

A Clinical Study of Visual Outcome and IOP in Lens Induced Glaucoma Attending a Tertiary Eye Centre

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Abstract

Objectives: To know the post-operative visual outcome and intraocular pressure (IOP) in lens induced glaucoma (LIG) cases. *Methods and Material:* 50 cases of lens induced glaucoma are studied in 1 year. All patients diagnosed as LIG were included. At presentation visual acuity, IOP were recorded, which were repeated postoperatively at 2 and 7 weeks interval. *Results:* The most frequent type of LIG was Phacomorphic glaucoma (86%). The best corrected visual acuity (BCVA) of 6/18 or more was found in 54% cases. Visual acuity of less than 6/60 was seen in 26% of cases. Good visual acuity of 6/12 or better was achieved in 72% ($p < 0.01$) of cases with symptoms less than 2 weeks and in 59.10% of cases with IOP less than 35 mmHg at presentation. The mean IOP in cases with duration of symptoms of 2 to 4 weeks was 40.33 ± 9.36 mmHg. *Conclusions:* Good visual outcome was seen in patients with early diagnosis, early presentation within 2 weeks and with IOP less than 35 mmHg at presentation.

Keywords: Lens-Induced Glaucoma; Cataract; IOP; Cataract Surgery.

Introduction

Lens induced glaucomas are a common occurrence in India.

Glaucoma's in which the lens plays a role, either by size or by position or by causing inflammation have been classified as lens induced glaucomas. In the past, significant confusion existed about the terminology and mechanisms causing the glaucoma. Terms such as phacotoxic reaction, phacogenetic glaucoma, phacotopic glaucoma, lens-induced uveitis and endophthalmitis phacoanaphylactica were used [1].

With a cataract backlog of around 12 million and annually increasing at an estimated rate of 3.8 million [2], it is not surprising that the occurrence of lens induced glaucomas is not an infrequent event in India [3].

It has long been recognized clinically that several

forms of glaucoma may occur in association with the formation of cataracts, which are an important cause of secondary glaucoma in the developing world [4].

In the developing world, like India, financial, cultural and psychosocial barriers for accessing excellent surgical services still exist. There is an ever-increasing backlog of cataract due to the population explosion, increased life expectancy and low productivity in terms of utilization of the available surgical services. The uptake of eye care services by the rural community has also been sub optimal in countries like India, where lens induced glaucoma's is a common cause of ocular morbidity [4].

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These lens-induced glaucoma's are a common occurrence in India, hardly surprising in a situation where the incident of cataract cases far exceeds the total number of surgeries performed currently [5].

Though not all inclusive, these lens induced glaucomas are either secondary angle closure glaucomas (phacomorphic glaucomas) or secondary open angle glaucomas (phacolytic glaucomas). Irrespective of these models of presentation, the treatment has been oriented towards a single focus, namely, removal of the cataractous lens [6].

Whatever be the mode of surgical intervention, the prognosis for good postoperative visual recovery in these conditions remains guarded.

The present study has endeavored to determine the postoperative visual outcome and IOP in lens induced glaucoma's.

Materials and Methods

Methodology

This study included 50 cases of different types of LIG, admitted in the ophthalmic wards of the tertiary hospital during the period of one year.

Inclusion Criteria

- All patients diagnosed for lens induced glaucoma.
- Patients who signed written and informed consent.

Exclusion Criteria

- Primary glaucoma.
- Secondary glaucoma other than lens induced glaucoma.
- Patients unfit for surgery due to very poor general condition.

All patients diagnosed as LIG on the basis of clinical symptoms and signs were included. Clinical features included pain, loss of vision, redness of the eye, headache, presence of an intumescent, mature or hyper mature cataract associated with raised IOP of more than 21 mmHg.

A detailed clinical examination of both eyes included the status of the lens, depth of the anterior chamber by slit lamp biomicroscopy and IOP recording by Perkins applanation tonometry. Written and informed consent was taken from patients. At

presentation visual acuity, IOP were recorded, which were again repeated after medical treatment and post operatively. None of the cases had fundal glow at presentation.

Phacomorphic glaucoma was diagnosed, when patients presented with red eye, acute pain and reduction of vision of certain duration. On clinical examination the eye showed circumcorneal congestion, corneal oedema, shallow anterior chamber, dilated and fixed or sluggish pupil, intumescent cataract and IOP more than 21 mmHg.

Phacolytic glaucoma was diagnosed, when patients presented with acute pain in the eye with long standing poor vision. On examination the eye showed marked diminution of vision, corneal oedema, normal or deep anterior chamber containing floating lens particles and or pseudohypopyon in severe cases and hypermature morgagnian cataractous lens in some cases. Dense flare was seen with extensive keratic precipitates.

The management of these 50 cases consisted, with the aim of preserving useful vision, relief from pain and reduction of the elevated ocular tension to almost normal levels, achieved by both medical and surgical methods. Relief from pain was by bringing down the IOP and by systemic administration of analgesics. Anti-emetics were given in cases of severe vomiting.

In all cases, preoperative medication to reduce IOP included either topical timolol 0.5% twice a day, oral acetazolamide 500mg thrice a day or intravenous mannitol 20% alone or in combination, and also intravenous mannitol 20% was used before the surgery in refractory cases. Topical mydriatics, phenylephrine 10% and cycloplegics were used just before surgery, for good capsulotomy.

In all patients cataract extraction with IOL implantation was offered under guarded prognosis. After controlling IOP, patients were taken for surgery. In all the patients, after peribulbar block, digital pressure was applied except in lens displacement cases, for nearly 8-10 minutes to achieve good hypotony. Planned manual small incision cataract surgery with intra ocular lens implantation was done in all but except in one case. In one case, after lens extraction IOL was not implanted, since the patient had posterior capsule tear. Peripheral iridectomy was added in one case with long standing refractory glaucoma. Thorough anterior chamber wash with balanced salt solution was given. At the end of procedure, subconjunctival injection of steroid and antibiotic was given.

Post operatively, all the patients received topical antibiotic-steroid combination, 1 drop hourly a day

tapering was given upto 40 days and mydriatic-cycloplegic, twice a day if required. If the tension appeared to be on higher side, topical timolol 0.5% twice daily for 7 days were instilled and in severe cases, oral acetazolamide was given. All the patients were followed up regularly at 2nd and 6th week interval. At every visit, patients were evaluated for visual acuity with Snellen's chart, IOP by Perkins applanation tonometer, slit lamp examination of anterior segment and posterior segment examination with direct ophthalmoscope and 90D lens. The results were tabulated on Microsoft excel spreadsheet and data was statistically analyzed using Paired 't' test,

Chi square test and pooled chi square test wherever applicable and a P value less than 0.05 was considered significant.

Results

Phacomorphic glaucoma was the most common LIG with 43 cases (86%), followed by phacolytic glaucoma with 07 cases (14%).

In this study, it was observed that none of the cases presented with visual acuity of better than hand movement

Table 1: Distribution of cases according to LIG subgroups

Diagnosis	No. of cases	Percentage
Phacomorphic glaucoma	43	86
Phacolytic glaucoma	07	14
Total	50	100

Table 2a: Distribution of cases according to Visual acuity at presentation

Visual Acuity	At Presentation	
	No.	%
HM	32	64
PL	16	32
?PL	02	04
TOTAL	50	100

Table 2b: Distribution of cases according to Visual acuity at last follow-up

Visual Acuity	At last follow up	
	No.	%
6/6-6/12	22	44
6/18-6/60	15	30
<6/60	13	26
Total	50	100

Table 3: Distribution of cases according to IOP at presentation, after medication, and at last Follow-up

IOP MmHg	At NO.	Presentation %	After NO.	Medication %	At Last NO.	Follow UP %
00-20	00	00	43	86	50	100
21-30	15	30	07	14	00	00
31-40	17	34	00	00	00	00
>41	18	36	00	00	00	00
Total	50	100	50	100	50	100

At the last follow up, 22 (44%) cases gained good visual acuity, 15 (30%) cases gained moderate visual acuity and 13 (26%) cases gained poor visual acuity.

In this study, total mean IOP at presentation was 38.88 ± 11.31 mmHg (range 22-64), after medication it was 18.76 ± 3.47 mmHg and at last follow up it was 15.60 ± 2.10 mmHg. Paired 't' test was used to compare the reductions of IOP from the baseline at presentation to IOP after medication, IOP from baseline at presentation to IOP at last follow up and IOP after medication to IOP at last follow up, the

mean respective were 20.12 ± 1.41 ($t=14.31$, $p<0.0001$), 23.32 ± 15.94 ($t=14.62$, $p<0.0001$) and 2.78 ± 0.49 ($t=5.65$, $p<0.0001$).

BCVA of 6/12 or better, at last follow up was achieved in 18 (41.86%) of Phacomorphic glaucoma and 4 (57.14%) in phacolytic glaucoma. ($p=0.603$). Poor visual acuity of less than 6/60 in both the subgroups were almost same with 11 (25.58%) in Phacomorphic glaucoma and 02 (28.57%) in phacolytic glaucoma.

Table 4: Distribution of cases according to BCVA at last follow up among LIG subgroups

BCVA	Phacomorphic NO.	Glaucoma %	Phacolytic No.	glaucoma %	Total No.	%
6/6-6/12	18	41.86	04	57.14	22	44
6/18-6/60	14	32.56	01	14.29	15	30
<6/60	11	25.58	02	28.57	13	26
Total	43	100.00	07	100	50	100

Table 5: Distribution of cases according to BCVA at last follow up and duration of symptoms

BCVA	Duration of Symptoms (In Days)									
	0-2	%	3-7	%	8-14	%	15-30	%	>30	%
6/6-6/12	00	00	10	76.92	08	66.67	04	28.57	00	00
6/18-6/60	00	00	03	23.08	04	33.33	06	42.86	02	18.2
<6/60	00	00	00	00.00	00	00	04	28.57	09	81.8
Total	00	00	13	100.00	12	100.0	14	100.0	11	100

The BCVA at last follow up of 6/12 or better was achieved in 18 (72%) of 25 cases with symptoms less than 2 weeks and in only 4 (16%) cases of 25 cases with symptoms more than 2 weeks. The poor visual acuity of less than 6/60 was found in 13 (52%) in 25 cases with more than 2 weeks and in 0 (0%) in 25 cases with symptoms less than 2 weeks duration. Duration symptoms had linear relation with visual outcome. More the duration of symptoms poorer the

visual outcome ($\delta^2 = 31.5$, $p=0.0001$)

BCVA at last follow up of 6/12 or better was achieved in 13 (59.10%) cases with IOP at presentation of less than 35 mmHg and in 09 (32.14%) cases with IOP at presentation of more than 35 mmHg. Poor vision of less than 6/60 was 12 (42.86%) cases and 01 (4.54%) cases with IOP at presentation of more than 35 mmHg and less than 35 mmHg respectively. ($\delta^2 = 9.52$, $p=0.009$)

Table 6: Distribution of cases according to BCVA at last follow up and IOP at presentation

BCVA	IOP at Presentation			
	<35mmHg		>35mmHg	
	No.	%	No.	%
6/6-6/12	13	59.10	09	32.14
6/18-6/60	08	36.36	07	25.00
<6/60	01	04.54	12	42.86
Total	22	100.00	28	100.00

Discussion

This longitudinal study was undertaken to study the visual outcome after planned manual small incision cataract surgery.

In this study series, it was observed that the most frequent type of LIG was PMG (86%) followed by PLG (14%), similar occurrence was noted by Madurai study [5] (52.68%) and Lahan study [7] (72%).

Occurrences of various lens-induced glaucomas in the above studies shows variations. Nevertheless, Phacomorphic glaucoma has been the most frequent and commonest among all the studies including the present one, which is peculiar to the developing countries. In this study, none of PMG occurred below 50 years of age, showing that Phacomorphic glaucoma is a disease of old age with preponderance in 60-69 years age group.

This is perhaps because of insidious onset, lack of medical awareness and limited resources in

developing countries. On the other hand, phacolytic glaucoma represents, lens induced acute secondary open angle glaucoma associated with rapid onset of pain, redness and watering in the eye and acute rise in intra ocular pressure causes the patient to seek medical advice earlier than Phacomorphic glaucoma.

Visual Outcome

In this study, none of the cases had vision better than hand movement at presentation. The best-corrected visual acuity at the end of last follow up is compared with other studies.

In this study, BCVA of 6/18 or better, is slightly higher (54%) than Lahan study series [7] (31.40%). There were a significant proportion of cases that had blindness, with visual acuity less than 3/60 (20%) slightly less than Lahan study [7] (21.0%). Thus, in this study higher percentage of cases has achieved good visual recovery and lower percentage of cases have poor visual outcome when compared to Lahan

study series.

BCVA in this study, of 6/12 or better was low (44%) and poor vision of less than 6/60 higher (26%) compared to Madurai study [5], with 59.13% and 11.82% respectively.

Final Visual Outcome by Subgroups

BCVA of 6/12 or better was taken as good visual acuity and less than 6/60 as poor visual outcome.

In this study, good visual acuity achieved by cases with phacolytic glaucoma (57.14%) was more than Phacomorphic glaucoma (41.86%) this difference was clinically significant but statistically not significant ($p > 0.05$). Poor outcome of less than 6/60 showed no significant difference between PLG (28.57%) and PMG (25.58%).

1994, Madurai study series found no statistical difference between the two groups on the final post-operative visual recovery ($p=0.68$)⁵. In a study done by Lane S S et al., BCVA of 20/50 or better was seen in 80% in PLG [8]. Study by A Braganza et al., showed BCVA of 20/80 or better in 85.4% in PLG. In another study by Gurudeep Singh et al., on PLG, BCVA of 6/12 or better was seen in 80% [9].

Duration of Symptoms

Good visual acuity achieved, in cases presented within 2 weeks (72%) was 65 more than the cases presented beyond 2 weeks (16%), whereas poor visual acuity of less than 6/60 was more in cases presented beyond 2 weeks (52%). In this study, duration of symptoms had a linear relation with best-corrected visual acuity at final follow up. More the delay in presentation, poorer was the visual outcome, which was both clinically and statistically significant ($p < 0.01$).

The Lahan study [7] of 1998, found that duration of pain and high level of intra ocular pressure at presentation in PMG was associated with poor visual outcome at discharge, while in phacolytic group no such association were made out. In our study, the mean duration of symptoms in PLG was 9 ± 14.52 days. In a study by A Braganza et al., on PLG mean duration of symptoms was $11.5 + 21.7$ days [10].

Clinically, significant proportion of cases with IOP at presentation less than 35 mmHg (59.10%) achieved good visual acuity, than cases with IOP more than 35 mmHg (32.14%), whereas poor visual outcome was more in cases presented with IOP more than 35 mmHg (42.86%) than cases with IOP less than 35 mmHg (4.54%). The correlation between height of

IOP and visual outcome was, clinically and statistically significant ($p < 0.05$). Madurai study had found no statistically significant association between the level of preoperative IOP and final visual acuity⁵.

It is found that the IOP tends to be higher with the delay in presentation beyond 30 days (44.67 ± 14.84 mmHg) than the duration of presentation of less than 2 weeks (38.76 ± 12.59 mmHg). Though mean IOP at last follow-up was normal (16.44 ± 6.54 mmHg), cases with delay in presentation between 2 to 4 weeks and more than 30 days tend to be on higher end of normal (18.44 ± 6.98 mmHg and 18.67 ± 12.48 mmHg). Thus delay of more than 2 weeks in presentation would result in higher IOP, especially if the delay is beyond 30 days, which is clinically significant.

Conclusion

The results have shown that, good visual acuity can be achieved in lens induced glaucoma presenting within two weeks, with intraocular pressure of less than 35 mmHg.

Planned manual small incision cataract extraction with IOL implantation, minimal tissue handling, a good follow up with efficient management of attendant complications and inflammation, are the key factors in the management.

In other words, a delay in presentation of more than two weeks, and intraocular pressure of more than 35 mmHg would ultimately jeopardize vision, in these potentially blinding lens-induced glaucomas.

It is to be stressed upon, imparting health education and creating awareness regarding cataract and its implications among the rural community, ophthalmic assistants and peripheral health workers.

This study has highlighted the importance of early diagnosis, and efficient medical management to control IOP, with meticulous surgery and IOL implantation, and also proficient postoperative management and follow up would probably achieve excellent visual prognosis.

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