e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(8); 1656-1660

Original Research Article

Retained Lens Fragments in the Anterior Chamber Post-Phacoemulsification: Clinical Features and Outcomes

Pramod Kumar[1], Swati Singh[2], Jawed Eqbal[3]

[1]Senior Resident, Department of Ophthalmology, Anugraha Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

[2]PG 3rd Year, Department of Ophthalmology, Anugraha Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

[3]Associate Professor, Department of Ophthalmology, Anugraha Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

Received: 21-06-2025 / Revised: 20-07-2025 / Accepted: 21-08-2025

Corresponding Author: Dr. Pramod Kumar

Conflict of interest: Nil

Abstract:

Background: Retained lens fragments in the anterior chamber are an uncommon but significant complication following phacoemulsification, often resulting in inflammation, corneal edema, and raised intraocular pressure if not managed promptly. The impact on visual outcomes highlights the importance of early recognition and appropriate intervention.

Aim: To assess the clinical characteristics, treatment approaches, and results of individuals who have anterior chamber residual lens fragments following phacoemulsification.

Methods: Over the course of a year, a prospective observational study was carried out at the Anugraha Narayan Magadh Medical College and Hospital's Department of Ophthalmology in Gaya. 110 individuals with fragments of their retained lenses were included in the study. Demographic information, clinical characteristics, management style, and postoperative results were gathered. Follow-up was done for three months after patients were treated conservatively or surgically. SPSS version 23.0 was used for the statistical analysis, and $p < 0.05$ was chosen as the significance level.

Results: Blurred vision was the most common presenting complaint (81.8%), followed by ocular discomfort (65.4%) and redness (36.3%). Raised intraocular pressure was documented in 26.4% of cases. Management included conservative treatment in 34.5% and surgical removal in 65.5%. At 3-month follow-up, 70.9% achieved BCVA ≥6/12, while 29.1% had BCVA <6/12. Surgical removal yielded significantly better visual outcomes compared to conservative management ($p = 0.021$). Persistently raised intraocular pressure was associated with poorer visual prognosis ($p = 0.014$).

Conclusion: Retained lens fragments in the anterior chamber after phacoemulsification can significantly impair vision if not identified and treated promptly. Surgical intervention provides superior outcomes compared to conservative management, particularly in cases with nuclear fragments or uncontrolled intraocular pressure.

Recommendations: It is important to prioritize routine postoperative evaluation with slit-lamp examination in order to guarantee early identification of residual fragments. Surgery should be performed as soon as possible on patients who exhibit severe symptoms or problems in order to maximize visual recovery. To create consistent management guidelines, further extensive multicenter investigations are advised.

Keywords: Cataract Surgery, Phacoemulsification, Retained Lens Fragments, Anterior Chamber, Visual Outcomes.

Introduction

The most common surgical procedure at the moment is phacoemulsification because of its safety, quick recovery, and good visual results. Cataracts continue to be the primary cause of reversible blindness globally. The retention of lens fragments in the anterior chamber is one of the problems that still arise despite improvements in surgical technique. Retained lens fragments might impair postoperative visual recovery by causing secondary ocular morbidity, including corneal edema, chronic intraocular inflammation, and elevated intraocular pressure [1,2].

The incidence of retained lens fragments following phacoemulsification has been reported to range between 0.1% and 1.5% [3]. While small cortical fragments may resorb spontaneously, larger nuclear pieces usually persist and require active

management, either medically or surgically. Failure to intervene promptly may result in sight-threatening complications, including glaucoma, persistent corneal decompensation, or cystoid macular edema [4]. Thus, timely diagnosis and management of retained fragments are crucial for favorable long-term outcomes.

Several recent studies have emphasized the importance of risk stratification in cataract surgery. Factors such as shallow anterior chamber depth, hard nuclear cataracts, and surgical inexperience have been associated with an increased likelihood of lens material retention [5]. Modern imaging modalities, including anterior segment optical coherence tomography (AS-OCT), have further improved the detection of small, residual fragments that may otherwise be overlooked on routine slit-lamp examination [6].

Management strategies for retained lens fragments vary depending on fragment size, location, and associated complications. Conservative treatment, consisting of topical corticosteroids and intraocular pressure-lowering agents, may be sufficient for small cortical remnants. However, surgical intervention such as anterior chamber washout or pars plana vitrectomy is often required for nuclear fragments or in cases with uncontrolled intraocular pressure [7]. Studies have consistently shown that patients undergoing timely fragment removal have significantly better visual outcomes compared to those managed conservatively [8].

Despite being a relatively uncommon complication, the clinical and prognostic implications of retained lens fragments make it an important area of investigation. Evaluating the clinical features, management approaches, and outcomes in affected patients can help refine surgical practices, enhance early detection, and guide optimal treatment strategies. In a tertiary care hospital setting, the current study is to examine the clinical features and results of retained lens fragments in the anterior chamber after phacoemulsification.

Methodology

Study Design: This research was designed as a prospective observational study.

Study Setting: The study was conducted at the Department of Ophthalmology, Anugraha Narayan Magadh Medical College and Hospital, Gaya, over a duration of 12 months.

Participants: The study comprised 110 patients who underwent phacoemulsification and subsequently developed retained lens pieces in the anterior chamber. Every participant underwent a methodical evaluation, and results were tracked.

Inclusion Criteria

Patients were eligible if they:

- Had undergone phacoemulsification for cataract surgery.
- Were diagnosed with retained lens fragments in the anterior chamber postoperatively.
- Provided informed consent for participation and follow-up.

Exclusion Criteria

Patients were excluded if they:

- Had pre-existing ocular comorbidities such as glaucoma, corneal dystrophies, or uveitis.
- Had intraoperative complications other than retained lens fragments (e.g., posterior capsular rupture with vitreous loss).
- Failed to complete follow-up evaluations.

Bias: All consecutive patients who met the inclusion criteria during the study period were enrolled in order to reduce selection bias. By having two ophthalmologists independently verify clinical assessments, observer bias was lessened.

Data Collection: Data were collected using a structured proforma, including demographic details, clinical features, surgical notes, time of presentation, management procedures, and postoperative outcomes. Standard ophthalmic examinations such as slit-lamp biomicroscopy, intraocular pressure measurement, and visual acuity assessment were performed at each follow-up.

Procedure: All patients underwent detailed ophthalmic evaluation post-phacoemulsification. Retained lens fragments were managed either conservatively or surgically (anterior chamber wash or removal), depending on fragment size, location, and associated complications. Follow-up was conducted at regular intervals to assess intraocular pressure, inflammation, corneal clarity, and best corrected visual acuity.

Statistical Analysis: SPSS software, version 23.0, was used to enter and analyze the data. The mean ± standard deviation (SD) was used to represent continuous variables, whereas frequencies and percentages were used to represent categorical variables. For categorical data, the chi-square test or Fisher's exact test was used to examine associations between variables; for continuous data, the Student's t-test was employed. Statistical significance was established at a p-value of less than 0.05.

Results

The study comprised 110 patients who had residual lens pieces in the anterior chamber following phacoemulsification. Participants' ages ranged from 45 to 78 years old, with a mean age of 62.4 ± 8.3

years. 42 (38.2%) of these were female, while 68 (61.8%) were male.

Table 1: Baseline Characteristics of Study Participants

Variable	Value (n=110)
Mean Age (years)	62.4 ± 8.3
Gender – Male	68 (61.8%)
Gender – Female	42 (38.2%)
Laterality – Right Eye	57 (51.8%)
Laterality – Left Eye	53 (48.2%)

The majority of patients were male and presented with nearly equal distribution between right and left eyes.

Clinical Presentation: The most common presenting symptom was blurred vision (81.8%), followed by ocular discomfort (65.4%) and redness (36.3%). Raised intraocular pressure was noted in 29 patients (26.4%).

Table 2: Clinical Features at Presentation

Clinical Feature	Frequency (n)	Percentage (%)
Blurred Vision	90	81.8%
Ocular Discomfort	72	65.4%
Redness	40	36.3%
Raised IOP (>21 mmHg)	29	26.4%
Corneal Edema	24	21.8%

Most patients complained of blurred vision, with a significant proportion also developing ocular discomfort and raised intraocular pressure.

Management Approach: Out of 110 patients, 38 (34.5%) were managed conservatively with topical steroids and anti-glaucoma medications, while 72 (65.5%) had pieces of their residual lens surgically removed (anterior chamber washout).

Table 3: Management Modalities

Management Type	Number of Patients (n)	Percentage (%)
Conservative (medical only)	38	34.5%
Surgical (fragment removal)	72	65.5%

Surgical removal was the preferred intervention in the majority of cases, particularly when fragments were large or associated with complications.

Postoperative Outcomes: At the 3-month follow-up, 78 patients (70.9%) achieved BCVA ≥6/12, while 32 patients (29.1%) had BCVA <6/12 due to persistent corneal edema, glaucoma, or posterior segment complications.

Raised IOP persisted in 12 patients (10.9%), despite medical or surgical intervention. Corneal clarity improved significantly in patients who underwent timely surgical removal (p = 0.032, Chi-square test).

Table 4: Postoperative Visual Outcomes at 3 Months

BCVA (Best Corrected Visual Acuity)	Number of Patients (n)	Percentage (%)
≥ 6/12	78	70.9%
< 6/12	32	29.1%

The majority of patients achieved good postoperative visual acuity, with better outcomes noted in the surgically managed group.

Statistical Analysis

- Compared to patients treated conservatively, those undergoing surgical removal saw noticeably improved visual outcomes (p = 0.021, Chi-square test).
- Poorer visual results were substantially correlated with higher IOP (p = 0.014, Student's t-test).
- There was no discernible correlation between gender and the outcome (p = 0.482).

Discussion

Males predominated in this research of 110 patients with retained lens pieces in the anterior chamber after phacoemulsification, and most of them were elderly, with a mean age of 62.4 years. There was no indication of a side-specific predilection as the laterality distribution was almost equal between the right and left eyes.

The most frequent presenting symptom was blurred vision (81.8%), followed by ocular discomfort (65.4%) and redness (36.3%). Raised intraocular pressure (26.4%) and corneal edema (21.8%) were the most common complications at presentation. These findings emphasize that retained lens fragments often manifest not only as visual disturbances but also with secondary ocular morbidities that, if untreated, may compromise long-term vision.

Regarding management, surgical intervention (65.5%) was more commonly required than conservative treatment (34.5%). Patients undergoing fragment removal had significantly better visual outcomes compared to those managed medically. At three months, 70.9% of patients achieved a (BCVA) of 6/12 or better, indicating that timely surgical removal yields favorable results.

Persistent raised intraocular pressure was seen in 10.9% of patients despite treatment, underscoring the importance of close monitoring of postoperative glaucoma. Statistical analysis further revealed that raised IOP was significantly associated with poorer visual outcomes, while gender had no influence on prognosis.

Retained lens fragments in the anterior chamber following phacoemulsification remain a significant postoperative complication with implications for visual prognosis. Saleh et al. emphasized that small lens fragments may dissolve spontaneously, but larger ones frequently require surgical removal to prevent corneal edema, persistent uveitis, and secondary glaucoma [9]. Similarly, Dharma et al. highlighted that early recognition and prompt removal were critical in preserving corneal endothelial cell density and minimizing long-term visual impairment [10].

Kang et al. reported that delayed management was strongly associated with corneal decompensation and raised (IOP), reinforcing the importance of timely surgical intervention [11]. In line with this, Raju et al. demonstrated that anterior chamber irrigation/aspiration or secondary pars plana vitrectomy, when fragments migrated posteriorly, achieved favorable visual outcomes when performed without delay [12].

Recent studies continue to expand on these findings. Shousha et al. observed that persistent inflammation and cystoid macular edema were more likely in eyes where retained fragments were left untreated for prolonged periods, again stressing surgical removal as the standard of care [13]. Likewise, Kim et al. showed that surgical retrieval of retained cortical fragments resulted in significant improvement in (BCVA) and reduction in IOP, with complications being minimal when the intervention was early [14].

Conclusion

If left untreated following phacoemulsification, retained lens fragments in the anterior chamber can have a major impact on visual results. Surgical removal was associated with better visual recovery compared to conservative management, while raised intraocular pressure emerged as an important predictor of poor prognosis. Early detection and timely intervention are key to achieving favorable postoperative outcomes.

References

1. Shah MA, Shah SM, Patel KD, Patel TP. Outcomes of retained lens fragments after phacoemulsification. Clin Ophthalmol. 2019;13:2381–7.
2. Khan MA, Shahid H, Song Y. Retained lens material after cataract surgery: current management and clinical outcomes. Eye (Lond). 2020;34(6):1072–9.
3. Shorstein NH, Herrinton LJ, Liu L. Comparative risk of retained lens fragments following phacoemulsification. J Cataract Refract Surg. 2019;45(5):657–63.
4. Lee SY, Lee SJ, Kim M. Clinical outcomes of surgical removal of retained lens fragments in the anterior chamber. BMC Ophthalmol. 2021;21(1):227.
5. Abell RG, Vote BJ. Risk factors for retained lens fragments after cataract surgery. Ophthalmology. 2019;126(9):1272–8.
6. Cho H, Kim M, Kim EC. Role of anterior segment OCT in detecting retained lens fragments. Graefes Arch Clin Exp Ophthalmol. 2020;258(8):1683–90.
7. Weikert MP, Koch DD. Management of nuclear fragments in the anterior chamber after cataract surgery. Curr Opin Ophthalmol. 2019;30(1):29–34.
8. Oetting TA, Omphroy LC. Visual prognosis after removal of retained nuclear fragments. Am J Ophthalmol. 2021;227:73–9.
9. Saleh R, Ghoneim A, El-Sebaity D. Management of retained lens fragments in the anterior chamber after phacoemulsification. J Cataract Refract Surg. 2020;46(5):709-715.
10. Dharma S, Lestari W, Sutjipto A. Retained lens fragments in the anterior chamber: clinical features and outcomes. Clin Ophthalmol. 2021;15:2917-2923.
11. Kang J, Lee H, Cho A. Retained lens fragments in the anterior chamber after cataract surgery: clinical outcomes and complications. Korean J Ophthalmol. 2020;34(3):204-210.
12. Raju VK, Sinha R, Shroff CM. Outcomes of retained lens fragments following phacoemulsification. Indian J Ophthalmol. 2019;67(9):1412-1418.
13. Shousha MA, Osman IM, Bayoumi NH. Impact of delayed removal of retained lens fragments

on postoperative complications. Middle East Afr J Ophthalmol. 2020;27(4):234-239.
14. Kim JH, Park JY, Hwang HB. Clinical results after removal of retained cortical fragments post-cataract surgery. BMC Ophthalmol. 2021;21(1):112-118.