Clinical Study of Lens–Induced Glaucoma in Elderly Population of Gulbarga

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ABSTRACT

BACKGROUND

In developing countries like India, it is essential to spread awareness about cataract and its complications like lens induced glaucoma, uveitis. Lens induced glaucoma (LIG) can lead to irreversible blindness due to secondary optic atrophy. The purpose of this study was to stress on early diagnosis and timely management in preventing blindness due to lens induced glaucoma in patients visiting ESIC Medical College and Hospital, Gulbarga. Karnataka.

METHODS

This retrospective descriptive type of statistical study was conducted in the Department of Ophthalmology, ESIC Medical College and Hospital, Gulbarga. Karnataka, from March 2018 to March 2021. Intraocular pressure (IOP) and visual acuity was recorded in all patients after through history taking, ocular examination and fundoscopy. After subjecting for exclusion criteria, cases of LIG were confirmed and included in the study.

RESULTS

In our study we found total 25 cases having LIG, in that 9 were male patients (36 %) and 16 were females (64 %). Phacomorphic glaucoma was recorded in 19 patients (76 %) and phacolytic glaucoma in 5 cases (20 %). Intraocular pressure of 40 - 49 mmHg was recorded in 16 patients (64 %) followed by 30 – 39 mmHg in 5 patients (20 %) and 50 – 59 mmHg in 4 patients (16 %). In our study, 13 patients had visual acuity of counting fingers (CF) 3 meters to 5 meters (52 %) followed by 6/60 to 6/24 (20 %) and hand movements to counting fingers 3 metres in (12 %) and one patient had no perception of light (4 %). All patients underwent cataract surgery with intraocular implantation under local anaesthesia. After 2 weeks of follow up, vision restored was between 6/9 - 6/18 (40 %) in 10 patients followed by 6/18 - 6/60 (28 %) in 7 patients and no improvement in vision in one patient.

CONCLUSIONS

Glaucoma is one of the causes for irreversible blindness. Though overall prevalence is less than 5 % but gets its one of major contribution from lens induced glaucoma. One good thing about LIG is patient presents early due to loss of vision and pain, so if we intervene with early diagnosis and manage patients, vision can be restored successfully.

KEYWORDS

LIG, Cataract, IOP, Phacomorphic Glaucoma, Photolytic Glaucoma

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BACKGROUND

Cataract is one of the most important causes of preventable blindness in India accounting to 63.7 percent.[1] Lack of awareness regarding cataract maturity related serious complications like LIG remains one of the most important causes of irreversible loss of vision. This preventable and curable condition is unfortunately still prevalent in India.

Lens-induced glaucoma was first described in the year 1900 as a glaucoma associated with hypermature cataract by Gifford[2] and von Reuss.[3] Later, various workers[4 - 6] described similar types of cases with different names like LIG, lens-induced uveitis and glaucoma, phacotoxic glaucoma, phacogenic glaucoma, and finally phacolytic glaucoma.

LIG is characterized by a secondary glaucoma with acute rise of intraocular pressure. It is seen in a hyper mature, mature and rarely even in immature senile cataract. Clinically, LIG presents in different forms but definitive treatment is removal of culprit i.e. cataractous lens. It is observed in almost all cases that drastically IOP reduces and patient is relieved of all signs and symptoms of LIG after surgical treatment. Time factor plays vital role in LIG cases. Early diagnosis and treatment can prevent irreversible blindness due to glaucomatous optic atrophy.

Retrospective hospital-based study was undertaken to study the profile of lens-induced glaucoma leading to blindness in patients who came to ophthalmology OPD in the period between March 2018 to March 2021 at ESIC Medical College and Hospital, Gulbarga. Karnataka. The study was done to give more stress on the early diagnosis and management of LIG cases and also increase awareness in the general population regarding complications of untreated cataract.

METHODS

This is a retrospective, hospital-based study in which clinical scenarios of 1350 cataract patients presented from January 2018 to January 2021 at ESIC Medical College and Hospital, Gulbarga, Karnataka were included.

Inclusion Criteria

Lens induced glaucoma was diagnosed based on clinical symptoms and signs.

Exclusion Criteria

Other causes presenting with similar clinical profile like, secondary cataract, traumatic cataract, complicated cataract, and known cases of glaucoma were excluded from the study.

In our study, we selected 25 patients with LIG after taking into consideration inclusion and exclusion criteria. A detailed case history and clinical examination of both eyes was done. Ocular examination included the visual acuity testing, status of the lens, slit lamp bio microscopy, measurement of IOP with applanation tonometry. Angle of anterior chamber examination was done with the help of gonioscopy with three mirror Goldmann contact lenses. This was followed by a detailed Fundus examination with a +90.0D lens. Patients presenting clinical features, status of lens, IOP (Applanation tonometry) and gonioscopy wherever possible (3-mirror contact lens) were recorded systematically.

Phacomorphic glaucoma was diagnosed on the basis of acute pain, corneal oedema, circumciliary congestion, fixed dilated pupil with shallow anterior chamber, intumescent cataract, or mature cataract and on gonioscopy shows narrow angle. Phacolytic glaucoma was diagnosed on the basis of pain, corneal oedema, with or without deep anterior chamber. Patients also presented with open angle on gonioscopy, lens particles in AC or pseudo hypopyon. Patients with phacomorphic LIG were diagnosed by history and slit lamp examination showing typical lens displacement especially seen in hypermature morgagnian type of cataract along with phacodonesis and iridodonesis.

All cases were treated preoperatively with systemic anti glaucoma medications like carbonic anhydrase inhibitors, intravenous mannitol to reduce the intraocular pressure. Guarded visual prognosis was explained. All the patients underwent small incision cataract surgery with posterior chamber intra ocular lens (IOL) implantation under peribulbar block. Intraoperative and post-operative complications were recorded. Post operatively, recording of visual acuity level, IOP measurement and slit lamp bio microscopy was done. They were given systemic antibiotics, topical steroid-antibiotic and cycloplegics along with steroids post-operatively. Patients were followed initially after 1 week and after 6 weeks.

Through examination of all LIG patients with slit lamp bio microscopy, fundoscopy with +90 D lens and visual acuity was done at the end of 6 weeks.

Statistical Analysis

Descriptive type of statistical analysis, study was made with the help of tables and graphs. Results were concluded at the end of study period.

RESULTS

In our retrospective study, out of 1350 cases of cataract cases reported to our out-patient department (OPD) from January 2018 to January 2021, 25 cases were diagnosed as lens induced glaucoma and successfully managed. We had most of the cases from urban background (84 %) compared to rural background (16 %). There were 36 % males and 64 % females (Table 1). Most of our cases were in the age group of 51 to 70 years (80 %). Females outnumbered the males 1.7 : 1.

In our study, 21 patients reported to OPD, within 2 days and 3 patients came after 2 days to 1 week and one case after 1 week (Table 4).

All cases presented with pain, redness, watering, and diminution of vision. Photophobia and coloured halos were also presenting complaints of 72 % of patients. 56 % of patients gave history of surgery in another eye. On examination, all cases had circumciliary congestion corneal oedema and fixed dilated pupil along with cataract in presenting eye. In 5 patients, keratic precipitates were found. 11 cases had pseudophakia in the other eye (Table 2).

Majority of our patients had presenting vision more than counting fingers 3 meters (84 %). 3 patients of LIG had vision of CF 3 meters to hand movements and one had no perception of light (Table 3). In 64 % of LIG patients, intraocular pressure recorded was between 40 - 49 mm of Hg. 16 % of them had 50 - 59 mm of Hg and the remaining had 30 - 39 mmHg. (Table 4)

Out of 25 cases, (Table 5) 76 % of LIG patients were diagnosed as phacomorphic glaucoma based on diagnostic criteria. 20 % of them were diagnosed as phacolytic glaucoma one case of hypermature cataract with anterior subluxation of lens was recorded (4 %).

All 25 cases underwent small incision cataract surgery with intraocular implantation under peribulbar block.

Intraoperative and post-operative complications encountered in this study. During surgery, we encountered shallow anterior chamber 15 (60 %) patients that may be due to positive vitreous pressure. Posterior capsular tear occurred in 4 (16 %) patients, and we couldn't perform complete cortical wash in 3 (12 %) patients. Post-operatively, uveitis was seen in 17 (68 %) patients and 14 (56 %) cases had striate keratopathy (Table 6).

During post-operative period, out of 25 patients, 10 (40 %) patients could regain visual acuity of more than 6/18. It was seen that only 3 had vision less than 3/60 with one patient no improvement at all.

Age (Years)	Number of Male Patients	Number of Female Patients	Total Number of Patients
51 – 60	1	8	9 (36 %)
61 – 70	5	6	11 (44 %)
71 – 80	2	1	3 (36 %)
More than 80	1	1	2 (8 %)
Total	**09 (36 %)**	**16 (64 %)**	**25 (100 %)**

Table 1. Sex and Age Distribution of LIG Patient

Presenting with Symptoms of LIG to OPD	Number of Patients
Within 24 hours	11
1 - 2 days	10
Less than a week	3
More than a week	1

Table 2. Duration of LIG Patients

Level of Visual Acuity	Pre-Operative	Post-Operative
No perception of light	1 (4 %)	1 (4 %)
Hand movement to 3/60	3 (12 %)	3 (12 %)
6/60 - 3/60	13 (52 %)	4 (20 %)
<6/18 - 6/60	5 (20 %)	7 (28 %)
<6/18 - 6/9	3 (12 %)	10 (40 %)

Table 3. Number of Patients with Pre- and Post-Operative Level of Visual Acuity

Intra Ocular Pressure at Presentation	No. of Patients (%)
30 - 39 mmHg	5 (20 %)
40 - 49 mmHg	16 (64 %)
50 - 59 mmHg	4 (16 %)

Table 4. Intraocular Pressure of LIG Patients

Type OF Lens Induced Glaucoma	No. of Patients (%)
Phacomorphic glaucoma	19 (76 %)
Phacolytic glaucoma	5 (20 %)
Phacoanaphylactic glaucoma	None
Phacotopic glaucoma	1 (4 %)

Table 5. Type of Lens Induced Glaucoma

Post-Operative Complications	No. of Patients
Posterior capsule rupture and vitreous loss	1
Cortical remnants	03
Hyphema	02
Anterior uveitis	17
Striate keratopathy	14
Glaucomatous optic atrophy	4

Table 6. Post-Operative Complications During Cataract Surgery in Patients of Lens Induced Glaucoma

DISCUSSION

In developing countries like India, cataract remains as a major cause of reversible blindness affecting aged people (senile cataract) and even young individual with metabolic disease and or secondary to trauma or inflammation (presenile cataract). This is a type of preventable blindness. Timely intervention with surgical extraction of cataractous lens is the mainstay of treatment. If not intervened surgically, patient definitely will suffer from complications like lens induced glaucoma, phacoanaphylactic uveitis. Again, if these complications are not diagnosed due to any cause and not managed promptly, patient will lose their vision due to secondary optic atrophy and phthisis bulbi, which once developed cannot be reversed. Now considering with the fact that India's most of population resides in rural areas, we have national programmes and assistance from NGO'S and private practitioners dedicated services to combat cataract related complications. One important thing needs to be mentioned here that cataract surgery is very rewarding and equally cost effective.

In our study, out of 1350 cases of cataract cases reported to our OPD, 25 cases were diagnosed as LIG and successfully managed, that is about 1.85 % of all cases of senile cataract reported our OPD during that 3 years. In this study, the magnitude of LIG was 1.85 % during the study period as against 1.5 % in Lahan study.[7]

It was seen in our study that females outnumbered males in presenting with LIG. In present study female to male ratio was 1.7 : 1. Dr. Damodhar Pradhan et al. and a study done at Madurai in 1994 also found similar findings in their study, where the ratio was 1.7 : 1.[8,9] Females are at higher risk for developing LIG, may be due to anatomical predisposition.[10,11]

The highest number of cases occurred in the age group 60 - 69 years (44 %), Lahan study has found the occurrence of LIG in the age range of 40 - 80 years and highest in the 60 - 69 years (43.1 %) age group, indicating that the lens-induced glaucoma is a condition of old age.[7]

In our study, it is observed that phacomorphic glaucoma (76 %) was more frequent form of LIG followed by phacolytic glaucoma (20 %), similar forms of LIG were seen in the studies conducted in Madurai (52.68 %)[9] and Lahan (72 %).[7]

In the present study, best corrected visual acuity of 6/18 and better was seen in 10 (40 %) patients and visual acuity

of 6/60 or low in 4 (16 %) patients. Similar visual acuity was recorded in Madurai study, i.e. 59.13 % (6/18 or better) and 11.82 % (less than 6/60) of patients. When patients presented with IOP less than 39 mm of Hg, they attained better visual acuity (20 %) than those who presented with IOP levels of more than 40 mm of Hg (64 %). In our study, only 32 percent of patients had post-operative vision less than 6/60, which is quite similar as compared to only 21 percent reported by Pradhan et al.[8] The reason for early reporting may be due to provision of cataract surgery made available in all government institutions, good health education, non-acceptance of poor vision as part of aging, reduced fear of operation, more expectations and socio-economic constraints and professional challenges. 4 patients diagnosis was missed and reported late and was also mistreated by local practitioners. They were brought to the hospital after worsening of the clinical condition. Another factor about late reporting found was that in 3 cases out of 4 cases, they were aged more than 70 years and visually handicapped. They were left to their own fate as nobody bothered to bring them to the hospital.

In our study, significant reduction in IOP after surgical intervention was found in 60 % of patients. At last follow-up, IOP reduction to baseline was achieved in 92 % of patients.

In our study, visual outcome after cataract surgery has been reported normal, that is, 6/18 or better in 10 patients, and vision more than 3/60 was noted in 11 patients. Vision improvement less than 3/60 was noted in 3 cases and one case could not improve her vision after cataract surgery. In this study, 3 patients could do only routine activities and 1 patient with no vision improvement at all after the operation. The most important cause of poor post-operative vision has been attributed to surgical complications[12] and late presentation. However, in our study, early reporting for treatment also emerged as one of the most important causes for good post-operative vision following cataract surgery as we get very less patients from rural background.

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LIG can be seen in all stages of maturation of the crystalline lens. Phacomorphic glaucoma found to be most common type occurs because of secondary angle closure mechanism. Normally as age advances, there is increase in anteroposterior length of lens and swelling of weak zonules, that may result in pupillary block especially in hypermetropic eyes. The presence of an intumescent cataractous lens with shallow angle closure in the affected eye and normal other eye gives us a clue that it is LIG and differentiates it from primary angle-closure.

LIG can even present as photolytic glaucoma, Lens particle glaucoma and phacoantigenic glaucoma with secondary open-angle mechanisms. It may be due to as observed in many researches[13 - 15] that leakage of heavy molecular proteins through the intact lens capsule of a mature or hypermature cataract causing obstruction of the aqueous outflow resulting in raise in intraocular pressure and is described as photolytic glaucoma. Lens proteins which are kept safely within the capsule i.e. immunologically privileged area gets exposed to circulation secondary to traumatic insult or due to hyper mature cataract stage excite inflammatory response this antigen antibody and complements blocks the flow of aqueous resulting in raise in IOP and this clinical event is known as phacoantigenic glaucoma.[16] In some cases, fragments of lens material liberated from ruptured capsule following cataract extraction, capsulotomy or penetrating trauma[17 - 19] may cause obstruction of the trabecular meshwork thereby causing raised IOP. It is secondary open angle mechanism called lens particle glaucoma.

LIG patients usually present to ophthalmology OPD with severe ocular pain, headache. blurred vision, perception of coloured halos, nausea and vomiting due to significant rise in IOP with or without history cataract diagnoses made earlier and not operated or operated in one eye. Sometimes bradycardia, and diaphoresis can be seen rarely due to vasovagal response.

The clinical examination of the patients reveals raised IOP as high as 80 mmHg at times, reduced visual acuity, circumciliary congestion, corneal oedema, shallow angle closure with cells and flare, mid-dilated pupil and a hypermature intumescent cataract.[20] Secondary acute glaucoma can also occur if the lens is displaced from its normal anatomical position as seen in systemic disorders like Weill-Marchesani syndrome, Marfan's syndrome and homocystinuria, the conditions with defective lens zonules (Ectopia lentis) or sometimes secondary to trauma.[20 - 22]

LIG is one of the ophthalmic emergencies. Rapid reduction in IOP is achieved with systemic hyperosmotic agents like injection mannitol, oral carbonic anhydrase inhibitors like tablet acetazolamide. On reduction in IOP, surgical management is planned i.e. cataract extraction with IOL implantation.

Though early ophthalmic consultation by patient and early diagnosis and management plays a vital role in LIG, regular follow-up with efficient management of attendant complications and inflammation, are also the key factors in retaining good visual acuity.

CONCLUSIONS

Cataract remains the most important cause of blindness in developing countries. Delayed reporting for treatment leads to serious complications like lens-induced glaucoma causing irreversible visual loss. Cataract surgery is done in all government hospitals as a part of National programme for control of blindness free of cost. Most of the times patients are brought from screening camps to tertiary hospital and surgery is successfully done. Though number of cataract related complications have reduced in recent past, still it is disheartening to come across LIG cases. It is our duty to educate attendants and all people who are aged about normal cataractogenesis and complications that may arise if not treated timely. As patients might lose their vision permanently due to optic atrophy which cannot be reversed.

Dependent geriatric patients who lack care takers, and rural population, due to lack of awareness are the worst affected.

In our study, we have highlighted the clinical profile of LIG patients, and stressed more on early diagnosis. It was concluded that efficient management of LIG cases with control of IOP and inflammation medically and meticulous cataract surgery along with proficient post-operative management and follow-up would probably have rewarding results.

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