

Nd:YAG Laser Posterior Capsulotomy and Visual Outcome

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Abstract

Background: Neodymium-doped yttrium aluminum garnet (Nd:YAG) laser capsulotomy is a relatively noninvasive procedure that is used in the treatment of posterior capsular opacification (PCO). PCO is caused by proliferation of lens epithelial cells which causes fibrotic changes and wrinkling of the posterior capsule and results in decreased vision, glare, and other symptoms similar to that of the original cataract. **Objective:** To find out the visual outcome after performing Nd:YAG laser capsulotomy for PCO. **Materials and method:** A prospective clinical trial was carried out in National Institute of Ophthalmology (NIO), Dhaka, Bangladesh from January 2010 to June 2011 on purposively selected 70 adult subjects of both sexes who developed PCO within 2 months to more than 2 years after extracapsular cataract extraction with posterior chamber intra ocular lens implant. After thorough pre laser assessment Nd:YAG laser capsulotomy was carried out with Zeis VISULAS YAG II through Zeiss slit lamp under topical anesthesia. Data were recorded and expressed as proportion. **Results:** Out of the 70 subjects 40 were male and 30 were female. The average time interval of cataract surgery and Nd: YAG laser capsulotomy was 23 months. Capsular fibrosis (57.04%) was the predominant type of PCO. The pre laser visual acuity (VA) of more than 6/36 or below while 41.12% had VA hand movements to finger count. After Nd:YAG laser capsulotomy VA of 6/18 or better was achieved in 63.9% of eyes while 9.94% recovered to 6/9 and 11.36% achieved 6/6. None of these eyes showed further deterioration in VA. **Conclusion:** Nd:YAG laser capsulotomy for PCO is safe, effective and a rewarding procedure for improvement of vision.

Key words: Nd:YAG laser capsulotomy, posterior capsular opacification, visual acuity

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Introduction

Neodymium-doped yttrium aluminum garnet (Nd:YAG) laser capsulotomy is a relatively noninvasive procedure that is used in the treatment of posterior capsular opacification (PCO). PCO is a common long term complication of cataract surgery that causes decrease vision, glare, and other symptoms similar to that of the original cataract.¹ PCO is caused by a proliferation of lens epithelial cells which causes fibrotic changes and wrinkling of the posterior capsule. Its reported frequency varies from 8.7% to 33.4%.^{2,3}

PCO is one of the common complications of extra capsular cataract extraction (ECCE) surgery and develops within 2 yrs after cataract extraction in 50% of the cases.⁴⁻⁷ It causes reduction in visual acuity (VA) and contrast sensitivity by obscuring the view or by scattering the light that is perceived by patients as

glare.^{4,5,8} It also decreases the field of view during therapeutic and diagnostic procedures and also causes uni-ocular diplopia.⁹ In younger age group it develops earlier but in elderly, its incidence declines.¹⁰ Since the use of Nd:YAG laser for posterior capsulotomy, the procedure has been gradually replacing the surgical capsulotomy as it is less invasive, and can be performed as an out patient procedure.¹¹ It should be noted that capsular opening created with Nd:YAG laser tends to increase in size with smoothing of edges from capsular tag retraction and may become circular.^{10,12}

The aim of the study was to find out the types of PCO, time interval between surgery, immediate visual outcome and proportionate comparison of pre and post laser intervention in terms of VA after Nd:YAG laser capsulotomy in pseudophakia.

Materials and method

This prospective clinical trial was carried out in National Institute of Ophthalmology (NIO), Dhaka, Bangladesh from January 2010 to June 2011 on subjects who came were operated for cataract either by extracapsular cataract extraction (ECCE) or phaco emulsification with posterior chamber intra ocular lens (IOL) implant and came with PCO after cataract. Total 70 subjects were purposively included in this study irrespective of age and sex. Subjects requiring capsulotomy for therapeutic purpose and with thick posterior capsule not suitable for Nd:YAG laser capsulotomy were excluded. Initially the extent of PCO was determined clinically. VA (Snellen's) was done by torch, slit lamp, funduscopy, and applanation tonometry (Goldman's). The type and extent of PCO was noted after pupil dilatation. Then Nd:YAG laser was used for capsulotomy with Zeiss VISULAS YAG II through Zeiss slit lamp under topical anesthesia. Post laser evaluation was carried out after 1 hour rest. Post operative management was carried out accordingly and final corrected post laser VA was recorded on next morning. Data were recorded in predefined data sheet and was expressed as proportion.

Results

Among the study subjects 40 were male and 30 were female. The time period between cataract extraction and development of PCO and performing Nd:YAG laser capsulotomy was between 2 months to more than 2 years. The posterior capsulotomy was performed on average of 23 months after cataract extraction (Table I).

Table I: Time period between cataract extraction and Nd:YAG laser capsulotomy (n=70)

Time period	Frequency (%)
< 6 months	5 (7.1%)
6 months to 1 year	13 (18.57%)
1 to 2 years	22 (31.42%)
> 2 years	30 (42.87%)

The predominant type of posterior capsule opacification was capsular fibrosis (57.04%) (Table II).

Table II: Type of posterior capsular opacity (n=70)

Posterior capsular opacity	Frequency (%)
Capsular fibrosis	40 (57.04%)
Elschnig's Pearls	15 (21.42%)
Capsular wrinkling	12 (17.14%)
Pigmentary deposits on capsule	3 (4.28%)

Pre and post Nd:YAG visual outcome in terms of VA were evaluated which revealed that 61.06% subjects had VA of 6/36 or less before capsulotomy. A major proportion of these subjects (41.12%) had VA of less than 6/60 ranging from hand movement to counting fingers. The VA after Nd:YAG laser capsulotomy showed improvement by one or more Snellen's lines in 70 out of 70 eyes. VA of 6/18 or better was recorded in 63.9% subjects. It was also observed that no one had further deterioration of VA after Nd:YAG laser capsulotomy (Table III).

Table III: Visual acuity before and after Nd:YAG laser capsulotomy (n=70)

Visual acuity	Prelaser (%)	Post laser (%)
Less than 6/60	29 (41.12%)	6 (8.52%)
6/60	7 (9.94%)	5 (7.1%)
6/36	6 (8.52%)	5 (7.1%)
6/24	10 (14.2%)	9 (12.78%)
6/18	12 (17.04%)	18 (25.71%)
6/12	5 (7.1%)	12 (17.04%)
6/9	1 (1.42%)	7 (9.94%)
6/6	0 (0%)	8 (11.36%)

Discussion

Since the introduction of refined techniques of ECCE, opacification of posterior capsule has become the commonest cause of postoperative reduction of vision following cataract removal.¹ The noninvasive

technique of Nd:YAG laser has become popular for doing posterior capsulotomy and it has been established as a standard treatment for PCO replacing surgical capsulotomy.^{11,13-15}

In this study out of 70 subjects about 57% were male and rest were female which is in line with the study done by Hasan et al.⁷ and Tayyab et al.¹⁶ where they reported almost similar sex ratio. In this study the time period between cataract extraction and performing Nd:YAG laser capsulotomy at average was 23 months while it was reported as 2.49 years by Hasan et al.⁷ and 24 months in another study done by Kundi and Younas¹⁷. The predominant type of PCO was capsular fibrosis which differs from Hasan et al.⁷ who reported Elschnig's pearls to be the predominant type in pseudophakic eyes.

There was dramatic improvement of VA in all the subjects after Nd:YAG laser capsulotomy. It was also noted that there was no further deterioration of VA in any case which is supported by the study conducted by Hasan et al.⁷, who noted that improvement of VA after Nd:YAG laser capsulotomy on Snellen's chart was 1-3 lines in 42 and 4-6 lines in 31 out of 86 patients. A similar study showed improvement of VA of one or more Snellen's lines in 56 out of 63 eyes.¹⁷ A study conducted by Latif and Aasi¹⁸, using Nd:YAG laser showed overall 87.5% improvement in the VA of an average 3 lines on Snellen's chart. Another study showed that 80% cases were at VA of between hand movement to 6/36 whereas post laser VA was between 6/18 and 6/6 in 91% of cases.¹⁹ Nd:YAG laser use has been accepted as standard technique for treating PCO resulting in rapid visual improvement and so was found in this study.^{11, 20-22}

It can be concluded that posterior capsule opacification, which is a common complication after cataract surgery worldwide, can be managed safely as an outdoor procedure by Nd:YAG laser capsulotomy with remarkable improvement in visual outcome.

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