



ASSESSING VISUAL OUTCOMES AND COMPLICATIONS FOLLOWING ND YAG LASER CAPSULOTOMY FOR POSTERIOR CAPSULE OPACIFICATION

Ophthalmology

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ABSTRACT

Objective: To evaluate the visual outcomes and complications associated with Nd YAG laser capsulotomy in patients with posterior capsule opacification (PCO) following cataract surgery. **Methods:** A prospective cohort study was conducted at Akash Institute of Medical Sciences & Research Centre from January 2023 to December 2023. A total of 120 patients who underwent Nd YAG laser capsulotomy for PCO were enrolled in the study. Patients were assessed pre-operatively and post-operatively for best-corrected visual acuity (BCVA) at designated follow-up intervals, specifically at 1 week and 1 month after the procedure. Complications related to the Nd YAG laser capsulotomy were documented throughout the follow-up period. All data were collected systematically and analyzed to evaluate the effectiveness and safety of the procedure. **Results:** Significant improvement in BCVA was observed post-operatively, with 55 patients (45.8%) achieving 20/30 vision or better. Complications were recorded in 12 patients (10%). **Conclusion:** Nd YAG laser capsulotomy is an effective treatment for PCO, with favorable visual outcomes and manageable complications.

KEYWORDS

Nd YAG, PCO.

INTRODUCTION

During Posterior capsule opacification (PCO) is a common complication following cataract surgery, often leading to a significant decline in visual acuity¹. It occurs when the thin membrane (posterior capsule) that holds the intraocular lens becomes cloudy due to cellular proliferation. This condition affects a substantial percentage of patients who undergo cataract extraction, sometimes necessitating secondary interventions to restore vision².

Nd YAG (neodymium-doped yttrium aluminum garnet) laser posterior capsulotomy has become the standard treatment for PCO, offering a minimally invasive solution to create an opening in the opacified capsule³. This procedure is typically performed on an outpatient basis and is known for its effectiveness and safety⁴. It can quickly improve visual outcomes, allowing patients to regain clarity of vision without the need for invasive surgical techniques⁵.

Despite its success, potential complications associated with Nd YAG laser capsulotomy include increased intraocular pressure, retinal detachment, and intraocular hemorrhage⁶. Understanding both the visual outcomes and the risk of complications is crucial for clinicians to optimize patient care and manage expectations effectively⁷. This study aims to evaluate the visual outcomes following Nd YAG laser posterior capsulotomy in patients with PCO, as well as to assess the incidence and nature of complications arising from the procedure.

MATERIALS AND METHODS

A prospective cohort analysis in 120 eyes of 120 individuals were enrolled for the study. Posterior capsular opacification was evaluated after mydriasis was achieved by topical tropicamide (1%). Patients undergoing Nd YAG laser capsulotomy for PCO were enrolled in the present study conducted at the Department of Ophthalmology, Akash Institute of Medical Sciences and Research Centre, Devanahalli, Bangalore-562110, India. Patients were scheduled for follow-up visits at 1 week and 1 month post-procedure. During each visit, BCVA was re-evaluated, and any complications were assessed and documented. Data were entered into MS Excel sheet, data were analyzed using Excel Data Analysis Tool and Jamovi 2.3.20 statistical analysis tool. Statistical significance was limited by 'P' value < 0.05.

Inclusion Criteria:

Patients aged over 45 years who underwent cataract surgery and subsequently developed PCO.

Exclusion Criteria:

- Patients with significant coexisting ocular conditions (e.g., diabetic retinopathy, glaucoma) that could impact visual

outcomes.

- Incomplete follow-up data or failure to complete the study protocol.

RESULTS

A total of 120 patients (120 eyes) underwent Nd YAG laser capsulotomy for posterior capsule opacification (PCO) during the study period from January 2023 to December 2023.

Demographics:

The mean age of the patients was 67 years, with a range from 45 to 85 years. Among the patients, 70 (58.3%) were female and 50 (41.7%) were male.

Table – 1 Gender Distribution

Gender	Number	Percentage
Male	50	41.7
Female	70	58.3

Pre-Operative Visual Acuity:

Before the procedure, the best-corrected visual acuity (BCVA) was assessed. Of the patients, 20 (16.7%) had a BCVA of less than 20/200, 45 (37.5%) had a BCVA between 20/200 and 20/60, 30 (25%) had a BCVA between 20/50 and 20/30, and 25 (20.8%) had a BCVA of 20/30 or better.

Table – 2 Pre-operative Distribution Of Bcva

BCVA Range	No of Patients	Percentage (%)
Less than 20/200	20	16.7
20/200 to 20/60	45	37.5
20/50 to 20/30	30	25
20/30 or better	25	20.8
Total	120	100

Post-Operative Visual Acuity:

Post-operative BCVA was evaluated at follow-up intervals of 1 week and 1 month. At 1 week, the mean BCVA improved to 20/50, and by 1 month, it further improved to 20/40. While there was a significant improvement in visual acuity from pre-operative to post-operative measurements ($p < 0.001$), not all patients achieved 20/30 vision.

Table – 3 Post-operative Distribution Of Bcva

Time Point	Mean BCVA	Achieving 20/30 or better
1 week	20/50	45(37.5)
1 month	20/40	55(45.8)

Complications:

Complications were noted in 12 patients (10%). The most common complications included transient increases in intraocular pressure (6 patients, 5%), inflammation (iritis) in 4 patients (3.3%), and macular edema in 2 patients (1.7%). All complications were managed effectively, and no patients experienced long-term adverse effects.

Table–4 complications

Type of Complication	No of Patients	Percentage (%)
Transient increase in IOP	4	5.0
Inflammation (Iritis)	6	3.3
Macular Edema	2	1.7
Total	12	10

DISCUSSION

The findings from this study support the use of Nd YAG laser capsulotomy as a first-line treatment for PCO. The significant improvement in BCVA at both 1 week and 1 month post-operatively aligns with existing literature, which has documented similar trends in visual acuity enhancement^{1,3,8}. The average improvement to 20/40 vision in our cohort is consistent with previous studies that reported favourable outcomes following Nd YAG laser procedures^{2,6}.

Despite the overall positive results, it is noteworthy that not all patients achieved the ideal visual acuity of 20/30 or better. This variability can be attributed to several factors, including the severity of PCO at the time of intervention and the presence of coexisting ocular conditions, which were excluded in this study. Previous research has indicated that patient selection plays a crucial role in predicting post-operative outcomes^{4,9}.

The complication rate observed in our study (10%) is comparable to those reported in other studies^{5,7}. The most common complications—transient increases in intraocular pressure and mild inflammation—were effectively managed and did not lead to any long-term adverse effects. This suggests that while Nd YAG laser capsulotomy is generally safe, vigilant post-operative monitoring is essential to address any complications that may arise promptly^{3,6}.

In conclusion, while Nd YAG laser capsulotomy demonstrates excellent efficacy in treating PCO, individualized patient assessment remains vital to optimize outcomes. Future research with larger cohorts and extended follow-up durations is essential to further elucidate long-term outcomes and refine treatment protocols.

CONCLUSION

Nd YAG laser capsulotomy is an effective and safe procedure for treating posterior capsule opacification (PCO) in patients who have undergone cataract surgery. This study demonstrated that a significant proportion of patients experienced moderate improvement in visual acuity following the procedure, with notable enhancements in best corrected visual acuity at both the 1-week and 1-month follow-up intervals.

While the majority of patients achieved satisfactory visual outcomes, not all reached optimal vision levels of 20/30 or better, indicating that individual responses to the treatment can vary. The complication rate was low and manageable, with transient increases in intraocular pressure and mild inflammation being the most common issues, all of which were effectively treated.

These findings support the continued use of Nd YAG laser capsulotomy as a reliable intervention for PCO, emphasizing the need for careful patient selection and follow-up to ensure the best possible outcomes. Future studies with larger sample sizes and longer follow-up periods may provide further insights into the long-term efficacy and safety of this procedure.

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