

LENS INDUCED GLAUCOMA-EXPERIENCED IN GOVERNMENT TERTIARY CARE HOSPITALS

DAKSHAYINI

Department of Ophthalmology, Bangalore Medical College and Research Institute, Fort Road, Bangalore, Karnataka, India

ABSTRACT

From the study of fifty cases of lens induced glaucomas by various mechanisms on patients attending BMCRI from January 2010 to March 2012, The maximum prevalence of lens induced glaucomas occurred in the age group between 50-65 years. Females are more affected than males. Majority of the patients were affected by phacolytic and phacomorphic glaucomas. Extra capsular cataract extraction or Small Incision cataract surgery with posterior chamber IOL implantation alone is curative in lens induced glaucoma of duration less than 7 days. In cases of duration of more than seven days, a trabeculectomy has to be combined. The need for trabeculectomy in lens induced glaucoma needs further comparative study.

KEYWORDS: Phacolytic, Phacomorphic Glaucomas, IOL Implantation

INTRODUCTION

There are twenty million blind people in India; eighty percent of this blindness is due to causes which are preventable. Cataract in India is the most important cause of preventable blindness accounting to 63.7 percent [1]. Lens-induced glaucoma (LIG) was first described in the year 1900 by Gifford [2] and von Reuss [3] independent of each other. While the former described it as a glaucoma associated with hyper mature cataract, the latter described it as a glaucoma associated with spontaneous absorption of lens substance through intact lens capsule. Subsequently, various workers [4-6] described such types of cases under different names like LIG, lens-induced uveitis and glaucoma, phacotoxic glaucoma, phacogenic glaucoma, and finally phacolytic glaucoma. These terms including the more popular term phacolytic glaucoma have been discarded for various reasons and convenience in favour of the term "LIG." At present, LIG is a clinical condition characterised by (i) a violent secondary glaucoma (resembling acute angle closure glaucoma) in one eye with senile mature cataract, hyper mature senile cataract (rarely immature senile cataract) yet with an open angle, (ii) normal intraocular pressure and open angle in other eye, and (iii) a prompt relief of symptoms and restoration of vision after cataract extraction in the effected eye. Late reporting for treatment of cataract leading to serious complications like LIG remains one of the most important cause of irreversible loss of vision, especially so in the rural population. This preventable and curable condition, though rare in developed countries, is unfortunately still prevalent in India. The study is undertaken to study the profile of lens-induced glaucoma leading to blindness in rural and urban population in Bangalore city, India. It is a retrospective cross sectional hospital-based study. The records of cataract cases who were diagnosed as LIG and operated at our hospital from 2010 to 2012 were analyzed.

MATERIALS AND METHODS

Fifty cases included in this study were operated for lens-induced glaucoma between 2010 and 2012 at MINTO

Eye hospitals, BMCRI, Bangalore, India. All of them reported with pain, redness, and watering of acute onset in addition to gradual progressive loss of vision in affected eye as their presenting complaints and were diagnosed as LIG based on the clinical findings and raised intraocular pressure. Congenital cataract, secondary cataract, traumatic cataract, complicated cataract, and known cases of glaucoma were excluded from the study. Complete ophthalmic examination with preoperative and postoperative visual acuity, IOP measurement, slit lamp examination, and intraoperative and postoperative complications were recorded.

Inclusion Criteria

All cases of phacolytic and phacomorphic glaucoma seen between January 2010 and March 2012

Clinical Features

History of acute onset of pain, redness, and watering following a period of painless loss of vision. Hypermature cataract, IOP > 21 mm of hg, Cells and flare

White spots on lens capsule, Pseudohypopyon and Intumescent lens with shallow anterior chamber.

Exclusion Criteria: Cases with immature cataract, lens induced glaucoma associated with trauma or uveitis and other causes of secondary glaucoma were excluded. Any associated systemic illness like DM, SHT, IHD, BA were recorded.

Patient Evaluation: All cases were examined for vision, slit lamp examination, schiottz tonometry, gonioscopy, and phththalmoscopy of both eyes.

Visual Acuity: Visual acuity of affected eye and fellow eye was assessed using the snellen's text types. For the purpose of analysis, this was converted to the corresponding Log MAR (logarithm of minimal angle of resolution) value. The visual acuity can be specified with different scales. Two commonly used are the decimal visual acuity and LogMAR. Decimal visual acuity is obtained by dividing the numerator of the snellen's fraction by the denominator. The logarithm of the reciprocal of this approximates the logarithm of minimal angle of resolution. The visual acuity after full refractive correction (the BCVA) was taken. The conversion table from the snellen's test types to their Log MAR value is given below.

Table 1

Snellen's V/A	Decimal Fraction	Log MAR
6/60	0.10	+1.0
6/48	0.125	+0.9
6/38	0.16	+0.8
6/30	0.20	+0.7
6/24	0.25	+0.6
6/20	0.32	+0.5
6/15	0.40	+0.4
6/12	0.5	+0.3
6/10	0.63	+0.2
6/7.5	0.80	+0.1
6/6	1.00	0.00
6/5	1.25	-0.1

Anterior Segment Examination

Slit Lamp Examination

All cases were evaluated by slit lamp biomicroscopy using Haag Streit 900 slit lamp. Both eyes were evaluated to grade cells and flare in the anterior chamber and assess the maturity of cataract. Gonioscopy was performed using the 3 mirror Goldmann gonioscope. Stereo biomicroscopic evaluation of the optic disc was performed in the fellow eye prior to surgery and in the operated eye following surgery using 90 D lens.

Papillary Reaction

Presence of RAPD was assessed using swinging flash light test of Levatin. This was performed in all cases with a standard illumination time on the eye for 3 seconds before rapidly swinging the light on to the fellow eye. In cases where the pupil of the eye with phacolytic glaucoma was fixed and not reacting, the test was performed by eliciting the direct and consensual papillary reactions on the fellow eye with the normal pupil.

RAPD Was Graded as Follows

Grade 1: A weak initial contraction followed by greater redilatation.

Grade 2: Initial small and greater redilatation

Grade 3: Immediate papillary dilatation

Grade 4: Immediate papillary dilatation following prolonged illumination of the good eye for 6 seconds.

Grade 5: Immediate papillary dilatation with no secondary constriction.

Gonioscopy

Evaluation and grading of the angle of the anterior chamber was performed in the eye to be operated on and the fellow eye using Goldmann three mirror goniolens with minimum intensity of slit lamp compatible for good visualization. In most cases affected eye required a repeat gonioscopy prior to surgery after the IOP, severity of the uveitis and corneal edema was brought down by medical means and visualization of the angle structures involved possible.

Grades Were According to Shaffer's

Grade 1: schwalbe;s line

Grade 2: trabecular meshwork

Grade 3: sclera spur

Grade 4: ciliary body band

Total closure meant 360° closure and less than 360° as subtotal closure.

Tonometry

This was done using schiottz tonometer. A mean of three IOP readings were taken.

Evaluation of Optic Disc

A stereo biomicroscopic examination of the optic disc could not be performed in the affected eye prior to surgery.

The fellow eye was examined preoperatively and both eyes postoperatively with a 90D lens and slit lamp. Evaluation was in terms of the size, color, neuroretinal rim, cup disc ratio and any associated nerve fibre layer defects. The optic disc was graded as

Flaucomatous Based on Criteria Shown Below

- Enlargement of the cup
- Generalized enlargement
- Localized enlargement
- Vertical-horizontal disproportion
- Asymmetry of more than 0.2
- Baring of the lamina cribrosa
- Loss of rim
- Diffuse thinning
- localized notching
- Increased pallor
- Central area of pallor
- Pallor of NRR
- Vascular changes
- Changes in the configuration of the vessel
- Nasalization
- Bayoneting
- Flame shaped haemorrhage

Preoperative Management

All the cases were managed preoperatively with hourly topical steroids during the day and short acting cycloplegics twice daily. The IOP was controlled medically with acetazolamide and hyperosmotics (mannitol) when needed. Some cases needed IV mannitol preoperatively.

Surgery

The operations were performed in our hospital. Regional anaesthesia (peribulbar and facial ablocks) with 2% lignocaine and adrenatline was used. Informed consent was obtained and relative guarded prognosis was explained to the patient.

Extra Capsular Cataract Extraction

Cases had ECCE. A beveled corneal groove was made. The AC was entered by a paracentesis in a controlled manner. Methylcellulose was used to maintain the anterior chamber and protect the endothelium. Can opener capsulotomy was made. A stab incision was made using the blade and completed with the corneal scissors. When there was liquefied cortical material blocking the view for capsulotomy, it was cleared with simcoe cannula and capsulotomy proceeded. After hydrodissecting the nucleus in the capsular bag, it was delivered by pressure counter pressure technique. The remaining cortical material was aspirated with a simcoe cannula. A decision to implant an intraocular lens was based on those whose fellow eyes were pseudophakic or insignificant cataract with BCVA of 6/18 or better. An intraocular lens was offered to all patients.

The anterior chamber was irrigated to wash out the methylcellulose. After forming AC with air and BSS, the wound was closed with 10-0 nylon sutures. Integrity of the sutures was tested at the end of the procedure.

Small Incision Cataract Surgery

Small incision cataract surgery with PCIOL implantation was done in 18 cases in our study.

Advantages of SICS in Lens Induced Glaucoma

- Minimal intraoperative bleeding and tissue injury.
- Reduced chances of positive vitreous pressure or expulsive haemorrhage.
- Less postoperative inflammation.
- Minimum astigmatism.
- Surgery safe despite uncontrolled IOP preoperatively.

SICS Technique in Phacolytic Glaucoma

A fornix based conjunctival flap is preferred because of less amount of conjunctival injury. A frown incision is preferred to a linear incision because the wound stability is better. After making a good sclera tunnel, a paracentesis was made 90o away from the tunnel. Sudden decompression should be avoided, as it would lead to abrupt shallowness of anterior chamber. Once the paracentesis was made and AC decompressed, cornea became clear with better visibility of AC details. AC was formed with viscoelastics through the paracentesis. The anterior chamber was entered with a keratome. Then the AC was washed with BSS to get rid of lens material. Linear capsulotomy is the method of choice. The nucleus is prolapsed into the anterior chamber, followed by a thorough AC wash. A single piece PMMA IOL is desirable.

SICS Technique in Phacomorphic Glaucoma

The incision should be longer than the usual (i.e. 7-9mm), 1.5-2mm posterior to the limbus at its centre due to bigger nucleus, in case of intumescent lens. In a single stroke, a gentle paracentesis is followed by a puncture into the anterior capsule done with the same instrument. This prevents sudden AC collapse and helps to lower the intracapsular pressure by reducing the volume of the lens. Once the chamber is reformed with viscoelastics, the capsulotomy is completed by canopener technique. The nucleus is prolapsed into AC by bimanual technique and extracted through the tunnel. The cortex is aspirated, IOL implanted and the procedure completed with a peripheral iridectomy. The anterior

chamber is formed and if necessary, a suture applied.

Cataract Surgery with Trabeculectomy

Cataract surgery with trabeculectomy was performed without the use of mitomycin C. A fornix based conjunctival flap was made. A partial thickness limbal based sclera flap was fashioned and the block to be excised marked out. After ECCE by corneal section or SICS with IOL, the trabecular block was excised and a broad based peripheral iridectomy was done. The sclera flap was then sutured with interrupted 10-0 nylon, at this stage, the functioning of the trabeculectomy was evaluated by irrigating the anterior chamber with BSS. The conjunctiva was closed and the bleb was tested by irrigating with BSS. Subconjunctival gentamycin and dexamethasone were given in the lower fornix. Postoperatively in all cases that had trabeculectomy, the conjunctival bleb was examined for the extent, height, vascularity and leak with the use of slit lamp. The AC was examined for the presence of hyphaema or hypopyon. The depth of the anterior chamber was graded as shown below:

Grade 1: peripheral iridocorneal touch

Grade 2: collarette touch

Grade 3: lenticulocorneal touch

The cornea was examined for epithelial edema and clarity. The fundus was examined for the presence of choroidal detachment, suprachoroidal haemorrhage, optic disc edema, maculopathy or choroidal folds.

Post Operative Management

All patients were examined postoperatively. As the surgery was easily detectable, no attempt at masking was made. Those who underwent cataract surgery alone received oral acetazolamide 250mg postoperatively 6th hourly for 1 day. Postoperative IOP was treated if more than 30 mm of Hg or if associated with corneal edema.

Topical steroids at hourly interval and short acting cycloplegics twice daily were used in all operated eyes to control the inflammation. Eyes which developed severe postop uveitis or an exudative membrane were treated with SC injection or a short course of systemic steroids.

Follow Up

All cases were followed as inpatients as Madurai medical college hospital for 5 days. Postoperative follow up examination was done every day for first 5 days. The patients were reviewed after 7 days and at 6 weeks following surgery. At each visit, routine postoperative examination was done. The parameters that were tested were:

- Best corrected visual acuity
- IOP by Applanation tonometry
- Anterior segment examination with the slit lamp
- Ophthalmoscopy with biomicroscopic evaluation of the optic disc.

RESULTS

Table 2: Age Group of Lens Induced Glaucoma Based on the Prevalence of the Entity

Sl.	Age In Years	No of Cases	Percentage
1	Less than 45	02	4%
2	46-50	04	8%
3	51-55	07	14%
4	56-60	13	26%
5	61-65	14	28%
6	66-70	08	16%
7	71-75	01	2%
8	76-80	01	2%
Total		50	100.0

The prevalence of lens induced glaucoma is more in the age group of 61-65 yrs and the next higher group 50-60 yrs. At this age where most of the population have senile cataract, in its various stages and maturity, the prevalence is higher. The prevalence of glaucoma in this age group was due to intumescence and leaking morgagnian stages of hypermature cataract. Lens induced glaucoma below 45 and 75 yrs were less. 28 were females and 22 were males.

Present study, it was seen that females had a higher prevalence than men mostly due to social constraints. Right eye was affected in 20 eyes and 30 in left eye.

Table 3: Duration of Attack in Days is Shown in the Following Table

Duration of Attack	No of Cases	Percentage
Less than 3 days	16	32%
3-5 days	5	10%
6-10 days	12	24%
11-15 days	12	24%
More than 15 days	5	10%

All the patients were admitted for the complaints of severe pain, headache of varying severity. The onset of illness was acute in most cases. Since the glaucoma under consideration is a complication of lenticular opacity, all the patients had seriously impaired vision prior to the onset of glaucoma. The visual accuracy at the time of admission varied from no perception of light, to perception of light, to ability to perceive hand movements and 1/60.

DISCUSSIONS

In this study 68% of cases were between the age group 51-65 years. According to Milton flock et al, the majority of patients in their study of 138 patients were above 70 years, but here it was found that above 70 years was only 4%. The early occurrence of secondary glaucoma by lens in comparison to other reports may be due to the early onset of lenticular changes seen in our population, which may be due to an environmental factor like sunlight.

In our study females seemed to have an increased risk of having glaucomas. Though it is possible that this entity is more common among females because of social constraints, we also have to consider the fact that prevalence of cataract itself is more common among females than males. The finding was consistent with data from the Punjab study in India and from the Matlab study in Bangladesh. In the Framingham Eye study as well as in the US Health and Nutrition Examination Survey, senile lens changes were more common in women. The incidence of glaucoma in left eye was slightly more than right eye.

Most of the patients presented with pain and loss of vision. The pain was sudden and varied little from the well known picture of “acute congestive glaucoma”. Since phacolytic and phacomorphic types under study are a complication of cataract, all of these patients had either seriously impaired vision prior to the onset of acute glaucoma. At the time of examination visual acuity varied from no perception of light to perception of light. Present study of the 2 groups of glaucomas, phacomorphic (52%) was slightly more common than phacolytic (46%), similar occurrence was noted by Prajna (52.86%) and Lahan study (72%). Phacomorphic glaucoma has been the most frequent and commonest among all the studies including the present one, which is peculiar in developing countries. This may be because the 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 intraocular pressure which causes the patient to seek medical advice earlier than phacomorphic glaucoma. The unaffected eye was studied in all the cases and the lens status was found to be aphakic in 2 cases and pseudophakic in 30 cases. Among the 30 cases of pseudophakia, 25 cases were found to be having good vision. The result was found that mean post operative IOP was less than 21 mm of Hg in 90% of cases. In the study done by Prajna it was found that 95% patients had good IOP control post operatively. Visual acuity improved fairly well despite of the type of surgery undertaken the determining factor being the duration of symptoms and timely intervention.

SURGICAL INTERVENTION

The addition of a trabeculectomy in the surgical management allows early postoperative IOP control and avoids the expense and the adverse effects of antiglaucoma medication. However our results confirmed that ECCE or SICS along is curative in phacolytic glaucoma. The IOP is well controlled by one week and this is maintained at 6 weeks and does not seem to be related to the type of surgery. However the original idea of adding on a trabeculectomy was for the management of cases with a longer duration of symptoms, such cases would be expected to be having heavy molecular weight soluble lens proteins in the trabecular meshwork, which would require time to clear. Trabeculectomy would still be expected to have at least a short term benefit in such cases. It was found that a few patients developed postoperative inflammation during the follow up period, 3 among trabeculectomy group and 5 among ECCE/SICS group, the reason might be due to more inflammation in the preoperative period which settled with treatment.

CONCLUSIONS

In the patients with raised preoperative intraocular pressure timely intervention after the control of intraocular pressure gives better visual recovery and also control of intraocular pressure. Preoperative rise of intraocular pressure, accuracy of light perception and final visual recovery were related to the duration of glaucoma. A good visual recovery was obtained if the attack lasted less than 15 days beyond which only a hand movement or perception of light could be recovered. Extracapsular cataract extraction or Small incision cataract surgery with posterior chamber IOL implantation alone is curative in lens induced glaucoma of duration less than 7 days. In cases of duration of more than 7 days, a trabeculectomy has to be added. The need for trabeculectomy in lens induced glaucoma needs further study. It is always better to advice patients in the postoperative period who have undergone cataract surgery in one eye to have periodic checkup of the other eye and also to advice them to report immediately as soon as the signs and symptoms of lens induced glaucoma develops in the other eye. In the context of the usage of intraocular lenses which has been proved to be safe in these glaucomas, it is natural for the patient to harbor high expectation and hence the guarded prognosis should be adequately explained, particularly in the high risk groups such as persons above the age of 60 years and persons who have raised intraocular pressure for more than 5 days.

ACKNOWLEDGEMENTS

Author acknowledge the Dean Cum Director, BMCRI, Professor and HOD, Department of Ophthalmology, BMCRI, Bangalore

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