

**Case Series**

Immediate Closure of Macular Holes after Pars Plana Vitrectomy with Heavy Silicone oil Tamponade - A Case Series

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Citation: Riotto E, Batis V, Tobler E, Wolfensberger T, Potic J, et al. (2024) Immediate Closure of Macular Holes after Pars Plana Vitrectomy with Heavy Silicone oil Tamponade - A Case Series. J Surg 9: 11166 DOI: 10.29011/2575-9760.11166

Received Date: 18 October 2024; **Accepted Date:** 24 October 2024; **Published Date:** 26 October 2024

Introduction

Macular holes (MH) represent full-thickness defects in the central retina that can result in significant vision impairment if not treated promptly. Traditionally, pars plana vitrectomy combined with gas tamponade has been the primary approach to manage these conditions. However, Silicone Oil (SO) tamponade has emerged as a viable alternative, for selective cases. Numerous studies have demonstrated that both silicone oil and gas tamponade are effective in achieving anatomical closure of macular holes [1-5]. Furthermore, a specific investigation suggested that silicone oil may be more effective than air tamponade for larger Idiopathic Macular Holes (IMH) measuring greater than 400 μ m in diameter [6]. Additionally, silicone oil tamponade has been recommended as the preferred treatment option for persistent or recurrent full-thickness macular holes, highlighting its role in more complex cases [7-9]. Despite the effectiveness of silicone oil, immediate outcomes following macular hole surgery using this method have been underreported in the literature. One study indicated noticeable flattening of the retina as early as the first postoperative day [10]. A notable case series involving 13 patients found that in 11 instances, the macular holes closed within the first 24 hours post-surgery when silicone oil was utilized as the tamponade agent [11].

In our study, we further explore the prompt closure of macular holes, demonstrating successful anatomical closure within less than 24 hours following pars plana vitrectomy with heavy silicone oil

tamponade in a cohort of seven patients. This adds to the growing evidence supporting the efficacy and rapid action of silicone oil in the management of macular holes in selective cases particularly in challenging clinical scenarios.

Materials and Methods

A retrospective analysis was conducted on all eyes that underwent standard pars plana vitrectomy by the senior author (LK), combined with internal limiting membrane (ILM) peeling, autologous ILM graft and heavy Silicone Oil (SO) tamponade for macular holes at the Jules Gonin University Eye Hospital in Lausanne, Switzerland, during the period from January 2023 to June 2024. The study included a total of seven eyes from seven patients, comprising three males and four females. The ages of the patients ranged from 36 to 74 years, with a mean age of 57 years.

Among the cohort, three patients were diagnosed with high myopia, which is known to be a risk factor for the development of macular holes. One patient was pseudophakic, while three others had persistent macular holes following previous surgical interventions. Additionally, one case (36 years' old male) involved a longstanding post-traumatic macular hole. The sizes of the macular holes, as measured by Optical Coherence Tomography (OCT), varied significantly, ranging from 333 μ m to 856 μ m, with an average size of 475 μ m. Preoperative visual acuity also varied, with values ranging from 6/120 to 6/15, yielding an average of

6/19, reflecting a range of visual impairment prior to surgery.

All patients received an autologous ILM graft during the procedure, a technique aimed at promoting healing and reducing the risk of recurrence. Postoperatively, patients were maintained in a face-up position for the first 24 hours to optimize the tamponade effect of the silicone oil. Subsequent imaging using swept-source optical coherence tomography (SS-OCT) was performed 16 to 23 hours after surgery, as well as at one week and one month postoperatively. Additionally, the best-corrected visual acuity was assessed one month after surgery to evaluate functional outcomes.

All patients underwent silicone oil removal 2 to 4 months following the initial surgery. After the removal of silicone oil, patients were monitored for a minimum of three months, allowing for a thorough assessment of both anatomical closure of the macular holes and visual recovery. This comprehensive follow-up is crucial in understanding the long-term efficacy of the surgical intervention and the role of silicone oil tamponade in managing macular holes.

Results

All seven eyes in the study exhibited complete anatomical closure of the Macular Holes (MH) within less than 24 hours following surgery. This positive outcome was maintained in all cases after the removal of Silicone Oil (SO) at the final follow-up examination. Notably, visual acuity improved for all patients, with the mean visual acuity increasing from 6/19 prior to surgery to a mean of 6/12 at both the one-month and three-month postoperative assessments. The mean follow-up period after silicone oil removal was approximately six months, with a standard deviation of 1.2 months, allowing for adequate evaluation of both anatomical and functional outcomes. Figures 1 and 2 illustrate the successful closure of macular holes within 24 hours of treatment; Figure 1 highlights the closure in a case of persistent macular hole, while Figure 2 depicts the closure achieved in a longstanding traumatic macular hole. These visual representations provide compelling evidence of the rapid and effective outcomes associated with this surgical technique, further supporting the use of silicone oil tamponade as a beneficial intervention in managing selective cases of macular holes.

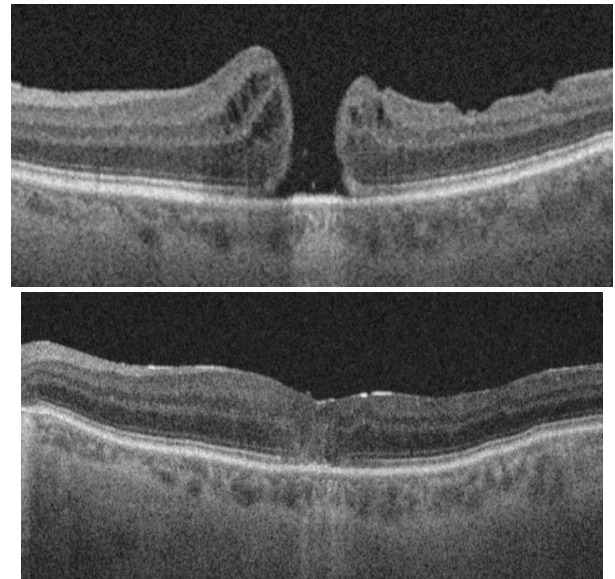


Figure 1: MH closure within 24 hours of treatment in a persistent MH after previous surgery.

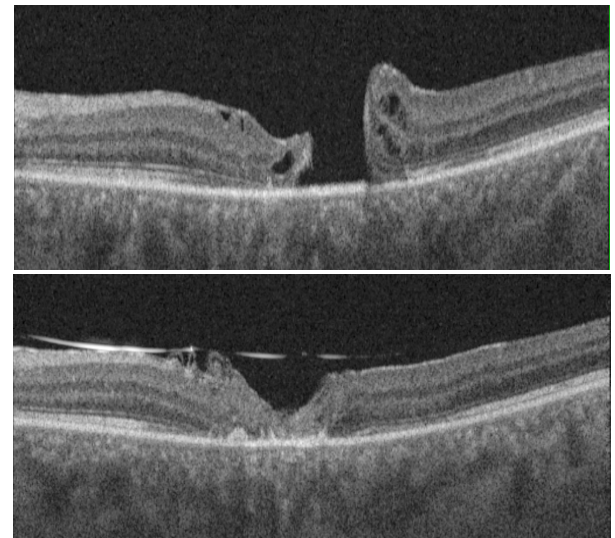


Figure 2: MH closure within 24 hours of treatment in a long standing traumatic macular hole.

Conclusions

Pars plana vitrectomy with heavy Silicone Oil (SO) tamponade has emerged as a highly effective alternative to gas tamponade, particularly for selective patients. These cases could potentially include patients who live in high altitudes that gas is contraindicated, patients who are unable to maintain postoperatively a face-down positioning or for those experiencing recurrence of Macular Holes (MH) [1-5]. One of the notable advantages of using silicone oil tamponade is that it allows for timely assessment of the fundus through optical coherence tomography (OCT) as early as the first postoperative day, facilitating immediate insights into the surgical outcome. While some studies have indicated that visual outcomes following silicone oil tamponade may be less favorable compared to those achieved with gas tamponade [2,12], other research has presented findings to the contrary, suggesting that outcomes can be equally promising with silicone oil [13-15]. In our cohort, all patients demonstrated a significant increase in visual acuity at both one and three months postoperatively, supporting the effectiveness of the intervention. This case series highlights the rapid closure of macular holes achieved through pars plana vitrectomy with heavy silicone oil tamponade, underscoring its potential as a viable surgical option. Although the precise timing of closure remains to be determined, it would be of considerable scientific interest to explore this aspect further and to investigate how macular hole characteristics might inform prognostic outcomes. Understanding these dynamics could significantly enhance our approach to treating macular holes and improve patient management strategies in the future.

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