Original Paper

VISUAL OUTCOME AFTER Nd:YAG LASER CAPSULOTOMY

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Abstract

A longitudinal study was carried out in the laser unit of the Combined Military Hospital (CMH), Dhaka on 500 eyes of 500 patients who were treated with Neodymium-yttrium-aluminium-garnet (Nd:YAG) laser capsulotomy over a period of two and a half years. The aim of this study was to evaluate the visual acuity following Nd:YAG laser capsulotomy. The main entry criteria for this study were posterior capsular opacification (PCO) following Extracapsular Cataract Extraction (ECCE). The patients with corneal opacity, glaucoma, vitreous opacity, macular diseases, optic nerve diseases and any other retinopathies causing visual impairment were excluded from this study. Thirty six percent patients had pre-capsulotomy visual acuity 6/36 to 6/60, 32% patients had 6/18 to 6/24, 18% patients had <6/60 and 14% patients had 6/12. After seven days of capsulotomy 76% patients gained 6/12 or better vision. Eighty percent patients gained visual acuity of 6/12 with optical correction after thirty days. On the other hand, 64% patients had pre-capsulotomy near vision < N_{10} and 16% patients had N_8. After capsulotomy near vision improved considerably. Four percent of the patients failed to improve vision following laser capsulotomy. It can be concluded that Nd:YAG laser capsulotomy in PCO can improve both distant and near vision, which can be augmented with optical correction after one month of laser surgery.

Key words : Laser capsulotomy, Nd:YAG laser, visual acuity.

Introduction

The posterior capsular opacification (PCO) is the most common late complication of uneventful extracapsular cataract extraction (ECCE)[1,2]. At least 28% of eyes develop PCO within 5 years after surgery[3], although nearly 100% opacification occurs in case of children[4,5]. PCO can be treated by primary or secondary capsulotomy, but these procedures are repleted with a lot of disadvantages. Nd:YAG laser posterior capsulotomy is easy, effective and non-invasive technique to improve visual acuity. The aim of this study is to evaluate the changes in visual acuity following Nd:YAG laser posterior capsulotomy.

Materials and Methods

A longitudinal study was performed on 500 pseudophakic eyes of 500 patients attended the laser unit of the CMH, Dhaka during the period of August 2005 to January 2008. The age of the patients varied from 40 to 80 years. The diagnosis of PCO was made from analysing history, estimating visual acuity, Slit lamp biomicroscopy and Direct Ophthalmoscopy[6]. The patients with corneal opacity, glaucoma, vitreous opacity, macular diseases, optic nerve diseases & retinopathies were excluded from the study.

The pupil was adequately dilated before the surgery with Tropicamide 1% eye drop 3 times at 10 minutes interval. One drop of 0.4% Oxybuprocaine HCL 3 times in 5 minutes was instilled into the conjunctival sac prior to inserting Abraham lens with visco-elastic substance. The laser was delivered through Slit lamp delivery system after aiming by helium-neon beam. The capsulotomy was performed by applying a series of punctures either a cruciate or circular patterns. An opening of about 2.5 to 3 mm was created at the visual axis. The pulsed energy threshold for puncture of PCO varies with the thickness of PCO. Higher energy level was required for dense PCO. Dexamethasone 0.1% eye drop 3 times a day for 1 week was routinely given. Goldmann applanation tonometry was performed 3 hours after capsulotomy. Tab. Acetazolamide 250 mg twice daily for 3 days was given to those patients found raised intraocular pressure (IOP). The pre-laser and post-laser visual acuity for distant vision was measured with Snellen's test type and the printer's type of 'N' series was used to measure near vision. Pre-laser visual acuity was measured just before the laser surgery and post-laser visual acuity was recorded on 7th day and again on 30th day of operation. The autorefractometry was performed after one month of surgery for the selected cases to find out the best-corrected visual acuity & for prescribing lens.

Results

A total of 500 eyes of 500 patients were taken as sample of the study, of which 330 were males and 170 were females. Fifty percent patients underwent conventional ECCE with PCIOL implantation, 34% patients small incision cataract surgery (SICS) with PCIOL implantation and 16% patients Phacoemulsification (PHACO) with PCIOL implantation. Fourty two percent of the patients

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had mild, 40% moderate and 18% severe thickness PCO. Thirty six percent patients had pre-capsulotomy visual acuity 6/36 to 6/60, 32% patients had 6/18 to 6/24, 18% patients had <6/60 and 14% patients had 6/12. After seven days of capsulotomy 76% patients gained 6/12 or better vision. Eighty percent patients gained visual acuity 6/12 or better vision with optical correction after thirty days (Table-I).

Table-I: Pre and post laser visual acuity after seven and thirty days (n=500).

Visual acuity	Pre-laser Number (%)	Post-laser after 7 days Number	Post-laser after 30 days Number (%)
6/6	000 (00)	(%)070 (14)	100 (20)
6/9	000 (00)	120 (24)	180 (36)
6/12	070 (14)	190 (38)	120 (24)
6/18 - 6/24	160 (32)	070 (14)	050 (10)
6/36 - 6/60	180 (36)	040 (08)	030 (06)
<6/60	090 (18)	010 (02)	020 (04)

On the other hand, 64% patients had pre-capsulotomy near vision < N_{10} and 16% patients had N_8. After capsulotomy near vision improved in 26%, 32%, 22% & 16% patients to N_5, N_6, N_8 & N_{10} respectively (Table-II).

Table-II: Pre and post laser near vision (n=500).

Visual acuity	Pre-laser Number (%)	Post-laser after 7 days Number	Post-laser after 30 days Number (%)
N_5	000 (00)	(%)000 (00)	130 (26)
N_6	000(00)	020 (04)	160 (32)
N_8	080 (16)	060 (12)	110 (22)
N_{10}	100 (20)	200 (40)	080 (16)
$<N_{10}$	320 (64)	220 (44)	020 (04)

Four percent of the patients failed to improve vision following laser capsulotomy. The raised IOP, ruptured anterior hyaloid face and pitting IOL found in a few patients immediately after operation which disappear within 30 days after operation (Table-III).

Table-III: Types of symptoms (n=1293).

Complications	Number	Percentage
IOP > 22 mm of Hg	20	4%6%
Ruptured anterior Hyaloid face	30	2%
IOL pitting	10	

Discussion

PCO develops earlier in patients who underwent conventional ECCE with PCIOL than small incision cataract surgery (SICS) or Phacoemulsification. This may be due to the fact that, in ECCE, Polymethylmethacrylate (PMMA) lens was implanted. Whereas, in small incision cataract surgery and phacoemulsification, the acrylic soft lens were most commonly used[5]. The soft lenses remain in contact with the posterior capsule that may prevent the epithelial cells to migrate to posterior capsule[7].

Only a few patients complain of reduction of near vision. This is mostly in case of focal central PCO, where distant vision is adequate in order to have larger pupil size. The difficulties in near vision occur because of miosis during watching near object.

It was evident that a good number of patients gained better vision after seven days of capsulotomy. The vision has further improved after 30 days of operation.

Not all patients gain 6/6 vision after effective Nd:YAG laser capsulotomy. This may be due to pre-existing ocular diseases e.g. age-related macular degeneration, cystoid macular oedema, glaucoma, ischaemic optic neuropathy and amblyopia which were remained unidentified before operation[8].

The visual improvement co-relates with the findings of other studies. In a study of 140 patients by Uddin MG found that 26 patients gained 6/6 vision while 31 patients were 6/60 or less vision before capsulotomy[9]. Hossain AM et.al. compared pre-laser and post-laser visual acuity of 135 patients and found 85.9% achieved visual acuity >6/12 after laser capsulotomy[10].

A few complications like raised IOP, ruptured anterior hyaloid face and IOL pitting after 7 days of capsulotomy were observed in this study, which disappear after 30 days. Uddin MG observed raised IOP, iritis and IOL pitting[9,11]as complications. Iritis was not observed after seven days of operation in this study.

Conclusion

The PCO is the most common late complication of conventional ECCE or Phacoemulsification. The Nd:YAG laser capsulotomy in PCO can improve both distant and near vision, which can be augmented by optical correction one month after surgery. Being simple, the procedure can be performed in the out patient department. But the procedure is not without hazards.

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