

## A Clinical Study of Visual Outcome after Nd YAG Laser Capsulotomy

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### Abstract

**Introduction:** Posterior capsular opacification is caused by migration and proliferation of cuboidal epithelium from remnant of anterior capsule and equatorial part of the lens capsule. Posterior capsular opacification also called after cataract is a nagging post surgical complication following phacoemulsification or non phaco cataract surgery (small incision cataract surgery or conventional cataract surgery) ECCE with posterior chamber intraocular lens implantation. Posterior capsular opacification is actually misnomer. Though there are many factors suggested to reduced posterior capsular opacification. The incidence of PCO still exists considerably. **Aims and Objective** are to find out the visual improvement after Nd yag laser posterior capsulotomy. **Materials and Methods:** The prospective study was conducted in the department of ophthalmology of Ad-din Women Medical College Hospital, Dhaka, Bangladesh from June 2014 to June 2018. 175 patients of 189 eyes with significant PCO. Before laser capsulotomy all patients were assess by routine slit lamp examination, IOP measurement and posterior segment examination done for every patient for exclusion of Gross posterior segment pathology. **Results:** The study had female preponderance (58.86%). Most of the patients 165 were 40 to 80 years old (87.31%). The patients had pre laser visual acuity 6/9 to 6/18 (31.75%) 6/24 to <6/60 (68.25%). After laser capsulotomy functional visual acuity upto 6/8 were 169 (89.42%) and 6/24 to <6/60 were 20 (10.58%). The mean pre and post laser capsulotomy visual functional score were 54.45±36.44 and 94.16±50.36 respectively. **Conclusion:** Nd YAG laser capsulotomy is safe, non-invasive and effective procedure.

**Keywords:** PCO, ND YAG Laser Capsulotomy, Visual Acuity.

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### Introduction:

Cataract is the most common cause of curable blindness world wide. Prevalence of blindness due to senile cataract is high in rural and urban population<sup>1</sup>. PCO is Characterized by Proliferation, Migration and Transformation of the germinative zone of cuboidal epithelial cells of lens which from plaque on the non

epithelial posterior capsule<sup>2,3</sup>. Posterior capsular opacity (PCO) develops following cataract surgery between 2 months and 5 years after extracapsular cataract extraction with posterior chamber intra ocular lens implant. The prevalence of PCO was reported to be 8.3 -33.7%<sup>2</sup>. It results in decreased vision, glare and other symptoms mimicking that of original cataract. It is treated by a non-invasive procedure; laser capsulotomy e.g Neodymium yttrium aluminium garnet laser (Nd YAG). It causes reduction in visual acuity (VA) and contrast sensitivity by obstructing the view or by scattering the light that is perceived by patients as glare<sup>4,5</sup>. PCO Causes the deterioration of visual acuity. However, there no absolutely effective methods to prevent it. Nd YAG laser therapy presents the advantage of a non-invasive, effective, relatively safe technique to manage intact posterior capsule that opacify post operatively. Nd YAG laser capsulotomy is magic event. It does not need patient hospitalization. Various published articles on PCO estimate, a postoperative PCO incidence of 11.8% at 1 year, 20.7% at 3 years and 28.5% at 5 years. It is a also major problem in paediatric cataract where incidence approaches 100% between 2 months to 5 years after the initial surgery<sup>6,7</sup>. The actual gain in visual function and the quality of life following Nd YAG laser posterior capsulotomy in pseudophakic patients with PCO can be assessed in terms of improvement in visual function index<sup>8,9</sup>.

### Materials and Methods:

This study was conducted in the department of ophthalmology of Ad-din Women Medical College Hospital, Dhaka-1217 from June 2014 to June 2018. Total eyes 189 of 175 patients who were

history taking and ocular examination were done to evaluate the severity of PCO. Visual acuity and contrast sensitivity 189 eyes of 175 patients. The patients were included depending upon the inclusion and exclusion criteria. The patients were pseudophakic with posterior chamber intraocular lens (IOL) implantation included and who had PCO associated with ocular diseases and complications like retinal degenerations, glaucoma, complicated and traumatic cataract and patient with significant media opacities eg corneal opacity etc were excluded.

Examination of each patient was done on presentation and best corrected visual acuity was recorded using snellen's chart for distance and near vision chart. Intraocular pressure was measured by Goldman Applanation Tonometer. Slit lamp examination was done to evaluate the anterior chamber and the nature as well as the density of the PCO. Patients who needed were prescribed glasses to give best corrected visual acuity in the better eye and were advised to wear the prescribed glass constantly. After 2 weeks, the patients were asked to attend the OPD when they were questioned about their performances in daily life activities, coarse and fine, as per the VF-14 index quality of life (QOL) questionnaire.

Visual function indexing and scoring were done. The patients were then subjected to Nd:YAG posterior capsulotomy in the affected eye. A minimum period of 4 months interval following cataract surgery was taken for Nd: YAG posterior Capsulotomy. The patients were followed up at 1st week, 3rd week, 3rd month and 6th months after capsulotomy to evaluate visual outcome or presence any complication. During these follow up visits, thorough examination was done with help of slit lamp biomicroscope and direct or indirect ophthalmoscope for anterior and posterior segment.

**Results:**

Most of the patients 165 (87.31%) were between 40 to 80 years (Table-I). The study had female preponderance 103 (58.86%) than male 72 (41.14%) (Table 3). Most of the patients had pre laser visual acuity 6/9 to 6/18 60 patients (31.75%) and <6/60 to 6/24 patients no 129 (68.25%). After laser capsulotomy Visual acuity 6/6 to 6/18 no of patients 169 (89.42%) and <6/60 to 6/24 No of patients 20 (10.58%). The post laser capsulotomy, patients had improvement of visual acuity which was significant. Two lines improvement of visual acuity in snellen's chart was found in most of the patients after capsulotomy (Table-VI).

There were some apparent difference in the age and gender but those difference were not statistically significant. The amount of gain was rather dependent upon the pre capsulotomy visual function status. Less satisfactory VF score was obtained in some cases where there was evidence of associated ocular diseases in posterior segment like temporal pallor of the disc. Age related macular degeneration,

choroidal sclerosis, healed cystoids macular edema and chorioretinitis. There were very few cases of complications such as lens pitting, raised intraocular pressure and cystoids macular edema noticed following laser capsulotomy (Table-VI).

**Table I: Age distribution.**

Age	No	%
15-29 yrs	12	6.35%
30-39	07	3.70%
40-50	35	18.52%
51-60	61	32.28%
61-70	46	24.34%
71-80	23	12.17%
81-90 and above	05	2.65%

**Table -II: Side of the eyes.**

Side	No of Patients	%
Right eye	112	59.26%
Left eye	77	40.74%
	189	100%

**Table-III: Sex distribution.**

Sex	No	%
Male	72	41.14%
Female	103	58.86%
Total	175	100%

**Table-IV: Time interval between PCO formation and Nd YAG laser capsulotomy.**

Time interval	No of eyes	%
6 months	10	5.29%
01 year	78	41.27%
02 years	36	19.05%
03 years	42	22.22%
4 years	23	12.17%
	189	100%

**Table-V: Energy level used for capsulotomy:**

Energy level (MJ)	No of eyes	%
1-2	62	32%
2.1-2.5	48	25%
2.6-3	31	16%
3.1-3.5	28	14.81%
3.6-4.0	11	5.82%
4.1-4.5	09	4.76%

**Table-VI: Complications of post Nd; YAG laser capsulotomy:**

Complication	No of patients	Percentage
IOL pitting	12	6.35%
Transient IOP elevation	09	4.76%
Cystoid macular edema	02	1.05%
Uveal reaction	03	1.59%
<b>Total</b>	<b>26</b>	<b>13.75%</b>

**Table VII: Comparison of best corrected visual outcome before and after laser capsulotomy:**

Visual acuity	Pre capsulotomy	Post capsulotomy	Remark
CF-to less than 6/60	10 (5.29%)	1 (0.53%)	
6/60	36 (19.05%)	2 (1.06%)	
6/36	35 (18.52%)	4 (2.12%)	
6/24	48(25.40%)	13 (7.94%)	
6/18	45(23.81%)	11 (5.82%)	
6/12	12(6.35%)	16 (8.47%)	
6/9	3 (1.59%)	70(37.04%)	
6/6	0 (0)	72(38.10%)	

**Table-VIII: Improvement of visual Acuity after Nd yag laser capsulotomy in snellen's chart distance vision:**

Improvement snellen's chart	No of patients
1 line	13 (6.88%)
2 lines	48 (25.40)
3 lines	38 (20.11%)
4 lines	33 (17.46)
5 lines	46 (24.34)
6 lines	7 (3.70%)
7 lines	4 (2.11%)
<b>Total</b>	<b>189 (100%)</b>

**Discussion**

The technique of Nd yag laser capsulotomy has become most popular procedure of posterior capsulotomy and it has been established as a standard treatment for PCO replacing manual surgical capsulotomy<sup>10,11</sup>. The study done by Hasan et al<sup>12</sup> and Tayyab et al<sup>13</sup> showed that it had male preponderance but our study had female preponderance. Piyali sarkar et al research also show female preponderance<sup>14</sup> sarkar and Baral Zarnowski.zogorski Z<sup>15</sup> had included 25 and 25 eyes respectively and visual outcome was 89% and 95% respectively and in our present study it was 89.42% VA 6/18 to 6/6). The assessment of visual function including visual acuity by various sophisticated devices, the ultimate gain by visual function following laser posterior capsulotomy can be judged by assessment of ability in daily life activities of an individual by health related quality of life (QOL) questionnaire method<sup>16,17</sup>. VF 14 QOL questionnaire was developed and used to assess the visual outcome following cataract surgery at flinders Medical centre, Adelaide, South Australia since 2005 VF14 QOL questionnaire reflects the changes in self reported satisfaction with vision. It was later adopted in the studies relating the assessment of visual function and health related QOL following Nd :YAG laser posterior capsulotomy in pseudophakic patients<sup>18</sup>. In the present study the VF 14 QOL questionnaire was used but in a modified way to fit the socio-economic profile of the present set of patients. The question related to outdoor games and driving were excluded from the questionnaire as per suggestion of Friedman et al. in the present study there was a considerable improvement of BCVA(best corrected visual acuity) both for distance and near following posterior capsulotomy. BCVA for distance improved by 1-7 with a mean of 4 snellen's acuity lines. This result is more encouraging than that found in the study done by Terry et al<sup>19</sup> where the improvement was 1-2 snellen's acuity lines. The improvement of near vision was upto N 12 to N6. This finding corroborates with the results in the other previous studies<sup>20</sup> as for the visual function<sup>21</sup> indexing, the observation from the present study was quite satisfactory.

**Conclusion:**

The posterior capsule opacification which is worldwide common delayed complication after cataract surgery can be managed noninvasively, effectively and safely as an outdoor procedure by Nd ;YAG laser capsulotomy with remarkable improvement in visual outcome.

**Conflict of Interest:** None.

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