



PROSPECTIVE STUDY TO ANALYSE THE EFFECT OF ND-YAG LASER POSTERIOR CAPSULOTOMY ON OCULAR PROFILE AND VISUAL REHABILITATION.

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ABSTRACT

Background: Posterior capsular opacification (PCO) is the most common delayed complication following cataract surgery. Nd-YAG laser posterior capsulotomy is the standard treatment; however, the impact on ocular parameters such as intraocular pressure (IOP), visual acuity, and postoperative complications varies among patients. **Aim:** To analyse the risk factors associated with PCO, evaluate serial ocular changes after Nd-YAG laser posterior capsulotomy, and manage significant postoperative alterations in ocular profile. **Methods:** A prospective observational study was conducted on 126 pseudophakic patients with visually significant PCO. Patients were divided into two groups: those receiving prophylactic timolol (Group A; n=62) and those without pre-treatment (Group B; n=64). Ocular parameters including BCVA, IOP, PCO morphology, and complication rates were assessed at baseline, 1 hour, 3 hours, 3 days, 1 week, and 6 weeks post-laser. **Results:** Majority of patients were between 61–70 years (38%). Elschnig pearl-type PCO was most common (53.9%), followed by fibrous type (38%). Mean energy required increased with PCO grade (Grade 1: 41–48 mJ; Grade 3: 91–110 mJ). A significant rise in IOP (>10 mmHg) occurred in 18.25% of patients, predominantly in non-treated Group B. Visual acuity improved significantly in 92% of eyes within 1 week. Complications included IOL pitting (3.9%), mild iritis (4.7%), and CME (1.5%); no sight-threatening events were reported. **Conclusion:** Nd-YAG laser capsulotomy significantly improves visual acuity with minimal complications. Prophylactic antiglaucoma medication effectively reduces postoperative IOP spikes. PCO morphology and grade influence the energy required and complication likelihood. Nd-YAG capsulotomy remains a safe, effective, and essential tool in restoring visual function in pseudophakic patients.

KEYWORDS : Nd-YAG capsulotomy, posterior capsular opacification, intraocular pressure, visual rehabilitation, Elschnig pearls

INTRODUCTION

Posterior capsular opacification (PCO) continues to be the most frequent long-term complication after successful cataract surgery, affecting up to 50% of patients within five years. It results from proliferation and migration of residual lens epithelial cells, leading to fibrotic or pearl-type opacification. PCO causes glare, reduced contrast sensitivity, and decline in best-corrected visual acuity (BCVA), thereby impacting patients' quality of life. Nd-YAG laser posterior capsulotomy is a non-invasive and effective procedure that restores visual clarity by creating an opening in the opacified posterior capsule. Although generally safe, the procedure may lead to complications such as transient IOP spikes, cystoid macular edema (CME), retinal detachment, and IOL pitting. This study aims to analyse risk factors associated with PCO formation, evaluate serial ocular changes after capsulotomy, and compare IOP outcomes between patients receiving pre-treatment with timolol and those without prophylaxis.

MATERIAL AND METHODS

Study Design and Setting A prospective observational study conducted at the Department of Ophthalmology, NSCB Medical College, Jabalpur, between January 2023 and June 2024. **Sample Size** 126 eyes of 126 pseudophakic patients with visually significant PCO.

Inclusion Criteria

BCVA < 6/12 due to PCO
Clear corneal media enabling laser delivery
Minimum 3 months after cataract surgery
Normal baseline IOP (10–21 mmHg)

Exclusion Criteria

Glaucoma or ocular hypertension
Corneal opacity
High myopia (>6 D)
Uveitis, retinal pathology, previous ocular surgery
Grouping Group A (n=62): Received prophylactic Timolol 0.5%
Group B (n=64): No pre treatment
Procedure Pupil dilation was achieved with tropicamide and phenylephrine. Nd-YAG capsulotomy was performed using 1.5–2.5 mJ energy per pulse, creating a 3.5–4.0 mm opening. Outcome

Measures BCVA (Snellen) IOP (Goldmann applanation)
Morphology and grade of PCO Laser energy used
Post-laser complications
Follow-up was done at 1 hr, 3 hrs, 3 days, 1 week, and 6 weeks.

RESULTS

Demographics Mean age: 64.3 ± 8.2 years
Gender: 57% males, 43% females
Peak incidence: 61–70 years (38%)
PCO Morphology Elschnig pearls: 53.9%
Fibrous: 38%
Mixed type: 7.9%
Energy Requirements Higher PCO grades required increased mean laser energy: Grade 1: 41–48 mJ
Grade 2: 72–91 mJ
Grade 3: 100–110 mJ
Intraocular Pressure (IOP) IOP spike (>10 mmHg rise): 18.25% overall
Group A (pre-treated): 6%
Group B (non-treated): 30%
Most spikes occurred within 3 hours and normalized by 1 week. **Visual Outcomes** 92% of eyes showed ≥2 Snellen line improvement
84% achieved BCVA of 6/9 or better at 6 weeks
Complications IOL pitting: 3.9%
Mild iritis: 4.7%
CME: 1.5%
No retinal detachment or other major sequelae.

DISCUSSION

Nd-YAG capsulotomy remains the gold standard for PCO management owing to its non-invasive nature and rapid restoration of vision. Our study confirmed that the procedure significantly improves BCVA in more than 90% of patients. Elschnig pearl morphology was the predominant type and required lower cumulative energy than fibrous or mixed types. One key concern following capsulotomy is transient IOP elevation. This study found a significantly lower incidence of IOP spikes in patients pre-treated with timolol, demonstrating the protective effect of prophylactic IOP-lowering therapy. This aligns with literature highlighting the benefit of prophylaxis, especially in high-risk eyes. Complications were minimal and comparable to published studies, with no sight-threatening events observed. The rarity of CME or retinal issues further supports the safety of the procedure when performed with controlled energy levels.

CONCLUSION

Nd-YAG laser posterior capsulotomy is a safe, effective, and

reliable intervention for treating posterior capsule opacification. Visual outcomes were excellent, and significant complications were rare. Pre-treatment with timolol significantly reduced the incidence of post-laser IOP spikes and is recommended, especially for patients with borderline IOP or other risk factors.

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