

# Micro Pulse Transscleral Cyclophotocoagulation for Refractory Silicone Oil–Induced Glaucoma Complicated by Toxic Keratopathy: A Case Report



Monica Rizky Wigianita<sup>1</sup>, Yulia Primitasari<sup>2</sup>, Ima Yustiarini<sup>3</sup>  
<sup>1-3</sup>Department of Ophthalmology, Faculty of Medicine, Universitas Airlangga, Indonesia; Dr. Soetomo General Academic Hospital, Indonesia; <sup>1</sup>Universitas Airlangga Hospital, Indonesia.

## ABSTRACT

Silicone oil (SO) tamponade is often used in complex retinal detachment surgeries and can cause secondary glaucoma through various mechanisms, including pupillary block, trabecular obstruction, and chronic inflammation. We present a case of a 35-year-old man with refractory glaucoma in his right eye after the second procedure of pars plana vitrectomy with SO tamponade. His intraocular pressure (IOP) was elevated to 47 mmHg despite maximum medical therapy and unsuccessful laser peripheral iridotomy. Micro Pulse Transscleral Cyclophotocoagulation was performed twice with an interval of five months and the IOP gradually decreased to 16-22 mmHg. Long-term use of antiglaucoma medications containing preservatives causes toxic keratopathy with chronic epithelial defects. The patient required both ocular surface management and a medication switch to preservative-free antiglaucoma medication. This case highlights the therapeutic challenges in glaucoma management including ocular surface diseases especially after anti-glaucoma therapy and surgical intervention.

**Keywords:** Secondary Glaucoma, Cyclophotocoagulation, Keratopathy.

**How to Cite this Article:** Wigianita MR, Primitasan Y, Yustiarini I. Micro Pulse Transscleral Cyclophotocoagulation for Refractory Silicone Oil–Induced Glaucoma Complicated by Toxic Keratopathy: A Case Report. 2026;42(4):426-429. **Doi:10.36351/pjo.v42i4.2383**

---

*Correspondence to: Yulia Primitasari  
Department of Ophthalmology, Faculty of Medicine,  
Universitas Airlangga, Indonesia; Dr. Soetomo General  
Academic Hospital, Indonesia  
Email: yulia-p@fk.unair.ac.id*

---

*Received: February 17, 2026*

*Revised: July 29, 2026*

*Accepted: August 22, 2026*

## INTRODUCTION

Silicone oil (SO) is frequently used as an intraocular tamponade in the management of complicated retinal detachments, including rhegmatogenous retinal detachment (RRD) or recurrent retinal detachment. Secondary glaucoma is a well-documented complication associated with the use of SO tamponade. The development of glaucoma can be

attributed to various mechanisms, including mechanical obstruction, pupillary block, and emulsification of the SO.<sup>2</sup> Although laser peripheral iridotomy is recommended in suspected pupillary block, failure rates are considerable in SO-filled eyes due to membrane formation and recurrent closure.<sup>3</sup>

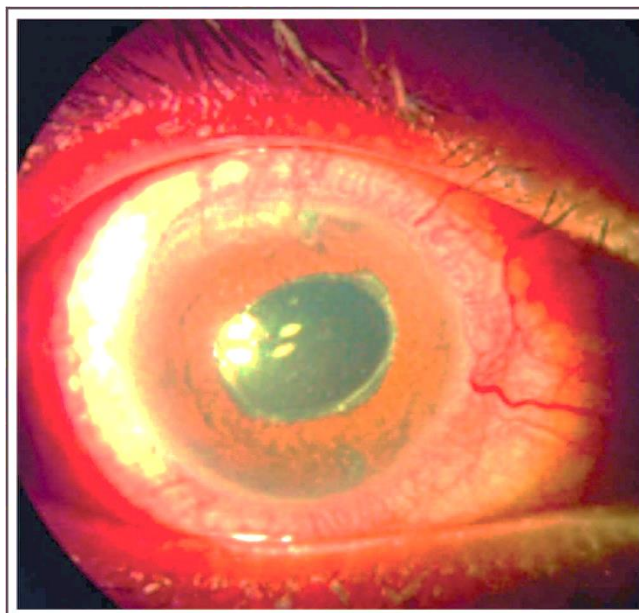
Micro Pulse transscleral cyclophotocoagulation (MP-TSCPC) is gaining recognition as a safer alternative to traditional cyclodestructive procedures for refractory glaucoma.<sup>4</sup> Although MP-TSCPC has recently been recognized as a safer alternative to conventional cyclodestructive surgery, there is still a lack of evidence regarding its efficacy in the treatment of SO-induced glaucoma.<sup>5</sup> This is crucial for patients with complicated surgical cases, requiring careful consideration of IOP regulation and ocular surface preservation.

## Case Presentation

A 35-year-old man presented with severe pain and redness in his right eye, four months after receiving a RRD repair involving a repeat pars plana vitrectomy with SO tamponade. He had no history of glaucoma prior to vitreoretinal surgery. Examination revealed visual acuity (VA) of hand movements and an IOP of 47 mmHg in the right eye. Slit-lamp examination revealed significant conjunctival hyperaemia and a deep anterior chamber with minimal flare (Figure 1). SO was observed posterior to the iris plane. Secondary glaucoma related to SO tamponade was diagnosed, initially suspected to be predominantly pupillary block with possible trabecular involvement.

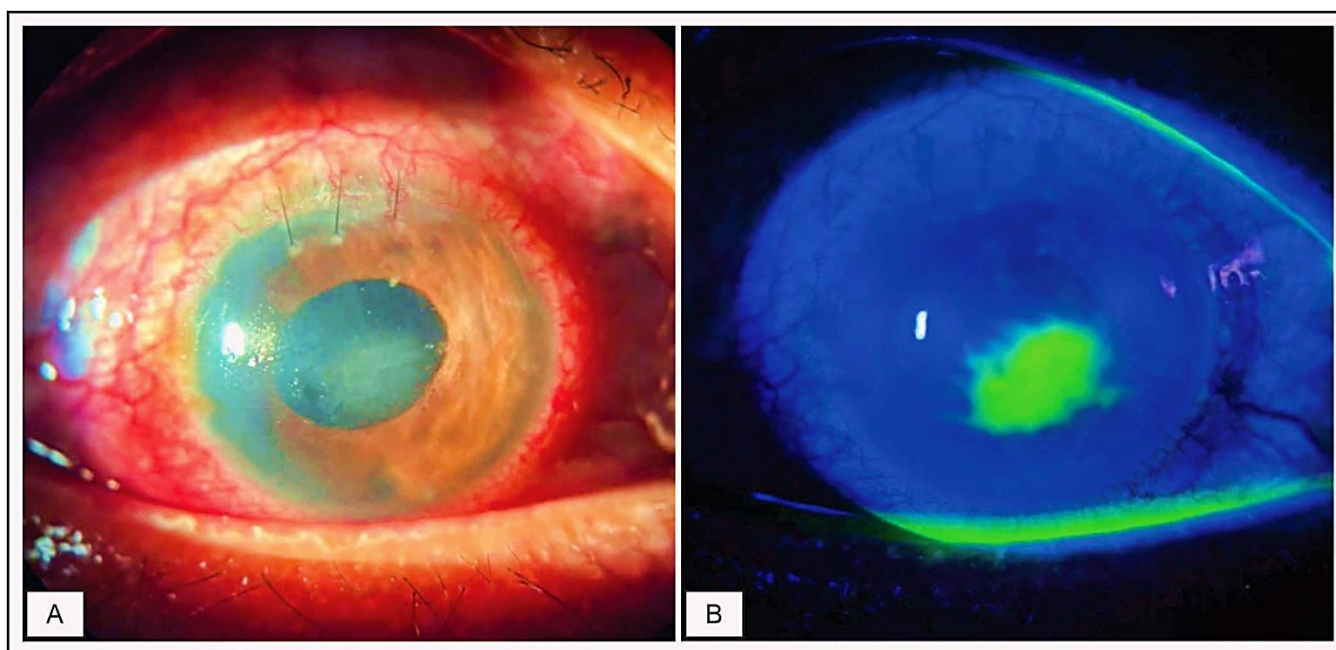
Initial treatment included medical therapy, including oral glycerine, systemic acetazolamide (250 mg four times daily), a topical beta-blocker and a topical corticosteroid. An inferior laser peripheral iridotomy (LPI) was performed and IOP was reduced transiently to 7.8 mmHg. However, two weeks later, the IOP had elevated to 37 mmHg again. The iridotomy was found to be occluded by a membrane, with SO lining the posterior iris surface. A subsequent LPI was performed, but the IOP remained 32 mmHg, suggesting a multifactorial mechanism, rather than an isolated pupillary block.

MP-TSCPC was performed. The fluctuation of IOP over the next six months, ranging from 16 to 22

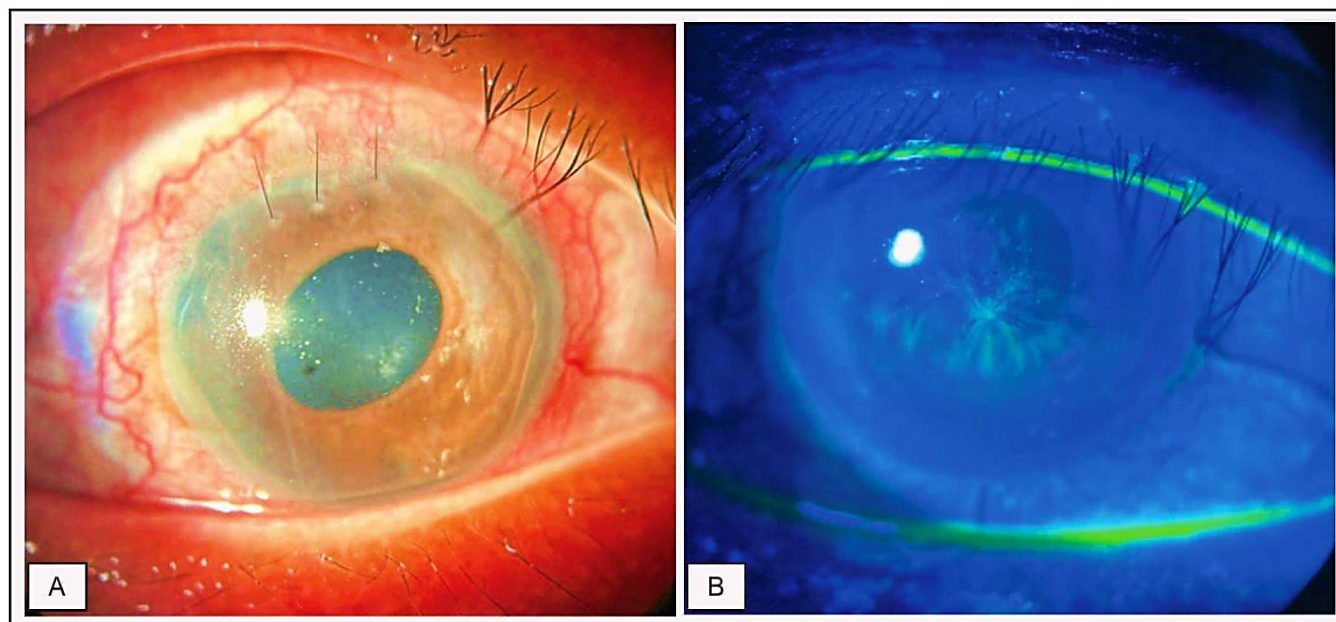


**Figure 1:** Slit-lamp examination of the anterior segment of the right eye showing conjunctival hyperaemia, mid-mydriatic pupil with keratic precipitates and flare cells.

mmHg, alongside the combination of topical therapy and systemic acetazolamide, resulted in the necessity for a repeated MP-TSCPC session. The IOP was 22 mmHg at 1-month follow-up. There was a 5×5 mm corneal epithelial defect and positive fluorescein staining with underlying stromal haze (Figure 2a,2b),



**Figure 2:** (a) One month after the second MP-TSCPC, the anterior segment of the right eye showed corneal cloudiness in the central area. (b) The fluorescent examination showed a positive result with an epithelial defect.



**Figure 3(a):** Three-month follow-up after ocular surface management showing decreased corneal cloudiness. **(b)** The fluorescent examination showed a positive result and a significant decrease in the size of the epithelial defect.

consistent with toxic keratopathy likely related to the prolonged use of preservative-containing topical medications. Treatment was shifted to preservative-free topical agents, and comprehensive ocular surface management was initiated, including intensive lubrication, topical antibiotic coverage, and vitamin A ointment.

Three months following ocular surface management, the epithelial defect had decreased to approximately 1×1 mm (3b). IOP remained stable at 11 mmHg and VA in the affected eye was hand movements.

## DISCUSSION

Secondary glaucoma following SO tamponade remains a major complication of vitreoretinal surgery. In this case, the IOP decreased temporarily after the LPI, followed by a quick return to its previous high. This suggests that the pupillary block was a contributing factor, but it might not be the only mechanism.

An unsuccessful LPI procedure in a SO-filled eye may be due to formation of membrane or migration of SO, which could obstruct the LPI site. A temporary decrease in IOP followed by a rebound after repeated LPI procedures indicates a lack of response to LPI, therefore further management strategies are required.<sup>6</sup> The MP-TSCPC offers greater safety because of the

use of short pulses of energy that reduce collateral damage compared to conventional cyclodestructive procedures.<sup>7</sup> Systematic reviews show a good safety record with moderate IOP lowering in refractory glaucoma.<sup>7</sup> Data for SO-induced glaucoma, however, remains scarce.

In this study, two sessions of MP-TSCPC achieved good control of IOP, although medical therapy was still required. This highlights the complexity of the condition and the insufficient role of reducing aqueous production alone.

A neglected aspect of glaucoma treatment is ocular surface disease. Topical antiglaucoma medications with preservatives, such as benzalkonium chloride, lead to tear film instability, corneal epithelial toxicity, and inflammation. Intraocular surgery itself compromises the homeostasis of the ocular surface.<sup>8</sup> Persistent epithelial defects in this patient during prolonged intensive glaucoma therapy indicate that the cumulative effect of drug toxicity is predominant over the effect of ischemia induced by pressure. The patient's ocular surface improved after switching to preservative-free topical antiglaucoma medication.

This case presents the therapeutic challenges of managing refractory glaucoma secondary to silicone oil. Although MP-TSCPC is relatively safe and

effective treatment modality, the efficacy of the treatment should not be evaluated based on the reduction of IOP alone. Maintenance of the integrity of the ocular surface is equally important.

## CONCLUSION

Refractory glaucoma associated with silicone oil tamponade is a complex disease and can often be difficult to manage. MP-TSCPC has been shown to be effective in the management of glaucoma by reducing the intraocular pressure, but it is important to closely monitor the patients. Intensive topical anti-glaucoma medications have detrimental effects on the ocular surface, and therefore, the effective management strategy needs to achieve a balance between controlling IOP and preserving ocular surface integrity to optimise patient outcomes.

**Funding:** This study was not funded by any organization.

**Patient's Consent:** Researchers followed the guidelines set forth in the Declaration of Helsinki.

**Conflict of Interest:** Authors declared no conflict of interest.

## REFERENCES

1. **Chen Y, Kearns VR, Zhou L, Sandinha T, Lam WC, Steel DH, et al.** Silicone oil in vitreoretinal surgery: indications, complications, new developments and alternative long-term tamponade agents. *Acta Ophthalmol.* 2021;**99**(3):240-250. Doi: 10.1111/aos.14604. Epub 2020 Sep 15. PMID: 32930501.
2. **Nicolai M, Lassandro N, Franceschi A, Rosati A, De Turris S, Pelliccioni P, et al.** Intraocular pressure rise linked to silicone oil in retinal surgery: A review. *Vision.* 2020;**4**(3):36. Doi: 10.3390/vision4030036.
3. **Majidi AR, Moghadam RS.** Silicone oil pupillary block after laser retinopexy in aphakic eyes with presumed closed peripheral iridectomy: Report of three cases. *Int Ophthalmol.* 2014;**34**(4):913-917. Doi: 10.1007/s10792-013-9862-z.
4. **Lima NVDA, Lopes NLV, Maestrini HA, Giacometti HHAR, Rodrigues Neto TDS, Mario LPD, et al.** Micropulse transscleral cyclophotocoagulation for the management of diverse glaucoma types: A multicenter short-term real-world study. *Clini Ophthalmol.* 2026;**20**:1-12. Doi: 10.2147/OPTH.S555181.
5. **Zbiba W, Sayadi S, Kharrat M, Daoued M.** Efficacy and safety of micropulse transscleral laser therapy in silicone oil-induced glaucoma. *J Glaucoma.* 2022;**31**(8):689-693. Doi: 10.1097/IJG.0000000000002051.
6. **Zalta AH, Boyle NS, Zalta AK.** Silicone oil pupillary block: An exception to combined argon-Nd:YAG laser iridotomy success in angle-closure glaucoma. *ArchOphthalmol.* 2007;**125**(7):883-888. Doi: 10.1001/archophth.125.7.883.
7. **Chavez MP, Guedes GB, Pasqualotto E, De Almeida INF, Lopes LM, Prata TS, et al.** Micropulse transscleral laser treatment versus continuous wave transscleral cyclophotocoagulation for the treatment of glaucoma or ocular hypertension: A meta-analysis. *J Glaucoma.* 2025;**34**(8):575-584. Doi: 10.1097/IJG.0000000000002583.
8. **Andole S, Senthil S.** Ocular surface disease and anti-glaucoma medications: Various features, diagnosis, and management guidelines. *Semin Ophthalmol.* 2023;**38**(2):158-166. Doi: 10.1080/08820538.2022.2094714.

## Authors Designation and Contribution

Monica Rizky Wigianita; *Resident: Concepts, Design, Literature Search, Data Acquisition, Data Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review.*

Yulia Primitasari; *Consultant Ophthalmologist: Concepts, Design, Literature Search, Data Acquisition, Data Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review.*

Ima Yustiarini; *Consultant Ophthalmologist: Design, Literature Search, Data Acquisition, Data Analysis, Manuscript Preparation.*

