

Clinical Profile, Management, Visual Outcome and Prognostic Factors in Patients with Lens-Induced Glaucoma: A Prospective Observational Study**Mrutyunjaya Khadia¹, Ramamani Dalai², D. Anuradha³, Tarun Kumar Panda⁴, Kedar Nath Das⁵**¹Postgraduate Resident, Department of Ophthalmology, RIO SCB Medical College Cuttack, Odisha, India²Professor, Department of Ophthalmology, RIO SCB Medical College Cuttack, Odisha, India³Assistant Professor, Department of Ophthalmology, RIO SCB Medical College Cuttack, Odisha, India⁴Professor and Head, Department of Ophthalmology, RIO SCB Medical College Cuttack, Odisha, India

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Abstract:**Background:** Lens-induced glaucoma (LIG) is an important form of secondary glaucoma associated with advanced cataract and lens-related abnormalities. It may present with marked elevation of intraocular pressure (IOP), severe visual impairment, corneal edema and significant intraocular inflammation. Delayed presentation may adversely affect visual prognosis. Early recognition, control of IOP and definitive removal of the offending lens remain the main principles of management.**Aim:** To evaluate the clinical profile, types, management, postoperative visual outcome, IOP control, complications and prognostic factors in patients with lens-induced glaucoma.**Materials and Methods:** This prospective observational study was conducted at the Regional Institute of Ophthalmology, S.C.B. Medical College, Cuttack. A total of 100 consecutive patients clinically diagnosed with LIG and fulfilling the eligibility criteria were included. Detailed demographic and clinical information was recorded. Visual acuity, IOP, slit-lamp findings, lens status and other ocular findings were documented. Patients received appropriate initial medical treatment for IOP reduction and control of inflammation, followed by definitive cataract extraction with or without additional glaucoma surgery. Postoperative assessments were performed on day 1, day 7 and 6 weeks. Visual outcome, IOP control and complications were evaluated. Statistical significance was considered at $p < 0.05$.**Results:** The mean age of the study population was 66.8 ± 8.4 years, and 63% were female. Rural residents constituted 71% of participants. Phacomorphic glaucoma was the most common subtype (68%), followed by phacolytic glaucoma (27%). The mean presenting IOP was 43.8 ± 9.6 mmHg, and 82% of patients presented with perception of light or hand-movement vision. Small-incision cataract surgery with posterior chamber intraocular lens implantation was the most frequently performed procedure (65%). At 6 weeks, 43% achieved visual acuity of 6/6–6/12, while 90% achieved 6/60 or better. Mean IOP decreased from 43.8 ± 9.6 mmHg preoperatively to 18.4 ± 4.2 mmHg on postoperative day 1 and 16.2 ± 3.8 mmHg at 6 weeks ($p < 0.001$). Earlier presentation and lower preoperative IOP were significantly associated with better visual outcomes.**Conclusion:** Lens-induced glaucoma predominantly affected elderly patients and was frequently associated with delayed presentation and severe visual impairment. Definitive lens extraction following appropriate initial IOP control resulted in substantial reduction in IOP and favorable visual outcomes in most patients. Earlier presentation and lower preoperative IOP were important predictors of better postoperative visual recovery.**Keywords:** Lens-induced glaucoma; phacomorphic glaucoma; phacolytic glaucoma; cataract; intraocular pressure; visual outcome; prognostic factors.**DOI:** 10.25258/ijcpr.18.8.293

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Introduction

Lens-induced glaucoma (LIG) comprises a group of secondary glaucomatous disorders in which abnormalities of the crystalline lens or lens-related material result in elevation of intraocular pressure (IOP). Depending on the underlying mechanism, LIG may occur because of lens swelling with

secondary angle closure, leakage of lens proteins, retained lens particles, or lens subluxation or dislocation. [1]

Phacomorphic glaucoma is caused by an enlarged or intumescent cataractous lens, which produces

forward displacement of the iris–lens diaphragm, shallowing of the anterior chamber and narrowing or closure of the anterior chamber angle, thereby impairing aqueous outflow. Phacolytic glaucoma, in contrast, is typically associated with a hypermature cataract and leakage of lens proteins into the anterior chamber, resulting in obstruction and dysfunction of the trabecular outflow pathway. [1,2]

Lens-induced glaucoma remains an important cause of secondary glaucoma in developing countries, including India, where delayed presentation with advanced cataract continues to occur. Indian studies have documented the clinical features, visual outcomes and risk factors associated with phacomorphic and other lens-induced glaucomas and have emphasized the importance of timely management. [3,4]

Patients with LIG commonly present with acute or subacute diminution of vision, ocular pain, redness, headache and markedly elevated IOP. Corneal edema, anterior chamber inflammation, a shallow anterior chamber and a fixed or mid-dilated pupil may be present, depending on the underlying mechanism. Recognition of the lens-related cause is important because the clinical presentation may resemble other forms of acute secondary or primary angle-closure glaucoma. [1]

Initial treatment is directed toward lowering IOP and controlling intraocular inflammation, thereby improving the ocular condition before definitive intervention. However, medical therapy alone does not correct the underlying lens pathology. Definitive treatment generally involves removal of the causative cataractous lens or retained lens material, with additional glaucoma surgery considered when clinically indicated. [5,6] Manual small-incision cataract surgery has been reported to provide substantial IOP reduction and satisfactory visual outcomes in eyes with phacomorphic glaucoma, including in resource-limited settings. [5,7]

Visual outcome following treatment may be influenced by the severity and duration of the glaucomatous episode. Previous studies have reported an association between shorter symptom duration and better postoperative visual outcomes in patients with phacomorphic and phacolytic glaucoma. [4,8] These observations highlight the importance of early recognition, prompt referral and timely definitive treatment.

The present study was therefore undertaken to evaluate the clinical profile, types, management, postoperative visual outcome, IOP control, complications and factors associated with visual outcome among patients with lens-induced glaucoma presenting to a tertiary-care ophthalmic centre.

Materials and Methods

Study Design: This was a hospital-based prospective observational study conducted to evaluate the clinical features, treatment modalities, postoperative outcomes and prognostic factors in patients diagnosed with lens-induced glaucoma.

Study Setting: The study was conducted at the Regional Institute of Ophthalmology, S.C.B. Medical College, Cuttack, a tertiary referral ophthalmic centre catering to patients from both urban and rural areas.

Study Population: All consecutive patients presenting to the outpatient or emergency department and clinically diagnosed with lens-induced glaucoma during the study period were considered for inclusion.

Inclusion Criteria

Patients were included if they:

1. Were clinically diagnosed with lens-induced glaucoma.
2. Provided written informed consent for participation.

Exclusion Criteria

Patients were excluded if they had:

- Primary glaucoma.
- Secondary glaucoma caused by conditions other than lens-induced glaucoma.
- A medical condition rendering them unfit for surgical intervention.

Study Procedure: After obtaining written informed consent, a detailed history was recorded, including age, sex, duration of symptoms, diminution of vision, ocular pain, redness, headache, watering, vomiting, history of trauma and previous ocular surgery.

A complete general and systemic examination was performed before ophthalmic assessment.

Visual acuity was assessed using a standard Snellen chart. IOP was measured using Goldmann applanation tonometry. Slit-lamp biomicroscopy was performed to assess corneal clarity, anterior chamber depth and reaction, lens status, presence of lens material and other anterior-segment abnormalities. Gonioscopy was performed wherever feasible to evaluate the angle configuration and mechanism of IOP elevation.

Patients diagnosed with LIG were admitted for appropriate management. Initial medical treatment was directed toward reduction of IOP and control of intraocular inflammation. Depending on clinical severity, treatment included topical beta-blockers, topical carbonic anhydrase inhibitors, oral

acetazolamide, intravenous mannitol, topical corticosteroids and cycloplegics.

Following adequate control of IOP and inflammation, definitive surgical treatment was performed. Surgical procedures included small-incision cataract surgery (SICS) with posterior chamber intraocular lens implantation (PCIOL), phacoemulsification with PCIOL implantation, combined cataract surgery and trabeculectomy, SICS with aphakia and SICS with scleral-fixated intraocular lens implantation, depending on the individual clinical requirement.

Postoperative Follow-up: Patients were assessed on postoperative day 1, day 7 and 6 weeks. At each visit, visual acuity, IOP, slit-lamp findings and postoperative complications were documented. Final visual outcome and IOP control were evaluated at the last follow-up.

Outcome Measures

The primary outcome measures were:

1. Postoperative visual acuity at 6 weeks.
2. Postoperative IOP control.

Secondary outcome measures included:

1. Intraoperative complications.
2. Postoperative complications.
3. Association between preoperative IOP and visual outcome.

4. Association between duration of symptoms and visual outcome.

Statistical Analysis: Data were compiled and analyzed using standard statistical software. Categorical variables were expressed as frequencies and percentages. Continuous variables were expressed as mean±standard deviation. Associations between categorical variables were assessed using the chi-square test. Continuous variables were compared using Student's t-test or analysis of variance, as appropriate. A p-value <0.05 was considered statistically significant.

Ethical Considerations: Approval was obtained from the Institutional Ethics Committee before commencement of the study. Patients were counselled regarding the disease, study objectives, treatment plan and follow-up schedule. Participation was voluntary, and written informed consent was obtained from all participants.

Results

A total of 100 patients with lens-induced glaucoma were included in the study.

Demographic Characteristics: The mean age was 66.8±8.4 years, with the majority of patients belonging to the 61–70-year age group (47%). Females constituted 63% of the study population, while 71% were from rural areas.

Table 1: Baseline demographic characteristics of the study population (n=100)

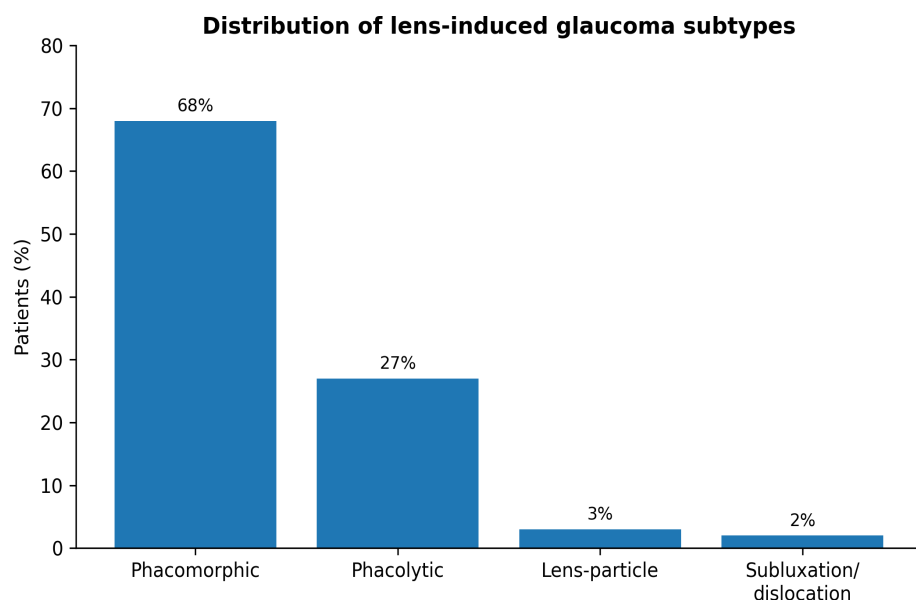
Characteristic	Number (%)
Age group (years)	
40–50	5 (5.0)
51–60	18 (18.0)
61–70	47 (47.0)
71–80	28 (28.0)
>80	2 (2.0)
Mean age ± SD	66.8±8.4 years
Sex	
Male	37 (37.0)
Female	63 (63.0)
Residence	
Rural	71 (71.0)
Urban	29 (29.0)

The demographic profile is summarized in Table 1. The predominance of elderly patients and females, together with the high proportion of rural residents, indicates that LIG occurred predominantly among older patients presenting from rural communities.

Type of Lens-Induced Glaucoma: Phacomorphic glaucoma was the most common subtype, accounting for 68% of cases, followed by phacolytic glaucoma in 27%. Lens-particle glaucoma and glaucoma associated with lens subluxation/dislocation accounted for 3% and 2%, respectively.

Table 2: Types of lens-induced glaucoma (n=100)

Type of LIG	Number (%)
Phacomorphic glaucoma	68 (68.0)
Phacolytic glaucoma	27 (27.0)
Lens-particle glaucoma	3 (3.0)
Subluxation/dislocation of lens	2 (2.0)
Total	100 (100)

**Figure 1: Distribution of patients according to the type of lens-induced glaucoma.**

Phacomorphic glaucoma predominated in the present study (Table 2; Figure 1), corresponding with the high frequency of intumescent cataract observed at presentation.

Clinical Characteristics at Presentation: The mean duration of symptoms was 7.6 ± 6.2 days. Diminution of vision was present in all patients,

while ocular pain and redness were reported by 91% and 87%, respectively.

Corneal edema was the most frequent ocular sign, observed in 94% of cases, followed by conjunctival congestion (87%) and a mid-dilated fixed pupil (86%). A shallow anterior chamber was present in 68%.

Table 3: Important clinical characteristics at presentation (n=100)

Clinical characteristic	Number (%)
Presenting symptoms	
Diminution of vision	100 (100.0)
Eye pain	91 (91.0)
Redness of eye	87 (87.0)
Headache	77 (77.0)
Watering	55 (55.0)
Vomiting	18 (18.0)
Swelling of lids	41 (41.0)
Ocular signs	
Corneal edema	94 (94.0)
Shallow anterior chamber	68 (68.0)
Mid-dilated fixed pupil	86 (86.0)
Aqueous cells and flare	41 (41.0)
Conjunctival congestion	87 (87.0)
Posterior synechiae	11 (11.0)
Phacodonesis	2 (2.0)

The severe clinical presentation is demonstrated by the high frequency of pain, corneal edema, conjunctival congestion and fixed mid-dilated pupil (Table 3).

Visual Acuity and Intraocular Pressure at Presentation: Most patients presented with severe

visual impairment. Hand movement vision was present in 57%, while 25% had only perception of light. The mean presenting IOP was 43.8 ± 9.6 mmHg, with 46% of patients having IOP between 41 and 50 mmHg.

Table 4: Presenting visual acuity and intraocular pressure (n=100)

Parameter	Number (%)
Visual acuity	
Perception of light	25 (25.0)
Hand movement	57 (57.0)
Finger counting	16 (16.0)
6/60 to 3/60	2 (2.0)
IOP (mmHg)	
21–30	7 (7.0)
31–40	29 (29.0)
41–50	46 (46.0)
51–60	15 (15.0)
>60	3 (3.0)
Mean IOP $\pm$ SD	43.8 ± 9.6 mmHg

Thus, 82% of patients presented with perception of light or hand-movement vision, indicating advanced visual impairment at presentation (Table 4).

Surgical Management and Postoperative Outcome: SICS with PCIOL implantation was the

most frequently performed procedure, accounting for 65% of surgeries. Phacoemulsification with PCIOL implantation was performed in 17%, while combined SICS, PCIOL implantation and trabeculectomy was performed in 12%.

Table 5: Surgical procedures and intraoperative complications (n=100)

Parameter	Number (%)
Surgical procedure	
SICS + PCIOL	65 (65.0)
Phacoemulsification + PCIOL	17 (17.0)
SICS + PCIOL + trabeculectomy	12 (12.0)
SICS + aphakia	4 (4.0)
SICS + SFIOL	2 (2.0)
Intraoperative complications	
No complication	82 (82.0)
Posterior capsular rupture	11 (11.0)
Vitreous prolapse	5 (5.0)
Zonular dialysis	2 (2.0)

Most surgeries were uncomplicated, with no intraoperative complication in 82% of cases (Table 5).

At 6 weeks, 43% achieved good visual acuity of 6/6–6/12, while 47% achieved moderate visual acuity of 6/18–6/60. Only 10% had visual acuity below 6/60.

Table 6: Visual outcome and postoperative IOP at 6 weeks (n=100)

Outcome	Number (%)
Visual acuity at 6 weeks	
6/6–6/12	43 (43.0)
6/18–6/60	47 (47.0)
<6/60	10 (10.0)
IOP at 6 weeks (mmHg)	
≤ 20	82 (82.0)
21–30	16 (16.0)
31–40	2 (2.0)
41–50	0
>50	0
Mean IOP $\pm$ SD	16.2 ± 3.8 mmHg

Overall, 90% of patients achieved visual acuity of 6/60 or better, and 82% achieved an IOP of ≤ 20 mmHg at 6 weeks (Table 6).

Change in Intraocular Pressure Following Surgery: The mean IOP decreased from 43.8 ± 9.6

mmHg preoperatively to 18.4 ± 4.2 mmHg on postoperative day 1 and further to 16.2 ± 3.8 mmHg at 6 weeks. The reduction was statistically significant ($p < 0.001$).

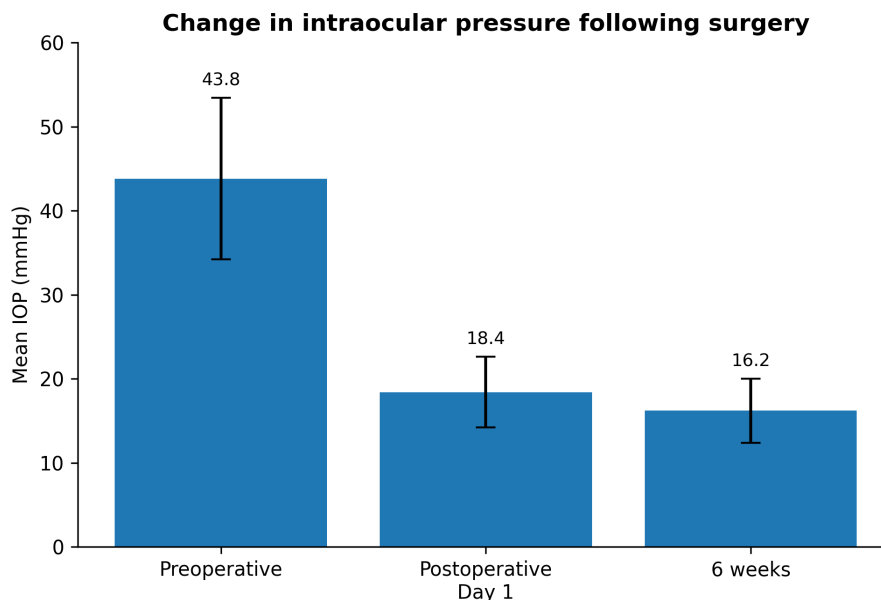


Figure 2: Comparison of mean intraocular pressure before surgery, on postoperative day 1 and at 6 weeks.

The marked postoperative reduction in IOP demonstrates effective pressure control following definitive lens extraction (Figure 2).

Prognostic Factors Associated with Visual Outcome: Preoperative IOP and duration of symptoms were significantly associated with visual outcome at 6 weeks.

Patients with preoperative IOP ≤ 40 mmHg had significantly better visual outcomes than those with IOP > 40 mmHg. Good visual acuity was achieved in

66.7% of patients with IOP ≤ 40 mmHg compared with 28.1% among those with IOP > 40 mmHg ($p < 0.001$).

Similarly, patients presenting within 7 days had significantly better visual outcomes than those presenting after 7 days. Good visual acuity was achieved in 52.9% of early presenters compared with 18.8% of late presenters ($p = 0.002$).

Table 7: Prognostic factors associated with visual outcome at 6 weeks

Visual outcome	IOP ≤ 40 mmHg n (%)	IOP > 40 mmHg n (%)	p-value
Good (6/6–6/12)	24 (66.7)	18 (28.1)	<0.001
Moderate (6/18–6/60)	11 (30.6)	37 (57.8)	
Poor ($< 6/60$)	1 (2.7)	9 (14.1)	
Total	36 (100)	64 (100)	
Visual outcome	≤ 7 days n (%)	> 7 days n (%)	p-value
Good (6/6–6/12)	36 (52.9)	6 (18.8)	0.002
Moderate (6/18–6/60)	30 (44.1)	18 (56.2)	
Poor ($< 6/60$)	2 (3.0)	8 (25.0)	
Total	68 (100)	32 (100)	

These findings demonstrate that lower presenting IOP and shorter duration of symptoms were significantly associated with better postoperative visual recovery (Table 7).

Discussion

Lens-induced glaucoma (LIG) remains an important cause of secondary glaucoma and visual morbidity, particularly in patients presenting with advanced or neglected cataract. The present prospective observational study evaluated the clinical profile, types of LIG, management, postoperative visual and

IOP outcomes, complications, and factors associated with visual recovery among 100 consecutive patients.

The mean age of patients in the present study was 66.8 ± 8.4 years, indicating that LIG predominantly affected the elderly population. This finding is consistent with the association of LIG with advanced age-related cataract. Previous studies have similarly reported a predominance of elderly patients among individuals presenting with phacomorphic and other lens-induced glaucomas. [4,9]

A female predominance was observed, with women constituting 63% of the study population. In addition, 71% of patients were from rural areas. The high proportion of rural patients may reflect delayed access to cataract services and late presentation with advanced cataract. Previous Indian literature has emphasized delayed cataract treatment as an important factor contributing to the occurrence of phacomorphic glaucoma in developing-country settings. [3,5,7] However, because socioeconomic status, health-care accessibility and cataract-surgery history were not formally measured in the present study, these factors should be considered possible explanations rather than established determinants.

Phacomorphic glaucoma was the most common subtype, accounting for 68% of cases, followed by phacolytic glaucoma in 27%. Lens-particle glaucoma and glaucoma associated with lens subluxation/dislocation accounted for 3% and 2%, respectively. Phacomorphic glaucoma results primarily from enlargement or intumescence of the cataractous lens, producing forward displacement of the iris-lens diaphragm and secondary angle closure. Phacolytic glaucoma, in contrast, is associated with leakage of lens proteins from a hypermature cataract and obstruction of trabecular outflow. [1,2] The predominance of phacomorphic glaucoma in the present series is in keeping with previous reports describing advanced cataract as an important cause of lens-induced secondary glaucoma. [3,4]

The clinical presentation in the present study was severe. All patients had diminution of vision, while 91% reported ocular pain and 87% reported redness. Corneal edema was observed in 94% of patients, conjunctival congestion in 87%, and a mid-dilated fixed pupil in 86%. A shallow anterior chamber was present in 68%. These findings reflect the acute and severe nature of IOP elevation commonly encountered in LIG and are consistent with the recognized clinical manifestations of lens-induced glaucoma. [1,2] The presence of corneal edema and a mid-dilated fixed pupil may also make differentiation from acute primary angle-closure glaucoma clinically important, particularly when the underlying lens pathology is not immediately obvious. [1]

The mean presenting IOP was 43.8 ± 9.6 mmHg, with 46% of patients having an IOP between 41 and 50 mmHg. Such marked elevation emphasizes the need for prompt diagnosis and initial IOP-lowering therapy. Previous studies of phacomorphic glaucoma have also reported substantially elevated presenting IOP followed by a marked reduction after definitive cataract extraction. [5,7,10] The high IOP observed in the present study is therefore consistent with the clinical severity of LIG.

Visual impairment at presentation was considerable. Eighty-two percent of patients had either perception of light or hand-movement vision, indicating severe visual impairment at presentation. This poor presenting vision may reflect the combined effects of advanced cataract, acute IOP elevation, corneal edema, inflammation and, in some patients, pre-existing or established glaucomatous optic nerve damage. Previous studies have reported that delayed presentation and greater severity of glaucoma may adversely affect final visual recovery in lens-induced glaucoma. [4,8]

Initial medical therapy was directed toward reducing IOP and controlling intraocular inflammation before definitive surgical treatment. The treatment regimen included topical beta-blockers, topical carbonic anhydrase inhibitors, oral acetazolamide, intravenous mannitol when clinically indicated, topical corticosteroids and cycloplegics. This approach is consistent with the established principle of medically stabilizing the eye before definitive removal of the causative lens. [5,6] Medical therapy, however, does not remove the underlying cause of LIG; definitive treatment requires removal of the pathological lens or retained lens material. [1,2]

In the present study, SICS with PCIOL implantation was the most frequently performed procedure, accounting for 65% of surgeries. Phacoemulsification with PCIOL implantation was performed in 17%, while combined SICS, PCIOL implantation and trabeculectomy was performed in 12%. The choice of procedure was based on individual clinical requirements. Manual SICS remains an important surgical option for advanced cataract in resource-limited settings and has been reported to provide satisfactory IOP control and visual outcomes in phacomorphic glaucoma. [5,7] Similar favorable functional outcomes following cataract surgery in phacomorphic glaucoma have also been reported by Moraru et al. [9]

Most procedures were completed without an intraoperative complication, with 82% of surgeries having no recorded complication. Posterior capsular rupture occurred in 11%, vitreous prolapse in 5% and zonular dialysis in 2%. The technical difficulty of cataract surgery in LIG may be increased by advanced cataract, shallow anterior chamber, corneal edema, inflammation and possible zonular

weakness. The complication profile observed in the present study is therefore clinically plausible for this challenging surgical setting and is comparable with the complications described in previous reports of surgery for phacomorphic glaucoma. [5,7]

A major finding of the present study was the substantial reduction in IOP following definitive surgical treatment. Mean IOP decreased from 43.8 ± 9.6 mmHg preoperatively to 18.4 ± 4.2 mmHg on postoperative day 1 and 16.2 ± 3.8 mmHg at 6 weeks, with the reduction being statistically significant ($p < 0.001$). At 6 weeks, 82% of patients had an IOP of ≤ 20 mmHg. These findings demonstrate effective short-term IOP control following removal of the causative lens. Previous studies have similarly reported significant and sustained reductions in IOP following cataract extraction in phacomorphic glaucoma. [5,7,10,11]

The visual outcome was also favorable. At 6 weeks, 43% of patients achieved visual acuity of 6/6–6/12, while a further 47% achieved 6/18–6/60. Thus, 90% of patients achieved visual acuity of 6/60 or better. This represents substantial visual recovery considering that 82% of patients had presented with perception of light or hand-movement vision. Favorable visual and functional outcomes after cataract extraction in phacomorphic glaucoma have also been reported in previous studies. [4,5,7,9] The difference between very poor presenting vision and postoperative vision underscores the potential for useful visual recovery when the causative lens pathology is treated promptly.

An important finding was the association between preoperative IOP and postoperative visual outcome. Patients with a preoperative IOP of ≤ 40 mmHg had a significantly greater proportion of good visual outcomes than those with IOP > 40 mmHg. Good visual acuity of 6/6–6/12 was achieved in 66.7% of patients with IOP ≤ 40 mmHg compared with 28.1% of patients with IOP > 40 mmHg ($p < 0.001$). This finding suggests that marked preoperative IOP elevation may be a marker of more severe disease and greater risk of irreversible ocular damage. Because this was an observational study, however, the association should be interpreted as a prognostic relationship rather than proof that elevated IOP alone caused poor visual recovery.

Similarly, duration of symptoms was significantly associated with visual outcome. Among patients presenting within 7 days, 52.9% achieved good visual acuity compared with only 18.8% of those presenting after 7 days ($p = 0.002$). The substantially better outcome among early presenters supports the importance of timely recognition and treatment. Previous studies have also identified duration of symptoms and other indicators of disease severity as factors associated with final visual outcome in lens-induced glaucoma. [4,8] These findings reinforce

the clinical importance of early referral and avoidance of prolonged IOP elevation.

The present findings have practical implications for the management of LIG. Early recognition, prompt IOP reduction and definitive removal of the causative lens are central to management. Medical therapy should be used to stabilize the eye and reduce surgical risk, but definitive lens extraction should not be unnecessarily delayed once the patient is medically optimized for surgery. [1,5,6] The favorable postoperative IOP and visual outcomes in the present study support this approach.

The high proportion of rural patients and the advanced clinical presentation also highlight the potential importance of early cataract detection and timely cataract surgery. Although the present study did not directly evaluate barriers to cataract care, the predominance of rural residents and severe presentation suggest that delayed access to appropriate ophthalmic care may contribute to presentation with advanced lens-related disease. This observation warrants further investigation rather than being interpreted as a definitive causal association.

The present study has several limitations. First, the study was conducted at a single tertiary-care centre, which may limit the generalizability of the findings to other populations and healthcare settings. Second, the follow-up period was relatively short for assessing long-term IOP control, visual stability and late postoperative complications. Third, although preoperative IOP and duration of symptoms were evaluated as prognostic factors, the study did not provide a multivariable analysis adjusting for potential confounding factors such as age, type of LIG, baseline visual acuity, optic nerve status and surgical procedure. Therefore, the identified associations should be interpreted cautiously. Finally, socioeconomic factors, duration of cataract and reasons for delayed presentation were not systematically assessed.

Despite these limitations, the prospective design and inclusion of 100 consecutive patients provide useful clinical information regarding the presentation and short-term outcomes of LIG in a tertiary ophthalmic centre. The study demonstrates that, despite severe presentation in many patients, appropriate initial medical stabilization followed by definitive lens extraction can result in substantial IOP reduction and useful visual recovery in the majority of patients.

Overall, the findings emphasize that lens-induced glaucoma is a potentially vision-threatening but treatable cause of secondary glaucoma. The significant association of better visual outcome with lower presenting IOP and shorter symptom duration further supports the importance of early diagnosis,

timely referral and definitive treatment. The results of the present study are broadly consistent with previous reports of phacomorphic, phacolytic and other lens-induced glaucomas.

Conclusion

Lens-induced glaucoma predominantly affected elderly patients in this study and was characterized by severe visual impairment, markedly elevated IOP and frequent corneal edema at presentation. Phacomorphic glaucoma was the most common subtype, followed by phacolytic glaucoma.

Definitive cataract extraction following appropriate initial medical stabilization resulted in substantial reduction of IOP and favorable visual recovery in the majority of patients. At 6 weeks, 90% of patients achieved visual acuity of 6/60 or better and 82% achieved IOP $\leq$ 20 mmHg.

Importantly, lower preoperative IOP and shorter duration of symptoms were significantly associated with better visual outcomes. Early recognition, timely referral and definitive lens removal are therefore essential to reduce irreversible visual morbidity associated with lens-induced glaucoma.

Declarations

Ethics Approval and Consent to Participate: The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants before enrollment.

Availability of Data: The data generated during the study may be made available by the corresponding author on reasonable request, subject to institutional and ethical requirements.

Competing Interests: The authors declare no competing interests.

Funding

Authors' Contributions: All authors contributed to the conception and design of the study, data collection, analysis and interpretation of findings, manuscript preparation and critical revision of the manuscript.

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