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Endoscopic-assisted removal of intraocular foreign body embedded in ciliary sulcus

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ABSTRACT

Purpose: To report a novel approach for removal of intraocular foreign body in the ciliary sulcus.
Observations: A 72-year-old male presented with an intraocular foreign body embedded in the ciliary body, localized with ultrasound biomicroscopy. An intraoperative endoscopic camera was then used to directly visualize the foreign body in the ciliary body and the object was successfully removed with intraocular forceps.
Conclusions and Importance: Removal of foreign bodies in the ciliary sulcus often require either a transscleral approach or a pars plana approach with vitrectomy. In this case, direct visualization with endoscopy allowed for a much safer and less invasive technique for intraocular foreign body removal, preventing the need for sclerotomy or vitrectomy.

1. Introduction

Ocular trauma resulting in intraocular foreign body (IOFB) is an ophthalmologic emergency, which often results in severe vision-threatening complications such as endophthalmitis, retinal detachment, and toxic optic retinopathy or neuropathy.[1] Prompt removal of intraocular foreign bodies is of paramount importance in order to reduce the risk of permanent vision loss, particularly in cases of metallic or vegetative foreign bodies. Surgical planning and technique vary greatly depending on the location of the foreign body: foreign bodies in the anterior chamber angle may often be removed with direct visualization with gonioscopy, while foreign bodies in the posterior segment typically require pars plana vitrectomy. Foreign bodies of the ciliary body pose a distinct challenge in that this space may not be easily visualized from an anterior approach or a posterior approach, and is separated from the vitreous cavity by the lens and zonules. Consequently, removal of foreign bodies between the lens and iris often requires either a transscleral approach or a pars plana approach with zonulectomy.[2] We report a case of an intraocular foreign body embedded in the sulcus which was successfully removed with intraocular forceps after being directly visualized by intraoperative endoscopy.

2. Case report

A 72-year-old male presented to an outside institution with eye pain and decreased vision after hammering metal. He was found to have a self-sealed full thickness corneal laceration, a full thickness traumatic iridotomy, and localized traumatic cataract (Fig. 1A). CT scan demonstrated a metallic IOFB located in the inferior ciliary body. An initial attempt at removal with an intraocular magnet from an anterior approach was unsuccessful in retrieving the IOFB. The patient was offered a subsequent surgery with a pars plana approach, however, the patient presented to our department for a second opinion.

The patient presented to our institution with an uncorrected visual acuity of 20/100 in the affected left eye. Intraocular pressure was 10 and the left pupil was irregular with an afferent pupillary defect. Motility and confrontational visual fields were normal. Slit lamp examination revealed a 1.0 mm full-thickness, healed corneal scar with an underlying full thickness iris transillumination defect and focal traumatic cataract. The small circumscribed iris defect revealed an underlying lens opacity without prolapsed lens material. No visible foreign body was identified on anterior segment exam or on dilated fundus exam or gonioscopic exam. There was no evidence of traumatic posterior segment injury on scleral depressed exam, though disc hemorrhages and mild nasal elevation of the optic nerve head was noted, thought to be from either toxic optic neuropathy or nonarteritic ischemic optic neuropathy. Ultrasound biomicroscopy (UBM) was performed to further evaluate the sulcus and ciliary body. UBM revealed a metallic foreign body in the inferior sulcus at six o'clock (Fig. 1B). The patient was offered surgical removal of the foreign body from an anterior approach, and he chose to

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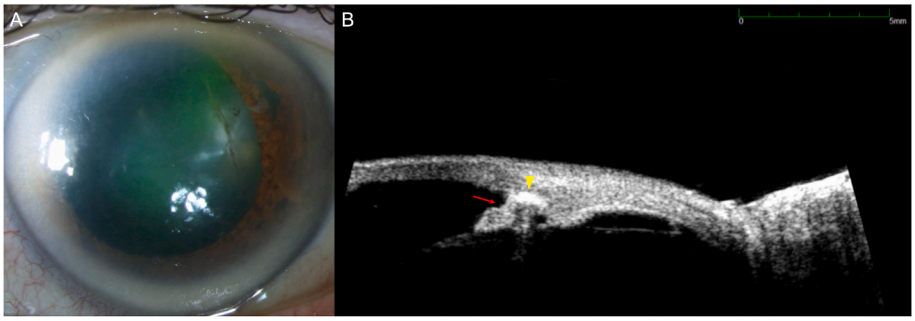

Fig. 1. Clinical evaluation of patient with intraocular foreign body.
A) Slit lamp photograph of patient at presentation, demonstrating full-thickness corneal laceration, traumatic iridotomy, and traumatic cataract. B) Ultrasound biomicroscopy demonstrating foreign body (yellow arrowhead) located behind the iris (red arrow) and embedded in the ciliary body. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

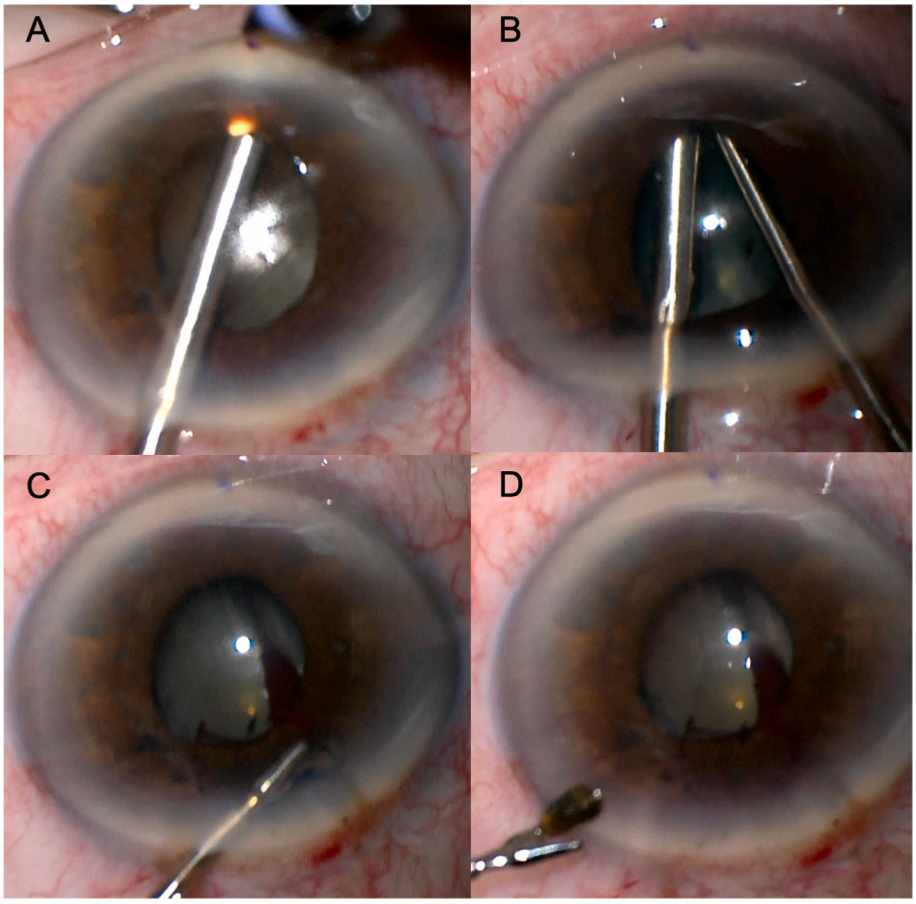

Fig. 2. Surgical approach for intraocular foreign body removal.
A) Localization of foreign body (FB) with endoscope through main incision. B) Retrieval of FB with forceps under direct visualization with endoscope. C) Removal of FB through main incision after removal of endoscope. D) Extracted foreign body.

proceed with the planned surgery.

Under monitored anesthesia care and topical anesthesia, a 1 mm paracentesis and 2.4 mm clear corneal wound were created. Viscoelastic was used to elevate the inferior iris, exposing the region of the ciliary sulcus where the foreign body was localized on UBM. An intraocular 20G endocyclophotocoagulation camera (OME200SMAEA, Endo Optiks, Little Silver, New Jersey) was inserted through the main wound and was used to directly visualize the foreign object (Video 1). The object was found to be embedded in the ciliary body (Fig. 2). The light beam from the endoscopic camera was reflected by the metallic foreign body through the limbus, also allowing identification of its position from an external view. After an intraocular magnet failed to dislodge the foreign body, 23G serrated intraocular forceps (MicroSurgical Technology Micro-Holding Forceps, Redmond, Washington) were inserted through the sideport incision and were used to remove the object under direct endoscopic visualization, without damage to the adjacent structures. The viscoelastic, remaining small particles of foreign material, and a scant amount of heme were removed with the irrigation/aspiration handpiece and the wounds were closed. The patient had an uncomplicated post-operative course and elected for cataract extraction and intraocular lens placement three months after foreign body removal. Post-operatively, his uncorrected visual acuity was 20/50, refracting to 20/30, with vision limited by his underlying optic neuropathy.

Supplementary video related to this article can be found at https://doi.org/10.1016/j.ajoc.2022.101665

3. Discussion

Foreign bodies embedded in the ciliary body or sulcus provide a uniquely difficult challenge in both their localization and surgical removal. In cases where direct visualization of the object is difficult or impossible, other tools that may assist in localization include computed tomography (CT), B-scan ultrasonography, and UBM. Although CT can identify nearly 100% of metallic foreign bodies greater than 0.5 mm, its use in non-metallic objects is limited.[3] Furthermore, as B-scan ultrasonography and CT scan often fail to reveal the exact location of the foreign bodies, especially when embedded in the ciliary body or sulcus, UBM may be the only tool that can accurately localize the foreign object.[4,5] While anterior segment OCT often does not provide adequate resolution to structures posterior to the iris, whole eye OCT is a system being currently developed which could assist in localization of occult IOFBs.[6]

Though there are various options for extraction of the foreign body including both internal and external approaches, each method has significant morbidity with high risk of injury to the surrounding structures. Internal approaches such as pars plana or endoscopic vitrectomy require zonulectomy in order to grasp the foreign body – risking lens instability, subluxation, or capsular damage.[7,8] Deep scleral indentation has also been used to directly visualize and remove an IOFB through a clear corneal incision,[9] though this requires lensectomy and posterior capsulorhexis, and many foreign bodies in the sulcus or ciliary body including this case would not be in a location amenable for this procedure. External approaches through a scleral flap also risk complications including extrusion of intraocular contents and retinal incarceration, tears, detachments, or dialysis.

This case successfully utilized endoscopy to directly visualize and remove a foreign body in the ciliary sulcus, preventing the need for either sclerotomy or vitrectomy, and minimizing surgical trauma. Endoscopy allows for visualization of otherwise inaccessible structures including the ciliary body, the ciliary sulcus, and the anterior retina. It thus provides an important role in ocular trauma with IOFB, as proper visualization of the foreign body prior to the removal with forceps is essential. Imprecise attempts at removal could lead to more iatrogenic trauma, especially in the narrow space of the anterior chamber angle or ciliary sulcus. Endoscopic assistance has been used to remove intraocular foreign bodies in the anterior chamber in a few case reports,[10,11] but this is the first case, of which we are aware, to describe its use for foreign body removal in the posterior chamber without concurrent vitrectomy. Under these circumstances, endoscopy proved an effective tool in management of complicated traumatic ophthalmic disease.

4. Conclusions

This report reinforces the utility of endoscopy in visualization and removal of intraocular foreign bodies, particularly those embedded in the ciliary body or sulcus where other forms of visualization are difficult or impossible. This obviates the need for sclerotomy or pars plana vitrectomy, ultimately providing a safer and less invasive technique for intraocular foreign body removal.

Patient consent

The patient orally consented to publication of this case.

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References

1. Greven CM, Engelbrecht NE, Slusher MM, Nagy SS. Intraocular foreign bodies: management, prognostic factors, and visual outcomes. *Ophthalmology*. 2000;107(3):608–612. https://doi.org/10.1016/S0161-6420(99)00134-7.
2. Loporchio D, Mukkamala L, Gorukanti K, Zarbin M, Langer P, Bhagat N. Intraocular foreign bodies: a review. *Surv Ophthalmol*. 2016;61(5):582–596. https://doi.org/10.1016/j.survophthal.2016.03.005.
3. Published online October 26. *Intraocular Foreign Bodies—A Review from Entry to Exit and beyond*. US Ophthalmic Rev; 2015. https://www.touchophthalmology.com/anterior-segment/journal-articles/intraocular-foreign-bodies-a-review-from-entry-to-exit-and-beyond/. Accessed February 20, 2021.
4. Kaushik S, Ichhpujani P, Ramasubramanian A, Pandav SS. Occult intraocular foreign body: ultrasound biomicroscopy holds the key. *Int Ophthalmol*. 2008;28(1):71–73. https://doi.org/10.1007/s10792-007-9110-5.
5. Chen K-J, Liu C-H, Liu L. Intraocular foreign body embedded in ciliary body. *New Front Ophthalmol*. 2018;4. https://doi.org/10.15761/NFO.1000215.
6. Kuo AN, McNabb RP, Izatt JA. Advances in whole-eye optical coherence tomography imaging. *Asia-Pac J Ophthalmol Phila Pa*. 2019. https://doi.org/10.22608/APO.201901. Published online March 25.
7. Sabti KA, Raizada S. Endoscope-assisted pars plana vitrectomy in severe ocular trauma. *Br J Ophthalmol*. 2012;96(11):1399–1403. https://doi.org/10.1136/bjophthalmol-2012-302187.
8. Yang X, Li Q, Du S, Ren H, Jia C, Tang X. [Extraction of intraocular foreign body at or near the ciliary body under endoscopic vitrectomy]. *Zhonghua Yan Ke Za Zhi Chin J Ophthalmol*. 2013;49(8):691–695.
9. Ji J-D, Ding Y-Z, Hu Z-Z, Xie P, Yuan S-T, Liu Q-H. Extracting intraocular foreign body at or near the ciliary body with scleral indentation in direct visualization. *Int J Ophthalmol*. 2018;11(3):533–535. https://doi.org/10.18240/ijo.2018.03.29.
10. Nukala N, Pappuru RR, Dave VP. Endoscopy-assisted removal of angle foreign body presenting as persistent localised corneal oedema. *BMJ Case Rep CP*. 2020;13(4), e233419. https://doi.org/10.1136/bcr-2019-233419.
11. Xiao-Qiang L, Tian-Lin X, Zhen-Quan Z, et al. Endoscopy-Assisted removal of nonmagnetic metallic foreign body in anterior chamber angle. *Ophthalmic Surg Lasers Imaging Retina*. 2010. https://doi.org/10.3928/15428877-20100215-39. Published online March 9.