Long-Term Retention of a Large Intraconal Stick Associated with a Discharging Fistula and Optic Nerve Granuloma

Gilbert Bonsaana¹, Mikdad Robilu², and EDMUND DER¹

¹University for Development Studies
²Tamale Teaching Hospital

November 22, 2023

KEYWORDS: long-term, retention, intraconal, stick, discharging, fistula

1. INTRODUCTION

The term intraorbital foreign body refers to a foreign body that occurs within the orbit but outside the ocular globe.¹ Foreign bodies inside the orbital cavity are rare. They can cause more or less serious complications, depending on their nature and size.² Wooden foreign bodies are notorious for remaining quiescent for a long time, before presenting with a variety of complications. The wound of entry may often be small and self-sealing. Wooden foreign bodies also show a propensity to break during attempted removal. Detection of intraorbital foreign bodies requires a high index of suspicion. Obtaining an accurate and detailed history is absolutely essential.³

Intraorbital wood is often not detected by standard diagnostic tests like the computed tomography scan, adding to the diagnostic dilemma. The presence of an intraorbital mass with a discharging sinus should evoke suspicion of a retained organic foreign body, regardless of the time interval between the trauma and current presentation. It is imperative to maintain a high index of suspicion in such cases to avoid misdiagnosis.⁴ Here, the authors described the case of painful proptosis and loss of vision associated with a discharging orbital
fistula. An explorative anterior inferior-lateral orbitotomy revealed a large stick at the lateral intraconal area associated with an optic nerve granuloma.

2. CASE REPORT

A 12-year-old otherwise healthy black female self-referred from Ouagadougou, Burkina Faso presented with a history of fall onto a piece of wood (stick) a year prior to presentation. She sustained a penetrating stick injury to the inferiolateral aspect of the left orbit. She was attended to in a hospital in Ouagadougou, Burkina Faso where surgery was done to remove the pieces of wood (sticks) from the left orbit. The patient was apparently doing well until 6months following the surgery when she started experiencing severe pain in the affected eye associated with headache, protrusion of the left eye and discharges from the entry wound. She was sent back to the hospital for further treatment but there was no improvement. They self-referred to Tamale Teaching Hospital (TTH) Eye Clinic in Tamale, Ghana following several failed traditional/ herbal treatments over three months period. They presented at the Eye Clinic of the Tamale Teaching Hospital (TTH) one year after the initial injury.

On examination, the patient’s general condition was otherwise satisfactory. The vision was 6/6 and no perception of light (NPL) in the right and left eye, respectively. The intraocular pressure was 14mmHg and 18mmHg in the right and left eye, respectively. There was a discharging fistula 3mm below the lower lid margin of the left eye and 4mm medial to the lateral canthus from a self-sealed wound, presumably the entry wound as seen in Figure 1. There was limited adduction of the left globe as seen in Figure 2A, normal abduction as showed in Figure 2B, and limited inferior- and supraduction of the left globe as showed in Figure 3A and 3B associated with proptosis of 4mm measured with a ruler from the lateral canthus. The orbital rim was palpable with no mass palpable. There was relative afferent pupillary defect grade IV (RAPD IV) in the left eye, lens and vitreous were clear, there were no dilated or tortuous vessels nor choroidal folds. The cup/disc ratio (CDR) was 0.3 with a normal macular reflex. The anterior and posterior segments of the right eye were normal.
**FIGURE 1:** A photo of patient on first presentation with proptosis and discharging fistula of the left eye and orbit, respectively.
FIGURE 2A: Limited adduction

FIGURE 2B: Normal abduction
FIGURE 3A: Limited inferior-duction
FIGURE 3B: Limited supra-duction

An orbital ultrasound showed features of an orbital foreign body indicated by a relative hyperechogenic structure behind the left eyeball. The left eyeball itself however appeared normal. A contrast enhanced computed tomography (CT) Scan of the head and orbit showed anterior displacement of the left globe. There was no evidence of left orbital abscess, foreign body or globe injury. There was however calcifications and relative thickening of the left optic nerve. The imaged brain parenchyma appeared normal.

Given the high index of suspicion of a stick in the orbit, proptosis, restricted motility, signs of optic nerve compression and discharging fistula, surgical intervention was indicated though there was no visual potential. Explorative orbitotomy was done and to our surprise, a large stick was retrieved from the orbit, which measured approximately 5cm in length as displayed in Figure 4. It was in the lateral intraconal area, stuck adjacent the optic nerve extending from the orbital apex to the posterior aspect of the globe along the
full length of the intraorbital part of the optic nerve. The intraorbital part of the optic nerve was enlarged on further examination. Since the vision in that eye was already lost an incisional biopsy of the enlarged portion of the nerve was taken and sent for histopathology that showed the tract of the penetrating stick with associated granulomatous reaction as displayed in the histological slide in **Figure 5**.
FIGURE 4: Intraoperatively - piece of wood (stick) retrieved from the left orbital lateral intraconal area.

FIGURE 5: Section from orbital mass showing the tract of the penetrating stick (block arrow) with associated granulomatous reaction (X10)

Post-operatively the proptosis resolved, the fistula closed with no more discharge and the vision remains no perception of light (NPL).

3. DISCUSSION

Our patient presented with a penetrating left orbital injury from a stick that became embedded adjacent to the optic nerve for over one year before presenting with painful proptosis and loss of vision associated with a discharging orbital fistula at the entry wound, which had self-sealed after an attempted removal. Detection of intraorbital foreign bodies requires a high index of suspicion. Obtaining an accurate and detailed history is absolutely essential. Srirangam et al. reported a case of an unusual intraorbital foreign body in which the point of entry of the foreign body was not proportionate with the size of it and the trajectory and final location of the foreign body did not concur with a symptomless presentation of the patient, this is consistent with our patient.

In our patient who was a child, the details and extend of the injury might have been concealed for fear of punishment. Considering the fact that there was a discharging fistula, limited extraocular motility, proptosis and loss of vision, we suspected there was a more serious injury. Lefebvre et al. reported that in cases, that there are ophthalmic findings of decreased vision, decreased motility, or of any neurological derangement, it should raise suspicion for more serious injury, particularly in children (who may resist revealing the details of the injury), the possibility of a retained foreign body must also be considered.

We performed an orbital ultrasound that suggested an intraorbital foreign body indicated by a relative hyperechogenic structure behind the left eyeball. Therefore, we proceeded to order a contrast enhanced CT scan which showed anterior displacement of the left globe but to our surprise there was no evidence of orbital abscess or foreign body. The left optic nerve however appeared calcified and relatively thickened. A CT scan of the orbit is the imaging modality of choice for detection and localization of orbital foreign body. Initial neuroimaging in the form of CT should be carefully reviewed, and concern for a retained foreign body...
body should be communicated directly to the radiologist. The treating clinician should directly review all imaging studies and not simply rely on written reports. Wooden foreign bodies typically appear as aerated structures and widening of window width and level on CT scans can be helpful in revealing a linear course and overall geometric structure that is highly suspicious for a clinically occult wooden foreign body.\textsuperscript{6} Despite the modern imaging methods, it is often difficult to identify and locate organic intraorbital foreign bodies,\textsuperscript{7} unlike metallic foreign bodies which can be easily located by computed tomographic scan.\textsuperscript{2} In some cases, there may be the need to rule out foreign body in the case of any penetrating injury of orbit with the help of not just radiographs and CT scans but also ultrasonography and MRI.\textsuperscript{5}

Based on the high index of suspicion of a retained intraorbital foreign body, we proceeded to perform an explorative anterior orbitotomy. There was no abscess seen but rather to our surprise a large lateral intraconal stick lying adjacent and in contact with the optic nerve, extending from the apex of the orbit to the posterior pole of the globe was encountered. The intraorbital part of optic nerve was enlarged on further examination. Since the vision in that eye was already lost an incisional biopsy of the enlarged portion of the nerve was taken and sent for histopathology, which showed the tract of the penetrating stick with associated granulomatous reaction that could be a foreign body induced optic nerve granuloma. This is similar to other reports in which there was coexistence foreign body (shot) and tumor – inflammatory pseudo tumor of the orbit. It is possible, that in this case long-time occupying foreign body in the orbit was a cause of the tumor.\textsuperscript{8}

Early diagnosis, surgical exploration and extraction, when indicated, greatly influence the final outcome and at times the visual prognosis\textsuperscript{3} of intraorbital foreign body, unfortunately this was too late for our patient as she reported one year after the initial injury. An explorative orbitotomy may be done under general anaesthesia to reveal additional foreign body after what is thought to be adequate investigation. This often put most of the preoperative queries to rest\textsuperscript{5} as pertains in this case. Intraorbital metallic foreign bodies can be well tolerated and may not require surgical intervention despite proximity to important structures.\textsuperscript{9,10}

Exceptions include copper materials, which have been reported to cause purulent inflammation, iron, which can cause siderosis, and lead, which can cause systemic toxicity.\textsuperscript{11,12} Thus, removal of intraorbital foreign bodies is a complex issue requiring assessment of the composition, location, and size of the penetrating body, as well as associated signs and symptoms.\textsuperscript{11,13} Organic foreign bodies should be expeditiously removed\textsuperscript{11,13} or extracted as safely as possible via anterior orbitotomy\textsuperscript{6} due to significant risk of orbital inflammation and infection\textsuperscript{11,13} evidenced in this case.

The presence of the periorbita allows the classification of orbital injuries into intradural (deep in the peri-orbita) and extradural (when they are located between the periorbita and osseous orbit). In its turn, the muscular cone divides the orbit into two areas, the intraconal and the extraconal one. Whereas intraconal injuries are always intradural, extraconal injuries may be intra- or extradural. The intraconal area may also be divided in relation with the optic nerve into a medial, central and lateral area\textsuperscript{1} as seen in Figure 6. According to Turliuc et al., the stick in the orbit of our patient was located in the lateral intraconal area.
In general, surgery to remove the foreign body is planned based on certain aspects, which are summarized in Table 1 above. In general, a posteriorly located foreign body may be observed if inert and not causing any complications, due to the risk of iatrogenic optic neuropathy or diplopia. Similarly, small nonorganic foreign bodies may be left in the orbit. Our patient had almost all the indications for surgery in patients with intraorbital foreign bodies as listed in Table 1.

A study on a retrospective study reported the outcomes of 50 eyes with conservatively managed metallic intraorbital foreign bodies. Thirty-seven were located posterior to the globe, three of which were at the orbital apex. For these apical foreign bodies, the visual acuities at presentation were no light perception (NLP) and remained so following steroid treatment. While 93% of all patients in this study had improved vision following steroids, patients presenting with acuity at 20/200 or worse were highly likely to remain as such and few cases showed improvement to 20/50 or better. Complications occurred in only 5% of cases. Generally, patients requiring surgical intervention had worse visual outcomes.

In a retrospective analysis of five cases with intraorbital foreign bodies adjacent to the optic nerve, their
retrieval can significantly reduce psychological morbidity. These patients presented within a month from their injury with significant loss of vision ranging from hand motion (HM) to NLP and reported symptoms of anxiety and/or insomnia. After surgery, three patients remained NLP or HM and two had visual acuities of 20/500 and 20/1000; however, all patients reported improved psychological symptoms Our patient’s vision remained NLP following steroid treatment and extraction of the foreign body.

Protocols for intraorbital foreign body management aged nonsurgically, whereas anteriorly located foreign bodies are safer to remove. While visual outcomes are unlikely to improve, removal allows for future magnetic resonance imaging. Ultrasonography may also be a useful adjunct to diagnose or monitor intraorbital foreign bodies. Surgery for asymptomatic inorganic foreign bodies in the posterior orbit has significantly increased risk of perioperative morbidity without consistently demonstrated clinical benefits. While traumatic optic neuropathy is often seen in these cases, patients presenting with poor visual acuity in this setting are unlikely to recover significant visual function with surgical extraction.

4. CONCLUSIONS

Given the history of trauma by a stick, proptosis, restricted motility, signs of optic nerve compression and fistula formation, surgical intervention was indicated to avert loss of vision. The literature suggests that consideration of size, composition, location, and presenting symptoms among others are integral to the decision regarding surgical retrieval. A high index of suspicion must always be entertained in such cases and explorative orbitotomy done early enough to protect sight. This case seeks to inform and add to the knowledge available and raise awareness about stick injuries in children which could save sight when high index of suspicion is maintained, and early surgical intervention carried out as some of such injuries could remain asymptomatic for many years before inflammation leading to foreign body granuloma will lead to complications as in this case.

AUTHOR CONTRIBUTIONS

Gilbert Batieka Bonsaana: Conceptualization; writing – original draft; writing – review and editing.
Mikdad Abubakari Robilu: Writing – review and editing. Edmund Muonir Der: Writing – review and editing.

ACKNOWLEDGEMENTS

None.

FUNDING INFORMATION

The authors received no external source of funding for this study.

CONFLICT OF INTEREST STATEMENT

All authors in this study have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

All data in this case report have been made available.

CONSENT

Written informed consent was obtained from the patient for the medical records and photos of this patient.

ORCID

Gilbert Batieka Bonsaana https://orcid.org/0000-0003-3362-7881

REFERENCES


