

Clinical Profile of Lens induced Glaucoma

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Abstract: Aim of this research was to study the clinical profile and risk factors associated with lens induced glaucoma in a tertiary care centre in western Maharashtra, To study the demography of patients with LIG, To know the risk factors of LIG. Patients and Methods: This study was conducted in OPD of Department of Ophthalmology in a tertiary care centre in western Maharashtra. This was an observational descriptive study. This study was conducted from September 2016 to August 2018. All cases diagnosed as secondary glaucoma in the OPD of Department of Ophthalmology and subsequently admitted to ward were included in the study. This was continued till the desired sample size of 100 cases achieved. Both male and female patients included. The anterior segment was examined using Slit lamp, Visual acuity, Perimetry, gonioscopy and fundus evaluation done. Results: Secondary Glaucoma according BCVA (Best Corrected Visual Acuity). Out of 100, 32% cases had visual acuity ranging from 6/60 - 6/18 and another 33% had visual acuity ranging from 5/60 & PL+. 15% had no perception of light. In anterior segment examination of Secondary Glaucoma cases <1/4 CT PACD in 32% cases, Neovascularization of Iris in 20%, Peripheral Iridectomy in Pupil in 25%, Subluxation of lens in 37% and PEX (bulle's eye) in 16%. In fundus examination of Secondary Glaucoma. Inferior and Nasal thinning was there in 37% and Inferior, Nasal and Superior in 47% cases in Neuro retinal rim examination, C:D was <0.5 in 36%, Disc haemorrhage was present in 59%, Peripapillary atrophy was present in 61%. Perimetry finding in cases of Secondary Glaucoma. Superior Scotoma (SS) was found in 37%, Superior Arcuate Scotoma (SAS) was there in 37% cases. Gonioscopy finding in the Secondary Glaucoma cases. Highest cases were having grade 3 (40%) and 5% cases were having grade 0. Lens induced glaucoma cases. Out of 18 cases of Lens induce Glaucoma, 11 (61.1%) were having Phacomorphic glaucoma followed by Phacolytic glaucoma in 5 cases (27.8) and one case of traumatic Lens Induced Glaucoma and one case of Pseudoexfoliation Lens Induced Glaucoma. Conclusion: Lens induced glaucoma was found in 18% cases. Out of 18 cases of LIG 11 (61.1%) were having Phacomorphic glaucoma, Phacolytic glaucoma in 5 cases (27.8).

Keywords: Lens induced Glaucoma, Neovascularisation

1. Introduction

Glaucoma is a chronic progressive optic neuropathy caused by a group of ocular conditions which leads to damage of the optic nerve along with loss of visual function with associated raised intra ocular pressure. The most common risk factor being raised intraocular pressure.¹

Glaucoma is divided in two divisions. Primary glaucoma is genetically influenced and is not associated with other ocular or systemic diseases. Secondary glaucomas are group of disorders in which rise of intra ocular pressure is associated with some secondary ocular or systemic disease² causing increasing IOP leading to optic nerve damage and vision loss. Secondary glaucoma can be divided in to the open-angle or angle-closure type in one or both eyes caused by an eye injury, inflammation, certain drugs like steroids and advanced cases of cataract or diabetes and treatment depend on the underlying causative condition, which includes medications, laser surgery, or conventional surgery.³

Glaucoma is second only to cataract as a leading cause of global blindness, and is the leading cause of irreversible visual loss. It is estimated that 4.5 million persons globally are blind due to glaucoma and that this number will rise to 11.2 million by 2020. In India, the estimated number of cases of glaucoma is 12 million, around one fifth of the global burden of glaucoma.⁴

Since it is secondary to other ocular or systemic pathological condition, primary prevention is possible by controlling risk factors associated with it's development.⁵

Early detection is important for better therapeutic response.

In secondary angle closure glaucoma, the iris is physically obstructing the drainage angle of the eye. Secondary angle closure glaucoma includes lens induced glaucoma and

neovascular glaucoma. In secondary angle closure glaucoma, the natural drainage angle is narrow either because of the underlying condition or because of its formation. In open angle glaucoma there is no physical obstruction of drainage angle of the eyes. Secondary open angle glaucoma includes pigment dispersion, induced and traumatic glaucoma.⁶

Secondary glaucoma is one of the most significant causes of ocular blindness prevalent in our society⁶.

With this background, this research was conducted in a tertiary hospital located in western Maharashtra, to study the clinical profile and risk factors associated with lens induced glaucoma to among the patients coming to the ophthalmology OPD.

2. Aim & Objectives

2.1 Aim

Aim of this research was to study the clinical profile and risk factors associated with lens induced glaucoma in a tertiary care centre in western Maharashtra

2.2 Objectives

This study was conducted with following objectives:

- To study the demography of patients with LIG
- To know the risk factors of LIG

3. Published Literature Regarding Secondary Gloucoma

Inatani M et al (2000)⁷ elucidated the clinical characteristics of secondary glaucoma associated with

subluxation of the crystalline lens. This retrospective study comprised 14 eyes of 13 patients with uncontrolled intraocular pressure (IOP) and lens subluxation. The subluxated lens was extracted through surgery. Angle closure caused by the subluxated lens was complicated in 3 eyes. In the remaining 11 eyes, uncontrolled IOP elevation was found despite the presence of deep anterior chambers and wide open angles. A mean of 14.1 months \pm 13.7 (SD) after cataract surgery, IOP was well controlled (lower than 21 mm Hg) in all 14 eyes. Mean IOP was 15.4 \pm 2.2 mm Hg at the final examination. Complications included transient vitreous hemorrhage in 5 eyes, choroidal detachment in 2 eyes, and retinal tears in 1 eye.

The Glaucoma Services at the Aravind Eye Hospital, a large tertiary eye care centre in South India, registered 367 individuals with various secondary glaucomas in the year 2000. This represents about 6.0 % of total new cases of glaucoma seen annually.

Glaucomas in which the lens plays a role, either by size, position or by causing inflammation have been classified as lens induced glaucomas. Abnormalities of crystalline lens may incite elevation of intraocular pressure often accompanied by intraocular inflammation. In majority of the cases of lens induced glaucoma the management is essentially surgical. However, intensive medical management is tried first to normalize IOP and inflammation. **Qayum S et al. (2016)**⁸ evaluated visual outcome, intraocular pressure control, and complications in patients with lens induced glaucoma following manual Small incision cataract surgery was conducted in the Upgraded Department of Ophthalmology, Govt. Medical College Jammu. It was concluded that higher the IOP at presentation, poorer the visual prognosis.

Lens Induced Glaucoma (LIG) is a clinical condition characterized by secondary glaucoma in one eye with senile mature cataract, hyper mature senile cataract. **Kumar VS et al (2018)**⁹ assessed the visual outcome following medical and surgical management of lens induced glaucoma and to study the intraocular pressure control pre and post-operatively from 2015 to 2016. Main outcome measures include changes in intraocular pressure and BCVA. Most of the patients (91%) had BCVA better than 6/60 after surgery. Post-operative IOP reduced to normal in almost all cases. Early presentation and moderate increase in preoperative IOP and early treatment resulted in good visual outcome.

Bhuyan J et al. (2016)¹⁰ studied the incidence of lens induced glaucoma (LIG), various modes of presentation in different types of LIGs and to assess the visual outcome following management of LIGs. The present study was conducted on the patients who presented with Lens induced glaucoma in the outpatient department of the Regional Institute of Ophthalmology, Gauhati Medical College & Hospitals, Guwahati during the period September 2014 to August, 2015. Altogether 51 patients presented with lens induced glaucoma during this period of study. Phacomorphic glaucoma (58.86 %) was higher in incidence compared to Phacolytic glaucoma (33.33 %) followed by 5.82 % of lens particle glaucoma and 3.92 % of glaucoma secondary to lens dislocation. In our study 58.82 % of cases achieved best-

corrected visual acuity at the end of final follow up at 6 weeks. 35.29 % cases achieved visual acuity between 6/18-6/60 and 5.88 % regained visual acuity less than 6/60.

Perum V et al. (2017)¹¹ studied visual outcome of Phacolytic glaucoma, a common cause of ocular morbidity. Participants were 30 patients in a tertiary care hospital for both urban and rural population. 30 eyes of patients clinically diagnosed as Phacolytic glaucoma were treated. Intraocular pressure (IOP) and visual acuity were recorded preoperatively and postoperatively. Small Incision cataract surgery with posterior chamber intraocular lens implantation (IOL) was done after the control of intraocular pressure and inflammation. Postoperative complications were noted. The data was analyzed by simple statistical methods.

Mean age of the all the patients was 60.7 yrs (males 59.95 yrs and females 62.6 yrs). Laterality was RE in 16 (70.9%) and LE in 9 (30.0%). Duration of the presenting symptoms before reporting to the hospital was <1 week in 17 (56.6%) and >1 week in 13 (43.3%). Mean IOP was 45.8 mmHg preoperatively. Visual Acuity was PL doubtful in 2 (6.6%), PL +ve in 15 (50.0%) and HM<3/60 in 13 (43.4%) preoperatively. Postoperative visual acuity at 6-8 weeks was <6/60 in 8 (26.7%) and >6/60 in 22 (73.3%). Postoperative complications were bullous keratopathy in 5 (16.6%), anterior uveitis with membrane on IOL in 7 (23.3%), posterior capsular tear in 3 (10.0%) and Zonular dialysis in 2 (6.6%). Fellow eye showed pseudophakia in 22 (73.4%), immature cataract in 6 (20.0%) and Aphakia in 2 (6.6%). This study concludes that a better Visual outcome in Phacolytic glaucoma depends on the effective Preoperative control of intraocular pressure and inflammation.

Yaakub A et al. (2014)¹² determined the clinical presentations, management and outcome of lens-induced glaucoma (LIG) in Hospital University Sains Malaysia from January 2003 to December 2008. Patients with LIG were included and exclusion criteria were applicable for those who had glaucoma or other underlying causes of glaucoma. Demographic data, clinical presentations, management and outcome were recorded and analysed. The mean age was 70.2 years and predominantly women (22, 57.9%) were affected. Phacomorphic glaucoma (73.7%) was the main cause of LIG, followed by Phacolytic glaucoma (,21.1%). (50.0%) underwent ECCE with PCIOL implanation out of which (73.7%), patients did not required pressure lowering drugs post operatively.

A study by Prajna et.al (1996) ¹³reported proportion of Phacomorphic glaucoma 52.7 % and Phacolytic glaucoma 47.3%.

A study by Pradhan et al. (2001)¹⁴also reported high prevalence of phacomorphic glaucoma (72 %) followed by phacolytic glaucoma (28 %).

Rijal AP (2006) ¹⁵ and Murtyet. al. (2015)¹⁶ also reported phacomorphic glaucoma 65 % and 62% respectively and phacolytic glaucoma 35 % and 38 % respectively.

4. Methodology

Study settings:

This study was conducted in OPD of Department of Ophthalmology in a tertiary care centre in western Maharashtra.

Type of study:

This was an observational descriptive study.

Period of study

This study was conducted from September 2016 to August 2018.

Sample size:

Considering the feasibility and stud period, a sample size of 100 case of secondary glaucoma was decided.

Sampling Technique:

All cases diagnosed as secondary glaucoma in the OPD of Department of Ophthalmology and subsequently admitted to ward were included in the study. This was continued till the desired sample size of 100 cases achieved.

Inclusion criteria:

- Cases diagnosed as LIG
- Patients aged between 20 years to 70 years
- Both the gender group

Exclusion criteria:

- All other case of secondary glaucoma
- Primary Open Angle Glaucoma
- Primary Closed Angle Glaucoma

Ethical Consideration

Ethics committee clearance was obtained before starting the study. Written and informed consent was taken from all patients before enrolling them i the study. The purpose of the study, the advantages and the risk involved were explained to the patients and their relatives in a language that would be understood by them.

Data Collection tool

A semi structured questionnaire was prepared to collect and record desired information from each cases. The performa was pilot tested in 5 cases to check operational feasibility. Final performa was prepared after necessary modification in the questionnaire.

Clinical History

Particulars of the patient recorded in the proforma which include name, age, gender and socioeconomic status. Detailed history of the patient was taken which include:

- Factors pertaining to the causation of glaucoma, duration and progress of diminution of vision, associated with pain, redness, watering, photophobia in the affected eye which include history of ocular trauma, use of medication.
- The visual acuity of the patient had assessed using SNELLEN'S Chart for distance and JAEGER'S CHART for near. Pin hole acuity was done to estimate refractive error and retinal function test was done by assessing 1.1v; PL and PR.
- Examination of the globe also included.
- The anterior segment was examined using Slit lamp for anterior chamber depth through Von Herick's method.
- Iris examination done to rule out neovascularization of the iris, any presence of pseudoexfoliative material on iris crypts or any nodules (Bussaca's) on iris.
- Pupil was examined un dilated for presence of relative afferent pathway defect, any pseudo exfoliative material on Pupillary margin, any nodules(Koppe's) at pupillary margin, any peripheral Iridectomy also noted.
- Lens was examination for grading for cataract.
- The stereoscopic view of the fundus of the patient had examined using 90D lens. Direct ophthalmoscopy and indirect ophthalmoscopy also done for fundus examination.
- Intra-ocular pressure was measured by Applanation Goldman's tonometer.
- Gonioscopy was done with the help of a 4 mirror gonioscope to visualize the angle.
- Perimetry was done for visual field assessment using Zeiss automated perimeter.
- B-Scan was done in affected eye as and when required.

Statistical Analysis

Data was entered in an excel sheet and analysed a using software Epi-info, quantitative variables was expressed in terms of means, standard deviations (SDs), and qualitative in terms of proportion and percentage (%).

5. Results

The present study was conducted among 100 cases of secondary glaucoma. The findings are shown in the following tables and graph

Table 1: Distribution of Cases according to BCVA

BCVA	Cases	Percentage
6/12-6/6	20	20.0
6/60 - 6/18	32	32.0
5/60 & PL+	33	33.0
No PL	15	15.0

Table 2: Finding of Anterior segment examination in cases of secondary glaucoma

Anterior Segment		Cases	Percentage
Cornea edema	Present	9	9.0
	Absent	91	91.0
Anterior Chamber PACD (Van Herick grading)	<1/4 CT	32	32.0
	>1/4 CT	24	24.0
	1/2 CT	44	44.0
Neovascularization of Iris	Present	20	20.0
	Absent	80	80.0
Peripheral Iridectomy in Pupil	Present	25	25.0
	Absent	75	75.0
Pseudoexfoliation in Pupil	PEX +nt	40	40.0
	PEX -nt	60	60.0
Lens	Matured	36	36.0
	Immature	52	52.0
	Other	12	12.0
Subluxation present	Present	37	37.0
	Absent	63	63.0
PEX (bulle's eye pattern)	Present	16	16.0
	Absent	84	84.0

Table 3: Finding of Fundus examination in cases of secondary glaucoma

Fundus		Cases	Percentage
Neuro retinal rim	Inferior and superior	37	37.0
	Inferior, Superior and Nasal	47	47.0
	Inferior, Superior, Nasal and Temporal	16	16.0
C:D	<0.5	36	36.0
	>0.5	64	64.0
Bearing of circum linear blood vessels	Present	54	54.0
	Absent	46	46.0
Lamellar dot sign	Present	41	41.0
	Absent	59	59.0
Bayoneting	Present	53	53.0
	Absent	47	47.0
Disc haemorrhage	Present	59	59.0
	Absent	41	41.0
Peripapillary atrophy	Present	61	61.0
	Absent	39	39.0
Hypertensive retinopathy (n=24)	Present	12	50.0%
	Absent	12	50.0%
Proliferative Diabetic Retinopathy (n=18)	NVD	5	27.8%
	NVE	4	22.2%
	CRVO	1	1.0%
Any other finding in retina	BRVO	0	0.0%

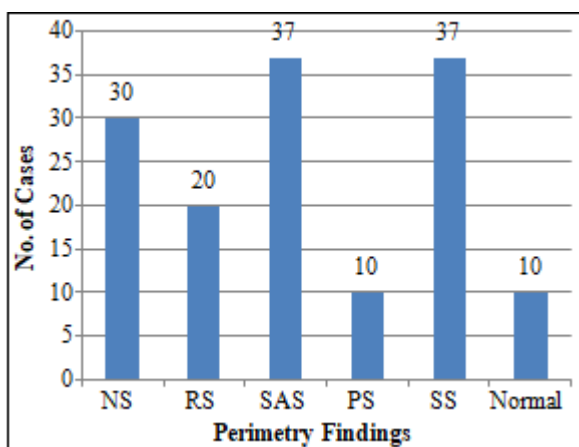


Figure 1: Perimetry finding in cases of secondary glaucoma

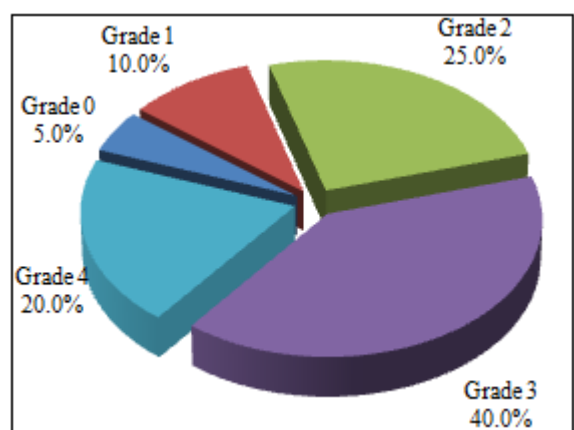


Figure 2: Findings of Gonioscopy in cases of secondary glaucoma

Table 4: Various type of Lens Induced Glaucoma

Lens Induced Glaucoma	Cases	Percentage
Phacomorphic glaucoma	11	61.1
Phacolytic glaucoma	5	27.8
Traumatic	1	5.6
Pseudoexfoliation	1	5.6
Lens Particle	0	0.0
Phacoanaphy lactic	0	0.0
Total	18	100.0

6. Discussion

The present study was conducted among 100 cases of secondary glaucoma to study the clinical profile of secondary glaucoma.

In **Table No.1** the present study out of 100 eyes, 32% cases had visual acuity ranging from 6/60 - 6/18 and another 33% had visual acuity ranging from 5/60 & PL+. 15% had noPL. In 20% cases visual acuity was within normal range.

Clinical Findings (Anterior Segment, Fundus, Perimetry and Gonioscopy) in Various Secondary Glaucoma

Table No.2 corneal oedema was present in 9% cases, <1/4 CT PACD in 32% cases, Neovascularization of Iris in 20%, Peripheral Iridectomy in Pupil in 25%, Pseudoexfoliation in Pupil in 40%, matured lens in 36%, subluxation of lens in 37% and PEX (bulle's eye) in 16%.

Table No.3 Inferior, Nasal thinning was there in 37% and Inferior, Nasal and Superior thinning in 47% cases in Neuro retinal ream examination, C:D was <0.5 in 36%, Bearing of blood vessels was present in 54%, Lamellar dot sign was present in 41%, Bayoneting was present in 53%, Disc haemorrhage was present in 59%, Peripapillary atrophy was present in 61%. Among the 24 cases of hypertension, hypertensive retinopathy was present in 12 (50%) cases. Out of 18 cases of diabetes, NVD was present in 5 (27.8%) cases and NVE in 22.2% cases. In one case CRVO was found.

Figure No.1 Perimetry Superior Scotoma (SS) was found in 37%, Superior Arcuate Scotoma (SAS) was there in 37% cases. Other findings on perimetry included Nasal Shifting (NS) in 30%, Ring Scotoma (RS) in 20% and Peripheral Scotoma (PS) in 10%.

Figure No.2 Gonioscopy found highest cases were having grade 3 (40%) and 5% cases were having grade 0. Grade 1 was found in 10% cases, Grade 2 in 25% cases and Grade 4 in 20% cases.

Table No. 4 Lens induced Glaucoma in the present study out of 18 cases of, 11 (61.1%) were having Phacomorphic glaucoma followed by Phacolytic glaucoma in 5 cases (27.8) and one cases of traumatic Lens Induced Glaucoma and one case of Pseudo exfoliative Glaucoma.

7. Summary

The present study has conducted among 100 cases of secondary glaucoma to study the clinical profile of

secondary glaucoma. Results of the study are summarised as below:

- Lens induced glaucoma was found in 18% cases and steroid induced secondary glaucoma was found in 16% cases.
- Out of 18 cases of Lens induce Glaucoma, 11 (61.1%) were having Phacomorphic glaucoma followed by Phacolytic glaucoma in 5 cases (27.8) and one case of traumatic Lens Induced Glaucoma and one case of Pseudoexfoliation Lens Induced Glaucoma.

8. Conclusion

From this present description cross sectional study of 100 cases of secondary glaucoma, aimed to describe the clinical profile of LIG. Pseudo exfoliation in Pupil, matured lens, anterior chamber depth was <1/4 CT PACD were the commonest findings in anterior segment Disc haemorrhage, Peripapillary atrophy, Bayoneting and Bearing of circum linear blood vessels were the common finding in fundus examination. In the perimetry, Superior Scotoma (SS) and Superior Arcuate Scotoma (SAS) are common findings. Secondary glaucoma cases commonly have grade 3 finding on Gonioscopy.

In Lens induced Glaucoma, Phacomorphic glaucoma followed by Phacolytic glaucoma are commonest causes.

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