

# A Clinical Study of Visual Outcome after Nd-YAG Laser Capsulotomy in Posterior Capsule Opacification

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**Abstract:** *Introduction:* Cataract remains the single largest cause of blindness worldwide which is curable. The aim of this study is to see the visual outcome after Nd-YAG laser capsulotomy in posterior capsule opacity (PCO) and to study the correlation between PCO and visual acuity before and after Nd-YAG laser capsulotomy. *Material and Methods:* Nd-YAG laser capsulotomy was carried out in 300 eyes of 300 patients. It was a hospital based prospective study which included patients who underwent small incision cataract surgery (SICS) or phacoemulsification with PCIOL implantation and developed PCO. *Results:* 95% eyes showed improved vision after Nd-YAG laser capsulotomy. Sex predilection was not found among patients who developed PCO. Majority patients were in the age group of 60-80 years. *Conclusion:* Nd-YAG laser capsulotomy presented as a noninvasive, effective and relatively safer technique to manage intact posterior capsule opacity

**Keywords:** visual outcome, Nd-YAG laser capsulotomy, posterior capsule opacity

## 1. Introduction

Posterior capsular opacification (PCO) has been found as the most common delayed complication after cataract surgery[1]. PCO causes decreased visual acuity, impaired contrast sensitivity, glare disability and monocular diplopia, and hence, requires treatment [2][3]. Currently, Nd:YAG laser capsulotomy is the standard treatment for it[4].

Nd : YAG laser capsulotomy procedure uses a quick pulsed Nd:YAG laser to apply a series of focal ablations in the posterior capsule which creates a small circular opening in the posterior capsule[5].

Though it is a safe and effective techniques; retinal detachment, cystoid macular edema, and rise in intraocular pressure are some of its known complications [6] [7].

The absolute contraindications of Nd:YAG laser capsulotomy are corneal pathologies like corneal scar, corneal edema and corneal irregularities. Cystoid macular edema and active ocular inflammation are some of its relative contraindications. The present study is conducted to study the visual outcome after Nd-YAG laser capsulotomy in posterior capsule opacity.

## 2. Materials and Methods

This prospective interventional study at a tertiary eye care centre in Western India from January 2019 to July 2020 after approval from Institutional Ethics Committee in 300 eyes of 300 pseudophakic patients of the age 40 years and above. These patients had undergone cataract surgery at least 6 months before undergoing Nd-YAG laser capsulotomy, either by small incision cataract surgery (SICS) or by phacoemulsification. All the patients had age related senile cataract. All the intraocular lens (IOLs) used were in-the-bag posterior chamber IOLs, either non foldable PMMA IOLs or foldable Acrylic IOLs. The patients selected had both subjective and objective diminution of vision. Details of the

procedure were explained to the patients and their attenders in their local language and informed consent was taken.

### Objectives:

- To study different types of posterior capsule opacifications
- To study effect of energy and number of shots applied during Nd-YAG laser capsulotomy on final visual acuity of the patient
- To study the visual outcome after Nd-YAG laser in posterior capsule opacity
- To study various complications associated with Nd-YAG laser capsulotomy

### Inclusion Criteria:

- Posterior capsule opacity following cataract surgery
- Patients of age 40 years and above
- Decrease best corrected visual acuity (BCVA) of 2 or more lines of Snellen chart

### Exclusion Criteria:

- Multifocal IOLs
- Decentered IOLs
- Anterior chamber/scleral fixated IOLs
- Patients having glaucoma, uveitis, active ocular inflammation
- Patients underwent retinal surgeries
- Congenital abnormalities like aniridia, microphthalmos, nystagmus

Each patient was thoroughly evaluated by slit lamp examination. BCVA was noted and intraocular pressure was recorded by applanation tonometry. Pupillary dilatation was achieved by using a short acting mydriatic drug (0.8% tropicamide and 5% phenylephrine). Fundus evaluation was done by indirect ophthalmoscopy. Grading of posterior capsular opacities was done according to Sellman and Lindstrom slit lamp observation to evaluate level of PCO using reflected light rather than retroillumination.

PCO was categorized as below:

- 0 – none visible at all
- 1 – visible but not reaching to IOL edge
- 2 – at the IOL edge
- 3 – well inside the IOL edge but visual axis clear
- 4 – across the visual axis

Topical anaesthetic (proparacaine 0.5%) was instilled in the eye. The patient was made to sit on ND-YAG laser machine. The Abraham YAG capsulotomy lens was fixed on the eye with the help of viscoelastic substance. The energy of the laser was fixed and then shots were taken and modified according to the type of PCO. Patient was advised to instill topical antibiotic and steroid combination eyedrop for 4 times a day and an antiglaucoma eyedrop twice a day. At 1 week follow-up the IOP and BCVA of the patient was recorded.

### 3. Results

300 patients were identified having posterior capsule opacity diagnosed by slit lamp examination. These cases were divided according to age and sex. Nd-YAG laser capsulotomy was done for all the cases. Pre and post procedure BCVA was recorded. The complications after Nd-YAG laser capsulotomy were recorded.

As shown in table 1, out of 300 patients, 156 (52%) were males and 144 (48%) were females. The sex ratio was not statistically significant. Most of the patients (42%) were in the age group of 60-80 years. In this study left eye (56%) involvement was more common than right eye (44%). Elschnig pearl (65%) type of PCO was the most common than Fibrous (20%) and Mixed (15%).

**Table 1:** Demographic distribution of Patients (N=300)

	Number of cases	Percentage (%)
<b>Age (years)</b>		
40-60	111	37
60-80	126	42
>80	63	21
<b>Gender</b>		
Male	156	52
Female	144	48
<b>Eyes</b>		
Right Eyes	132	44

Left Eyes	168	56
<b>Type of PCO</b>		
Fibrous	60	20
Elschnig 's Perl	195	65
Mixed	45	15

As shown in table 2, In elschnig pearl type of PCO, the most commonly used energy level range was 61 to 70 mJ, in 20% cases; while in fibrous and mixed type of PCO, the most commonly used energy level range was 81-90 mJ, in 15% cases.

**Table 2:** Energy required in different types of PCO (N=300).

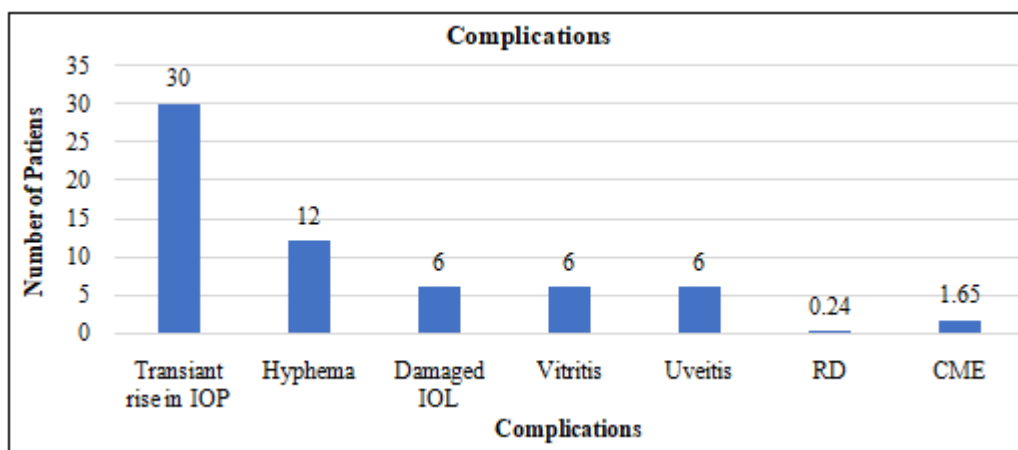
Cumulative laser energy in mj.	Elschnig pearl	Fibrous and mixed	Total
<50	27 (9%)	3(1%)	30(10%)
51-60	36(12%)	12(4%)	48(16%)
61-70	60(20%)	9(3%)	69(23%)
71-80	42(14%)	12(4%)	54(18%)
81-90	30(10%)	45(15%)	75(25%)
91-100	-	24(8%)	24(8%)
>100	-	-	-
Total	195(65%)	105(35%)	300(100%)

As shown in table 3, maximum patients (35%) achieved BCVA 6/9 post Nd YAG laser capsulotomy, while 22% of patients achieved BCVA 6/6.

As depicted in graph 1, the most common complications seen post Nd YAG laser capsulotomy was transient rise in intraocular pressure, seen in 30% of patients. Other complications noted were hyphema (12%), damaged IOL (6%), vitritis (6%), anterior uveitis (6%), retinal detachment (0.24%) and cystoid macular edema (1.65%).

**Table 3:** Visual improvement after Nd: YAG laser posterior capsulotomy

Pre laser VA	Post laser VA							
	6/6	6/9	6/12	6/18	6/24	6/36	6/60	5MFC-4MFC
5MFC (114)	0	9	33	12	15	27	9	15
6/36-6/60 (156)	42	90	12	12	-	-	-	-
6/18- 6/24 (30)	24	6	-	-	-	-	-	-
Total- 300	66	105	45	24	15	27	9	15



**Graph 1:** Complications post Nd YAG laser capsulotomy

#### 4. Discussion

The study was carried out in 300 eyes of 300 patients which was a hospital based prospective study on outpatient basis who underwent phacoemulsification or SICS with PCIOL implantation and diagnosed PCO. Most common complaint of all these patients was diminution of vision. Before undergoing laser capsulotomy each patient was evaluated to confirm that the visual loss was only after cataract. ND - YAG laser capsulotomy is a non- invasive, effective, out patient procedure relatively safe but associated with many complications like endophthalmitis, increased intraocular pressure, retinal detachment, cystoid macular edema, post laser visual acuity not improved due to various causes like glaucomatous optic atrophy, diabetic neuropathy, myopic degeneration of retina. Study conducted by Hasan et al [8] Wilkins et al [9], Hameed et al [10], Hayashiet al [11], Stark et al [12] had similar results as that of our study.

The current study showed that elschnig pearl type of PCO requires lesser amount of energy as compared to fibrous and mixed type of PCO. Maximum patients achieved BCVA 6/9 to 6/6 in this study. While the most common complication recorded post Nd YAG laser capsulotomy was transient rise in intraocular pressure; complications resulting in low vision like hyphema, anterior uveities, vitritis, retinal detachment and cystoid macular edema, were also seen in few patients.

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