

Factors Affecting Visual Outcome in Post-Operative Cases of Lens Induced Glaucoma - A Prospective Study

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ABSTRACT

BACKGROUND

Lens induced glaucoma is common in India. By early identification and removal of cataract, vision loss due to lens induced glaucoma can be prevented. Of the 12.5 million blind people in India, 50 - 80 % is due to cataract. In developing countries like India financial, cultural, and psychosocial constraints still exist to access excellent surgical services. This study was undertaken to determine factors affecting postoperative visual acuity in patients with lens induced glaucoma and to estimate the proportion of cases attaining good visual acuity.

METHODS

This prospective cohort study was conducted in 85 cases of lens induced glaucoma admitted in Regional Institute of Ophthalmology during a period of 1 year from May 2018 - April 2019. All patients underwent a complete ophthalmic examination preoperatively as well as postoperatively. All patients underwent cataract surgery and postoperatively patients were followed up regularly at 1 day, 1 week and 4 week and were evaluated.

RESULTS

Majority of patients were in the age group of 70 - 79 years (35.3 %). Females outnumbered males by 13 %. Most of the patients had a preoperative intraocular pressure between 21 - 30 mmHg (37.6 %). On analysis of the impact of duration of symptom on postoperative visual acuity, 70.4 % patients attained visual acuity > 6 / 24 when presented within 3 days. This was statistically significant with a P value of 0.011. When preoperative visual acuity was hand movements vision or better, 79.2 % patients attained visual acuity > 6 / 24 and it was significant with a P-value of < 0.01.

CONCLUSIONS

Delayed presentation, elderly age and sustained rise in preoperative intraocular pressure are the factors leading to poor visual prognosis. As majority of the patients were pseudophakic in the fellow eye, it is necessary to council all patients regarding timely surgery in the second eye at the time of discharge.

KEYWORDS

Cataract, Secondary Glaucoma, Visual Outcome

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BACKGROUND

Glaucoma in which lens plays a role, either by size or position or by causing inflammation has been classified as lens induced glaucoma. Lens induced glaucoma is a preventable disease by early identification and removal of cataract. Lens induced glaucoma is common in India.¹

It has been estimated that there are about 12.5 million blind people in India, with 50 - 80 % of this group is due to cataract² and in developing countries financial, cultural and psychosocial barriers still exist to access excellent surgical services.

Cataract extraction or removal of retained lens material is the definitive treatment of lens induced glaucoma. The great importance of lens induced glaucoma lies in the fact that early recognition may save the sight of the eye. We wanted to determine the factors affecting postoperative visual acuity in patients with lens induced glaucoma.

METHODS

This prospective cohort study was conducted in 85 cases of lens induced glaucoma admitted in Regional Institute of Ophthalmology during a period of 1 year from May 2018 - April 2019.

Patients with primary glaucoma who go on to develop cataract, long standing lens induced glaucoma (> 6 months with no perception of light), traumatic lens induced glaucoma, congenital dislocation or subluxation of lens and patients who could not come for follow up were excluded from the study. After obtaining informed written consent, all patients diagnosed as lens induced glaucoma on the basis of clinical signs and symptoms, and slit lamp examination were included in the study.

Phacomorphic glaucoma was diagnosed by subjective complaints of acute pain, redness associated with objective signs such as presence of corneal oedema, shallow anterior chamber, an intumescent cataractous lens and intraocular pressure (IOP) > 21 mmHg. Phacolytic glaucomas were diagnosed by presence of pain, corneal oedema, a normal or deep anterior chamber containing floating lens particles and / or pseudo hypopyon in severe cases of a white hypermature morgagnian cataractous lens.

Preoperative assessment was detailed and included visual acuity, slit lamp examination, corneal changes, depth of anterior chamber (AC) by directing a slit lamp beam adjacent to the limbus and anterior chamber was considered to be shallow if its depth was less than one fourth of corneal thickness, Goldmann applanation tonometry was used to measure the intraocular pressure.

All patients were treated with topical beta blockers, antibiotic steroid eye drops, oral acetazolamide and intravenous mannitol if IOP was found to be very high.

All patients underwent lens extraction with or without posterior chamber intraocular lenses (PCIOL) depending upon the intraoperative assessment. Postoperatively all patients were treated with antibiotic steroid eye drops for 6 - 8 weeks, anti-glaucoma medications were continued if IOP was found elevated postoperatively.

All patients were regularly followed up at 1st day, 1st week and 4th week and at each visit patients were evaluated for visual acuity and, anterior segment examination by slit lamp examination, IOP by applanation tonometry. Complications which persisted on final follow up at 4th week were considered to be significant.

Statistical Analysis

Data was entered into Excel sheet. The categorical variables were entered as proportion and quantitative variables were expressed as mean and standard deviation. Statistical test of significance – chi-square test for categorical variables and Students t-test for quantitative variables was applied. Analysis of data was done using appropriate statistical software (SPSS)

RESULTS

Analysis of Cases According to Age Group

Out of the 85 patients studied, 35.3 % were in the age group of 70 - 79 years, 28.2 % were in the age group of 60 - 69 years and 23.5 % patients were in the above 80 years age group. Only 12.9 % patients were in the less than 60 years age group. It suggests that lens induced glaucoma is seen more commonly in elderly age group. 56.5 % patients were females and 43.5 % patients were males.

Analysis of Visual Acuity on Admission

28.2 % patients presented with hand movements vision or better. 54.1 % patients presented with PL + PR accurate vision and 16.5 % patients presented with PL + PR inaccurate. Only 1.2 % patients presented with no PL.

Analysis According to Duration of Symptoms

31.8 % of patients presented within 3 days of the onset of symptoms, 25.9 % patients presented between 4 - 7 days after the onset of symptoms, 18.8 % presented between 8 - 15 days after the onset. 23.5 % presented only 2 weeks after the onset of symptoms. Delay in visiting the hospital may be due to lack of awareness regarding eye condition or other socioeconomic constraints.

Lens Status of Unaffected Eye

Unaffected eye was found to be pseudophakic in 57.6 % patients. Immature cataract was found in 18.8 % patients. Mature cataract was seen in 11.8 % patients. Other eye was normal in 5.9 % patients and aphakic in 5.9 % patients.

Analysis of IOP on Admission

37.6 % of patients had IOP in the range of 21 – 30 mmHg on presentation, 32.9 % had IOP in the range of 31 - 40 mmHg and 20 % had IOP more than 41 mmHg.

Diagnosis of Cases

50.6 % patients were diagnosed to have phacomorphic glaucoma whereas 49.4 % of patients were found to have phacolytic glaucoma.

Intraoperative Complications

Intraoperatively vitreous loss with zonular dialysis was found in 9 patients, shallow AC with raised IOP occurred in 6 cases, posterior capsular rent in 4 cases. 64 cases were uneventful.

Final Visual Outcome

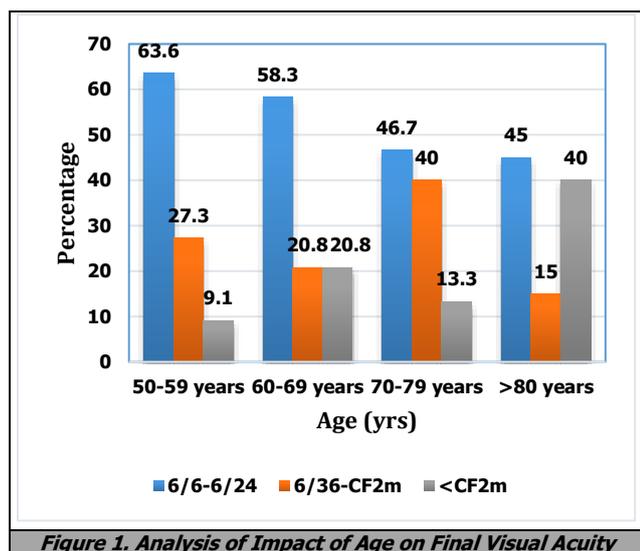
At last follow up visit at the end of 4 weeks best corrected visual acuity (BCVA) was 6 / 24 or better in 51.8 % of patients, 6 / 36 - CF2 m in 27.1 % of patients and < CF2 m in 21.2 % patients.

Post-Operative IOP

At last follow up visit 95.3 % patients had an IOP < 20 mmHg. Only 4 patients had an IOP > 21 mmHg which required antiglaucoma medications.

Post-Operative Complication

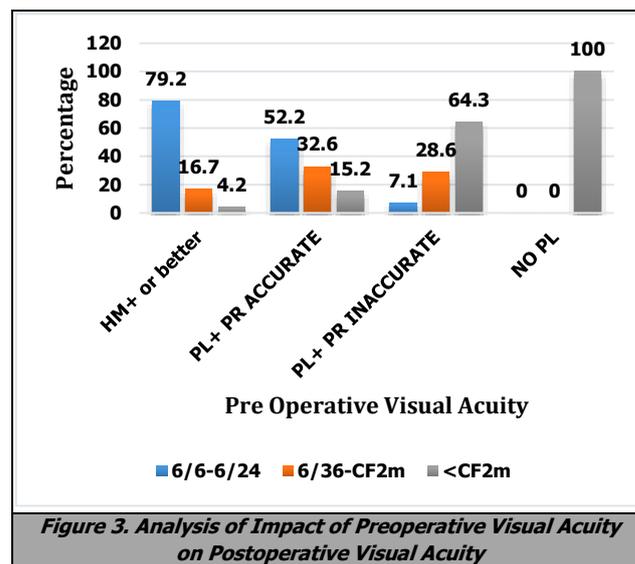
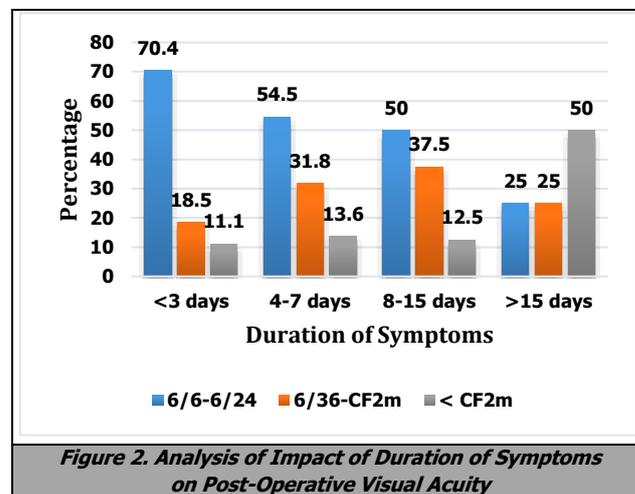
56.5 % of patients did not have any postoperative complications. 18.8 % of patients had post-operative uveitis, 14.1 % patients had postoperative corneal oedema. Glaucomatous disc change was seen in 4.7 % of cases. Other complications were vitreous haemorrhage, bullous keratopathy and hyphema.



From Fig. 1 it is clear that as age increases, the chances for visual recovery is less. When the age was < 60 years 63.6 % patients attained visual acuity of > 6 / 24. But when the age was > 80 years only 45 % had visual acuity of > 6 / 24, in 40 % cases visual acuity was < CF2 m at last follow up.

From Fig 2 on analysis of impact of duration of symptoms on postoperative visual acuity it was found that 70.4 % patients attained visual acuity of > 6 / 24 when presented

within 3 days. Only 11.11 % patients had visual acuity < CF2m. but when patient presented after 15 days, 50 % patients had visual acuity < CF2 m. Only 25 % patients had visual acuity of > 6 / 24. The impact of duration of symptom on final visual acuity was statistically highly significant suggesting that earlier presentation had a high probability of achieving good final visual acuity and conversely delayed presentation can lead to poor visual outcome.



On analysis of the impact of preoperative visual acuity on postoperative visual acuity (Fig. 3), it was found that when the preoperative visual acuity was hand movements vision or better; 79.2 % patients attained visual acuity of > 6 / 24. When it was perception of light with projection of rays accurate, 52.2 % patients attained visual acuity of > 6 / 24. But when it was perception of light with projection of rays inaccurate only 7.1 % patients attained good visual acuity and when it was no perception of light, visual acuity was < CF2 m

On analysis of impact of IOP on admission on postoperative visual acuity (Fig. 4), it was found that as the initial IOP was between 11 - 20 mmHg, 100 % patients attained visual acuity of > 6 / 24. When the IOP was between 21 - 30 mmHg, 62.5 % attained visual acuity of > 6 / 24. But when the IOP was > 41 mmHg only 41.2 % attained visual acuity of > 6 / 24. The impact of IOP on

admission on postoperative visual acuity was statistically highly significant.

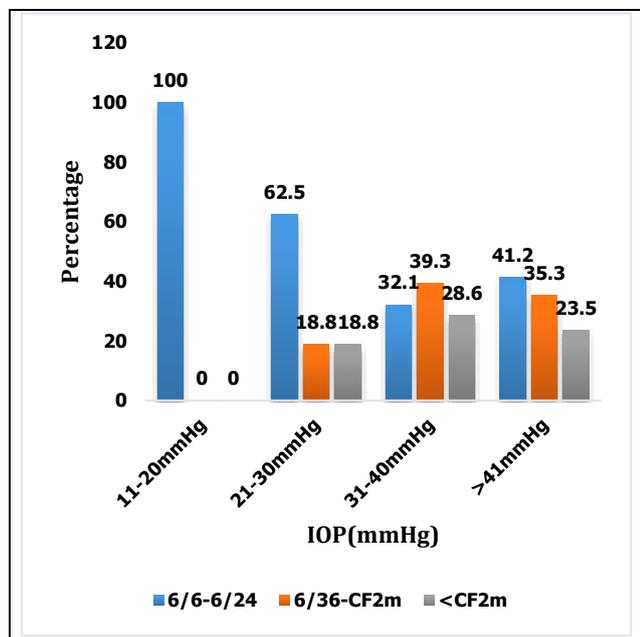


Figure 4. Analysis of Impact of IOP on Admission on Postoperative Visual Acuity

DISCUSSION

In this study majority of patients were in the age group of 70 - 79 years (35.3 %), 28.2 % in the age group of 60 - 69 years and 23.5 % in the above 80 years group. Pradhan³ et al. in Nepal in 2001 have found the occurrence of lens induced glaucoma (LIG) in the age range of 40 - 80 years with the highest in the 60 - 69 years (43.1 %) age group. Earlier studies had also indicated that phacolytic glaucoma occurred more commonly with increasing age, probably due to the aggregation of high molecular weight proteins over time.^{4,5}

The incidence of lens induced glaucoma was more common in females than males. This was similar to the studies conducted by Sinha A⁶ and Prajan et al.⁷ According to Dr. S.K. Angra⁸ et al. it was F:M ratio 3:1 and according to Dr. Damodhar Pradhan³ et al, it was 1.7:1. The reason for more number of females presenting with LIG may be due to the higher prevalence of cataract in females than males.⁹

In this study, in more than half of the patients the fellow eye was pseudophakic (57.6 %). This was similar to a study conducted in Nepal¹⁰ in 2016, in that study the fellow eye was pseudophakic in 57.5 % patients.

Phacomorphic glaucoma was more common (50.6 %) than phacolytic glaucoma (49.4 %) which was similar to study by Prajna⁷ et al, whereas in study by Pradhan⁹ et al. percentage of phacomorphic glaucoma was as high as 72 %.

Intraoperative complications were absent in 75.3 % patients. Vitreous loss and zonulodialysis was seen in 10.6 % patients, shallow anterior chamber with raised IOP was seen in 7.1 % patients. Posterior capsular rent was seen in 4.8 % patients. 51.8 % patients attained a final visual acuity

of 6 / 24 or better. 21.2 % patients had visual acuity of CF2m or less.

Prajna⁷ et al. in Madurai, found that 57 % of phacomorphic glaucomas and 61 % of phacolytic glaucomas attained postoperative corrected visual acuity of 6 / 12 and better. None of these patients had a compromised optic nerve due to glaucomatous process. Fifty patients (10.2 %) with phacomorphic glaucoma and six patients (13.6 %) with phacolytic glaucomas had visual acuity less than 6 / 60.

In the present study 95.3 % patients maintained a normal postoperative pressure of < 20 mmHg. Only 4 patients had intraocular pressure > 20 mmHg, which could probably be due to persistent postoperative inflammation, uveitis and hyphema and required antiglaucoma medications to control IOP.

In a study conducted by Mandal AK¹¹ et al. the intraocular pressure was controlled in all of the patients without antiglaucoma medications.

On comparison of age with postoperative visual acuity it was found that when the age is 50 - 59 years 63.6 % patients attained visual acuity > 6 / 24. When the age was between 60 - 69 years, 58.3 % attained visual acuity > 6 / 24. When the age was between 70 - 79 years and > 80 years, only 46.7 and 45 % patients attained visual acuity > 6 / 24.

Patients above the age of 60 years had a marginally significant increase in odds of obtaining poor visual acuity. A related but no similar parallel can be drawn to studies which show that primary open angle glaucoma is more common in old age^{12,13} probably due to susceptibility of the optic nerve to damage.

On comparison of the duration of symptom with the postoperative visual acuity, it was found that when patient presented within 3 days 70.4 % patients attained visual acuity > 6 / 24. When they presented between 4 - 7 days 54.5 % patients attained visual acuity > 6 / 24. 50 % of patients attained good visual acuity when presented between 8 - 15 days. But when patients presented after 2 weeks only 25 % attained good visual acuity > 6 / 24. The association between duration of symptom and postoperative visual acuity was statistically very significant with a P value 0.011 (significant at 0.05 level), suggesting that the shorter the duration between onset of symptom and surgery, better is the visual prognosis.

In the study conducted by Gujjula C¹⁴ et al. also good visual acuity was achieved when presented within 1 week (62.06 %), it was more than the cases presented beyond 2 weeks (12.5 %).

In a study conducted by Dr V Sreekumar,¹⁵ when the duration of symptom was less than 5 days, 28 subjects had visual acuity better than 6 / 12 and 12 subjects had visual acuity between 6 / 18 - 6 / 60.

Gnanadurai¹⁶ et al. found that 28 (56 %) patients who presented within 5 days and 5 (10 %) patients who presented between 6 and 10 days had a good postoperative visual outcome (> 6 / 12). All patients who presented after 10 days attained a postoperative visual outcome of 6 / 18 or worse. This shows a definite correlation between duration of symptom and final visual outcome. So, if a patient arrives at

a late stage, guarded visual prognosis must be explained to the patient before surgery.^{17,18}

Ramakrishnan¹⁹ et al. at Tirunelveli found that there was a significant association between duration of symptoms and postoperative visual acuity. Fifty-one patients had a visual acuity better than 20 / 40, out of them significantly a greater number of patients had duration of symptom less than 10 days (84 %) as compared to those with duration more than 10 days (16 %).

Rupali Tyagi²⁰ et al. found out that BCVA at 6 weeks was less than < 6 / 60 in patients who had high preoperative IOP in the range of 53.79 ± 19.85 and it was statistically significant (P-value < 0.001). On analysis of the postoperative complications 56.5 % patients had no complications. Major postoperative complications were uveitis (18.8 %) and corneal oedema (14.1 %). Other complications were glaucomatous disc changes (4.7 %), bullous keratopathy (2.4 %) and hyphema (2.4 %). Kothari²¹ et al. found postoperative uveitis in 19 (33.3 %) cases, striate keratopathy in 14 (24.6 %) cases, hyphema in 7 % cases and cortical remnants in 5.3 % cases.

CONCLUSIONS

Definitive management of lens induced glaucoma is the removal of cataractous lens. Delayed treatment of lens induced glaucoma may result in poor visual outcome. So, early diagnosis and treatment of mature cataract is very important. As the age increases, the susceptibility of optic nerve to get damaged increases and it results in poor visual outcome. A sustained rise of intraocular pressure for a long period is a poor prognostic factor for postoperative visual outcome in lens induced glaucoma. Intraocular pressure came down to normal limits after cataract extraction without any antiglaucoma medications. Majority of the patients were pseudophakic in the other eye, as a result of which they neglected the affected eye till they developed lens induced glaucoma leading to pain at the time of presentation. Hence, it is important to counsel the patient about timely surgery in the second eye at the time of discharge after first eye surgery.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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REFERENCES

- [1] Sharma RG, Verma GL, Singhal B. A direct evaluation of Scheie's operation with sclerectomy along with lens extraction in lens induced glaucoma. *Ind J Ophthalmol* 1983;31(5):639-641.
- [2] Murthy GVS, Gupta SK, Bachani D, et al Current estimates of blindness in India. *British Journal of Ophthalmology* 2005;89(3):257-260.
- [3] Pradhan D, Hening A, Kumar J, et al. A prospective study of 413 cases of lens- induced glaucoma in Nepal. *Indian Journal of Ophthalmology* 2001;49(3):103-107.
- [4] Jedziniak JA, Kinoshita JH, Yates EM, et al. On the prevalence and mechanism of formation of heavy molecular weight aggregates in human normal and cataractous lenses. *Exp Eye Res* 1973;15(2):185-192.
- [5] Spector A, Li S, Singelman J. Age dependent changes in the molecular size of human lens proteins and their relationship to light scatter. *Invest Ophthalmol* 1974;13(10):795-798.
- [6] Sinha A. Combined trabeculectomy and cataract extraction. *Ind J Ophthalmol* 1983;31(7):836-838.
- [7] Prajna NV, Ramakrishnan R, Krishnadas R, et al. Lens induced glaucomas-visual results and risk factors for final visual acuity. *Indian J Ophthalmology* 1996;44(3):149-155.
- [8] Angra SK, Pradhan R, Garg SP. Cataract induced glaucoma- an insight into management. *Indian J Ophthalmol* 1991;39(3):97-101.
- [9] Chatterjee A, Milton RC, Thyle S. Prevalence and etiology of cataract in Punjab. *Br J Ophthalmol* 1982;66(1):35-42.
- [10] Sitoula RP, Sarkar I, Nayak D, et al. Lens induced glaucoma: an experience in tertiary eye care centre in eastern Nepal. *Nep J Ophthalmol* 2017;8(16):161-166.
- [11] Mandal AK, Gothwal VK. Intraocular pressure control and visual outcome in patients with phacolytic glaucoma managed by extracapsular cataract extraction with or without posterior chamber intraocular lens implantation. *Ophthalmic Surg Lasers* 1998;29(11):880-889.
- [12] Leske MC. The epidemiology of open angle glaucoma: a review. *Am J Epidemiol* 1983;118(2):166-191.
- [13] Leske MC, Rosenthal J. Epidemiologic aspects of open angle glaucoma. *Am J Epidemiol* 1979;109(3):250-272.
- [14] Gujjula C, Kumar S, Varalakshmi U, et al. Study of the incidence, mechanism, various modes of presentation and factors responsible for the development of lens-induced glaucomas. *Albatar Int J Ophthalmol* 2015;3(2):56-62.
- [15] Sreekumar V, Murthy SNE, Preethi B. Clinical study of visual prognosis in lens induced glaucoma. *International Journal of Contemporary Medical Research* 2018;5(3):C6-C8.
- [16] Gnanadurai JSC, Sanjana EF, Radhakrishnan M. Factors affecting visual outcome in phacolytic glaucoma. *Int J Sci Stud* 2016;3(11):24-27.
- [17] Moschos M, Brouzas D, Papantois F. Extra capsular cataract extraction and PCIOL implantation in phacolytic glaucoma. *Eur J Imp Refract Surg* 1993;5(2):145-147.
- [18] Gross KA, Pearce JL. Phacolytic glaucoma with ECCE and primary IOL implantation. *Cataract* 1984;2:22-23.
- [19] Ramakrishnan R, Maheswari D, Khader MA, et al. Visual prognosis, intraocular pressure control and complications in phacomorphic glaucoma following manual small incision cataract surgery. *Indian Journal of Ophthalmology* 2010;58(4):303-306.

[20] Tyagi R, Tarannum S, Dhawan A, et al. Clinical profile of lens induced glaucoma at a tertiary centre in north India. *Indian J Clin Exp Ophthalmol* 2019;5(2):169-175.

[21] Kothari R, Tathe S, Gogri P, et al. Lens induced glaucoma: the need to spread awareness about early management of cataract among rural population. *ISRN Ophthalmol* 2013;2103:581727.