

Clinical Study of Lens Induced Glaucoma at a Tertiary Eye Care Centre

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ABSTRACT

BACKGROUND

Lens induced glaucomas are common in India. There were different types of lens induced glaucomas based on clinical features and morphological features. This study was undertaken to evaluate the various characteristics and presentations of glaucomas, to define the risk factors and to evaluate as to how they influence the post-operative visual acuity, intra ocular pressure, inflammation and optic disc changes.

METHODS

This longitudinal study included 90 cases of lens induced glaucoma admitted in the ophthalmic wards of the Great Eastern Medical School and Hospital, Srikakulam, during the period March 2018 to March 2020. All consecutive patients diagnosed as lens induced glaucoma on the basis of clinical symptoms and signs were included. At presentation, visual acuity, IOP, inflammation including corneal changes were recorded, which were repeated after institution of medical line of treatment and postoperatively patients were followed up regularly at 2, 4 and 6 weeks intervals and the same parameters were evaluated including optic disc changes.

RESULTS

Occurrence of lens induced glaucoma in the hospital during the study period was 1.72 %. The mean age of presentation of various types of glaucomas was 60.57 years and the female to male ratio was 2:1. The most frequent type of lens induced glaucoma was phacomorphic glaucoma (70 %). In 34.4 % patients best corrected visual acuity was found to be better than 6 / 18. In 14.4 % of cases, visual acuity was found to be worse than 6 / 60. In patients who presented with symptoms of less than two weeks duration, better visual acuity of 6 / 12 or more was noted (76.2 %, $P < 0.01$). In 60 % patients who presented with IOP levels of less than 35 mmHg, better visual acuity of 6 / 12 or more was noted in 76.2 %. The mean IOP noted in patients with symptoms of 2 to 4 weeks duration was found to be 40.33 ± 9.36 mmHg. Inflammation was more severe in patients who were symptomatic for more than 2 weeks (37.50 %, $P < 0.05$) and also in cases with IOP more than 35 mmHg (40 %). Optic disc of the presented eye was found to be damaged in 35.5 % of cases and in patients presenting with symptoms of more than 2 weeks' duration it was 62.5 % ($P < 0.01$).

CONCLUSIONS

Presentation with intraocular pressure value greater than 35 mm of Hg and with symptoms of more than two weeks would result in severe inflammation further affecting the cornea and causing optic nerve damage which would ultimately jeopardize vision. This can be prevented by early presentation and regular screening of people above 60 years of age.

KEYWORDS

Lens-Induced, Glaucoma, Cataract

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BACKGROUND

Glaucomas in which the lens plays a role, either by size or by position or by causing inflammation have been classified as lens induced glaucomas.¹ Lens-induced-glaucoma is a pathological entity, which can be easily identified, prevented and often curable by cataract extraction. Lens induced glaucoma are an important cause of secondary glaucoma and a common cause of ocular morbidity in developing world.² The lens unlike other ectodermal structures is devoid of the ability to get rid of its old fibres which are buried in itself in the centre forming the hard core. This imposes unlimited restrictions in its rate of growth. With aging, the lens assumes greater thickness, a greater curve of its anterior surface, and the zonules loosen. These factors cause increasing shallowness of the anterior chamber and iridolenticular contact, which results in a greater amount of pupillary block.³⁻⁶ Lens induced glaucoma in general can be secondary angle closure (phacomorphic) or secondary open angle (phacolytic). Phacolytic glaucoma and lens particle glaucoma are part of secondary open angle glaucomas. The iridocorneal angle is open and the trabecular meshwork is being blocked by lens proteins. Phacomorphic glaucoma and lens displacement glaucoma are secondary angle closure glaucomas.⁷

There is an increasing backlog of cataract in India may be due to the population expansion, increase in the life expectancy, survival and low usage of the available surgical services along with, financial, cultural and psychosocial barriers. The uptake of eye care services by the rural community has also been sub optimal in countries like India, where lens induced glaucomas are a common cause of ocular morbidity.⁸ When surgeries were conducted presentation of symptoms within a day or two were managed by controlling IOP and restoring good vision. Whatever be the mode of surgical intervention, the prognosis for good postoperative visual recovery in these conditions remains guarded, unless diagnosed early and managed efficiently.⁹

The main objective of the present study was to observe the risk factors, visual outcome and IOP changes along with disc changes pre and post-surgery in lens induced glaucoma

METHODS

The present study included 90 cases of different types of lens induced glaucomas, admitted in the ophthalmic wards of the Great Eastern Medical School and Hospital, Srikakulam, during the period from March 2018 to March 2020 for a period of two years. Patients with lens induced glaucoma were included in this study.

Exclusion Criteria

- Patients with coincident cataract and previously diagnosed with other types of glaucoma.
- Long standing patients with lens induced glaucoma (> 6 months) and with no perception of light visual acuity at presentation.

- Patients with poor general condition.

Patients with clinical features, signs and symptoms of lens induced glaucoma were included in the present study. Clinical features include those with pain, loss of vision, eye redness, an intumescent, mature or hypermature cataract with elevated IOP of more than 21 mmHg.

Both the eyes were examined in a detailed manner. The examination includes the lens status, the anterior chamber depth by slit lamp biomicroscopy and intraocular pressure was noted using applanation tonometry. Type of lens induced glaucoma and other clinical features were noted on slit lamp biomicroscopy examination and details were entered in the study proforma. Visual acuity, intraocular pressure, inflammation including corneal changes were recorded at presentation and were repeated after institution of medical line of management. Detailed gonioscopic examination, posterior segment examination and B Scan examination was also done in all cases depending on the requirement.

Patients were divided into phacomorphic glaucoma, phacolytic glaucoma, phacoanaphylactic and glaucoma due to displacement of lens based on clinical features and slit lamp biometry examination.

All the 90 cases were managed by both surgical and medical methods. Medical methods were used to reduce intraocular pressure there by relieving some amount of pain. If still unable to control pain, analgesic medication was given. Anti-emetics were prescribed in patients with severe vomiting. Surgical methods were used to relieve the causative factor there by reducing the IOP so as to preserve vision and reduce further optic nerve damage.

Preoperative management consists of reduction of intraocular pressure and methods to prevent post-operative infection. In the management to reduce intraocular pressure, topical timolol 0.5 % drops were given twice daily and oral acetazolamide was given twice daily. In case with high intraocular pressure resistant to treatment, intravenous mannitol 20 % stratum was given before surgery to avoid high intraocular pressure during surgery. Mydriatics, cycloplegics and topical phenylephrine in combination were started just before surgery to get good dilated pupil. Local antibiotics belonging to fluoroquinolones were given topically and oral antibiotics were given in order to prevent post-operative infections. In lens induced glaucoma (LIG) cases with severe inflammation, topical steroid drops were given. In all patients informed consent was taken and guarded visual prognosis was explained. Irrespective of amount of decrease in intraocular pressure, all patients underwent surgery as early as possible.

In maximum number of patients, lens extraction was done with posterior chamber intraocular lens implantation. After giving peribulbar block all patients underwent appropriate surgical procedure whatever necessary. At the subconjunctival injection of antibiotic and steroid was given and antibiotic drops were instilled onto the conjunctival sac.

On the first post-operative day examination was done to note for any post-operative complications and treatment was given accordingly. All of them were prescribed topical antibiotic and steroid eye drops six times a day. Mydriatic

with cycloplegia drops were prescribed two times a day. If patient was noted to have high intraocular pressure topical antiglaucoma drugs were prescribed. If still not controlled systemic anti glaucoma drugs were given. If inflammation is severe short course of oral steroids were prescribed.

All patients were advised to come for follow up at 2, 4 and 6 weeks after the time of discharge. At each follow-up visit, patients were examined thoroughly for visual acuity, intraocular pressure examination and anterior segment examination. Posterior segment examination was done with direct, indirect ophthalmoscope and 90 D whichever was feasible. B scan examination was done in required cases and all the finding were entered into case proforma.

The results were tabulated and data was statistically analysed using different significant tests such as, Paired 't' test, chi-square test with Yates' correction and Fischer's exact test.

RESULTS

Among 90 patients with lens induced glaucoma, 60 % patients were in the age group of 60 - 70 years, 20 % were above 70 years of age and 20 % were below 60 years of age. The mean age of presentation was 60.57 + / - 7.86. Females to males ratio was 2:1.

In this study, the magnitude of lens induced glaucoma was 1.72 % during the study period. Of the total 90 cases of LIG, 63 (70 %) cases were phacomorphic glaucoma, 21 (23.3 %) cases were phacolytic glaucoma, 3 (3.3 %) cases were lens particle glaucoma with previous history of trauma and 3 (3.3 %) cases were dislocated lens with pupillary block glaucoma.

Duration of presentation of less than 1 week 23 (25.5 %) patients had visual acuity better than 6 / 18, 15 (16.6 %) patients had visual acuity 6 / 24 to 6 / 60 and 3 (3.33 %) had visual acuity less than 6 / 60. 1 - 2 weeks of presentation 3 (3.33 %) patients had visual acuity better than 6 / 18, 39 (43.3 %) had visual acuity between 6 / 24 – 6 / 60 and 4 (4.44 %) patients had visual acuity less than 6 / 60. More than 2 weeks of presentation 1 (1.1 %) had visual acuity between 6 / 24 – 6 / 60 and 2 (2.22 %) patients had visual acuity less than 6 / 60. Those who presented late belonged to old age and were treated with pain killers and antibiotic drops.

At presentation 12 (13.35 %) patients had intraocular pressure between 20 - 35 mm of Hg, 68 (73.5 %) patients had intraocular pressure between 35 - 50 mm of Hg and 10 (11.11 %) had intraocular pressure above 50 mm of Hg.

Planned extra capsular cataract extraction i.e. small incision cataract surgery with posterior chamber intra ocular lens implantation was performed in 81 (90 %) patients. In 2 (2.22 %) cases, with traumatic anterior dislocation of lens with pupillary block glaucoma, after lens extraction intraocular lens implantation was not done as the patient had total retinal detachment and vitreous disturbance.

In 1 (1.11 %) patient with posterior dislocation of lens with glaucoma lens extraction was done with vitrectomy and scleral fixated intraocular lens was done. In 3 (3.33 %) cases, after lens extraction scleral fixation of intraocular lens

was done. The scleral fixated intraocular lens was done as secondary procedure. Trabeculectomy was added in 3 (3.335) cases with long standing refractory glaucoma.

	< 1 Week	1 - 2 Weeks	> 2 Weeks
> 6 / 18	23 (25.5 %)	3 (3.33 %)	0
6 / 24 - 6 / 60	15 (16.1 %)	39 (43.3 %)	1 (1.1 %)
< 6 / 60	3 (3.33 %)	4 (4.4 %)	2 (2.22 %)

Table 1. Visual Acuity at Presentation with Duration of Presentation

	> 6 / 18	6 / 24 – 6 / 60	< 6 / 60
20 – 35 mm of Hg	10 (11.1 %)	1 (1.1 %)	1 (1.1 %)
35 - 50 mm of Hg	21 (23.3 %)	41 (45.5 %)	6 (6.66 %)
> 50 mm of Hg	0	4 (4.44 %)	6 (6.66 %)

Table 2. Comparison between IOP at Presentation with Post Surgery BCVA

Grade	At Presentation Number	At Presentation %	At Discharge Number	At Discharge %	At Last Follow-up Number	At Last Follow-up %
Normal	0	0	15	16.6 %	75	83.3 %
Mild	36	40 %	44	48.8 %	6	6.66 %
Moderate	35	38.8 %	23	25.5 %	4	4.44 %
Severe	27	30 %	6	6.66 %	3	3.33 %
Very severe	2	2.22 %	2	2.22 %	2	2.22 %

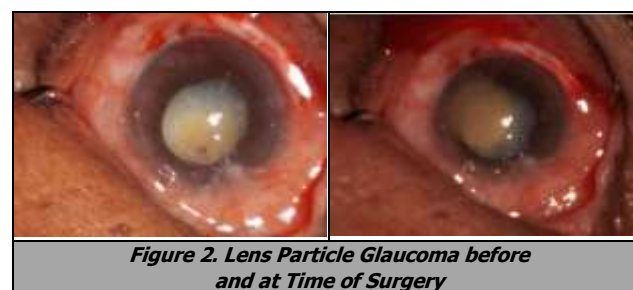
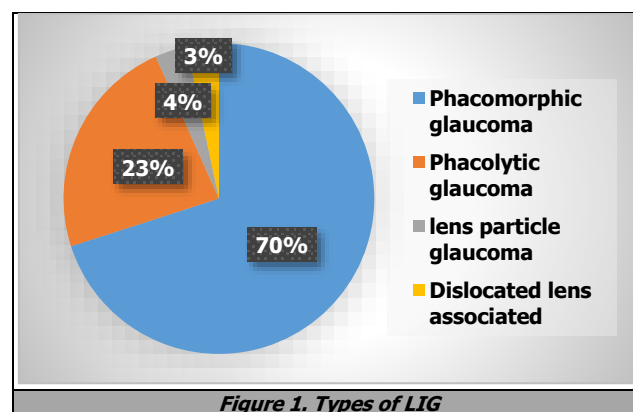
Table 3. Inflammation at Presentation, at Discharge and at Last Follow Up

Reduction of inflammation was achieved in all cases and was statistically significant (Fisher's test P < 0.0001)

BCVA	Optic Disc Changes at Last Follow-Up						Total
	Normal	Mild and Moderate	Severe	Hazy Media / Other			
> 6 / 18	27 87 %	4 12.9 %	0 0	0 0	0 0	31 (100 %)	
6 / 24 – 6 / 60	16 34.7 %	28 60.8 %	0 0	2 4.3 %		46 (100 %)	
< 6 / 60	0 0	2 15.3 %	9 69.2 %	2 65.3 %		13 (100 %)	

Table 4. BCVA at Last Follow-Up with Optic Disc Changes

With Fisher's test for the poor visual acuity, P value was < 0.0001



DISCUSSION

Lens induced glaucomas are of common presentation in developing countries like India.¹⁰ Although phacomorphic and phacolytic glaucomas have clinically different pathologies, they still have few common factors that they are induced by lens and they compromise the optic nerve function due to increased intraocular pressure. As lens is the main important cause for the development of lens induced glaucomas surgery for cataract is still useful in these cases and has a good prognosis.¹¹ The present study was undertaken to give an overview of the different presentations of lens induced glaucomas, to define the risk factors and their influence on visual acuity following surgery, intra ocular pressure and fundus changes following a planned cataract extraction.

According to Dr. Damodhar Pradan et al. Nepal, 35 % cases occurred in patients aged under 60 years.¹² In present study, it was observed that 80 % cases of LIG were above 60 years and 20 % were under 60 years. The incidence of LIG was more common in female population when compared to male population. In present study female to male ratio was 2:1. These findings were similar to the studies conducted by Dr. Damodhar Pradhan et al. where the ratio was 1.7:1.¹³

In the present study, the magnitude of lens induced glaucoma was found to be 1.72 % and was nearly similar to the study conducted in Lahan¹³ which was 1.5 %. In this study, it is observed that the most frequent type of lens induced glaucoma was phacomorphic glaucoma (70 %) followed by phacolytic glaucoma (23.33 %), the results were similar to Madurai study (52.68 %)⁹ and Lahan study (72 %).¹³ Occurrence of various lens-induced glaucomas in the above studies shows variations. In this study the best-corrected visual acuity at the end of last follow up is compared with other studies below. In this study, best corrected visual acuity (BCVA) of 6 / 18 or better, is slightly higher (34.4 %) when compared to Lahan study series (31.40 %) thus in this study higher percentage of cases has achieved good visual recovery and slightly higher percentage of cases have poor visual outcome when compared to Lahan study series.¹³

In the present study best corrected visual acuity of 6 / 18 and better was (34.4 %) and visual acuity of 6 / 60 or low in (14.4 %). These values showed that when being compared to Madurai study, with 59.13 % and 11.82 % respectively less number of people in present study had good visual acuity of less than 6 / 18. When patients presented with IOP less than 35 mm of Hg they attained good visual acuity (13.3 %) than those who presented with IOP levels of more than 35 mm of Hg (74.6 %). When IOP at presentation is being compared to visual outcome, the correlation was found to be clinically significant but not statistically significant. Madurai study also had found no statistically significant association between the level of preoperative IOP and final visual acuity.⁹

In the present study, the influence of inflammation on visual outcome was analysed. In (46.88 %) patients with mild to moderate inflammation good visual acuity was noted when compared to patients with severe to very severe inflammation (30.77 %) which was relatively high. Poor

vision was found to be higher in cases with severe inflammation (69.23 %) than with mild to moderate inflammation (12.5 %). The severity of the inflammation directly affects the final visual results, which was clinically and statistically significant ($P < 0.05$).

Optic disc, at last follow up, in the affected eyes with glaucoma was normal in majority patients (53.33 %). Glaucomatous disc damage was found in 35.5 % cases. There was significant damage in optic nerve in patients who presented beyond 2 weeks of duration (62.5 %) and especially those beyond 30 days (83.33 %), than cases which presented before 2 weeks of duration (14.29 %). On fundus examination optic disc was noted to be normal in most (80.95 %) of patients who presented to us with less than 2 weeks of duration. The severity of glaucomatous disc damage was directly proportional to the duration of symptoms with which was found to be clinically and statistically significant ($P < 0.01$).

CONCLUSIONS

Lens-induced glaucomas are a group of presentations in old age with increased risk among females in the lower socioeconomic stratum. Results from the present study have shown that, good visual acuity can be attained in lens-induced glaucoma patients who presented with less than two weeks duration, with intraocular pressure values of less than 35 mmHg. Planned extracapsular cataract extraction with intraocular lens implantation, good handling of tissue, a good follow up of patients with efficient management of pre- and post-operative complications and inflammation, play a major role in the management of lens induced glaucomas. Despite high intraocular pressure at the initial presentation in cases of lens induced glaucoma, intraocular pressure came down to normal limits after lens extraction.

In our set up, patients presented late because of poverty, ignorance, lack of awareness about the disease condition and about facilities for treatment. Encouragement of quackery at peripheries, lack of referral facilities, poor education and helplessness of patients, would have led to increase in ocular morbidity. Educating people and strengthening of ophthalmology services in rural areas may be helpful in prompt referral of lens induced glaucomas thereby reducing further morbidity caused by the disease.

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

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