

Successful vision recovery following penetrating ocular injury with metallic intraocular foreign body – a case report

Udane przywrócenie wzroku po penetrującym urazie gałki ocznej z metalicznym wewnątrzgałkowym ciałem obcym – opis przypadku

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Abstract

Open globe injuries (OGIs), particularly with intraocular foreign bodies (IOFBs), are a major cause of unilateral vision loss, especially in working-age adults. IOFBs account for up to 41% of OGIs, most often involving metallic fragments in occupational accidents. A 40-year-old male presented with right eye trauma and hemorrhage in the anterior chamber and vitreous body. Visual acuity was limited to hand movements; intraocular pressure was normal. CT revealed a metallic IOFB (1.5 × 2.5 × 2.5 mm) in the vitreous body, communicating with the sclera. The patient underwent scleral and conjunctival wound suturing, pars plana vitrectomy with decalin, IOFB removal, silicone oil tamponade, and endophotocoagulation. Postoperatively, visual acuity was 2/50 with intraocular pressure of 23 mmHg. After silicone oil removal and posterior vitrectomy with SF6 gas, vision improved to 5/8 and intraocular pressure normalized (16 mmHg). Prompt diagnosis, surgery, and pharmacotherapy enabled substantial visual recovery. Posterior vitrectomy is effective for IOFB-related trauma. (Gerontol Pol 2025; 33; 308-311) doi: 10.53139/GP.20253338

Keywords: open globe injury, intraocular foreign body, vitrectomy

Streszczenie

Urazy penetrujące gałki ocznej (OGI), zwłaszcza z obecnością wewnątrzgałkowych ciał obcych (IOFB), stanowią istotną przyczynę jednostronnej utraty widzenia, szczególnie u osób w wieku reprodukcyjnym. IOFB odpowiadają za nawet 41% OGI, najczęściej są to fragmenty metaliczne związane z wypadkami w pracy. 40-letni mężczyzna zgłosił się z urazem prawego oka i krwotokiem do komory przedniej oraz ciała szklistego. Ostrość wzroku ograniczyła się do ruchów ręki, a ciśnienie wewnątrzgałkowe było prawidłowe. TK wykazała metaliczne IOFB (1,5 × 2,5 × 2,5 mm) w ciele szklistym, w kontakcie z twardówką. Pacjent przeszedł szycie rany twardówki i spojówki, witrektomię pars plana z użyciem dekaliny, usunięcie ciała obcego, tamponadę olejem silikonowym i endofotokoagulację. Po operacji ostrość wzroku wynosiła 2/50, a ciśnienie 23 mmHg. Po usunięciu oleju silikonowego i ponownej witrektomii z gazem SF6, widzenie poprawiło się do 5/8, a ciśnienie unormowało (16 mmHg). Szybka diagnostyka, leczenie chirurgiczne i farmakoterapia pozwoliły na znaczną poprawę widzenia. Witrektomia z dostępu tylnego jest skuteczną metodą leczenia w urazach z IOFB. (Gerontol Pol 2025; 33; 308-311) doi: 10.53139/GP.20253338

Słowa kluczowe: uraz gałki ocznej, ciało obce wewnątrzgałkowe, witrektomia

Introduction

Open globe injury (OGI) remains a leading cause of unilateral blindness, particularly among adults of working age. Globally, its incidence is estimated at around 3.5 cases per 100,000 people per year [1]. A significant subset of these cases involves intraocular foreign bodies (IOFBs), which are unintentional projectiles lodged within the eye that necessitate prompt identification and treatment to prevent blindness or loss of the globe. IOFBs are involved in about 18–41% of OGIs and are commonly seen with severe visual impairment in ocular trauma patients [2,3,4]. The majority of IOFB-related injuries, about 66%, occur in patients between the ages of 21 and 40. The workplace is the most frequent setting for such injuries (54–72%), followed by the home environment (30%). The most common mechanisms of injury are hammering (60–80%), power or machine tool use (18–25%), and weapon injuries (19%) [5]. Over the past few decades, pars plana vitrectomy (PPV) has emerged as a key surgical method for managing posterior segment IOFBs and their complications [3,6]. Nevertheless, visual recovery can be limited due to the complexity of the injury and accompanying conditions [2,6]. Various factors have been reported to influence visual prognosis, such as age of the patient, initial best corrected visual acuity (BCVA), IOFB size, wound size, development of retinal detachment (RD), and timing of endophthalmitis [6].

This report aims to present a case of a patient who retained excellent visual function despite a penetrating

ocular injury involving a metallic IOFB. Surgical removal of the foreign material was performed while successfully preserving the structural integrity of the eye.

Case Report

A 40-year-old patient reported to the Emergency Department of Prof. K. K. Gibinski University Clinical Center of the Silesian Medical University Clinical Center of the Medical University of Silesia in Katowice due to visual impairment in the right eye caused by a trauma. He had no significant previous medical history. The injury happened when cutting a metal piece at work. On admission, the visual acuity of the right eye was 0,01 and intraocular pressure was 16 mmHg. On closer examination concomitant hemorrhage into the anterior chamber of the eye and the vitreous body was noted. Computed tomography revealed a metallic foreign body measuring 1.5 x 2.5 x 2.5 mm in the medial part of the right eyeball, within the vitreous body in communication with the sclera. Based on the clinical picture and the results of the imaging examination, the patient was qualified for surgery. The patient was anesthetized by periocular injection (2% lignocaine solution and 0.5% bupivacaine solution in a 1:1 ratio). The patient underwent suturing of the penetrating wound of the sclera and conjunctiva of the right eye. 3 trocars were inserted at the 5, 2 and 10 o'clock positions. The infusion got connected to the inferotemporal trocar site. Anterior chamber irrigation was performed, followed by vitrectomy with removal of the IOFB through an enlarged sclerotomy. The

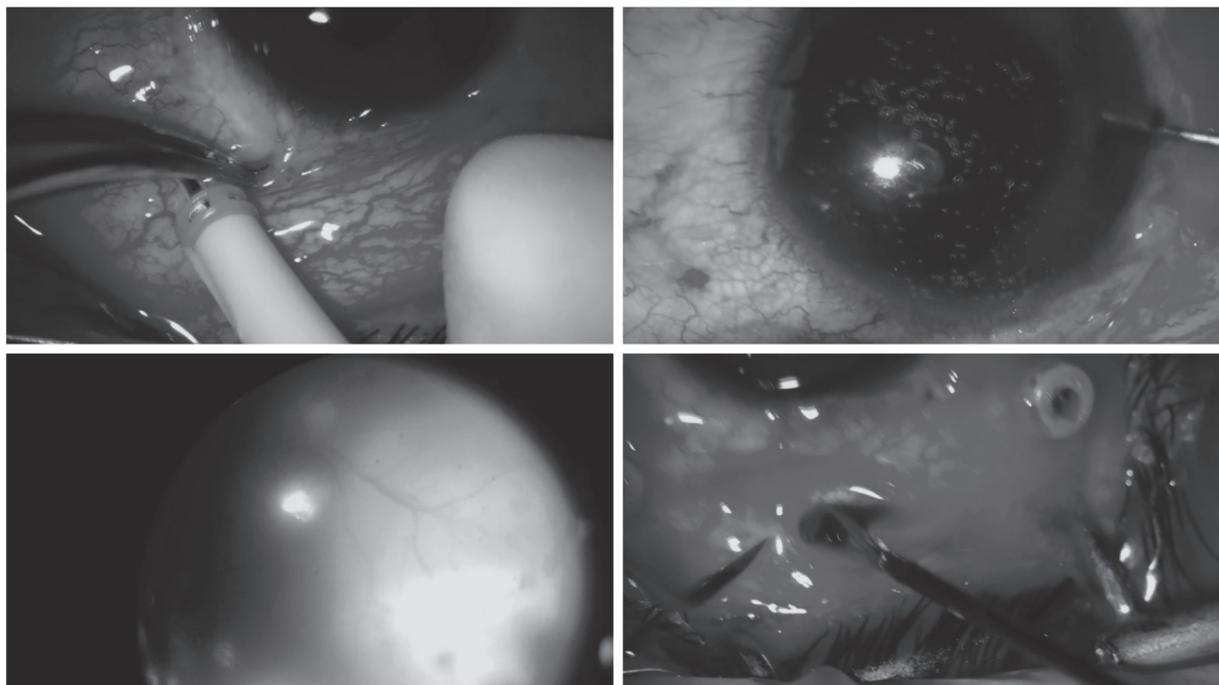


Figure 1. Stages of the surgery

sclera was sutured at the sclerotomy site. Retinal endolaser was performed, followed by silicone oil endotamponade and removal of the trocars. Stages of the surgery are shown in Figure 1. On the next day postoperative visual acuity in the right eye was 2/50 using the Snellen Chart, and intraocular pressure was 23 mmHg. A secondary glaucoma was diagnosed and a local treatment of the right eye with a combined product of timolol and dorzolamide was introduced twice daily. After 3 months, silicone oil was removed from the eyeball, which was combined with pars plana vitrectomy and administration of SF6 gas. Visual acuity during postoperative follow-up after one month in the right eye showed improvement to 5/8 using the Snellen chart and intraocular pressure was 16 mmHg. The local treatment of the right eye was maintained.

Discussion

The age-standardized incidence rate (ASIR) of IOFBs is increasing globally, along with a rise in the number of new cases, highlighting IOFBs as a significant global health concern [7]. In line with earlier research [4,8], metal was identified as the most prevalent material found in IOFBs, representing 76.9% of cases.

When an intraocular foreign body (IOFB) is suspected, obtaining a detailed patient history is essential. This should be followed by a comprehensive eye examination, which includes evaluating the external site of injury, assessment of visual acuity, performing a slit-lamp examination, and fundus examination. Certain clinical signs may indicate the likelihood of an open globe injury, such as a visible open wound (including a positive Seidel test), a collapsed or misshapen globe, prolapse of uveal tissue, a peaked pupil, subconjunctival hemorrhage accompanied by a shallow anterior chamber, and ocular hypotony with hemorrhagic chemosis under the conjunctiva [9]. Imaging plays a vital role in diagnosing and accurately locating IOFBs. Computed tomography (CT) is now the primary imaging method used in ocular trauma cases [10]. It offers a detection sensitivity that ranges from 65% for foreign bodies smaller than 0.06 mm³ to 100% for those larger than 0.06 mm³, making it widely regarded as the gold standard for identifying IOFBs [11]. CT is especially effective in locating rigid foreign materials such as metal, glass, or stone, and is particularly useful for uncovering IOFBs that are not easily visible [6].

The timing of primary repair for open-globe injuries varies significantly across trauma centers worldwide, and there is no universally agreed-upon optimal time-frame for this procedure [12]. This initial surgical repair

aims to restore the structural integrity of the eye, helping to resolve hypotony and re-establish a barrier to infection [1]. Traditionally, it has been recommended that primary repair be carried out as early as possible—preferably within 12 to 24 hours after the injury—in order to reduce the likelihood of complications such as endophthalmitis, expulsive hemorrhage, and disruption of internal ocular structures [1,13]. Research indicates that postponing repair beyond 24 hours may elevate the risk of endophthalmitis and negatively affect visual prognosis [1,12,13]. However, some more recent studies have found no significant link between the timing of surgical intervention and final visual acuity outcomes [14,15].

Visual outcomes after ocular trauma, such as open globe injuries, can range significantly—from vision better than 20/20 (Snellen) to no light perception (NLP). Several factors have been identified as predictors of poor visual prognosis, including diminished visual acuity at initial assessment, blunt or penetrating trauma, the presence of an afferent pupillary defect (APD), injuries located in the posterior segment of the eye, endophthalmitis, intraocular foreign bodies, and retinal detachment [16]. Additionally, the occurrence of an orbital fracture has been shown to independently worsen both visual and ocular outcomes in these patients [16].

The amount of energy transmitted to the eye by an intraocular foreign body (IOFB) depends on both its mass and velocity [4]. Endophthalmitis is a potential complication in approximately 3% to 30% of IOFB cases [10], most frequently caused by *Bacillus* species and *Staphylococcus epidermidis* [1]. This condition involves inflammation of the intraocular tissues and fluids, which can result in significant vision loss [17]. Prompt administration of prophylactic antibiotics is therefore essential in managing such injuries. Fluoroquinolones and cephalosporins, administered either orally or intravenously, are considered effective treatment options [18].

Conclusions

Comprehensive diagnostics and rapid surgical intervention and pharmacotherapy allowed for the restoration of visual acuity in the right eye to a large extent. Posterior vitrectomy is an effective method of treating eyeball injuries caused by the presence of intraocular foreign bodies.

Conflict of interest

None

References

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