. Chau

**ABSTRACT:** In this case of a perforating eye injury by a 2-inch-long nail that went through the cornea, lens, and posterior eye wall, the authors

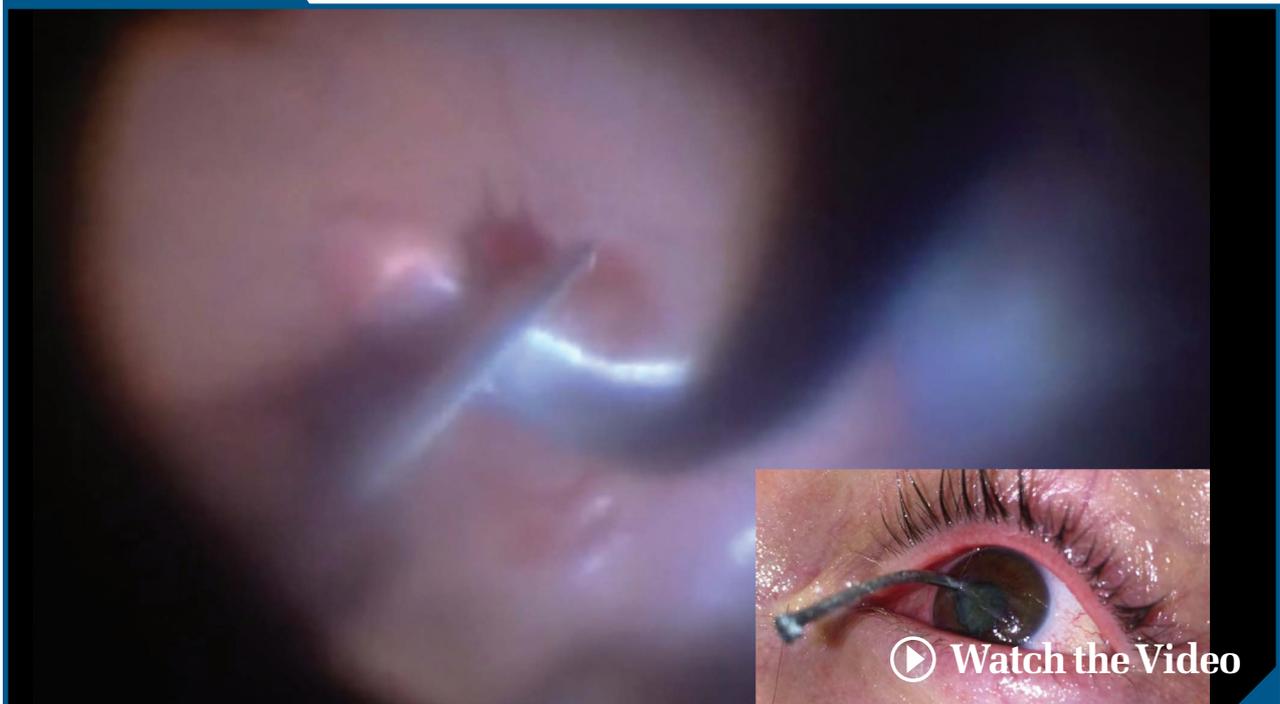
describe a combined external, anterior, and posterior segment surgical approach that resulted in safe and successful removal of the foreign body. Initial external trimming of the protruding nail facilitated the use of a noncontact viewing system. Combined limbal and pars plana placement of the vitrectomy cannulas optimized

access to both anterior and posterior intraocular structures. Most importantly, careful removal of potential sources of foreign body adhesion to intraocular structures prior to extraction likely increased the likelihood for a successful clinical outcome. Care was taken to remove as much of the vitreous as possible and to keep the eye formed. The patient recovered 20/25+2 vision with aphakic correction.

**T**he management of intraocular foreign bodies represents a continuous challenge for vitreoretinal surgeons.<sup>1,2</sup> In this video, we demonstrate our approach to managing a complex perforating ocular trauma involving a nail.

A man in his 30s had been working with a nail gun without wearing protective eyewear when a 2-inch nail was embedded into his left eye. Best-corrected

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**Figure 1.** Surgeon's view of vitrectomy around the intraoperative nail in the left eye after cutting the nail externally with wire-cutting scissors in a patient with a perforating nail gun injury (inset). The nail traversed an intraocular course with a bend more inferiorly in the globe and had engaged the retina, choroid, and sclera at the 5-o'clock meridian between macula and equator. The optic nerve and macula are not clearly visualized in this image but are oriented toward the right and lower right areas, respectively.

visual acuity (BCVA) was 20/20 and hand motions (HM) in the right and left eyes, respectively. The right eye was unaffected, and ocular examination was within normal limits. Measurement of intraocular pressure (IOP) in the left eye was deferred. Extraocular movements were grossly full, and there was no relative afferent pupillary defect.

Upon closer inspection, the metallic nail penetrated the superonasal paracentral cornea, incarcerating the nasal edge of the iris pupil margin before extending through the patient's newly developed traumatic cataract. The corneal wound was Seidel negative. Careful B-scan ultrasonography revealed extension of the nail to the posterior globe. Computed tomography (CT) scan confirmed a "metallic foreign body that traverses the anterior chamber, posterior chamber, lens, and vitreous body of the left globe before exiting through the posterior inferolateral wall," with the tip of the foreign body in the inferolateral orbital space. There was no retrobulbar hemorrhage. No acute orbital bone fractures or dislocations were noted. Intravenous cefazolin and levofloxacin (Levaquin; Janssen Pharmaceutical, Beerse, Belgium) were administered prior to surgery and the tetanus vaccination was updated.

#### **SURGICAL TECHNIQUE**

Under general anesthesia, the left eye was carefully prepared and draped, with copious irrigation of the ocular surface and nail with 5% povidone iodine. Orthopedic surgical wire-cutting forceps were used to trim the nail a few millimeters above the surface of the cornea to allow for the use of indirect surgical microscope lenses for the posterior segment portion of the case. The anterior chamber was irrigated and filled with viscoelastic through a paracentesis wound before placement of limbal-based 25-gauge vitrectomy cannulas infratemporally, supratemporally, and supranasally. Incarcerated iris was released and trimmed before lensectomy and capsulectomy.

Using the RESIGHT indirect viewing system (Carl Zeiss Meditech, Jena, Germany), inspection of the posterior segment revealed limited vitreous hemorrhage and inflammation. The optic nerve and macula were found to be well-perfused, and there was no clear evidence of direct trauma from the nail. The intraocular nail had traversed with a bend more inferiorly in the globe, and had engaged the retina, choroid, and sclera at the 5-o'clock meridian between the macula and the equator. A limbus-based core vitrectomy was performed around the intraocu-

lar nail. The three cannulas were then relocated to the pars plana, and completion of core and peripheral vitrectomy around the nail was performed. Triamcinolone was diluted to 40 mg/mL and inserted to highlight vitreous and several lens fragments that were subsequently removed. At this time, the pathway for intraocular foreign body removal through its original entry pathway was judged to be clear of any significant adhesions.

The supranasal 25-gauge cannula was removed, and the sclerotomy wound was expanded with a 20-gauge microvitrectomy V-Lance blade (Alcon, Fort Worth, TX). Using Neubauer intraocular foreign body extraction forceps, the intraocular portion of the nail was grasped posteriorly and gently lifted. The external portion of the nail was then grasped with a pair of toothed forceps. The IOP was raised to 60 mm Hg to reduce the risk of intraocular hemorrhage, and the nail was removed through its entry site. The corneal wound and supranasal sclerotomy were closed with 10-0 nylon and 7-0 vicryl sutures, respectively, which improved the hypotony and choroidal folds. Limbus-based placement of the cannula was used for subsequent supranasal entry of instruments. Endolaser was applied around the exit wound of the intraocular nail inferior to the macula. The posterior exit site was not surgically closed and instead left to close by secondary intention. The retina remained completely attached; thus, a tamponade agent was not used.

The limbal cannula wounds were closed with 10-0 nylon sutures, whereas the pars plana sclerotomies and conjunctival wounds were closed with interrupted 7-0 vicryl sutures. Intravitreal injections of vancomycin (Vancocin; Pfizer, New York City, NY), ceftazidime, and voriconazole were administered. Daily oral moxifloxacin 400 mg was prescribed for 14 days in addition to topical postoperative eye medications.

#### **CLINICAL OUTCOME AND CONCLUSION**

Corneal wound sutures were gradually removed during the first 3 months of postoperative follow-up and a Kontur bandage contact lens was placed. Five months postoperatively, with an aphakic contact lens and over-refraction glasses, the patient achieved a BCVA of 20/25+2. Fundus examination was notable for an untraumatized optic nerve and macula, attached retina with chorioretinal scarring around the mid-periphery, an inferior exit wound site, and no proliferative vitreoretinopathy.

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**Ru-ik Chee, MD**, can be reached at Department of Ophthalmology and Visual Sciences, Illinois Eye and Ear Infirmary, University of Illinois at Chicago, 1855 W. Taylor Street, Chicago, IL 60612; email: ruikchee@gmail.com.

**Felix Y. Chau, MD**, can be reached at Department of Ophthalmology and Visual Sciences, Illinois Eye and Ear Infirmary, University of Illinois at Chicago, 1855 W. Taylor Street, Chicago, IL 60612; email: felixychaum@gmail.com.

**Dean Elliott, MD**, can be reached at Retina Service, Massachusetts Eye and Ear, 243 Charles St., Boston, MA 02114; email: dean\_elliott@meei.harvard.edu.

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