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To Study the Visual Outcome After ND:YAG Laser Posterior Capsulotomy

Medical Science

KEYWORDS : visual outcome,Nd:YAG laser, posterior capsulotomy, posterior capsular opacification, complication, final visual acuity

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ABSTRACT

TITLE:The study of visual outcome after Nd:YAG laser posterior capsulotomy.PURPOSE::To find out different types of posterior capsular opacification.,To determine the visual outcome and complications after Nd:YAG laser in posterior capsular opacification..METHOD:This is a prospective interventional case study carried on 300 eyes age group from 40 years and above,who had posterior capsular opacification and were undergone Nd:YAGpcotomy in Department of Ophthalmology, P. D. U. Govt. Medical College, Rajkot during period of March 2014 to April 2015. All patients underwent preoperative assessment for visual acuity, anterior segment and posterior segment examination, IOP measurement by Schiotz tonometer. After Nd: YagCapsulotomy patients were assessed for visual acuity on 1st and 4th week and the results analysed.RESULT: Out of 300 patients 216 patients had vision >6/12 at end of 1 week after Nd:YAG and 236 had vision >6/12 at end of 4 week after Nd:YAG.AfterNd:YAG 18 patients hadraised intraocular pressure, 24 patients had IOL pitting,6 patients had vitreous in anterior chamber,6 patients had anterior uveitis,no patients had Retinal detachment and 246 patients had no complications.CONCLUSION:Nd:YAG laser capsulotomy is a safe and effective method to treat posterior capsular opacification. It is a non invasive and avoids all the complications of surgical capsulotomy.Nd:YAG laser procedure can improve visual acuityimmediately,which can be further improved by optical correction(BCVA). KEY WORDS: visual outcome,Nd:YAG laser, posterior capsulotomy, posterior capsular opacification, complication, final visual acuity

INTRODUCTION:

Cataract is the most common cause of blindness worldwide as per WHO estimates, affecting around 17 million people. Surprisingly cataract surgery is the most common surgery performed in the developed world. In last three decades resurgence of refined techniques of extra capsular cataract extraction (ECCE) surgery not only reduced the rate of complications like cystoid macular edema (CME),vitreous loss and retinal detachment (RD) compared to intra-capsular cataract extraction (ICCE) surgery,but the intact posterior capsule also encouraged the implantation of posterior chamber intraocular lens (PCIOL) for achieving good vision.(1)Posterior capsule opacification (PCO) is the most common complication after ECCE surgery.Incidence of PCO is about 18% to 50% by two years post operatively. After ECCE the lens is composed of the remaining capsule and the residual epithelial cells and the cortical fibres that were not removed at the time of surgery.The lens epithelial cells still possess the capacity to proliferate, differentiate and undergo fibrous metaplasia.Migration of these cells to the center results in the formation of PCO that is visually significant. The use of Nd:YAG Laser(1064nm) for posterior capsulotomy has been gradually replacing surgical capsulotomy,because it is safe effective out-patient procedure.(2,3) The complications of Nd:YAGlaser,thoug hoccasional,may defeat its very intention.Our study was designed to find out different types of posterior capsular opacity,time interval between surgery and development of visually significant posterior capsular opacification and visual outcome in terms of visual acuity after Nd:YAG laser capsulotomy

PURPOSE: To study the visual outcome after Nd YAG capsulotomy.

OBJECTIVES OF STUDY

- To find out different types of posterior capsular opacity.
- To determine the visual outcome after Nd:YAG laser in posterior capsular opacity.
- To study effect of energy and No. of shots applied during laser on final visual acuity of patients.
- To observe any complication

MATERIAL AND METHOD:

A total of 300 pseudophakicpatients ,aging from 40 years and over were included in this study during period of November 2013 to October 2015. These patients had undergone cataract surgery at least before 6 months; either by SICS (Small Incision Cataract surgery) or by phacoemulsification technique; at our institute (G.T.Sheth Eye Hospital) or elsewhere. All the patients had age related senile cataracts. All the IOLs used were in-the-bag posterior chamber IOLs – either non-foldable PMMA lenses or foldable acrylic IOLs. The following were the exclusion criteria:

Anterior chamber IOLs, Scleral fixated IOLs.

Decentered IOLs

Multifocal IOLs

Any evidence of complicated pseudophakia (vitreous in anterior chamber, IOLs in sulcus)

Past history of glaucoma in either eye

Past history of uveitis/ retinal surgeries/ intra ocular infetions

Eyes with nystagmus/microphthalmos/aniridia and other congenital defects or unable to fixate eye.

PCIOLs after a complicated surgeries (post chronic uveitis, retinal detachments)

Paediatric patients.

Patients having other macular or disc pathologies or presenting with any media opacity such as corneal opacity.

The patients selected had both a subjective as well as objective decrease of vision.The study protocol was approved by the institutional review board(Institutional Ethics Committee, P.D.U. Medical College, Rajkot). Informed consent was taken from all patients.Before the procedure, all patients underwent a thorough ocular evaluation including best corrected visual acuity ,detailed slit lamp examination on a Carl Zeiss Meditec AG SL 115 Classic,fundus evaluation by dilated direct ophthalmoscopy. Pupils were dilated using Tropicamide 0.8%+ Phenylephrine 5% drops instilled thrice at an interval of five minutes. Grading of posterior capsular opacities was done on a protocol based on that described by Sellman and Lindstrom-slit lamp observation to evaluate level of PCO using reflected light rather than retroilluminationimages.Using the following scale, for pearls and fibrosis separately PCO was categorized:

0-None visible at all.

1- Visible but none reaching to IOL edge.

2- At the IOL edge.

3- Well inside IOL edge but visual axis clear.

4- Across visual axis,

The other systems to evaluate the posterior capsular opacity are based on visual acuity and the fundus visibility.The imaging systems to record PCO are SchiempflugSystem,Density map, Computerized analysis of density boundaries, texture analysis and color coded grid. The slit lamp bio-microscopy evaluation was chosen as it was the most viable, reproducible and feasible at our set up.Summary of some of the advantages and disadvantages of PCO evaluation systems

System of analysis	Ease of availability	Objectiveness	Flexibility in use to measure varying criteria	Sensitivity	Specificity
Vision loss/visual psychophysics	+++++	++	+	++	+
Nd:YAGcapsulotomy rates	+++++	++	+	++	++
Slit lamp grading	+++++	+	++++	++	++
Fundus visibility	+++++	+	+	++	++
Schiempflug system	++	+++	+	+++	+++
Density map	+++	++++	++	++++	++++
Computerised analysis of density boundaries	++++	++++	++++	++++	++++
Texture analysis	+	+++++	++	+++++	++++
Colour coded grid	+++	++++	+++	++++	++++

+ = very poor; +++++ = excellent.

Just prior to the procedure, intra ocular pressure was recorded by means of Schiotztonometery. With the patient in supine position, a drop of 4% Lignocaine Hydrochloride was instilled. After one minute, with the patient fixating at the target on the ceiling, the lids are separated gently and the footplate of the tonometer is rested vertically on the centre of the cornea. The reading on the scale is recorded as soon as the needle becomes steady as per the Friedwaldnomogram.

The capsulotomy was performed by Consultant ophthalmic surgeons only. A Carl Zeiss Visulas YAG II Nd-YAG laser was used with the laser beam retro-focused approximately 0.1 mm behind the helium–neon beam focused on the posterior capsule and used pulses with the energy level ranging from 0.8 mJ to 5.0 mJ based on the thickness of the opacifiedcapsule.Any obvious lines of capsule tear were treated with laser if deemed beneficial and overall energy used was kept to a minimum. The intention was to create a 2–3 mm diameter opening in the center of the opacified capsule with the lowest laser energy and the least number of laser spots for each patient.All eyes received one drop of antibiotic-steroid combination (antibiotics plus 0.1% dexamethasone sodium phosphate) four times daily for 7 days. Each patient's post Nd:YAG laser follow up will be done on 1st and 4th week for visual outcome and complication.

OBSERVATION & DISCUSSION:

TYPES OF PCO IN THE STUDY

Types of PCO	Number of eyes	Percentage
Elschnig's Pearls	192	64
Fibrous PCO	108	36
Soemmering's type	0	0

This study showed that Elschnig's pearls type of PCO(64%) was more common when compared to fibrous type of PCO(36%).

TABLE SHOWING BEST CORRECTED VISUAL ACUITY BEFORE ND YAG LASER CAPSULOTOMY

Visual acuity	No. of eyes	Percentage
<6/60	90	30
6/60-6/36	111	37
6/24-6/18	93	31
6/12-6/9	6	2
6/6	0	0

30 percent of the patients had best corrected visual acuity between CF 1 mts to 6/60 before laser application. There were 37% patients with visual acuity between 6/60 and 6/36 and 31% patients had visual acuity between 6/24 and 6/18 and 2% had visual acuity >6/18 before posterior capsulotomy.

TABLE SHOWING BEST CORRECTED VISUAL ACUITY 1 WEEK AFTER ND YAG LASER CAPSULOTOMY

Visual acuity	Post laser 1 week(BCVA)	
	No of eyes	Percentage
<6/60	10	3
6/60-6/36	24	8
6/24-6/18	42	14
6/12-6/9	177	59
6/6	47	16

This study shows that 3% had visual acuity <6/60,22% had visual acuity between 6/60-6/18,59% had visual acuity 6/12 6/9 and 16% had visual acuity 6/6 1 week after Nd:yag laser pcotomy.

TABLE SHOWING BEST CORRECTED VISUAL ACUITY 4 WEEK AFTER ND YAG LASERCAPSULOTOMY

Visual acuity	Post laser 4 week(BCVA)	
	No of eyes	Percentage
<6/60	12	4
6/60-6/36	18	6
6/24-6/18	36	12
6/12-6/9	180	60
6/6	54	18

Above shows that 4% had visual acuity <6/60,18% had visual acuity between 6/60-6/18,60% had visual acuity 6/12-6/9 and 18% had 6/6 visual acuity 4 week after Nd:YAG laser pcotomy.

TABLE SHOWING COMPARISON OF BEST CORRECTED VISUAL ACUITY PRELASER,1WEEK AND 4 WEEK AFTER ND YAG LASER CAPSULOTOMY

Table shows that best corrected visual acuity is >6/12 in

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majority of patients after Nd:YAG laser as compared to pre laser.

TABLE SHOWING COMPLICATIONS OF ND YAG LASER POSTERIOR CAPSULOTOMY.

Complications	No. of eyes	Percentage
Raised intraocular pressure	18	6
Hyphema	0	0
IOL pitting	24	8
Vitreous in anterior chamber	6	2
Anterior Uveitis	6	2
Retinal detachment	0	0
No complication	246	82

Table shows that 6% patients had raised intraocular pressure,8% had IOL pitting and 2% had anterior uveitis,2% had vitreous in anterior chamber and hypema and retinal detachment was not found in this study.82% patients had no complications.

COMPARISON OF COMPLICATION IN DIFFERENT STUDIES(,4,5)

In study of Mohammad younas khan et.al (18)reported that 82% patients had raised intraocular pressure,22% patients had IOL pitting,13% had vitreous in anterior chamber,2% had anterior uveitis,1.7% had hyphema.Ajite K.O.et. al(4) reported that 10%patients had raised intraocular pressure,2.2% patients had IOL pitting,2.2% had vitreous in anterior chamber,2.2% had anterior uveitis,4.4% had hyphema and 78.9% had no complication.

In study of WajeehaRasool, Ali Raza,SyedImtiaz Ali(5) reported that 0.5%patients had raised intraocular pressure,16% patients had IOL pitting,1% had vitreous in anterior chamber,2 % had anterior uveitis,1 % had hyphema and 79.5% had no complication.

Name of study	<6/60 (%)	6/60-6/36(%)	6/24-6/18(%)	6/12-6/9(%)	6/6(%)
Mohan lalgupta et.al	3	14	21	32	30
Hussain et.al	4	6	10	60	20
Mohammad younas khan et.al	7	19	42	29	3
Khaledanazeenbari	8	14	39	27	12
Srinivas	0	4	4	60	32
Current study	4	6	12	60	18

Current study shows that 6% had raised intraocular pressure,8% patients had IOL pitting,2% had vitreous in anterior chamber,2% had anterior uveitis, 82% had no complication and none of patients had hyphema or retinal detachment in our set up.The increase in intra ocular pressure observed is consistent with the increase in number of laser shots used and the energy used. Number of laser shots used and energy used has no effect on visual acuity.

CONCLUSION: The most common post operative complication of cataract extraction is posterior capsular opacification, which in turn causes deterioration of visual acuity.The most common type of posterior capsular opacification is Elschnig'spearls.TheNd:YAG laser capsulotomy is a safe and effective method to treat posterior capsular opacification. It is a non invasive and avoids all the complications of surgical capsulotomy.Nd:YAG laser procedure can improve visual acuity immediately,which can be further improved by optical correction(BCVA). Nd:YAG laser capsulotomy carries a low but definite risk of some complications such as raised intraocular pressure,IOL pitting, vitreous in anterior chamber, anterior uveitis,hyphema and retinal detachment

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