OPIS PRZYPADKU CASE REPORT
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Retinal detachment as a late complication of ocular trauma with posterior segment intraocular foreign body

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HIGHLIGHTS

Persistent risk of retinal and glaucomatous complications long after successful IOFB-related trauma management underlines the critical importance of long--term follow-up.

ABSTRACT

The paper presents a case report of retinal detachment as a late complication in a 43-year-old patient, initially hospitalized in 2013 due to a penetrating injury to the right eye with the presence of an intraocular foreign body. The paper summarizes complications of posterior segment intraocular foreign body injuries, their diagnostics and discusses their potential clinical significance.

Key words: ocular trauma, intraocular foreign body, late complication after ocular injuries, retinal detachment, secondary glaucoma

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INTRODUCTION

Cases of ocular trauma are a common occurrence in ophthalmology departments both in Poland and worldwide. According to literature up to 40% of penetrating eye injuries are complicated by the presence of an intraocular foreign body (IOFB) [1, 2] and despite advances in surgical techniques, they still remain a common cause of blindness, especially among teenagers and young adults [3, 4]. According to WHO statistics, approximately 55 million ocular injuries are reported every year, mainly in men [5], of which 1.6 million cases end with complete loss of vision [3].

After initial surgical treatment of trauma and achieving satisfactory functional and anatomical results, despite the therapeutic success, physicians must remain attentive to potential long-term complications of the injury, such as late endophthalmitis, secondary glaucoma, secondary cataract, vitreous hemorrhage, retinal detachment, and optic nerve neuropathy [2, 6–9].

Post-traumatic retinal detachment, depending on the source [10], accounts for 10–40% of all retinal detachments and represents one of the most serious threats to vision if not diagnosed and treated promptly and appropriately.

OBJECTIVE

To evaluate and summarize the management and risk factors of retinal detachment and advanced secondary glaucoma as late complications of ocular trauma.

MATERIALS AND METHODS

A case description and literature review available in the PubMed database using key phrases: ocular trauma, intraocular foreign body, late complication after ocular injuries, retinal detachment, secondary glaucoma.

CASE DESCRIPTION

Patient, 43 years old male, underwent surgery at the Ophthalmology Department of Central Clinical Hospital of the Ministry of Interior and Administration in Warsaw in February 2013 due to penetrating trauma with the presence of a metallic intraocular foreign body, measuring 2 × 3 mm embedded in the retina of the right eye (fig. 1).

A 20-gauge pars plana vitrectomy was performed to remove the intraocular foreign body embedded in the temporal-inferior part of the retina. Retinal tear at the site of the foreign body was secured with endolaser. Due to disruption of the lens capsule by the foreign body (entry wound located at the corneal limbus), after removal of lens masses, an intraocular lens was implanted into the ciliary sulcus with anterior capsular support. In the post-operative optical coherence tomography (OCT) examination, a massive macular edema was observed. However, during follow-up examinations, the macular edema resolved (fig. 2).

FIGURE 1

X-ray scan showing the presence of a metallic intraocular foreign body, measuring 2 × 3 mm embedded in the right eye.

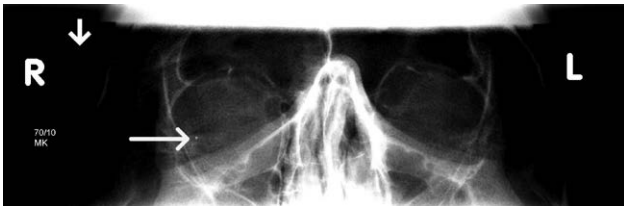
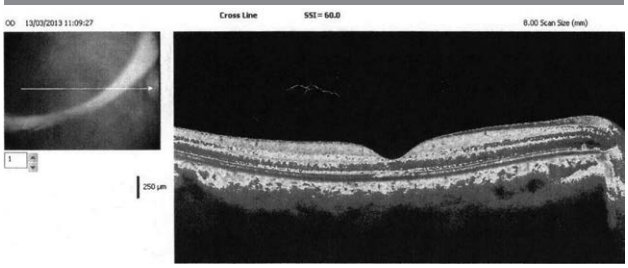


FIGURE 2

Optical coherence tomography scan showing no sign of macular edema of the right eye.



Visual acuity in the operated eye remained at the level of 0.4/0.5 during the first year after the surgery. Over the next 10 years, the patient did not complain of any discomfort and remained under the care of an ophthalmologist in their area of residence.

On 17.03.2023, the patient presented to the regional ophthalmology clinic due to blurred vision in the right eye. Physical examination revealed retinal detachment in the right eye, and it was recommended that the patient reports for a qualification for vitrectomy surgery.

On 22.03.2023, the patient presented to the National Medical Institute of the Ministry of the Interior and Administration and was admitted to the Ophthalmology Department. Upon physical examination, the patient presented with visual acuity of hand movement, intraocular pressure (IOP) of 4, mildly irritated right eye with a scar in the corneal limbus, clear anterior chamber of medium depth, intraocular lens implanted in the ciliary sulcus, nearly completely detached retina forming a funnel shape involving the macula with a tear in the peripheral area at the ten o'clock, attached only around the scar area from retinal laser photocoagulation around the site of the previously removed intraocular foreign body in 2013, pale optic nerve head with significantly widened neuroretinal rim to disc ratio of 0.9 and

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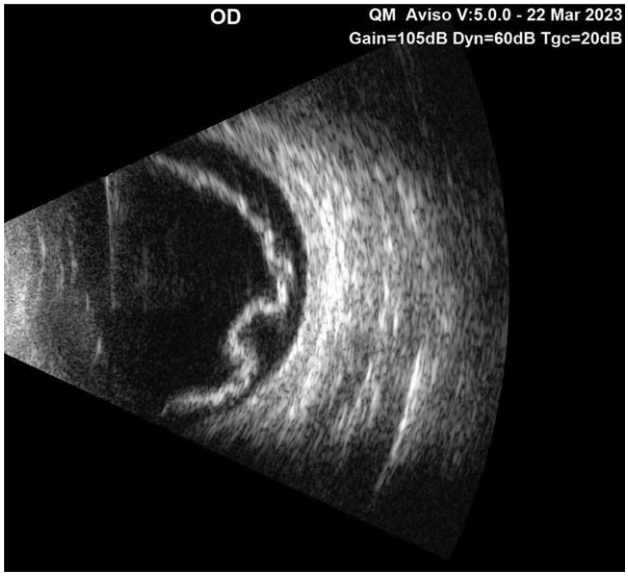
visible lamina cribrosa – findings suggesting a long-lasting elevated IOP. In the left eye, visual acuity was 0.9 best corrected visual acuity (BCVA), and both anterior and posterior segments were within normal limits.

FIGURE 3

Ultrasound scan showing funnel-shaped retinal detachment in the right eye with thickening of the choroid and detachment of the choroid in the upper quadrants.



Ultrasound examination revealed funnel-shaped retinal detachment in the right eye with thickening of the choroid and detachment of the choroid in the upper quadrants (fig. 3). OCT examination of the right eye confirmed retinal detachment with macular involvement.

Results

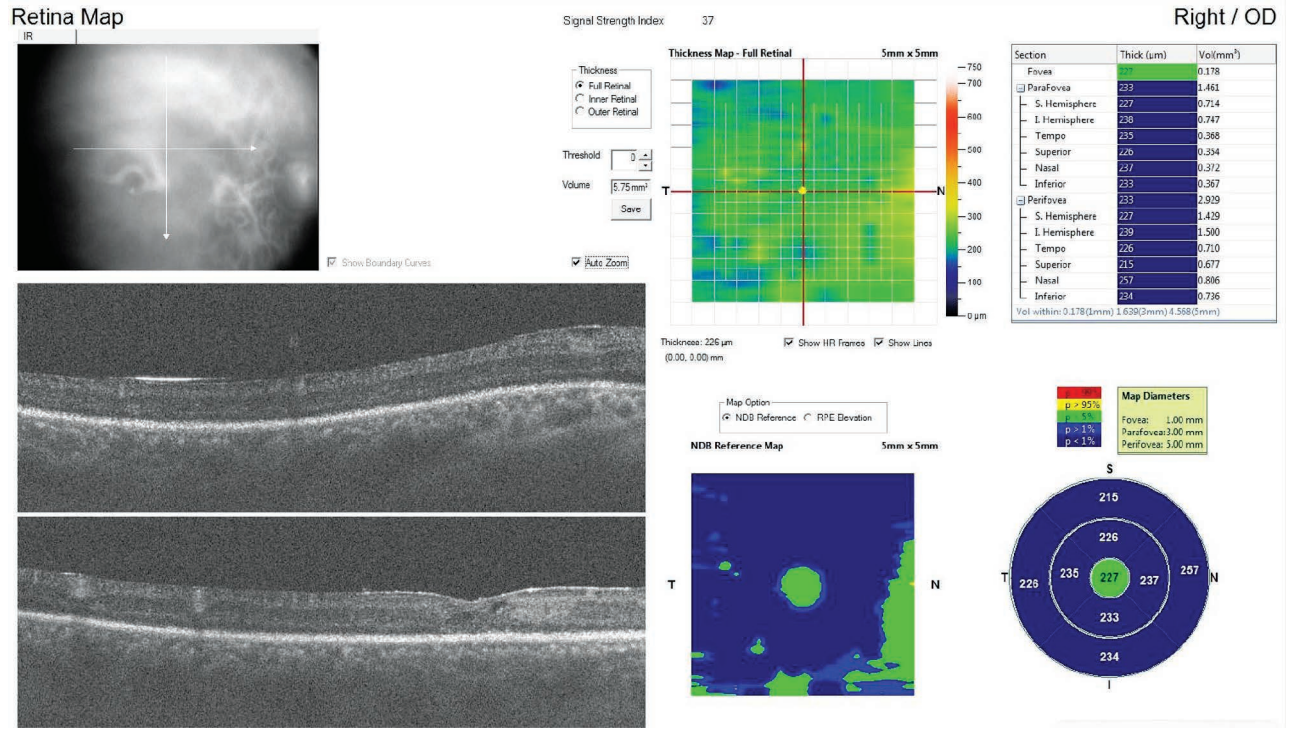
On 23.03.2023, a 23-gauge pars plana vitrectomy was performed using decalin, retinal laser photocoagulation, iridectomy and tamponade with 5000cs silicone oil. Successful attachment of the retina was achieved. The patient was discharged home in a good general and local condition. At discharge visual acuity was hand movement with IOP = 20 mmHg.

On the fourth postoperative day, the patient returned to the ophthalmology department due to severe headache and pain in the right eye. On examination IOP was measured at 51 mmHg accompanied by corneal edema and ocular irritation. B-scan revealed a small amount of fluid under the silicone oil in the vitreous cavity, with the retina remaining attached. OCT confirmed retinal attachment (fig. 4).

Conservative treatment was implemented to lower IOP (including paracentesis, pharmacological therapy with acetazolamide, mannitolum, brimonidini tartras + timololum drops). The desired reduction in IOP was not achieved after 10 days of therapy. Despite treatment, there was a deterioration in visual acuity to a doubtful perception of light, and IOP remained 45–52 mmHg.

FIGURE 4

Optical coherence tomography scans showing attached retina and retinal thinning of the right eye (28.03.2024).



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Due to the lack of effectiveness of conservative management and poor prognosis regarding the maintenance of functional vision in the right eye (blind eye due to end-stage glaucoma), a decision was made to remove the silicone oil despite the risk of retinal detachment.

On 6.04.2023, a 23-gauge pars plana vitrectomy was performed in the right eye with removal of the silicone oil, tamponade with 25% SF_6 gas with supplementary retinal laser photocoagulation. In the first day after the procedure, visual acuity was doubtful perception of light, IOP = 21 mmHg, and the retina remained attached.

Postoperatively, IOP returned within normal limits (15–22 mmHg) without the need for antiglaucoma medications. The patient was discharged without any pain complaints, in good general and local condition. Visual acuity was perception of light without projection.

In subsequent postoperative follow-up visits, the patient's condition remained stable, with visual acuity of perception of light, IOP within normal limits, attached retina, and a cup-to-disc ratio indicative of end-stage glaucoma.

DISCUSSION

Ocular trauma, especially penetrating injuries with the presence of intraocular foreign bodies, remain a significant clinical challenge [2].

It is vital to remember that both a history of eye trauma and vitrectomy with silicone oil tamponade are significant risk factors for the development of proliferative vitreoretinopathy and secondary glaucoma. Therefore, regular ophthalmic follow-ups and monitoring of IOP are essential to enable early detection and treatment of potential complications [11–13].

Current literature indicates that in cases where retinal detachment occurs as a complication after ocular trauma, 27% of cases (69/255) manifest within 24 h of the primary operation, 47% (119/255) within one week, and 72% (183/255) within one month of the injury [14]. Late retinal detachment cases are associated with the development of proliferative vitreoretinopathy in approximately 5–10% of patients [15–17], with 95% of them occurring within 2 months of the primary surgical procedure [15, 16]. However, the case presented in this study illustrates that such complication may also manifest many years after the initial intervention. Predictive factors for poorer treatment outcomes include the location of the foreign body in the posterior segment of the eye, accompanying retinal detachment, vitreous hemorrhage, or prolonged silicone oil tamponade [9, 10].

The late onset of retinal detachment in the described case may indicate a slow, steady process of membrane formation and its contraction, ultimately leading to extensive retinal detachment.

The development of secondary glaucoma in eyes following vitrectomy ranges from 8% to 20% of cases, depending on the source [18–22]. The use of silicone oil further increases this risk [23, 24], as does a history of penetrating trauma [25, 26]. Glaucoma often progresses insidiously and does not cause symptoms that would alarm a patient for an earlier visit to ophthalmologist, before significant visual impairment occurs. This was also the case in the described patient, where glaucomatous changes were already very advanced at the start of treatment, many years after the injury. Another challenge presented in this case was the fact of very high IOP, unresponsive to pharmacological treatment, persisting after the introduction of silicone oil. We suspect that the conventional pathway of aqueous outflow in this eye was significantly impaired, and the main pathway was through the uveoscleral outflow. This is suggested by the rapid decrease in pressure to normal values without the need for antiglaucoma medications after silicone oil removal.

CONCLUSION

The presented case of retinal detachment and advanced secondary glaucoma as late complications of ocular trauma underlines the need for planned, continuous, and regular postoperative follow-ups, as well as secondary glaucoma diagnostics, to prevent adverse prognostic outcomes and preserve functional vision.

Figures: from the material of the Department of Ophthalmology, National Medical Institute of the Ministry of the Interior and Administration.

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References

1. Parke DW 3rd, Flynn HW Jr, Fisher YL. Management of intraocular foreign bodies: a clinical flight plan. Can J Ophthalmol. 2013; 48(1): 8-12. http://doi.org/10.1016/j.jcjo.2012.11.005.
2. Loporchio D, Mukkamala L, Gorukanti K et al .Intraocular foreign bodies: A review. Surv Ophthalmol. 2016; 61(5): 582-96. http://doi.org/10.1016/j.survophthal.2016.03.005.
3. Négrel AD, Thylefors B. The global impact of eye injuries. Ophthalmic Epidemiol. 1998; 5(3): 143-69. http://doi.org/10.1076/opep.5.3.143.8364.
4. Greven CM, Engelbrecht NE, Slusher MM et al. Intraocular foreign bodies: management, prognostic factors, and visual outcomes. Ophthalmology. 2000; 107(3): 608-12. http://doi.org/10.1016/s0161-6420(99)00134-7.
5. Pandita A, Merriman M. Ocular trauma epidemiology: 10-year retrospective study. NZ Med J. 2012; 125(1348): 61-9.
6. Obuchowska I, Napora KJ, Sidorowicz A et al. Late complications after penetrating ocular injuries caused by intraocular and intraorbital foreign bodies. Klin Oczna. 2009; 111(10-12): 313-8.
7. Nicoară SD, Irimescu I, Călinici T et al. Intraocular foreign bodies extracted by pars plana vitrectomy: clinical characteristics, management, outcomes and prognostic factors. BMC Ophthalmol. 2015; 15: 151. http://doi.org/10.1186/s12886-015-0128-6.
8. Jabłoński M, Winiarczyk M, Biela K et al. Open Globe Injury (OGI) with a Presence of an Intraocular Foreign Body (IOFB)-Epidemiology, Management, and Risk Factors in Long Term Follow-Up. J Clin Med. 2022; 12(1): 190. http://doi.org/10.3390/jcm12010190.
9. Lee V, Ford RL, Xing W et al. Surveillance of traumatic optic neuropathy in the UK. Eye (Lond). 2010; 24(2): 240-50. http://doi.org/10.1038/eye.2009.79.
10. Nowomiejska K, Choragiewicz T, Borowicz D et al. Surgical Management of Traumatic Retinal Detachment with Primary Vitrectomy in Adult Patients. J Ophthalmol. 2017; 2017: 5084319. http://doi.org/10.1155/2017/5084319.
11. Nicolai M, Lassandro N, Franceschi A et al. Intraocular Pressure Rise Linked to Silicone Oil in Retinal Surgery: A Review. Vision (Basel). 2020; 4(3): 36. http://doi.org/10.3390/vision4030036.
12. Ichhpujani P, Jindal A, Jay Katz L. Silicone oil induced glaucoma: a review. Graefes Arch Clin Exp Ophthalmol. 2009; 247(12): 1585-93. http://doi.org/10.1007/s00417-009-1155-x.
13. Szurman P, Roters S, Grisanti S et al. Primary silicone oil tamponade in the management of severe intraocular foreign body injuries: an 8-year follow-up. Retina. 2007; 27(3): 304-11. http://doi.org/10.1097/01.iae.0000237685.99713.83.
14. Stryjewski TP, Andreoli CM, Eliott D. Retinal detachment after open globe injury. Ophthalmology. 2014; 121(1): 327-33. http://doi.org/10.1016/j.ophtha.2013.06.045.
15. Idrees S, Sridhar J, Kuriyan AE. Proliferative Vitreoretinopathy: A Review. Int Ophthalmol Clin. 2019; 59(1): 221-40. http://doi.org/10.1097/IIO.0000000000000258.
16. Pastor JC, de la Rúa ER, Martín F. Proliferative vitreoretinopathy: risk factors and pathobiology. Prog Retin Eye Res. 2002; 21(1): 127-44. http://doi.org/10.1016/s1350-9462(01)00023-4.
17. Pennock S, Haddock LJ, Mukai S et al. Vascular endothelial growth factor acts primarily via platelet-derived growth factor receptor α to promote proliferative vitreoretinopathy. Am J Pathol. 2014; 184(11): 3052-68. http://doi.org/10.1016/j.ajpath.2014.07.026.
18. Rossi T, Ripandelli G. Pars Plana Vitrectomy and the Risk of Ocular Hypertension and Glaucoma: Where Are We? J Clin Med. 2020; 9(12): 3994. http://doi.org/10.3390/jcm9123994.
19. Luk FO, Kwok AK, Lai TY et al. Presence of crystalline lens as a protective factor for the late development of open angle glaucoma after vitrectomy. Retina. 2009; 29(2): 218-24. http://doi.org/10.1097/IAE.0b013e31818ba9ca.
20. Stangos AN, Petropoulos IK, Brozou CG et al. Pars-plana vitrectomy alone vs vitrectomy with scleral buckling for primary rhegmatogenous pseudophakic retinal detachment. Am J Ophthalmol. 2004; 138(6): 952-8. http://doi.org/10.1016/j.ajo.2004.06.086.
21. Koreen L, Yoshida N, Escariao P et al. Incidence of, risk factors for, and combined mechanism of late-onset open-angle glaucoma after vitrectomy. Retina. 2012; 32(1): 160-7. http://doi.org/10.1097/IAE.0b013e318217fffb.
22. Mansukhani SA, Barkmeier AJ, Bakri SJ et al. The Risk of Primary Open-Angle Glaucoma Following Vitreoretinal Surgery-A Population-based Study. Am J Ophthalmol. 2018; 193: 143-55. http://doi.org/10.1016/j.ajo.2018.06.010.
23. Al-Jazzaf AM, Netland PA, Charles S. Incidence and management of elevated intraocular pressure after silicone oil injection. J Glaucoma. 2005; 14(1): 40-6. http://doi.org/10.1097/01.ijg.0000145811.62095.fa
24. Nguyen QH, Lloyd MA, Heuer DK et al. Incidence and management of glaucoma after intravitreal silicone oil injection for complicated retinal detachments. Ophthalmology. 1992; 99(10): 1520-6. http://doi.org/10.1016/s0161-6420(92)31771-3.
25. Ozer PA, Yalvac IS, Satana B et al. Incidence and risk factors in secondary glaucomas after blunt and penetrating ocular trauma. J Glaucoma. 2007; 16(8): 685-90. http://doi.org/10.1097/IJG.0b013e318073bd4d.
26. Osman EA. Glaucoma after open globe injury. Saudi J Ophthalmol. 2015; 29(3): 222-4. http://doi.org/10.1016/j.sjopt.2014.10.006.

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Authors' contributions:
Adam Chmiel– conception and design of the study or data acquisition or analysis and interpretation of data, critical corrections.
Tomasz Chudoba – conception and design of the study or data acquisition or data analysis and interpretation, critical corrections.
Angelina Papeczyc– editing the article, critical corrections.
Daniel Czyżewski- editing the article, critical corrections.
Małgorzata Frankowska-Gierlak – final approval.

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