

Lens Induced Glaucoma- An Entity Revisited

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ABSTRACT

Lens induced glaucomas are high occurrence in India, hardly surprising in a situation where the incidence of cataract cases far exceeds the total number of surgeries performed. Lens induced glaucoma may be due to many different reasons but ultimately they compromise the function of the optic nerve due to rise of intraocular pressure.

Method- A prospective study consisting forty two (42) cases of lens induced glaucoma over a period of two years upto July, 2020. Detailed history was recorded and patients have been evaluated for cause of lens induced mechanisms which led to symptoms. Proforma was prepared for this study and all findings were noted. Medical management was essential for controlling acute increase of intraocular pressure (IOP). Then planned surgery by lens extraction with or without posterior chamber Intraocular lens (PCIOL) was done. Some cases were managed by buttonhole iridectomy after getting diagnosed of posterior capsular rupture. Small Incision Cataract Surgery (SICS) was preferred for lens extraction. Only 2 cases had vision less than 6/60.

Results - 59.6% of cases were Phacolytic glaucoma with another 23.8% of Phacomorphic glaucoma cases. Lens dislocation numbered in less cases and one case of lens particle glaucoma was also managed in this series. Elderly females in 55-60 years age range were mostly affected in Phacomorphic and Phacolytic glaucoma. Young male presented mostly with traumatic dislocations. Acute elevated Intraocular pressure (IOP) with pain and redness was noted as presenting feature.

Conclusion- Prevalence of lens induced glaucoma is to be considered when symptomatic cataract is met in practice. High load of cataract cases often make surgeon to ignore mild symptoms which may lead to blindness. Cataract extraction is curative in phacomorphic and phacolytic glaucoma. Symptomatic relief by

medical management should not be the only venture. Swift surgical correction is important with strict follow-up.

Keywords- Blindness, Phacomorphic, Phacolytic, Lens Particle, Lens Dislocation, Trauma.

INTRODUCTION

Glaucoma as a cause of blindness results from irreversible degeneration of Optic nerve. Appropriate diagnosis & management is of paramount importance. Glaucoma in association with the cataract is described in many searched English literature and a known clinical entity in standard ophthalmology practice. Typical features delineating it from other varieties of glaucoma are its sudden onset in eye with mature or hypermature cataract, advanced age of more than fifty years at presentation and almost normal vision in contra lateral eye. Development of inflammatory phacolysis and subsequent glaucoma due lens protein termed as Phacolytic Glaucoma was described by Epstein et al^[1] Open angle glaucoma associated with hypermature cataract was described by Grifford in 1900^[2]. Swelling of lens by cataractous change or displacement can produce glaucoma by obstruction to the flow from posterior to anterior chamber termed as Phacomorphic type of Lens Induced Glaucoma (LIG). Many rare variants like Lens Particle Glaucoma and Endophthalmitis phacoanaphylactica are also described in others published article having distinct pathophysiology.

Most cases are Phacomorphic & Phacolytic glaucoma and usually associated with mature to hypermature cataract. Incidence of these varieties of glaucoma

with respect to age, sex and their response to surgical treatment is revisited by this present article. This article also aims to evaluate changes in Intraocular Pressure

(IOP) in relation to different causes, gonioscopy findings and complications of surgery done to treat this condition.

MATERIAL AND METHODS

Case no.	BP-
Name	P I Q X L E
Age & sex	<u>Systemic Examination-</u>
Date of Admission	CVS
Date of Discharge	RESP
Address and Mobile no.	CNS
	GI
<u>Chief complaints-</u>	LOCAL EXAMINATION-
<u>(Onset, Duration, Sudden/Gradual)</u>	
<ul style="list-style-type: none"> > Dimness of vision > Associated pain > Redness of eye > Seeing of haloes 	
Present Illness- detailed	
Personal History-	
Past treatment-	
Family History-	
<u>General Examination-</u>	
PR-	

	RIGHT	LEFT
POSITION OF HEAD		
ORBIT		
ALIGNMENT OF EYEBALLS		
MOVEMENT OF EYEBALLS		
LIDS AND PALPEBRAL FISSURE		
LACRIMAL APPARATUS		
CONJUNCTIVAL CONGESTION		
CILIARY CONGESTION		
CHEMOSIS		
DISCHARGE		
CORNEAL SIZE		

Figure- 1

SHAPE		
SURFACE		
TRANSPARENCY		
SENSATION		
ANTERIOR CHAMBER		
DEPTH		
FLARE		
CONTENT		
DISCHARGE		
IRIS		
COLOUR		
ATROPHIC PATCHES		
SYNECHIAE		
PERIPHERAL		
ANTERIOR		
POSTERIOR		
PUPIL		
SIZE		
SHAPE		
MARGIN		
REACTION TO LIGHT		
LENS		
ANY OPACIFICATION		
POSITION		
LENS CAPSULE- INTACT OR DISRUPTED		
VA		
DV		
NV		
PROJECTION OF RAYS		

IOP		
VISUAL FIELD CHARTING		
GONIOSCOPY		
OPHTHALMOSCOPY FINDING		
LABORATORY INVESTIGATION		
USG FINDING		
DIAGNOSIS		
TREATMENT		
FOLLOWUP		
CHECKUP AT DISCHARGE-		
VISION		
IOP		
SLIT LAMP FINDING		
OPHTHALMOSCOPY		
ADVICE AT DISCHARGE		

Figure- 2

This is a prospective study considering total of forty two cases (n=42) admitted to Ophthalmology ward of medical college tertiary level hospital cum referral center from the period of August 2018 to

July 2020. Detailed history with record of symptoms, clinical examination, investigation and management with follow-up were charted in designed format as described in images {fig. 1, 2}

Diagnostic Criteria for different types of LIG

Phacomorphic Glaucoma

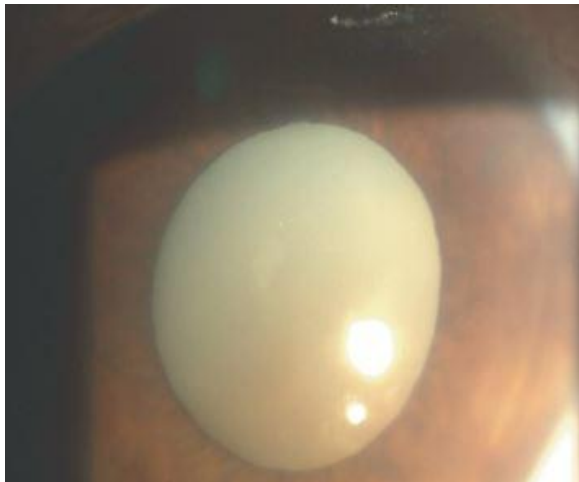


Figure 3 Hypermature Cataract

Subjective complaints of pain and redness associated with corneal edema and shallow anterior chamber in addition to IOP of more than 21 millimeter of mercury with cataract (in tumescent stage).

Phacolytic Glaucoma

Appearance of sudden pain in and around affected eye, corneal edema, with normal or deep anterior chamber showing intense flare and circulating particulate matter. Hypermature cataract with white capsular patches were present.

Dislocated lens

Dislocated lens may be either anterior or posterior. Pupillary block and secondary angle closure was caused by anterior dislocation. Posterior dislocation causes glaucoma due to vitreo-pupillary block, rubeosis iridis secondary to retinal detachment.

Lens particle Glaucoma-

Lens material liberated after phacoemulsification, SICS, penetrating lens injury or Nd:YAG posterior capsulotomy causing rise of IOP.

Phacoanaphylaxis

Diagnosis is often not made until an enucleated eye is examined

histopathologically. Redness and pain after ECCE or traumatic rupture of lens capsule is hallmark. Ciliary congestion, corneal clouding, edema of iris, absent pupillary reaction with synechiae (either anterior or posterior). No case of phacoanaphylaxis was reported in this series.

Management- Medical management was indicated for reducing intraocular pressure before surgical extraction of lens to be done using Pilocarpine (2%) eye drops or oral Acetazolamide (250mg) with or without Betaxolol (0.5%) eye drops. Mannitol (20%) intravenous was used in some cases if IOP more than 25 millimeter of mercury was observed after the above drug was administered. Operative procedure was done as per standard operating protocol, cases were managed by Small Incision Cataract Surgery (SICS) with or without implantation of an intraocular lens depending on refractive condition of other eye. Antibiotics coverage is important step maintained during all cases.

In cases of dislocated lens, surgical treatment varied as per type and degree of dislocation.

In Anterior Dislocated Lens, If lens was partially dislocated and in posterior chamber causing pupillary block, treatment was decided as per clarity of lens. If there was no cataractous change then peripheral buttonhole iridectomy was done in zone where zonules were intact. If cataractous change was present then extraction of lens was done. If lens was completely dislocated & in anterior chamber, extraction was done with help of wire vectis or cryoprobe along with a peripheral buttonhole. All statistical data were computed using SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.

RESULTS & OBSERVATION

This study included 42 cases of lens induced glaucoma (LIG) attending the ophthalmology OPD. Total admissions at same time to our institute with different ocular disease and pathology of the eye

were 840 in numbers. 5% of total cases were LIG. Different causes of lens induced glaucoma included 59.6% of Phacolytic glaucoma followed by Phacomorphic glaucoma (23.8%). Dislocated lens

contributed only 14.3 %. Only one case was found as lens particle glaucoma. Female preponderance 54.8% as compared to male population.(45.2%) was noted.

Table 1: Causes Of Lens Induced Glaucoma With Sex Incidence

Causes Of Lens Glaucoma	No. Of Males	%	No. Of Females	%	Total No. Of Cases	%
Phacomorphic Glaucoma	3	7.1	7	16.7	10	23.8
Phacolytic Glaucoma	12	28.6	13	31	25	59.6
Dislocated Lens	4	9.5	2	4.8	6	14.3
Lens Particle Glaucoma	--	--	1	2.4	1	2.4
Total	19	45.2	23	54.8	42	100

Age wise distribution of lens induced glaucoma was in 51-60 years age range (42.9%). Mean age at presentation for Phacolytic glaucoma and Phacomorphic glaucoma were 59±11years & 55±9years respectively. Presenting symptoms varied with severity of intraocular pressure. All the patients of Phacolytic and Phacomorphic glaucoma typically had a history of gradually diminishing vision of the affected eye followed by sudden pain and redness. Out of six dislocated lens patients, four patients (67%) had history of trauma. All the cases were monocular. All the cases of lens induced glaucoma had Ciliary and conjunctiva injections. Corneal edema was present in almost all the cases. Out of 25 cases of lens induced Phacolytic glaucoma

deep anterior chamber was seen in 20 cases and in 5 cases the anterior chamber was normal. All the cases had wide open angles and heavy flare in the anterior chambers. Phacomorphic cases had shallow anterior chamber and narrow angles. Anterior dislocated lens and shallow chamber but posterior dislocated lenses had deep chamber. All cases had semi dilated pupil and reaction of light was absent or sluggish. Phacolytic glaucoma had mature to hypermature cataract and Phacomorphic glaucoma cases had hyper swollen cataract as well as in tumescent cataract in some. Ten cases of Phacolytic glaucoma (40%) presented with soft white patches on the anterior lens capsule.

Table 2 PRESENTING SYMPTOMS OF LENS INDUCED GLAUCOMA

Causes Of Lens Induced Glaucoma	Total No. Of Cases	Symptoms				
		Pain	Photophobia	Watering	Vomiting	Decreased vision
PHACOMORPHIC	10	10	10	10	10	10
PHACOLYTIC	25	25	25	25	6	25
DISLOCATED LENS	6	6	3	6	0	6
LENS PARTICLE GLAUCOMA	1	1	1	1	0	1

Table 3 PRESENTING SIGNS OF LENS INDUCED GLAUCOMA

Causes of lens induced glaucoma	Total no. of cases	Signs on slit lamp examination									
		Ciliary congestion	cornea		Anteriorchamber		Iris		Pupil semidilated	lens	
			clear	cloudy	Shallow	Deep	Normal	atrophic		Cataract	clear
Phacomorphic	10	10	0	10	10	0	9	1	10	10	0
Phacolytic	25	25	0	25	0	25	24	1	25	25	0
Dislocated lens	6	6	3	3	4	2	5	1	6	5	2
Lens particle	1	1	0	1	0	1	1	0	1	0	0

In single case of lens particle glaucoma, patient had an ECCE of the affected eye. Gonioscopy revealed open angles in Phacolytic and lens particle glaucoma and narrow angles in

Phacomorphic glaucoma. In dislocated lenses, width of the angle varied.

Intraocular pressure was found to be very high in most of the cases of Phacolytic and Phacomorphic glaucoma with a mean of 46.6 and 49.2 millimeter of mercury

respectively. In glaucoma due to dislocated lenses, the mean intraocular pressure was found to be comparatively low (32.9 millimeter of mercury). In the single case of lens particle glaucoma, the presenting intraocular pressure was 31.6 millimeter of mercury. Analysis of the fellow eyes revealed that in Phacomorphic and Phacolytic glaucoma, maximum numbers of them had immature cataract. But in dislocated lens group, 50% of the lens of fellow eye is clear with no cataractous changes.

Hypotensive medications did reduce the intraocular pressure in different subtypes of lens induced glaucoma but was not controlled to normal. All cases of Phacomorphic and Phacolytic glaucoma were managed by SICS with or without

placement of posterior chamber IOL (PCIOL) has been done. In few cases where posterior capsular rupture was suspected, only peripheral buttonhole iridectomy was done. All the cases had zonular support. Post operatively the intraocular pressure and visual activity improved dramatically. Only 2 case of Phacolytic glaucoma had vision less than 6/60. Intraoperative complications including vitreous loss was uncommon.

But in glaucoma due to dislocated lenses, treatment has been tailored for each patient and in most of them lens extraction was the ultimate cure. Restoration of visual acuity was not that encouraging and 33.3% recovered to a visual acuity less than 6/60. Incidence of intraoperative complications including vitreous loss is more than other two groups.

Table 4 best corrected visual acuity at last followup

Visual Acuity	Phacomorphic		Phacolytic		Dislocated Lens	
	No. of Cases	%	No. of cases	%	No. of cases	%
6/6-6/12	6	60	14	56	2	33.3
6/36-6/60	4	40	9	36	2	33.3
<6/60	--	--	2	8	2	33.3
Total	10	100	25	100	6	100

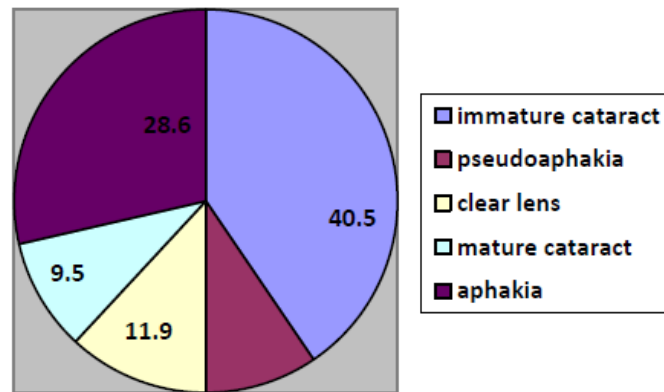


Figure 4- Status of fellow eye in lens induced glaucoma

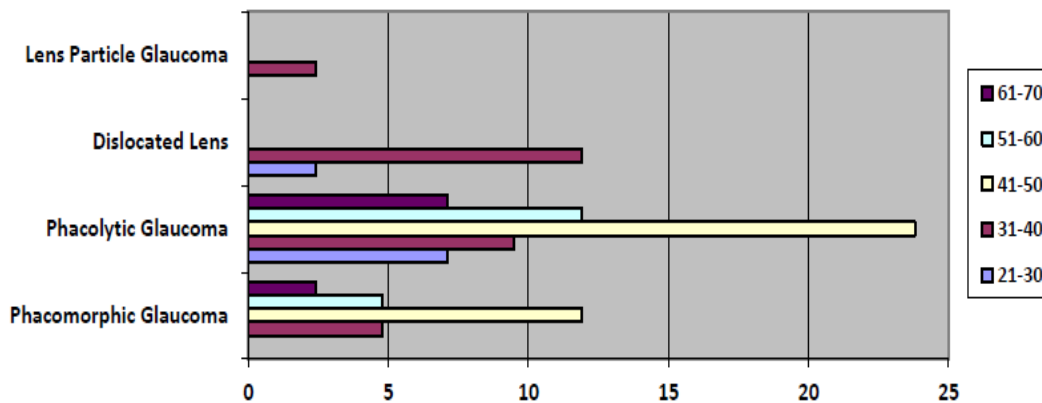


Figure 5- Intraocular Pressure At Time Of Admission Of Various Lens Induced Glaucoma.

DISCUSSION

Lens induced Glaucoma are common in Indian sub continent. Our study was prospective in nature considering 42 cases in an attempt to outline the different characteristics of glaucoma and management to be done even in small centers. We got only one case of lens particle glaucoma, low incidence is attributed to less patients to undergo Nd:YAG laser posterior capsulotomy which was one of the major reason behind lens particle glaucoma. Females outnumbered male in both Phacomorphic and Phacolytic glaucoma as seen in other research article.^[3-4] Higher incidence in females might be due to less attendance in OPD or till the lens develop hypermature cataract. Higher incidence of Phacomorphic glaucoma in females was that anatomically they have shallower anterior chambers than their male counterparts thus making them more prone for angle closure.^[5]

Lens induced glaucoma are more common in the elderly age group particularly in fifth and sixth decade of life. Presenting at an earlier age was seen in dislocated lens patients. As trauma is more common in working age population and young adults. Similar results were seen in other studies^[5-7]. Mean age at presentation of dislocated lenses causing glaucoma varies from 10 years to 48 years in different studies as compared to our study.^[8-9] we have not reported any congenital case which might be the reason.

Presenting symptoms varied in severity and were directly proportional to the degree of rise of tension. Gradual dimness in vision for few years followed by sudden pain and redness of eye. In most cases, pain is very severe and headache occurs and in some Phacolytic glaucoma cases, history of vomiting were present.^[7]

Five cases of Phacolytic glaucoma and two cases of Phacomorphic glaucoma had defective projection or rays. Similar observations have been made by other studies.^[5] On slit lamp examination, Ciliary injection was present in all cases and was

associated with conjunctival hyperemia and chemosis in a few instances. Diffuse edema of the corneal epithelium was present in all cases of Phacomorphic and Phacolytic glaucoma, visibility of anterior chamber was still retained. Similar finding were also found in other studies.^{[7][10-11]} Semi dilated pupil in all cases and reaction of light was sluggish or absent. All patients have mature or hypermature cataract. In few cases it was found lens cortex was partially liquefied with eccentric lens nucleus.^[7]

On the other hand, Phacomorphic glaucoma, it was found that the anterior chamber is invariably shallow and the angle is narrow due to pushing forward of iris by the swollen lens consistent with other workers like Prajna et al in 1996.^[7] Intraocular pressure of Phacolytic glaucoma of mean 46.6 was comparable to other studies.^[3, 7] Similarly 49.2 millimeter of mercury was seen in Phacomorphic glaucoma as the mean IOP.^[5,7]

Response to medical treatment by using Hypotensive medications, topical drops and Acetazolamide oral are part of immediate care of increased IOP.^[11-12] Miotics were avoided in lens particle glaucoma. Even topical corticosteroids are good if used in phacolytic and lens particle glaucoma.^[13] 63% of our patients IOP dropped to less than 30 millimeter of mercury in Phacolytic and Phacomorphic glaucoma by using Hypotensive medications.^[5,7] Less response was seen in lens dislocation by use of Hypotensive drugs.^[14] Surgical treatment remains mainstay to manage all these cases. Lens extraction was important mode to ameliorate symptoms in Phacomorphic glaucoma.^[7] In cases of anterior dislocation of lens, lens removal was surgeon's choice.^[14] If lens is partially dislocated and remains in the posterior chamber causing intermittent pupillary block glaucoma, peripheral button hole iridectomy or laser iridotomy should be done^[16]. All anterior chamber lenses dislocation was removed by wire vectis method in our series. Posterior dislocation was tackled by ultrasonic

phacofragmentation with pars plana vitrectomy.^[14] Lens extraction in phacolytic glaucomas was done by SICS. It protects anterior vitreous along with its inherent advantage of handling friable capsule. IOL insertion in posterior chamber (PCIOL) is easy I SICS. Phacomorphic glaucoma were also dealt by SICS. In cases of dislocated lens, SICS to be preferred as the zonular support to the lens is either wholly or partially lost. From vision as low as hand movement or perception of light, it improved dramatically in almost all the cases of lens induced glaucoma. A Corrected visual acuity of 6/12 or better is taken as good VA. 56% and 60% of Phacolytic and Phacomorphic glaucoma recovered to a good VA in the present series respectively. 61.4% and 57% respectively recovered a good visual acuity. But in the dislocated lenses group causing glaucoma, visual results were not that encouraging. This was to be expected as there were more operative complications. In the present series, 33.3% recovered to a good visual acuity which is comparable to the findings 37.7% and 41.6%.^[18-19] Improvements of visual acuity in eyes with faulty projection of rays in Phacomorphic and Phacolytic group has also been reported by other authors.^[3, 4, 5]

CONCLUSION

Lens induced glaucoma are prevalent in our subcontinent and surgical treatment have reached to new heights with use of recent gadgets. But diagnosing glaucoma in patients of cataract is still challenging owing to presenting late in disease course. Though prevalence of social illiteracy and financial burden on families is accountable but ignoring symptoms by treating ophthalmologist might alter results in gross capacity. Extraction of lens is curative in Phacolytic and Phacomorphic glaucoma as far as control of IOP and visual activity is concerned. Lens particle and anaphylaxis induced glaucoma remains challenging till date. Surgical approach protects against postoperative spikes of high

IOP which may represent a fatal insult to an optic nerve already compromised by a long duration of glaucoma.

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- How to cite this article: Prasad M. Lens induced glaucoma - an entity revisited. *International Journal of Research and Review*. 2020; 7(12): 404-411.
