Original Research Article

Visual outcome following ND: Yag laser capsulotomy in patients with posterior capsular opacity attending tertiary care center

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Abstract

Background: Posterior capsular opacity presents with gradual decrease in visual acuity after successful cataract surgery. This can be managed by Nd: YAG laser capsulotomy which is a non-invasive, effective and relatively safe technique. **Aim:** To study the visual outcome of Nd: YAG laser capsulotomy inpatients with posterior capsular opacity attending tertiary care center. **Material and Methods:** A total of 100 patients presenting with posterior capsular opacity with vision <6/9 after successful cataract extraction surgery and undergo Nd: YAG laser capsulotomy were studied. Best corrected visual acuity was measured at 1hr, 4hr and on day 7 of capsulotomy. **Results:** PCO was of grade II in 71 patients and grade III in 29 patients. Pre laser visual acuity was between 1/60 and 6/12.By seventh day, post Nd: YAG laser capsulotomy vision improvement of 6/6 was achieved in 70% of patients and in 12% patients the vision was 6/9, 6/12 in 17% patients and 6/24 in 1% patient. The overall improvement in visual outcome is seen in 100%patients. **Conclusion:** Improvement in visual acuity after Nd: YAG laser capsulotomy is excellent. It isa convenient, non-invasive and OPD based procedure.
Key Words: Cataract, posterior capsular opacity, Nd: YAG laser capsulotomy, visual outcome.

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INTRODUCTION

Cataract is the commonest cause of blindness in India. Although, surgical exponents of cataract surgery have achieved best visual acuity in patients, still posterior capsular opacification (PCO) caused by postoperative proliferation of cells in the capsular bag remains a major cause of reduced vision after surgery. Incidence of PCO in early 1990 was about 25 % to 50% by two years post operatively.[1] In pediatric cataract surgery PCO is a major problem where the incidence approaches 100%.[2]Posterior capsular opacity (PCO) is the opacification or clouding of normally clear posterior lens capsule. The proliferation, migration and abnormal differentiation of residual lens epithelial cells and fibers in capsular bag have been implicated in the pathogenesis of posterior capsular opacity. It is frequent long term outcome of cataract surgery. Posterior capsular opacity presents with gradual decrease in visual acuity after successful cataract surgery. Although various methods are employed for prevention like capsular polishing, implanting intraocular lens with convex posterior surface, surface-modified lens, use of antimitotic and others, they have not shown to be very successful in long term follow up.[3] Posterior capsular opacity can be managed by primary posterior capsulorhexis, secondary posterior capsulorhexis or Nd:YA Glaser. The Nd:YAG laser provides the advantage of cutting the lens capsule, capsular membrane, strands and adhesions without surgical intervention, thereby avoiding and minimizing infection, wound leaks, and other complications of intraocular surgery.[4] Thus, Nd:YAG laser capsulotomy is non-invasive, effective and relatively safe technique. In this study, an attempt has

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been made to study the visual outcome of Nd:YAG laser capsulotomy inpatients with posterior capsular opacity attending tertiary care center.

MATERIAL AND METHODS

In this prospective observational study conducted on 100 patients presenting with posterior capsular opacity after successful cataract extraction surgery who attend ophthalmology outpatient department of tertiary center and undergo Nd: YAG capsulotomy during a period of 2 years. These patients might present with decreased visual acuity and/or glare.

Inclusion Criteria: All patients with post-operative posterior capsular opacity with vision <6/9 and willing to undergo Nd: YAG laser capsulotomy.

Exclusion Criteria

Patients with PCO associated with corneal scars, irregularities or edema that interferes with target visualization. PCO associated with active intraocular inflammation. PCO associated with cystoid macular edema or other complications that is likely to reduce the visual acuity. An uncooperative patient who is unable to remain still or hold fixation during the procedure with inadvertent damage to adjacent intraocular structures. Patient with increased intraocular pressure. PCO associated with dislocated IOL.

Pre Nd: YAG laser assessment of patients

In pre Nd:YAG laser assessment, all the patients were interviewed for demographic details, previous medical, surgical and ocular history. Following detailed ocular examination was carried out:

1. Best corrected visual acuity recording on Snellen's charts
2. Slitlampbiomicroscopy

Diffuse examination B. Oblique and slit illumination C. Retro illumination

1. Recording IOP by Schiotz tonometer
2. Direct ophthalmoscopy
3. Indirect ophthalmoscopy

PCO was graded according to Madurai PCO Grading Scale.[5]

Nd: YAG laser capsulotomy procedure

1. SuggestedsettingsforNd:YAGcapsulotomyis0.8–2.0mJwitheither Q-switched or mode locked systems. One should start with pulse energy of 0.5mJ not to exceed 2mJ.
2. Dilatation is optional, specific level marks in the posterior capsule near the visual axis should be noted before dilatation.
3. Focus the laser beam slightly behind the posterior surface of the capsule for initial application, moving subsequent application anteriorly until the desired puncture is achieved.
4. Making the series of laser puncture in a spirally rather than cruciate pattern decreases the risk of radial tears.
5. The center of the visual axis is the desired site of the opening which is usually adequate at 3-4 mm in diameter.

Post Nd:YAG laser

1. Mild topical NSAIDs and steroid was given whenever patient was noted to have uveitis or hyphema immediately after Nd:YAG LASER capsulotomy, after 1 hour, after 4hours or on day 7 of follow up.
2. Systemic NSAID was given to all patients undergoing Nd:YAG LASER capsulotomy.
3. Best corrected visual acuity was measured at 1hr, 4hr and on day 7 of capsulotomy.

RESULTS

This study was carried out on 100 eyes of 100 patients in the outpatient Department of Ophthalmology of a Tertiary care hospital. The age of patients in the present study was between 30 and 88 years. In this study 45 patients were male and 55 females. Right eye was affected in 47 patients and left in 53 patients, PCO was of grade II in 71 patients and grade III in 29 patients.

Table 1: Pre laser visual acuity

Pre laser Visual acuity	No. of cases	Percentage of cases (%)
1/60-5/60	20	20.00%
6/60-6/36	46	46.00%
6/24-6/18	26	26.00%
6/12-6/9	8	8.00%
Total	**100**	**100.00%**

Pre laser visual acuity was between 1/60 and 6/12 (Table 1). Maximum patients needed 40-50mJ of energy and only one patient needed higher energy of 131-140mJ which was due to thick PCO. The mean total cumulative energy being 65.964 ± 22.3362 mJ.

Table 2: Post Nd:YAG LASER visual acuity (BCVA)

	VA at 1hr post laser	VA at 4hr post laser	VA on day 7 post laser	Percent on day 7 post laser
1/60-5/60	4	00	00	00
6/60-6/36	18	05	00	00
6/24-6/18	48	22	01	01
6/12-6/9	19	62	29	29
6/6	11	11	70	70
Total	**100**	**100**	**100**	**100**

Post Nd:YAG laser capsulotomy the vision improvement after 1 hr, 4hr, on day 7 post laser is shown in Table 2.

Table 3: Post laser visual outcome

Visual outcome	No. of patients	Overall visual outcome	Overall total visual outcome
6/6	70	70%	100%
6/9	12	12%	
6/12	17	17%	
6/24	1	1%	
Total	**100**	**100%**	

By seventh day, post Nd:YAG laser capsulotomy vision improvement of 6/6 was achieved in 70% of patients and in 12% patients the vision was 6/9, 6/12 in 17% patients and 6/24 in 1% patient. The overall improvement in visual outcome is seen in 100%patients.

Table 4: Comparison of pre laser and post laser visual acuity

	Pre-laser visual acuity	Post laser visual acuity on day 7
1/60-5/60	20	00
6/60-6/9	80	19
6/9-6/6	00	81

Pre laser visual acuity was between 1/60-5/60 in 20% patient and 6/60-6/9 in 80% patients. 19% patients had visual acuity between 6/60-6/9 and 81% patients had visual acuity between 6/9-6/6 on day7 post laser.

DISCUSSION

Posterior capsular opacification is a long term outcome of cataract surgery with or without intraocular lens implantation. The use of Nd:YAG laser has simplified the management of posterior capsular opacification. It is a non- invasive and out-patient procedure. In this hospital based observational prospective study 100 eyes of 100 patients were studied to evaluate the visual outcome following Nd:YAG laser posterior capsulotomy. All the affected eyes of patients in this study were pseudophakic with PCIOL meeting the inclusion and exclusion criteria. In this study, 71% of affected eyes had grade II PCO and 29% had grade III PCO. This is in near correlation with the study conducted by Sirisha *et al*[5] where it was found that 19.2% patients had grade I PCO, 72.4% patients had grade II PCO and 8.4% patients had grade III PCO. The pre laser visual acuity of patients included in this study was between 1/60 to 5/60 in 20 patients, maximum patients had vision between 6/60-6/36 which constitutes 46% of patients, 26% patients had vision between 6/24-6/18 and 8% had vision between 6/12-6/9. The pre laser visual acuity in Patel *et al*[6] study ranged from 1/60 to 6/12 and in Gore VS[7] study ranged from finger counting to 6/12 that correlates with the present study. But it does not correlate with the pre laser visual acuity in study conducted by Sirisha *et al.*[5] Maximum patients in the present study had pre laser visual acuity between 6/60 to 6/36 that does not correlate well with the study of Gore VS[7] and Ali Raza[8] where maximum patients had pre laser visual acuity of 6/18 and <6/60 respectively. The difference in correlation of pre laser visual acuity could be because of difference in inclusion and exclusion criteria of the present study with other studies. In ophthalmic practice, importance is given to visual acuity when assessing a patient's visual outcome in relation to planned or executed procedures. Improvement in visual acuity is the primary endpoint for successful Nd: YAG laser posterior capsulotomy for posterior capsule opacification. In this study, visual outcome has improved in all patients when compared to their pre laser visual acuity, none of the patients had visual deterioration; indicating 100% visual outcome improvement. 70% patients show best corrected visual acuity improvement to 6/6, 12% to 6/9, 17% to 6/12 and 1% patient to 6/24. The non-improvement to 6/6 vision was due to age related macular and choroidal degeneration which could not be recognized prior to Nd: YAG laser capsulotomy due to thick PCO blurring fundus vision and evaluation. This is in correlation with the studies of Gupta ML[9] which shows 99% visual outcome improvement, Sirisha *et al*[5] which shows 98% visual outcome improvement, JainS *et al*[10] which shows 90.7% visual outcome improvement, Bari KN[11] which shows 100% visual outcome improvement and Dharmaraju *et al*[12]which shows 95% visual outcome improvement. There are many methods to manage posterior capsular opacification that develops after cataract extraction surgery but Nd: YAG laser capsulotomy remains the most common and safe procedure. With correct procedure, proper patient selection, proper fundus evaluation and when done after at least 3-6mths of cataract surgery, Nd: YAG laser capsulotomy is convenient, non-invasive and OPD based procedure with minimum complications. It can be mastered easily with some practice. Although it is non-invasive and generally considered safer it carries a low but finite risk of complications. These complications are rare and rarely sight threatening. Therefore, we should be alert of development of cystoids macular edema, retinal detachment and persistent rise in IOP during follow up of patients with Nd: YAG laser posterior capsulotomy. To conclude, improvement in visual acuity after Nd: YAG laser capsulotomy is excellent.

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