

Original Research Article

Posterior capsule opacification assessment of need and outcome of Nd-YAG laser capsulotomy: a follow up of rapid assessment of avoidable blindness in a district in central India

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ABSTRACT

Background: Current study highlights the burden of PCO related blindness, need of Nd YAG laser in rural set up and positive and negative outcomes of Nd-YAG laser capsulotomy in treating PCO.

Methods: This study was conducted in 2020 at the department of ophthalmology at a medical college in central India. A total 53 such eyes were studied.

Results: A 408 individuals were included with pseudophakia in one or both eyes. Mean age of pseudophakic study population was 67.9 ± 7.6 years (range 50-92 years). Nearly 50% of the eyes had a visual acuity of less than 6/18. 40% of the pseudophakic eyes had visually significant PCO. There were 53 eyes where the visual impairment was solely due to PCO and Nd-YAG Laser capsulotomy was done for these eyes. Post Laser Treatment 79.2% of treated eyes achieved a visual acuity of $\geq 6/18$. Most commonly encountered complications after YAG Laser Capsulotomy was IOP spike which was seen in 29.5% of eyes undergoing the procedure which was followed by IOL pitting seen in 29.7%.

Conclusions: The reach of Nd-YAG laser capsulotomy is limited to these masses. A step to prevent blindness in this category of population would be to ensure availability of Nd-YAG laser capsulotomy. This procedure is relatively safe with few complications.

Key Words: Posterior capsular opacification, Nd-YAG laser, Intraocular lens

INTRODUCTION

The current accepted surgical trend for cataract surgery is phaco-emulsification or extracapsular cataract extraction. Whereas phacoemulsification is performed in most of urban set ups, in rural settings especially where camp surgeries are performed ECCE and small incision cataract surgeries are still performed in majority of hospitals in India.¹ Posterior capsular opacification (PCO) is the prime deleterious consequence of cataract surgery. ND-YAG laser capsulotomy is the accepted treatment for PCO. Most of the published literature on PCO is in cases where phacoemulsification with implant of foldable intraocular

lenses was performed.²⁻⁵ There is limited information on the prevalence of PCO and outcome of its treatment in cases after extracapsular cataract extraction surgery with implantation of polymethyl methacrylate lenses which is done in majority of camp surgeries in rural Indian set up. To achieve our aim to study, we reached out to the rural population through a cluster sample survey to screen the cases (detailed outcome of which has already been published by us elsewhere) and study the prevalence and grades PCO in these cases. Those cases where PCO was visually significant were brought to the hospital and worked up for Nd-YAG laser capsulotomy and were

accordingly assessed to record outcome and complications of the procedure.¹

Aim and objectives

Aim and objectives were to assess the visual status of pseudophakic eyes in rural population. To study prevalence of posterior capsule opacification in rural population. To assess the visual outcome of Nd-YAG laser capsulotomy and to study the complications of Nd-YAG laser capsulotomy.

METHODS

Case selection was made from a door-to-door population-based survey in a select 30 clusters of a single district located central India. Team performed door to door enumeration and examination of 100 people aged 50 years or more in each cluster (irrespective of whether operated for cataract surgery or not). After approval from the institutional ethical committee the patients were enrolled in this hospital based “prospective interventional case series clinical trial”. After a demographic record of patients, the history of cataract surgery was recorded. Visual acuity was recorded with ETDRS chart cutouts with E optotypes. Anterior segment evaluation was performed with torchlight examination. After dilatation with tropicamide and phenylephrine eye drops, a dilated direct ophthalmoscopy for fundus examination (posterior pole) was performed for patients with visual acuity of 6/18 or less and those with a PCO. Distant direct ophthalmoscopy was performed for assessment and grading of PCO. On distant direct ophthalmoscopy PCO Was graded as below; Grade 1-Peripheral PCO with no obscuration of fundus details. Grade 2-Central PCO, Disc seen, Macula details hazy. Grade 3-Central PCO, glow present, disc macula hazy in details. Grade 4-No/ Faint glow.^{6,7} A total 551 eyes of 408 individuals who were Pseudophakic in one or both eyes were assessed through above clinical procedures. Out of these we selected eyes with visual acuity 6/18 or less, where PCO was the only cause for reduced vision after ruling out other anterior segment and posterior segment causes. In this manner we selected 53 cases from the survey across all the 30 clusters who were brought to the hospital where a thorough ocular examination was done which included reconfirmation of visual acuity, slit lamp evaluation, indirect ophthalmoscopy and applanation tonometry. In patients with hazy media a B scan ultrasonography was done, Patients with PCO Grade 2 and above or those with a vision of 6/18 or less with no other anterior segment or posterior segment pathology were included in the study and were treated with Nd-YAG Laser capsulotomy.

Procedure of ND-YAG laser capsulotomy

Informed written consent was taken from all patients. Pre laser premedication included 1% apraclonidine drops, 2 % homatropine drops and 4% xylocaine drops. Patients were advised about flashes and noises during procedure.

Nd-Yag laser capsulotomy was performed with minimum possible laser energy (0.6 to 1.5 mj per pulse). Minimal possible number of shots were used with best focus keeping the beam first off centre and cutting along capsular lines to make capsular opening diameter about 3-4 mm. Post laser the patients were treated with % apraclonidine and lotepredlil drops. After Nd-YAG laser capsulotomy, IOP was recorded and slit lamp evaluation was done to record complications.

RESULTS

Age and sex distribution of pseudophakic persons

Total 408 persons with pseudophakia in one or both eyes (making the figure 551 pseudophakic eyes), 208 (50.9%) were males and 200 (49.1%) were females. Mean age of pseudophakic study population was 67.9 ± 7.6 years (range 50-92 years). This highlights the equal reach of cataract surgery services offered by Government and Non-Government organizations to both genders in this district in Rural Central India.

Table 1: Visual Status of pseudophakic eyes (n=551).

Visual status	Presenting VA, N (%)	Pin hole visual acuity, N (%)
$\geq 6/18$	241 (43.7)	276 (50.1)
$< 6/18-6/60$	179 (32.5)	147 (26.7)
$< 6/60-\geq 3/60$	58 (10.5)	55 (10)
$< 3/60-PL+$	63 (11.4)	63 (11.4)
No PL	10 (1.8)	10 (1.8)

Visual status of pseudophakic eyes

Pin-hole visual acuity in majority of Pseudophakic Eyes (over 50%) in the study population was 6/18 or better. Nearly a similar number of ye had a vision of less than 6/18, with over 20% of eyes with vision 6/60 or less (Table 1).

Prevalence of PCO

A fairly good number of eyes (60%) had no or minimal (Grade 1) PCO. Visually significant PCO (Grade 2 and more) was recorded in around 40% of eyes. Pertinent to note was that fact that only 1.6% of eyes received ND-YAG laser treatment, probably due to poor reach/unavailability of the procedure in hospitals which cater to eyecare needs of this population. Nd-YAG laser capsulotomy was done on 53 eyes after thorough pre laser evaluation (Table 2).

Pre-laser best corrected visual acuity

Pre-laser visual acuity in none of the eyes was more than or equal to 6/18. This is obvious since the eyes with visual acuity of less than 6/18 were included for the procedure. Of note is that a 30% of these eyes had a vision of less than

6/60 due to PCO indicating a severe burden of blindness due to PCO in the study population (Table 3).

Table 2: Prevalance of PCO.

Grade Of PCO	N (%)
NO PCO	261 (47.4)
Grade 1	73 (13.3)
Grade 2	142 (25.8)
Grade 3	52 (9.4)
Grade 4	14 (2.5)
Previously lasered PCO	9 (1.6)

Table 3: Pre-laser best corrected visual acuity (n=53).

Visual acuity	N (%)
≥6/18	0 (0)
<6/18-6/60	37 (67.8)
<6/60-≥3/60	5 (9.3)
<3/60-PL+	11 (20.4)

Post-laser best corrected visual acuity

Post laser treatment 42 eyes (79.2%) achieved a visual acuity of ≥6/18. None of the patients post laser had a visual acuity <6/60. Nd-YAG laser was therefore able to treat severe vision loss due to PCO necessitating its need and outreach to the masses where a routine cataract service is being offered (Table 4).

Table 4: Post-laser best corrected visual acuity (n=53).

Visual acuity	N (%)
≥6/18	42 (79.2)
<6/18-6/60	11 (20.8)
<6/60-≥3/60	0 (0)
<3/60-PL+	0 (0)

Post laser complication in relation to grade of PCO

Most commonly encountered complications after YAG laser capsulotomy was IOP spike which was seen in 29.5% of eyes undergoing the procedure which was followed by IOL pitting seen in 29.7%. Few cases also developed mild uveitis following procedure (Table 5).

Table 5: Post laser complication in relation to grade of PCO (n=53).

Complication	Grade 2 PCO, N (%)	Grade 3 and 4 PCO, N (%)	Total, N (%)
IOL pitting	02 (18.2)	09 (82.2)	11 (29.7)
IOP spike	13 (59.1)	09 (40.9)	22 (59.5)
Mild uveitis	02 (50)	02 (50)	04 (10.8)

DISCUSSION

Out of this cluster survey on 30 clusters, total 551 pseudophakic eyes were found and out of which 275 eyes had a visual acuity less than 6/18. (Table 1). Upon thorough evaluation of these 275 eyes we found 53 eyes in which posterior capsule opacification was the only cause of visual acuity of less than 6/18 (after ruling out other anterior and posterior segment pathologies). Therefore, Nd-YAG laser capsulotomy was performed on 53 eyes.

Pre-laser visual acuity in none of the patients was 6/18 or better. This clearly indicates the severe impact that PCO causes on the vision of the pseudophakic eyes on survey population rendering them blind. This necessitates us to talk in terms of PCO related blindness, on the same lines as we talk of cataract blindness. PCO causes a massive burden of blindness in pseudophakic eyes. After Nd-YAG laser capsulotomy, 79.2% eyes attained a visual acuity of 6/18 or better. Out of 53 eyes on which laser was done, 49.1% improved by 1 line of vision, 9.4% improved by 2 lines and 27.8% improved by 3 lines. This highlights the role of this modality of treatment in eliminating the PCO Related blindness necessitating the need to make this service available to the hospitals which cater to the visual needs of rural masses. Similar data on visual gain has already been published by Nirankari et al, Magno et al, Camparini et al in the literature.⁸⁻¹⁰ Out of 53 eyes which underwent Nd-YAG laser capsulotomy, pitting on the Intraocular lens surface was noted in 29.7% eyes and rise in intraocular pressure (IOP spike) was seen in 59.5% eyes. Nirankari noted pitting in 26% and IOP (spike in 24% eyes).³ Burq et al reported IOP Spike in 46.2% eyes, pitting in 19% eyes. He However reported a case of retinal detachment post YAG which we did not seen in our series which could probably relate to no medium or term follow up in our series being from a rural back ground.

Limitations

Limitation of the present interventional trial is that the sample size of the patients treated with Nd-YAG laser was 53 which is small. A larger sample size would enable us to evaluate for all possible complications. Secondly, the follow up of the treated patient's was limited due to the fact that they were brought from far flung areas.

CONCLUSION

PCO adds to a massive burden of blindness in rural population primarily depending on camp cataract surgeries. Nd-YAG laser capsulotomy leads to treatment of the PCO related blindness. The reach of Nd-YAG laser capsulotomy is limited to these masses. A step to prevent blindness in this category of population would be to ensure availability of Nd-YAG laser capsulotomy. This procedure is relatively safe with few complications, most commonly being IOP spike which can effectively be managed medically.

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Conflict of interest: None declared

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