

Effect of Nd:YAG laser in the management of posterior capsulotomy after extracapsular cataract extraction

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ABSTRACT

Background: Posterior capsular opacification and other related complications are naturally associated long-term complications of extracapsular cataract extraction (ECCE). Neodymium:Yttrium aluminum garnet (Nd:YAG) laser is an effective treatment for posterior capsulotomy. **Objectives:** To assess the effects and complication on visual acuity following Nd:YAG laser posterior capsulotomy after ECCE with or without intraocular lens (IOL) implantation. **Materials and Methods:** A total of 100 patients in between 15 and 85 years age group with significant complications after performing pre-laser assessment were subjected to laser treatment. The treatment is done as an outpatient procedure using VISUALS YAG-II Q-switched Nd:YAG laser. Post-laser treatment follow-up was done after 24 h, 1 week, 1 month, and 6 months interval for the improvement in visual acuity and to detect complications. **Results:** Pre-laser visual acuity was <6/60 in 61 patients, 6/24–6/60 in 29 patients, and in 10 patients it was 6/18–6/24. Post-operative mild iritis was seen in 3 cases, glare in 3 cases, vitreous floater in 4 cases, and pitting over IOL in 6 cases. Other associated complications such as cystoid macular edema, endophthalmitis, rhegmatogenous retinal detachment, and hyphema were not observed in present study. **Conclusion:** Among total cases, 93% cases had improvement in their best-corrected visual acuity. Nd:YAG laser capsulotomy has minimal complications and is a safe and effective treatment procedure for complications associated with ECCE. The results indicate that Nd:YAG laser posterior capsulotomies performed safe, effective, and carry a low-associated complication rate.

KEY WORDS: Neodymium:Yttrium Aluminum Garnet Laser; Extracapsular Cataract Extraction; Posterior Capsular Opacification; Cataract


INTRODUCTION

Cataract is the most common cause of curable blindness in the world, which remains the leading cause of blindness in India (62.60%).^[1] Cataract is responsible for 50–80% of the bilateral blindness in India.^[2] Posterior capsular opacification (PCO) is a common long-term complication of cataract surgery in extracapsular cataract extraction (ECCE). ECCE

with posterior chamber intraocular lens (IOL) implantation is the primary surgical choice than intracapsular cataract extraction for the treatment of cataract.^[3]

Neodymium:Yttrium aluminum garnet (Nd:YAG) laser posterior capsulotomy is the best choice of treatment for complications associated after ECCE surgery and has more than 95% success rate and is an eminent surgical procedure for PCO which is natural consequence of ECCE surgery.^[3-5] Nd:YAG laser posterior capsulotomy possibly combined with complications such as cystoid macular edema, transient rise in intraocular pressure (IOP), endophthalmitis, anterior hyaloid disruption, and lens pitting.

The Nd:YAG laser with a wavelength of 1064 nm that can disrupt ocular tissues by achieving optical breakdown with a

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Table 1: Initial laser power setting depending on degree of capsular opacification

Type of capsular opacification	Number of eyes	Basic power setting			
		1–2 mJ	2–3 mJ	3–5 mJ	>5 mJ
Elschnig's pearls	22	18	4	-	-
Moderate opacification	68	46	14	8	-
Thick fibrotic capsule	10	-	4	6	-

Table 2: Table amount of laser energy used for posterior capsulotomy

Total amount of laser energy given	Number of cases (%)
0–30 mJ	22 (22)
31–50 mJ	78 (78)
51–100 mJ	10 (10)
Total	100 (100)

Table 3: Intraocular pressure rise in post-laser period

Energy levels	Number of cases	Raise of IOP (5 mmHg)		
		After 1 h	After 4 h	After 24 h
0–30 mJ	22	Nil	0	Nil
30–50 mJ	78	3	3	Nil
50–100 mJ	10	5	10	Nil

IOP: Intraocular pressure

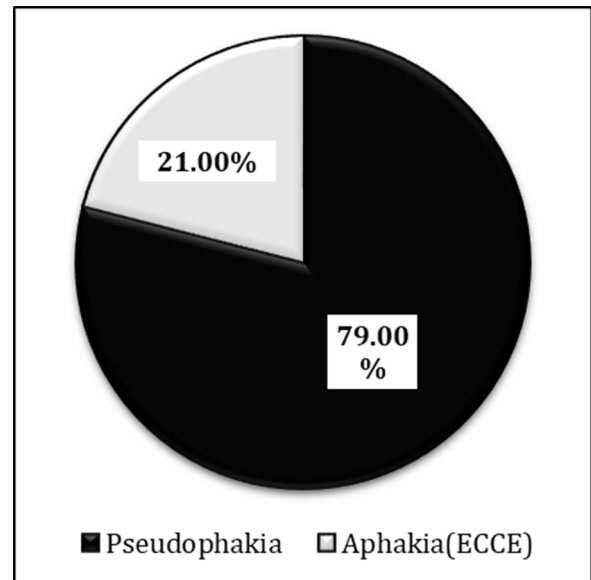
short, high-power pulse. Nd:YAG laser posterior capsulotomy introduced a technique for closed-eye, effective and relatively safe opening of the opacified posterior capsule, and laser capsulotomy rapidly became the standard of care.^[6-8]

With all above facts, the present study was organized to assess the effects and complication on visual acuity following Nd:YAG laser posterior capsulotomy after ECCE with or without IOL implantation.

MATERIALS AND METHODS

This study was carried out in the Department of Ophthalmology, Mahadevappa Rampure Medical College, Gulbarga, during April 2015–December 2016. Patients attending the outpatient department and from referred centers with chief complaints of gradual diminution of vision after some duration of successful cataract extraction surgery were included and eyes with the cause of diminution of vision other than PCO were excluded. A total of 100 patients in between 15 and 85 years age group underwent Nd:YAG laser posterior capsulotomy. The treatment is done as an outpatient procedure using VISUALS YAG-II Q-switched Nd:YAG laser.

Among total cases, 85 had pseudophakic and 15 had aphakic. The time interval between cataract surgery and Nd:YAG capsulotomy was <6 months in 30 cases and more than 6 months in 70 cases. All the patients were subjected to

**Figure 1:** Posterior capsular opacification in pseudophakic and aphakic eyes

detailed clinical evaluation and complete ocular examination before capsulotomy. Evaluation of visual acuity is done before laser procedure and in post-laser period, at 1 h, 24 h, 1 week, and 2 weeks. Evaluation of IOP is done before laser procedure and after the laser capsulotomy procedure at 1 h, 4 h, and 24 h. Follow-up was done after 24 h, 1 week, 1 month, and 6 months interval for the improvement in visual acuity and to detect complications. Post-operative raise of IOP (>5 mmHg) was treated with Timolol maleate drops (0.5%) twice per day, prednisolone acetate eye drops (1%) 4 times per day and tab. Acetazolamide 250 mg twice per day.

RESULTS

The present study contains 100 patients complaining painless, progressive diminution of vision after a successful cataract surgery.

Among 22 cases with Elschnig's pearls, the initial laser power setting was used between 1 and 2 mJ in 18 cases and was enhanced to 2–3 mJ in 4 cases for an adequate capsulotomy. Whereas 68 patients with moderate capsule opacification, the initial power setting was gradually increased from 1 to 2 mJ (46 cases) to 2–3 mJ (14 cases), further extended to 3–5 mJ (8 cases) [Table 1].

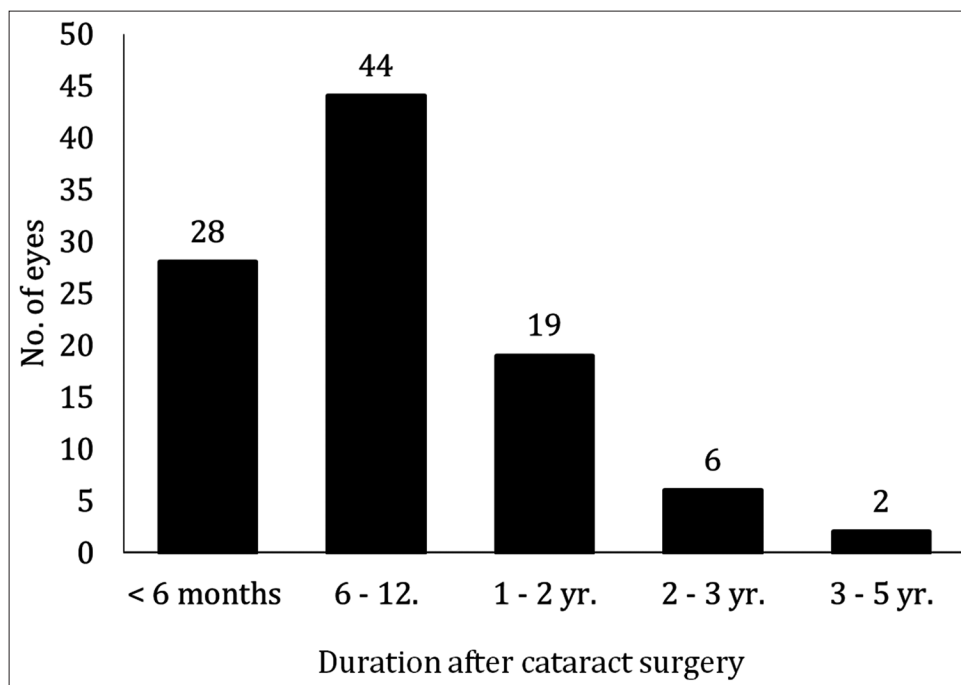


Figure 2: Duration of appearance of visually significant posterior capsular opacification after cataract surgery

The total amount of Nd:YAG laser energy used for posterior capsulotomy. In this study, among 100 cases, 22 cases required the energy between 0 and 30 mJ, 78 cases required 31–50 mJ, and rest 10 cases required 51–100 mJ. More amount of laser was used in moderate and thick fibrotic capsular opacification [Table 2].

Post-operative mild iritis was seen in 3 cases, glare in 3 cases, vitreous floater in 4 cases, and pitting over IOL in 6 cases. Other associated complications such as cystoid macular edema, endophthalmitis, rhegmatogenous retinal detachment (RD), and hyphema were not observed in present study [Table 5].

DISCUSSION

The present study was aimed to assess the effects and complication on visual acuity following Nd: YAG laser posterior capsulotomy after ECCE with or without IOL implantation. A total on hundred patients were selected with a chief complaint of painless, progressive diminution of vision after a successful cataract extraction surgery. Among 100 patients, 22 had Elschnig's pearls, 68 had moderate posterior capsular opacification and 10 had thick fibrotic posterior capsule. The amount of laser energy need for making an adequate opening in the posterior capsule depend on the type of capsule opacification. In present study, among 22 cases with Elschnig's pearls the initial laser power setting was used between 1-2mJ in 18 cases and was enhanced to 2-3mJ in 4 cases for an adequate capsulotomy. Whereas, 68 patients with moderate capsule opacification the initial power setting

was gradually increased from 1-2mJ (46 cases) to 2-3mJ (14 cases), further extended to 3-5mJ (8 cases) (Table 1). In this study, 79 cases were pseudophakic and 21 patients were aphakic (Figure 1). In this study, 28 cases had visually significant PCO within 6 months and 24 cases had significant PCO between 6-12 months (Figure 2). In this study, among cases 22% cases required total energy between 0-30 mj, 78% cases required 31-50 mj laser energy and 10 patients required between 51-100 mj laser energy for an adequate posterior capsular opening (Table 2).

A study by Frezzotti and Caporossi revealed that the incidence of PCO was 7.69% in the eyes with an IOL and 14.23% in the eyes without an IOL.^[9] Nishi noted that a significantly lower incidence of PCO after ECCE with posterior chamber intraocular lens (PCIOL) than in eyes without PCIOL.^[10] Liesegang and Bourne stated that the opacification with and without IOL to be 14.5% and 22.1%, respectively.^[11]

In this study, there is more raise in IOP from the baseline IOP with the increasing amount of total laser energy (Table 3). The patients who developed IOP >5 mmHg advised to acetazolamide 250 mg twice daily for 5 days. A study by Channell and Beckman found in which IOP increased more than 5 mmHg showed the increase within 1st 48 h.^[12] Pre-laser visual acuity was <6/60 in 61 patients, 6/24–6/60 in 29 patients, and in 10 patients it was 6/18–6/24 (Table 4).

Among 100 cases who underwent Nd:YAG capsulotomy, 93% cases had improvement in their best-corrected visual acuity. Failure of vision to improve is often due to pre-existing ocular disease, including age-related macular degeneration, cystoid

Table 4: Pre- and post-laser capsulotomy changes in visual acuity

Group	Number of cases	Pre-laser BCVA	Post-laser BCVA			
			6/24–6/60 (%)	6/12–6/24 (%)	6/6–6/12 (%)	No change (%)
1	61	<6/60	14 (22.9)	27 (44.26)	15 (24.5)	4 (6.5)
2	29	6/24–6/60	-	12 (41.3)	17 (58.6)	-
3	10	6/18–6/24	-	-	10 (100)	-
4	-	>6/18	-	-	-	-

BCVA: Best-corrected visual acuity

Table 5: Complication following Nd:YAG laser posterior capsulotomy

Complications	Number of cases
Post-laser iritis	3
Glare	3
Pitting over IOL	6
Vitreous floaters	4
Hyphaema	-
Cystoid macular edema	-
Rhegmatogenous RD	-
Endophthalmitis	-

Nd: YAG: Neodymium: Yttrium aluminum garnet, IOL: Intraocular lens, RD: Retinal detachment

macular edema, other macular disease, RD, corneal edema, glaucoma, ischemic optic neuropathy, and amblyopia. Post-laser visual acuity outcome and complication rates compare favorably with those in previous studies.

CONCLUSION

Among total cases, 93% cases had improvement in their best-corrected visual acuity. Nd:YAG laser capsulotomy has minimal complications and is a safe and effective treatment procedure for complications associated with ECCE. The results indicate that Nd:YAG laser posterior capsulotomies performed safe, effective, and carry a low-associated complication rate. The results indicate that Nd:YAG laser posterior capsulotomies performed safe, effective, and carry a low-associated complication rate.

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