European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 09, Issue 07, 2022

Original Research Article

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 from October 2020 to April 2022. 50 patients 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%). Most of the patients 35 were 60 to 80 years old (70%). The patients had pre laser visual acuity 6/9 to 6/18 (30%) 6/24 to <6/60 (70%). After laser capsulotomy functional visual acuity upto 6/9 were 43 pt(86%) and 6/24 to <6/60 were 7(14%). The mean pre and post laser capsulotomy visual functional score were 54.45±36.44 and 94.16±50.36 respectively.
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.

Keywords: Nd YAG laser capsulotomy, capsule opacification, germinative zone

Introduction

Cataract is the most common cause of curable blindness worldwide. Prevalence of blindness due to senile cataract is high in rural and urban population [1]. PCO is Characterized by

ISSN 2515-8260 Volume 09, Issue 07, 2022

Proliferation, Migration and Transformation of the germinative zone of cuboidal epithelial cells of lens which from plaque on the non-epithelial posterior capsule [2, 3]. 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% 2. It results in decreased vision, glare and other symptoms mimicking that of original catacract. It is treated by a non-invasive procedure; laser capsulotomy e.g. Neodymium yttrium aluminum 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 [4, 5]. 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 [6, 7]. 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 [8, 9].

Materials and Methods

This study was conducted in the department of ophthalmology of Noor Hospital Iimsr Warudi from November 2021 to April 2022. Total eyes 50 of 50 patients history taking and ocular examination were done to evaluate the severity of PCO. Visual acuity and contrast sensitivity 56 eyes of 50 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 e.g. 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 Application 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 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 35 (70%) were between 60 to 80 years (Table-I). The study had female preponderance 29 (58%) than male 21 (42%) (Table 3). Most of the patients had pre laser visual acuity 6/9 to 6/1815 patients (30%) and <6/60 to 6/24 patients no 35 (70%). After laser capsulotomy Visual acuity 6/6 to 6/18 no of patients 43 (86%) and <6/60 to 6/24 No of patients 7(14%). 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

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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 temporalpallor 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 1: Age distribution

Age	Number	%
50-60	8	16
60-70	20	40
70-80	15	30
80-90	7	14

Table 2: Side of the eye

Side	Number	%
Right eye	32	64%
Left eye	18	36%
Total	50	100%

Table 3: Sex distribution

Sex	Number	%
Male	21	42
Female	29	58
Total	50	100

Table 4: Time interval between PCO formation and Nd YAG laser capsulotomy

Time interval	Number of eye	%
6^{th} month	6	12%
12 months	35	70%
18 months	9	18%
	50	100%

Table 5: Energy level used for capsulotomy

Energy level (MJ)	Number of eye	%
1-2	20	40%
2.1-2.5	14	28%
2.6-3	8	16%
3.2-3.5	5	10%
3.6-4	2	4%
4.1-4.5	1	2%

Table 6: Complications of post Nd; YAG laser capsulitomy

Complication	Number of eye	%
IOL pitting	4	8%
Transient IOP raised	4	8%
Cystoids macular edema	1	6%

Table 7: Comparison of best corrected visual outcome before and after laser capsulotomy

Uveal reaction	1	2%
Total	10	20%

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Visual acuity	Pre capsulotomy	Post capsulotomy
CF or less than 6/60	13(26%)	0
6/60	15	3
6/36	9	16
6/24	7	13
6/18	3	10
6/12	3	6
6/9	0	2
6/6	0	0

Table 8: Improvement of visual Acuity after Nd yag laser capsulotomy in snellen's chart distance vision

Improvement snellens chart	Number of patients
1 line	9
2 line	12
3 line	7
4 line	16
5 line	6
6 line	0
7 line	0
Total	50

Discussion

The technique of Nd YAG laser capsulotomy has become the most popular procedure of posterior capsulotomy and it has been established as a standard treatment for PCO replacing manual surgical capsulotomy [10, 11]. The study done by Hasan *et al.* [12] and Tayyab *et al.* [13] showed that it had male preponderance but our study had female preponderance. Piyali Sarkar *et al*. research also show female preponderance [14] sarkar and Baral Zarnowski. Zogorski Z [15] 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 [16, 17]. 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 pesudophakic patients18. 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.* [19] 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 [20] as for the visual function 21 indexing, the observation from the present study was quite satisfactory.

Conclusion

The posterior capsule opacification which is worldwide common delayed complication after

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cataract surgery can be managed noninvasively, effectively and safely as an outdoor procedure by Nd ;YAG laser capsulotomy with remarkable improvement in visual outcome.

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