

Research Article

# A Study of Visual Rehabilitation and Intraocular Pressure Control in Phacolytic Glaucoma

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## Abstract

**Purpose:** To evaluate the visual recovery and intraocular pressure control after cataract surgery in patients of phacolytic glaucoma. **Methods:** 23 patients diagnosed clinically as phacolytic glaucoma and included in the study were operated upon using either SICS or Phacoemulsification procedure after lowering of the Intraocular pressure (IOP) and control of ocular inflammation. **Results:** Post-operatively 21.73% of patients achieved a best corrected visual acuity (BCVA) of 6/60-6/12, 43.82% had a BCVA of 4/60-6/60 and 30.43% achieved a final BCVA between 4/60 to only perception of light. However 86.95% of patients maintained an IOP less than 20 mm Hg, 8.69% had an IOP between 20-23 mm Hg and 4.34% had an IOP between 24-30 mm Hg requiring a Glaucoma filtering surgery. **Conclusion:** Patients of Phacolytic Glaucoma if present at an early stage can have a good visual recovery and well controlled IOP in the post-operative period.

## Keywords

Phacolytic Glaucoma, Small Incision Cataract Surgery (SICS), Intraocular Pressure (IOP)

## 1. Introduction

Phacolytic glaucoma is a type of lens-induced glaucoma seen in long-standing or neglected hypermature cataracts [1]. The condition is rarely seen nowadays, however, in developing countries like India, the condition still exists although less common. One big factor for the occurrence of Phacolytic glaucoma in India is a huge cataract backlog making patients reach the stage of hypermature cataracts before being taken for surgery.

In a hypermature / Morgagnian cataract, the cortical lens fibers get disintegrated into hydrosoluble proteins. These proteins leak through microscopic pores in the anterior lens capsule into the anterior chamber, where they incite an acute inflammatory reaction. Besides the lens proteins get engulfed by the macrophages in the

anterior chamber [2, 3]. Both protein-laden macrophages and free proteins clog the trabecular meshwork causing an acute rise in IOP [1]. The prognosis for visual recovery post cataract surgery in PG.

Therefore depends on the period that the IOP has been on the higher side thereby causing a permanent optic nerve damage.

Phacolytic glaucoma often presents as a long-standing visual loss due to hypermature/Morgagnian cataract and acutely with ocular pain, redness, watering and photophobia. Slit lamp examination reveals corneal edema, moderate to severe anterior chamber reaction with or without pseudohypopyon, and multiple white iridescent or hyper refringent particles in the anterior chamber which represent calcium

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oxalate and cholesterol crystals liberated from the degenerated cataractous lens with wrinkled but intact capsule. Yoo Ha et al. in 2014 used scanning electron microscopy to find these full-thickness dehiscences and holes in the anterior lens capsule despite an intact macroscopic appearance [2, 4].

Gifford et al in 1900 was the first to reveal a rise in IOP due to hypermature cataracts [5]. However, the term Phacolytic Glaucoma was coined by Flocks et al in 1955 who stated that the lens proteins leak through an intact capsule and incite an inflammatory anterior chamber reaction [6]. He also stated that protein-laden macrophages cause obstruction of the trabecular meshwork leading to a rise in IOP. Experimental studies by Epstein et al demonstrate that high molecular weight proteins could occlude the trabecular meshwork even in the absence of macrophages [7].

## 2. Methods

23 patients diagnosed clinically with phacolytic glaucoma were included in the study after consent. The study was conducted at SKIMS Medical College Hospital, Kashmir between March 2020 and March 2023. The patients presented with a history of long-standing severe diminution of vision and ocular pain and redness for the last 5-10 days. Slit lamp biomicroscopy was done in all the patients to look for corneal edema, anterior chamber reaction, free-floating particles, and shiny crystals in the anterior chamber. Intraocular pressure was measured using Goldmann applanation tonometry and B-Scan Ultrasonography was done in all the patients to look for any posterior segment pathology. Visual acuity was measured, although all the patients presented with vision varying from hand movement to perception of light. Three patients presented with defective projection of light, but were managed surgically as patients with phacolytic glaucoma with severe anterior chamber reaction might present with defective projection of light, but would get some useful vision postoperatively.

After admission, raised IOP was managed with systemic acetazolamide and topical anti-glaucoma medication. Intravenous mannitol 20% was given wherever necessary. The aim of lowering the IOP was to clear the corneal edema to facilitate the surgical procedure which would take 3-5 days. Anterior chamber reaction was managed with topical steroids and cycloplegic eye drops.

The patients were operated upon using either small incision cataract surgery or Phacoemulsification with intraocular lens implantation by a single surgeon. The choice of surgical procedure was decided based on nuclear sclerosis. Since hypermature / morgagnian cataracts usually present with weak zonules, patients with grade IV nuclei were selected for small incision cataract surgery while others were operated on by phacoemulsification procedure.

Post-operatively all the patients were advised topical steroid-antibiotic and cycloplegic eye drops. Systemic steroids were included in patients with severe post-operative uveitic

reaction. All the patients were put on topical anti-glaucoma medication varying from 1 - 3 weeks or till the intraocular pressure was normal. All the patients were examined on post-op day 1, day 3, day 8, 2 weeks, 4 weeks, and finally after 8 weeks. The final examination was done about visual acuity, IOP measurement, and any post-operative complications.

## 3. Results

**Table 1.** Male: Female distribution.

Total patients	Male	Female
23	9	14

A total of 23 eyes of 23 patients were included in the study, out of which 14 (60.86%) were females and 9 (39.13%) were males.

**Table 2.** Pre-operative visual acuity.

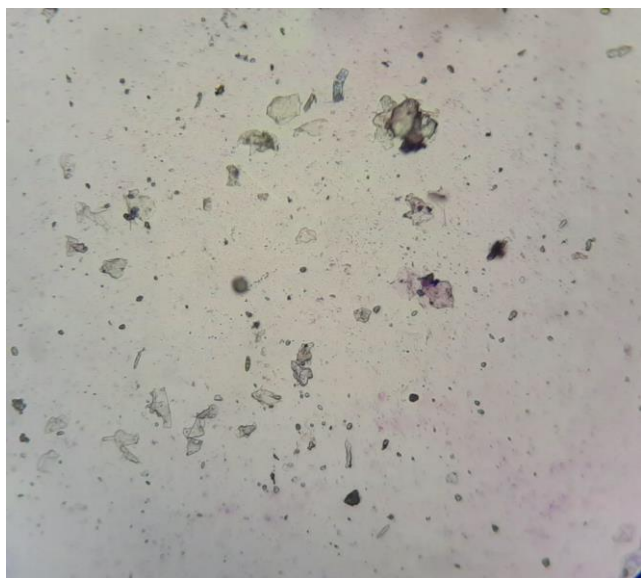
Total	PR defective	PL, PR accurate	HM	FC
14 FEMALES	2	11	-	1
9 MALES	1	8	-	-

Out of 14 female patients, 11 patients had perception and accurate projection of light, 1 patient had finger counting at 3 meters and 2 patients presented with defective projection of light. Out of 9 male patients, 8 had perception and accurate projection of light, while 1 patient had defective projection of light. All 3 patients (2 females and 1 male) with defective projection of light however underwent cataract extraction with IOL implantation and got useful vision in the post-operative period.

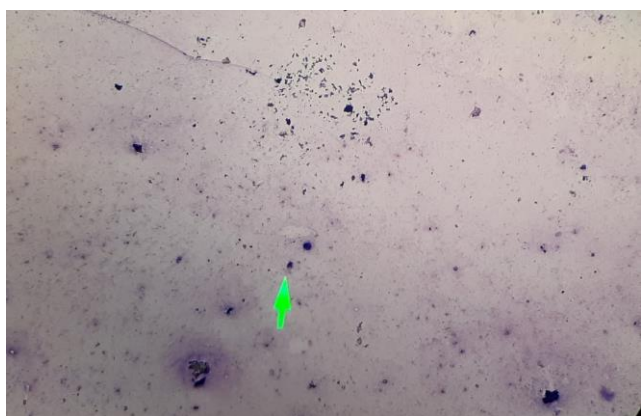
**Table 3.** Pre-operative IOP.

Total patients	30-40mmHg	24-30mmHg
14 females	12	2
9 males	6	3

Out of 14 females, 12 had IOP from 30 to > 40 mmHg, and 2 had IOP between 24-30 mmHg. Out of 9 males, 6 had IOP from 30 to > 40 mmHg, and 3 had IOP between 24-30 mmHg.



**Figure 1.** Aqueous tap showing multiple white iridescent or hyperrefractive particles which represent calcium oxalate and cholesterol crystals liberated from the degenerated cataractous lens.



**Figure 2.** Aqueous tap showing protein-laden macrophages. Proteins being liberated from the degenerated cataractous lens.

**Table 4.** Post-Operative Visual Acuity.

Total patients	PL-4/60	5/60-6/60	6/60-6/12
14 females	4	7	3
9 males	3	4	2

Post-operatively 21.73% of patients achieved a BCVA between 6/60-6/12, 43.82% had a BCVA of 4/60-6/60 while 30.43% of patients achieved a final BCVA between 4/60 to only perception of light.

**Table 5.** Post-Operative Complications.

Total patients	Persistent corneal edema	Uveitis with inflammation
14 females	2	3
9 males	1	1

Post-operatively two female and one male patient had persistent corneal edema and despite all conservative measures the corneal edema failed to regress and by six months progressed to corneal decompensation.

Four patients (3 females and 1 male) had moderate to severe post-operative uveitic reaction. However, all the patients responded to systemic steroids and one patient needed YAG Laser membranectomy.

**Table 6.** Post-Operative IOP.

Total patients	<20	20-23	24-30
14 females	12	1	1
9 males	8	1	-

Post-operatively one female patient persisted with IOP between 24-30 mm Hg despite maximum anti-glaucoma medication and was advised Trabeculectomy. One male and one female patient maintained IOP between 20-23 mm Hg and were kept under regular follow-up for any glaucomatous optic nerve damage. 8 male and 12 female patients had well-controlled IOP below 20 mm Hg.

## 4. Discussion

Flocks coined the term - Phacolytic glaucoma [5]. Epstein described the role of high-molecular-weight lens protein (HMW-LP) in the pathogenesis of PLG [6, 7]. Microdefects in the cataractous lens capsule lead to a progressive leak of the soluble lens proteins into the aqueous humor. The macrophages phagocytose these proteins and block the trabecular meshwork (TM), causing acute open-angle glaucoma [6]. The recent theory states that HMW-LP directly obstructs the TM to impede the aqueous outflow and precipitates PLG. The increase in the content of HMW-LP in the human lens with increasing age supports this theory.

Phacolytic Glaucoma although less common in the developed world, still poses a challenge for the Ophthalmologists in developing countries like India because of population overload and heavy backlog of cataract patients awaiting surgery.

The majority of surgeons prefer manual small incision cat-

aract surgery (SICS) in phacolytic glaucoma due to possible zonular weakness in hypermature cataracts. However, phacoemulsification is nowadays considered a good choice if zonular weakness is not encountered [8-10].

The duration of acute symptoms of phacolytic glaucoma like ocular pain, redness, watering, and photophobia should be elicited as a delayed presentation by more than 5-7 days results in glaucomatous optic nerve damage and hence poor prognosis. However, a defective projection of light should not be seen as a contraindication for cataract surgery in phacolytic glaucoma patients. In a study by Mandal AK et al, 18 patients out of 45 phacolytic glaucoma patients presented with defective projection of light, and after undergoing cataract extraction with intraocular lens implantation, 44% of such patients regained a visual acuity of 20/40 or better [11]. Almost similar results were found in our study where 3 patients with defective projection of light achieved useful vision after undergoing cataract surgery.

A study by Rajkumar P et al and Shrestha R et al showed female patients out-number males in both phacolytic glaucoma and phacomorphic glaucoma which could be due to social and cultural constraints. Similar results with females 60.86% would outnumber males 39.13% in our study [12, 13].

A prospective study by Sarkar K C et al showed that 72.2% of phacolytic glaucoma patients achieved a BCVA of more than 20/125 at final follow-up [14]. Gnanadurai JSC et al analyzed the visual recovery in phacolytic glaucoma patients and found visual acuity of more than 6/12 in 56% of patients presenting within 5 days of symptoms [15]. However, the visual recovery was less than 6/60 in patients presenting beyond 10 days of symptoms. He also attributed poor visual acuity to glaucomatous optic neuropathy and persistent corneal edema in such patients. In our study, however only 21.73% of patients achieved a BCVA of 6/60 – 6/12, 47.82% achieved a BCVA of 4/60 – 6/60 and 30.43% of patients had a final BCVA of less than 4/60 to only perception of light. This low visual recovery could be due to late presentation and hence permanent glaucomatous damage.

In a study by Nannaware SL et al, 53% of phacolytic glaucoma patients present with visual acuity of perception of light, and 47% present with a vision of Hand movements [16]. After surgery, 63% of patients achieved a BCVA of 6/6 – 6/12, 27% of patients achieved 6/18 – 6/60 and 3% of patients achieved a BCVA of less than 6/60.

In Phacolytic glaucoma, the correlation between IOP and visual outcomes is significant both clinically and statistically as patients with pre-operative IOP of more than 40 mm Hg have a poor visual outcome as compared to patients with pre-operative IOP of less than 30 mm Hg where the visual recovery is significantly better. This could be the reason for a poor BCVA between 6/60 – 6/12 in only 21.73% of patients in our study where an IOP between 30 to more than 40 mmHg was seen in 78.26% of patients at the time of presentation.

## 5. Conclusion

This study concludes that all patients of phacolytic glaucoma should be operated upon for cataract extraction using either small incision cataract surgery (SICS) or Phacoemulsification procedure, irrespective of the pre-operative visual status. However, if the patients present within 5 days of the symptoms, chances of achieving good post-operative visual acuity are high. Similarly, if the presenting intraocular pressures are very high or more than 40 mm Hg, the chances of glaucomatous optic nerve damage are also high with resultant poor post-operative visual recovery.

## Conflicts of Interest

The author declares no conflicts of interest.

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