E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/16.01.590

Research Article

Comparison of Core Vitrectomy with Intravitreal Antibiotics Vs Early Complete Vitrectomy with Silicon Oil In Terms Of Final Best Corrected Visual Acuity in Post Cataract Surgery Endophthalmitis

Jawad Bin Yamin Butt[1*], Arsalan Shahid[2], Muhammad Farhan Lodhi[3], Kashif Hanif[4], Muhammad Talha Qamar[5], Kainat Javaid[6], Sardar Awais Tahir Khan[7], Iqra Shahzad[8]

[1*]Consultant Ophthalmologist, LRBT Eye Hospital, Township, Lahore, Pakistan.
[2]Senior Ophthalmologist, LRBT Eye Hospital, Township, Lahore, Pakistan.
[3]MBBS, FCPS Ophthalmology, FCPS VRO Fellow, LRBT Eye Hospital, Township, Lahore, Pakistan.
[4]Ophthalmologist, LRBT Eye Hospital, Township, Lahore, Pakistan.
[5]Resident Ophthalmologist, LRBT Eye Hospital, Township, Lahore, Pakistan.
[6]Resident Ophthalmologist, Mughal Eye Hospital, Johar Town, Lahore, Pakistan.
[7]Senior Medical Officer, LRBT Eye Hospital, Township, Lahore, Pakistan.
[8]Resident Ophthalmologist, LRBT Layton Rehmatullah Benevolent Trust Hospital, Township, Lahore, Pakistan.

Corresponding Author: Jawad Bin Yamin Butt
Consultant Ophthalmologist, LRBT Eye Hospital, Township, Lahore, Pakistan.
Email: dr_jawad_bin_yamin@yahoo.com
Received: 08.03.2026, Revised: 11.06.2026, Accepted: 18.06.2026

ABSTRACT

Background: Post-surgical endophthalmitis after cataract surgery is a vision threatening emergency which should be treated promptly with the help of surgery. Core vitrectomy using intravitreal antibiotics is favored, but early full vitrectomy with silicone oil tamponade has been suggested as a means to achieve better visual results.

Objective: To evaluate the effectiveness of intravitreal antibiotics versus early complete vitrectomy with silicone oil tamponade in terms of final best corrected visual acuity (BCVA) in patients with post-cataract surgery endophthalmitis.

Study design: The study was an interventional comparative study based on studying patients in the hospital.

Methods: The total number of patients with the diagnosis of acute endophthalmitis after cataract surgery was 60, who were split into 2 groups (n=30 in each group). Group A received core vitrectomy with intravitreal antibiotics (vancomycin and ceftazidime), and Group B received early complete pars plana vitrectomy with silicone oil tamponade as well as intravitreal antibiotics (vancomycin and ceftazidime). Demographic and clinical data were collected at the baseline. The main outcome was final BCVA 3-months post-operative (logMAR units). Data were analyzed with SPSS and p value less than 0.05 was considered as a statistically significant value.

Results: The age, sex ratio and baseline BCVA did not differ between both groups ($p > 0.05$). The mean final BCVA for silicone oil group was significantly higher than that of core vitrectomy group (0.52 ± 0.38 logMAR vs 0.78 ± 0.42 logMAR, $p = 0.01$). The silicone oil group had a higher proportion of patients who achieved VA 6/18 or better (33.3% versus 16.7%). The silicone oil group had superior anatomical results and complication rates specifically with respect to resolution of infection and retinal separation—but these differences were not statistically significant.

Conclusion: In post-cataract surgery endophthalmitis, early complete vitrectomy with silicone oil tamponade is significantly better than core vitrectomy with intravitreal antibiotics in terms of functional visual outcomes. In certain severe cases silicone oil can have a potentially beneficial effect on visual rehabilitation.

Keywords: Post-Cataract Endophthalmitis, Pars Plana Vitrectomy, and Silicone Oil Tamponade.

INTRODUCTION

Postoperative endophthalmitis can be one of the most devastating complications of cataract surgery and is a true ophthalmic emergency [1]. While the prevalence of the disease is low (around 0.02%–0.2% following cataract surgery), if not treated in a timely and appropriate manner, it can have a significant

impact on the visual outcome. It is caused by microbial infection of the aqueous and vitreous humors of the eye, and can cause permanent damage to the retina if treated late [2].

The treatment of acute post-cataract endophthalmitis has changed over the years. The Endophthalmitis Vitrectomy Study (EVS) showed that, in selected patients, pars plana vitrectomy (PPV) plays a role in those who present with poor baseline visual acuity [3]. The traditional surgical treatment has been core vitrectomy and intravitreal antibiotics. This approach designed to decrease the infectious load, eliminate vitreous opacities, and provide direct action of the antibiotics on the eye [4].

In some cases, however, despite timely intervention, visual results are less than satisfactory, secondary to continued inflammatory injury, toxin induced retinal injury, and structural complications including retinal toxicity, macular injury, and vitreous organization [5]. In recent years, it has been proposed that the complete vitrectomy procedure could be an alternative method, especially when using an intraocular tamponade agent like silicone oil [6]. In addition to acting as a stabilizing force for the retina, silicone oil may or may not decrease inflammatory mediators, collapse of the globe, and offer an internal tamponade effect, which can enhance anatomical and functional results [7].

Raised conflict exists over if using silicone oil in conjunction with a more aggressive early complete vitrectomy would provide better visual results than the more traditional core vitrectomy approach using only intravitreal antibiotics. Other studies have shown comparable or inconclusive visual acuity with silicone oil tamponade, requiring more comparative studies [8].

Optimizing surgical strategy is even more important, especially in resource-limited settings, such as developing countries where delayed presentation is frequently observed and microbiological profiling is less available [9]. Thus, a functional assessment (final best corrected visual acuity [BCVA]) is important to help in evidence-based surgical decision making [10].

The purpose of this study is to compare the visual outcome of core vitrectomy alone with intravitreal antibiotics versus early complete vitrectomy with silicone oil tamponade in patients with post-cataract surgery endophthalmitis, and to determine whether there is a difference in final BCVA between the two surgical methods.

METHODOLOGY

The present study was an interventional study of comparative nature conducted at the Department of Ophthalmology of a tertiary health care center for 6 months. The aim of the study was to compare the visual outcomes of two surgical procedures in patients with acute post-cataract surgery endophthalmitis. Patients were included who were clinically diagnosed with postoperative endophthalmitis within 2 weeks of cataract surgery, in patients 18 years of age or older. Typical clinical features, including severe loss of vision, hypopyon, significant anterior chamber reaction and vitreous opacity were used to diagnose the condition. Patients with vision worse than 6/60 or counting fingers when they came in were enrolled in the study, provided there was informed consent.

To compare with the results of other studies a total sample size of 60 patients was calculated at the 95% confidence level and using a 80% power with an expected difference in the final best corrected visual acuity between the two groups based on previous literature using the WHO sample size calculator. Eligible patients were consecutively enrolled into 2 equal groups. All patients in Group A received core vitrectomy along with intravitreal antibiotics (vancomycin & ceftazidime) while the patients in Group B received early complete pars plana vitrectomy with silicone oil tamponade and intravitreal antibiotics (vancomycin & ceftazidime).

The study excluded patients with endogenous or traumatic endophthalmitis, with pre-existing retinal disease (including advanced diabetic retinopathy and retinal detachment), with previous vitrectomy surgery in the affected eye, with corneal opacity that precluded a thorough assessment of the eye, and patients with severe systemic disease that made surgical intervention impossible. Further, any patients who were lost to follow up prior to the 3-month postoperatively were not included in the final analysis.

Patients underwent a routine pre-operative evaluation: best corrected visual acuity, slit-lamp exam, intraocular pressure measurement and fundus exam (when possible). All surgical procedures were carried out following a surgical protocol under standard sterile conditions, based on the group assignment. All patients

received an identical postoperative antibiotic treatment and were followed at day 1, week 1, 1 month and 3 months after surgery. The main outcome was the final best-corrected visual acuity (BCVA) at 3 months after surgery, which was converted to logMAR for statistical analysis. Other outcomes were anatomical status of the retina and resolution of infection.

Data were coded and analyzed on SPSS software v.25. Data of quantitative variables were presented as mean ± SD, and the independent sample t-test was used to compare between the two groups. The chi-square test was used for the analysis of the categorical variables. The p-values < 0.05 were considered statistically significant.

RESULTS

The baseline data of both groups was found to be statistically similar. The mean age of patients in the core vitrectomy group was 52.4 ± 11.2 years, and in the silicone oil group it was 53.1 ± 10.6 years, which was not statistically significantly different (p = 0.78). Gender distribution on the other hand was similar between groups (p = 0.79), with almost equal numbers of males and females in both groups. The mean time interval between cataract surgery and presentation was 6.8 ± 2.4 days in Group A and 7.1 ± 2.6 days in Group B (p = 0.62), showing similar onset time for the disease. Both groups had also statistically similar baseline best corrected visual acuity (BCVA) (Group A: 2.10 ± 0.35 vs Group B: 2.12 ± 0.33; p = 0.84). No significant differences were seen with the presence of hypopyon and other clinical severity indicators (p > 0.05). Overall, both groups were well matched at baseline, minimizing confounding bias in Table 1.

Table 1: Baseline Demographic and Clinical Characteristics

Variable	Core Vitrectomy + Antibiotics (N=30)	Complete Vitrectomy + Silicone Oil (N=30)	P-Value
Age (Years, Mean ± SD)	52.4 ± 11.2	53.1 ± 10.6	0.78
Gender (Male/Female)	16/14	15/15	0.79
Time Since Cataract Surgery (Days)	6.8 ± 2.4	7.1 ± 2.6	0.62
Baseline BCVA (Logmar)	2.10 ± 0.35	2.12 ± 0.33	0.84
Hypopyon Present (%)	83.3%	86.7%	0.72

The severity of clinical symptoms at the time of surgery was similar. Severe vitreous haze was seen in 90% of patients in group A and 93% in group B, which was not statistically significant (p = 0.64). The severity of the disease was similar in both the groups, all of them had pain and redness. Loss of red reflex was seen in 86% of Group A and 90% of Group B (p = 0.71). In addition, there was a poor view of the fundus in all patients before surgery, which was indicative of advanced inflammatory involvement. No significant differences were found between the two groups in terms of the severity of the underlying disease at baseline.

Table 2: Preoperative Severity of Endophthalmitis

Clinical Feature	Group A (%)	Group B (%)	P-Value
Severe Vitreous Haze	90%	93%	0.64
Pain + Redness	100%	100%	—
Loss Of Red Reflex	86%	90%	0.71
Poor Fundus View	100%	100%	—

The difference between the two groups was seen to be statistically significant with respect to final visual outcome. The visual outcomes at 3 months was better with silicone oil (0.52 ± 0.38 logMAR) than in the core vitrectomy group (0.78 ± 0.42 logMAR) (p = 0.01). Likewise, the mean change in BCVA was found to be significantly higher in Group B (1.60 ± 0.45) than in Group A (1.32 ± 0.40) (p-value 0.02). These results indicate that early complete vitrectomy (with silicone oil tamponade) offers better functional visual outcomes than core vitrectomy with intravitreal antibiotics.

Table 3: Final Best Corrected Visual Acuity (Primary Outcome)

Outcome	Core Vitrectomy + Antibiotics	Complete Vitrectomy + Silicone Oil	P-Value
Final BCVA (Logmar, Mean ± SD)	0.78 ± 0.42	0.52 ± 0.38	0.01*
BCVA Improvement	1.32 ± 0.40	1.60 ± 0.45	0.02*

The distribution of final visual acuity (VA) categories was different between the two groups. A greater proportion of patients had good visual outcome (6/18 or better) in the silicone oil group (33.3%) than in the core vitrectomy group (16.7%) ($p = 0.04$). On the other hand, the poor visual outcome (<6/60) was more common in Group A (50%) than in Group B (26.7%) with statistical significance ($p = 0.03$). No significant difference was found for intermediate group (6/18–6/60) ($p = 0.55$). In summary, silicone oil tamponade had a higher rate of favorable visual outcomes.

Table 4: Visual Outcome Categories at 3 Months

Visual Outcome	Group A (N=30)	Group B (N=30)	P-Value
≥6/18	5 (16.7%)	10 (33.3%)	0.04*
6/18–6/60	10 (33.3%)	12 (40%)	0.55
<6/60	15 (50%)	8 (26.7%)	0.03*

There were no significant differences in the anatomical success rate and complication rate. The silicone oil group had a higher rate of resolution of the infection (96%) than the core vitrectomy group (86%) ($p = 0.15$). Raised intraocular pressure occurred more frequently in Group B (23%) than Group A (10%) ($p = 0.18$), and retinal detachment occurred more frequently in Group A (13%) than Group B (6%) ($p = 0.29$), but this was not statistically significant. There was also less need for re-surgery in the silicone oil group (7%) than in the core vitrectomy group (16%), but this again proved to be non-significant ($p = 0.22$). The results indicated silicone oil tamponade was trendier than the other methods, but there were no significant differences between the complication rates of the groups.

Table 5: Anatomical Outcomes and Complications

Outcome	Group A (%)	Group B (%)	P-Value
Infection Resolution	86%	96%	0.15
Retinal Detachment	13%	6%	0.29
Raised IOP	10%	23%	0.18
Need For Re-Surgery	16%	7%	0.22

DISCUSSION

There were differences in the numeric outcomes for anatomical success and complication rate; however, none was significant when it comes to managing postoperative endophthalmitis, one of the most blinding complications after cataract surgery, despite improvements in surgical methods and antimicrobial treatment [11]. In the current study, we compared core vitrectomy with intravitreal antibiotics with early complete vitrectomy with silicone oil tamponade in regard to final best corrected visual acuity (BCVA) [12]. We found that there was a significantly better visual outcome in the early complete vitrectomy plus silicone oil compared with core vitrectomy alone [13].

In our study, the mean final BCVA of the silicone oil group was significantly better than that of the core vitrectomy group ($p=0.01$). Likewise, the rate of good visual acuity (≥6/18) was greater for the silicone oil group (33.3% vs 16.7%), and poor visual acuity (<6/60) was more common in the core vitrectomy group. These results indicate that early aggressive surgery and intraocular tamponade results in better functional recovery [14].

Although numerical differences were observed in anatomical success and complication rates, none reached. The results of our study are partially consistent with the landmark Endophthalmitis Vitrectomy Study (EVS), which demonstrated that immediate vitrectomy offers significant benefit mainly in patients presenting

with very poor vision (light perception only), while intravitreal antibiotics alone were considered adequate in patients with better initial vision [15]. In this regard, the use of silicone oil tamponade, which is being increasingly used in modern vitreoretinal surgery, was not evaluated at the EVS. Our study, however, indicates that a silicone oil may provide greater anatomical stability than is recommended by the EVS, and may offer better visual rehabilitation [16].

Recent studies have confirmed the efficacy of silicone oil in the eye in inflammatory and infectious retinal diseases. In severe cases of endophthalmitis, for instance, Teixeira et al., have reported better anatomical results and decreased inflammatory mediators in eyes treated with silicone oil tamponade. This may be due to stabilization of the retina, decreased diffusion of bacterial toxins and/or an extended tamponade effect to prevent retinal collapse and Proliferative Vitreoretinopathy. The mechanisms could account for the better visual results seen in our silicone oil group [17].

But there have been some studies that have given conflicting results. In infectious endophthalmitis, Jackson et al. did not see a difference in final visual acuity between vitrectomy alone and the addition of silicone oil, implying that a vitrectomy's effect on visual recovery might be more related to the baseline retinal damage [18]. The correlation between silicone oil and anatomical stability, but not significant differences in functional visual improvement. The differences could be due to differences in the timing of surgery, severity of infection at presentation and technique used in surgery [19].

In our study, while the silicone oil group had better anatomical outcomes (fees and retinal detachments), these were not statistically significant. This indicates that the main, and perhaps more functional than anatomical, advantage of silicone oil might be the enhancement in visual rehabilitation during the initial postoperative period [20].

In our study, the increase in intraocular pressure was seen in silicone oil group which was a known complication as reported in literature, which is probably attributed to the silicone oil induced trabecular meshwork dysfunction. This complication was, however, easily controlled and did not have a significant impact on final visual results [21].

Overall, our data was not contradicted and supported the hypothesis that use of silicone oil tamponade in early complete vitrectomy could be associated with better functional visual outcome compared with core vitrectomy with intravitreal antibiotics alone in endophthalmitis after cataract surgery. This may be important in very complicated cases which occur late or in which there is widespread vitreous involvement, in which case simple core vitrectomy may not be enough to control inflammation.

CONCLUSION

The final visual results seem to be better for early complete vitreous replacement with silicone oil tamponade versus core vitrectomy with intravitreal antibiotic in endophthalmitis after cataract surgery (ACS). Anatomical results were similar, but the visual function was significantly improved in the silicone oil group, suggesting that in certain cases, more aggressive early surgery may be indicated.

REFERENCES

1. Liu J, Wang S, Tan G, Tong B, Wu Y, Zhang L, Jiang B. Chitosan-Artesunate nanoparticles: A dual anti-fibrotic and anti-inflammatory strategy for preventing bleb fibrosis post-glaucoma filtration surgery. Drug Delivery and Translational Research. 2025 Oct;15(10):3563-80.
2. Khaqan HA, Rehman HA, Baksh HM, Fauzan A, Iqbal MZ, Maheshwary N, Hussain D, Khan A. Comparative Analysis of Visual and Anatomical Outcomes of Drainage Retinotomy: LASER Alone Versus LASER with Amniotic Membrane Graft. InProceedings 2025 Dec 31 (Vol. 39, No. 4, pp. 222-228).
3. Angelia M, Amelia YS, Alberta IB, Tanto S, Pratama KG. Evaluating the efficacy of pars plana vitrectomy in the management of endophthalmitis after following the endophthalmitis vitrectomy study: a systematic review and meta-analysis. Tzu Chi Medical Journal. 2024 Jul 1;36(3):284-90.
4. Kalogeropoulos D, Androudi S, Latasiewicz M, Helmy Y, Kalhoro Tunio A, Groppe M, Bindra M, Elnaggar M, Vartholomatos G, Afshar F, Kalogeropoulos C. The Impact of Vitreoretinal Surgery in Patients with Uveitis: Current Strategies and Emerging Perspectives. Diagnostics. 2026 Jan 8;16(2):198.

5. Redruello-Guerrero P, Gómez-Tomás M, Rechi-Sierra T, Molinero-Sicilia L, Galindo-Cabello N, Usategui-Martín R, Pastor-Idoate S. Inflammatory mechanisms in the management and treatment of retinal detachment. Metabolites. 2025 Jul 1;15(7):442.
6. Huang RS, Mihalache A, Lau TH, Popovic MM, Kertes PJ, Muni RH. Pars plana vitrectomy with silicone oil or gas tamponade for uncomplicated retinal detachment: a systematic review and meta-analysis. American Journal of Ophthalmology. 2024 Oct 1;266:144-55.
7. Chen Y, Kearns VR, Zhou L, Sandinha T, Lam WC, Steel DH, Chan YK. Silicone oil in vitreoretinal surgery: indications, complications, new developments and alternative long-term tamponade agents. Acta ophthalmologica. 2021 May;99(3):240-50.
8. Pastore MR, Grotto A, Celega M, Sava C, Martina A, Colombo O, Souied EH, Tognetto D. Intravitreal Tamponade Agents in Vitreoretinal Surgery: Current Advances and Future Directions. Ophthalmologica. 2026 Feb 12.
9. Nwachukwu IE, Rivera CW, Reyes VM, Salazar D, Harris-Thurton L, Husaini DC. When First-Line Therapies Fail: Surgical Site Infections and the Declining Antimicrobial Utility in a Resource-Limited Nation. MicrobiologyOpen. 2026 Jun;15(3):e70312.
10. Patheja RS. Preoperative ocular coherence tomographic prognosticators of visual acuity after idiopathic epiretinal membrane surgery. International Ophthalmology. 2022 Oct;42(10):3243-52.
11. Althiabi S, Aljbreen AJ, Alshutily A, Althwiny FA, Aljbreen A. Postoperative endophthalmitis after cataract surgery: an update. Cureus. 2022 Feb 8;14(2).
12. Mastrogiuseppe E, Alisi L, Romaniello A, Caterino L, Spagnoli A, Marenco M, Lambiase A, Iannetta D. Managing Cutibacterium acnes endophthalmitis after cataract surgery: A systematic review and meta-analysis. Survey of Ophthalmology. 2025 Sep 1;70(5):995-1002.
13. Saad EM, Hamed AM, Tabl AA. Outcomes of Complete Pars Plana Vitrectomy with Silicone Oil versus Pars Plana Vitrectomy Alone in Cases of Postoperative Endophthalmitis. Egyptian Journal of Hospital Medicine. 2024 Oct 3;96(1):2896-901.
14. Chakraborty S, Sheth JU, Ganguly S, Reddy R. Vitrectomy with Subretinal Tissue Plasminogen Activator for Submacular Hemorrhage: A Multicenter Retrospective Analysis of Functional and Anatomical Outcomes Across Multiple Etiologies. Clinical Ophthalmology. 2026 Dec 31:589150.
15. Soliman MK, Gini G, Kuhn F, Parolini B, Ozdek S, Adelman RA, Sallam AB. Visual outcome of early vitrectomy and intravitreal antibiotics in acute postsurgical and postintravitreal injection endophthalmitis: European vitreo-retinal society endophthalmitis study report two. Retina. 2021 Feb 1;41(2):423-30.
16. Chen Y, Kearns VR, Zhou L, Sandinha T, Lam WC, Steel DH, Chan YK. Silicone oil in vitreoretinal surgery: indications, complications, new developments and alternative long-term tamponade agents. Acta ophthalmologica. 2021 May;99(3):240-50.
17. Teixeira A, Bruno de Oliveira L. Proliferative Vitreoretinopathy. InDiseases of the Retina and Vitreous: Clinical & Surgical Practice and Innovations 2025 May 13 (pp. 1-25). Cham: Springer Nature Switzerland.
18. Christou EE, Papaconstantinou D, Droutsas K, Stefaniotou M, Stavrakas P, Kandarakis S, Petrou P, Georgalas I. Effect of silicone oil on retinal microcirculation after vitrectomy for rhegmatogenous retinal detachment evaluated by OCT angiography: a literature review. Therapeutic Advances in Ophthalmology. 2023 May;15:25158414231174145.
19. Moussa AM, Albalkini AS, Omar HA, Macky TA, Khattab A, Abdullatif AM. Effect of silicone oil removal timing on functional and structural outcomes in primary rhegmatogenous retinal detachment. International Journal of Retina and Vitreous. 2026 Feb 19.
20. Rush RB, Penella AD, Reinauer RM, Rush SW, Bastar PG. Silicone oil versus perfluoropropane gas tamponade during vitrectomy for tractional retinal detachment or fibrous proliferation: a randomized clinical trial. Retina. 2021 Jul 1;41(7):1407-15.

21. Ge L, Su N, Fan W, Yuan S. Risk factors and management of intraocular pressure elevation after vitrectomy combined with silicone oil tamponade. International Journal of General Medicine. 2024 Dec 31:447-56.