ORIGINAL ARTICLE

EFFICACY OF ND: YAG LASER POSTERIOR CAPSULOTOMY IN VISUAL IMPROVEMENT OF PATIENTS HAVING POSTERIOR CAPSULAR OPACIFICATION

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ABSTRACT

Background: Posterior capsular opacification (PCO) is a common complication following extracapsular cataract extraction. The objectives of this study were to determine the frequency of involved age groups, duration and type of posterior capsular opacification, improvement in vision and complications of posterior capsulotomy with ND: YAG Laser.

Material & Methods: This study was conducted in Department of Ophthalmology, District Headquarters Teaching Hospital, Kohat, from January 2007 to June 2008. Patients aging more than 10 years with significantly impaired visual acuity due to posterior capsular opacification were included. Patients having very thick posterior capsules, patients with PCO following traumatic cataract surgery, patients having advanced glaucoma, diabetic or other retinopathies and patients with dislocated intraocular lenses were excluded.

Results: Total number of patients were 250 including 135(54%) males and 115(46%) females. Age group 1, 2, 3 and 4 had 13(5.2%), 40(16%), 65(26%) and 132(52.8%) patients of PCO respectively. PCO development was maximum i.e. 40% between 03 to 12 months. The frequency of poor best corrected visual acuity (6/60-CF) of 150 (60%) was reduced to 5 (2%) with the procedure. The frequency of very good best corrected visual acuity (6/6-6/9) of zero (0%) was enhanced to 195 (78%) with the procedure. Frequency of YAG laser complications was raised intraocular pressure in 25(10%) patients, IOL damage in 30(12%), rupture of anterior vitreous face in 13(5.5%), anterior uveitis in 20(8%), cystoid macular edema in 20(8%) and retinal damage in 5(2%).

Conclusion: Nd:YAG laser capsulotomy is safe, effective and convenient method for treatment of posterior capsular opacification.

KEY WORDS: Neodymium-Yttrium-Aluminium-Garnet Laser, Posterior capsular opacification, Intra ocular lens, Visual acuity.

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INTRODUCTION

As it is almost impossible to remove all the lenticular epithelial cells during cataract extraction surgery[1], some remaining anterior epithelial cells may migrate on posterior capsule leading to its opacification and cause dimness of vision according to the thickness of capsule. However the etiology is multifactorial in origin, including age of patient, post operative period, type and material of intraocular lens (IOL) implanted, surgical technique, post operative treatment etc. This reflects not only a medical problem but social, economical implication over patients, family and society as a whole.

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The incidence of posterior capsular opacification (PCO) is documented from 10% to 50% of patients between two months to five years post cataract operative period.[2] This exposes the patient once again to the same problem of dimness of vision and need for intervention at hospital. As it is causing dimness of vision in varying degrees according to its thickness, measures are taken to minimize chances

of PCO formation. Small capsulorhexis (4.5-5.0mm) and capsular bag implantation of 5.5 mm acrylic IOL are likely to reduce PCO formation as compared to the old design and placement in the sulcus.[3]

Despite all the measures taken to reduce PCO formation, it is still a major problem in post operative patients of cataract surgery. Previously this was treated by surgical capsulotomy which is still practiced in young children and for very thick, fibrosed capsules and uncooperative patients. However this practice has its own risks like endophthalmitis. Due to the complications and difficulty for patient and surgeon, surgical capsulotomy is replaced by posterior capsulotomy with Nd: YAG (Neodymium-Yttrium-Aluminium-Garnet) laser, which is safe, effective, and easy out-patient procedure.[4]

This procedure although safe, is not 100% free from complications. The possible complications associated with this procedure are elevation of intraocular pressure, rupture of anterior vitreous face, damage to intra ocular lens, acute iritis and cystoid macular edema (CMO).[1] These complications are less common if laser is performed six or more months after surgery. Macular hole, retinal hemorrhage, vitreous hemorrhage and rhegmatogenous retinal detachment are also rare complications and care should be taken in high risk patients.

Ophthalmologists all over the world tried to minimize this problem and gave good results to their patients. Many modules have been designed as a result of various studies. Improvement in surgical techniques, type and quality of IOL implanted, post operative treatment etc. have considerably helped in overcoming this problem. But even then over period of time PCO is almost universal.

The objectives of this study were to determine the frequency of involved age groups, duration and type of posterior capsular opacification, improvement in vision and complications of posterior capsulotomy with ND: YAG Laser.

MATERIAL AND METHODS

This interventional study was carried out in the Department of Ophthalmology, District Head Quarters Teaching Hospital, Kohat, Pakistan from January 2007 to June 2008. All patients aging more than 10 years with significantly impaired visual acuity due to posterior capsular opacification (PCO) were eligible for inclusion. Whereas all the patients having very thick PCO, patients with PCO following traumatic cataract surgery, patients having advanced glaucoma, diabetic or other retinopathies leading to dimness of vision and patients with dislocated intraocular lenses were excluded from this study. A sample size of 250 patients was selected by convenience sampling.

Patients were examined in the Out Patient Department (OPD). Patients were evaluated for best corrected visual acuity (BCVA), slit lamp examination of anterior and posterior segments & intra ocular pressure with air puff tonometer. Details of cataract surgery were also obtained from the patients. They were regularly followed up for six months. Patients were subjected to standard method of the YAG laser posterior capsulotomy. Cornea of the concerned eye was topically anaesthetized and Abraham's posterior capsulotomy lens was used for proper focusing and stabilization of eyeball. Q switched Nd: YAG laser was used to make a cross or circular hole of 2-3 mm in the posterior capsule. The amount of energy and number of pulses were adjusted as required.

Age grouping was done as: 11-30, 31-40, 41-50, more than 50 years. Based on slit lamp examination PCOs were divided into three groups of fibrosis, Elschnig pearls and wrinkling. The BCVA was grouped as: 6/6 – 6/9 as very good, 6/12 – 6/18 as good, 6/24 – 6/36 as fair and 6/60 – CF as poor.

The demographic variables were gender and age groups. The research variables were duration of PCO formation, type of PCO, BCVA before procedure and BCVA after procedure and complications of the procedure. Data was analyzed by SPSS 16 (SPSS, Inc., Chicago, Illinois, USA).

RESULTS

Total number of patients included in study were 250, including 135 (54%) males and 115 (46%) females.

Group 1, 2, 3 and 4 had 13 (5.2%), 40 (16%), 65 (26%) and 132 (52.8%) patients of PCO respectively. Out of the first group, 7 (54%) were having fibrosis, 4 (30%) elshnig pearls and 2 (16%) wrin-

Table 1: Types of Posterior Capsular Opacification based on four age groups among 250 patients .

Age in years	No of Pts	Fibrosis	Elschnig pearls	Wrinkling
11-30	13 (5.2%)	7	4	2
31-40	40 (16)	28	9	3
41-50	65 (26.0)	45	20	0
> 50	132 (52.8)	60	42	30
Total	250 (100%)	140 (56%)	75 (30%)	35 (14%)

kling. Out of the second group, 28 (70%) were having fibrosis, 9 (20%) elshnig pearls & 3 (7%) wrinkling. Out of the third group, 45 (70%) were having fibrosis, 20 (30%) elshnig pearls 0 (0%) wrinkling. Out of the fourth group, 60 (45%) were having fibrosis, 42 (32%) elshnig pearls & 30 (23%) wrinkling. (Table 1)

Posterior capsular opacification development was maximum between 03 to 12 months among the sample. (Table 2)

Table 2: Duration of Posterior Capsular Opacification formation among 250 patients.

Duration in Months	No. of cases	Percentage
03-12	100	40%
13-20	63	25.2%
21-36	45	18%
37-48	30	12%
48 and above	12	4.8%
Total	250	100%

Before intervention, 150 (60%) cases were having poor best corrected visual acuity (BCVA) i.e. 6/60-CF, 75 (30%) cases were having fair best corrected visual acuity (BCVA) i.e. 6/24-6/36, 25 (10%) cases were having good best corrected visual acuity (BCVA) i.e. 6/12-6/18 and 0 (0%) cases were having very good best corrected visual acuity (BCVA) i.e. 6/6-6/9. After the procedure, the figures were 5 (2%), 20 (8%), 30 (12%) and 195 (78%) in four groups respectively. It is clear that very good BCVA was enhanced from 0 (%) cases to 195 (78%) cases with the procedure. (Table 3)

Table 3: Best Corrected Visual Acuity before and after treatment of 250 patients with YAG laser.

Before YAG laser		Best Corredted Visual Acuity	After YAG laser	
No. of Cases	Percentage		No. of Cases	Percentage
0	0%	6/6–6/9	195	78%
25	10%	6/12–6/18	30	12%
75	30%	6/24–6/36	20	8%
150	60%	6/60–CF	5	2%
250	100%	Total	250	100%

Frequency of post YAG laser complications was raised intraocular pressure (IOP) in 25 (10%) patients, IOL damage in 30 (12%), rupture of anterior vitreous face was in 13 (5.5%), anterior uveitis in 20 (8%), cystoid macular edema in 20 (8%) and retinal damage 5 (2%). (Table 4)

Table 4: Procedure related complications among 250 Posterior Capsular Opacification patients.

Complication	No. of cases	Percentage
Transient rise in I.O.P	25	10%
Pitting of I.O.L	30	12%
Rupture of anterior vitreous face	13	5.5%
Mild anterior uveits	20	8.0%
Cystoid macular (CMO)	20	8%
Retinal detachment	5	2%

Percentage will not add up to 100% because one person can have more than one complication.

DISCUSSION

Total number of patients included in study were 250 including 135 (54%) males and 115 (46%) females. This is not similar to other studies where males were 45.55% and females were 54.45%.[1] in one study and 46.0% males and 54.0% females in another.[2]

Group 1, 2, 3 and 4 had 13 (5.2%), 40 (16%), 65 (26%) and 132 (52.8%) patients of PCO respectively. Out of the first group, 7 (54%) were having fibrosis, 4 (30%) elshnig pearls and 2 (16%) wrinkling. Out of the second group, 28 (70%) were having fibrosis, 9 (20%) elshnig pearls & 3 (7%) wrinkling. Out of the third group, 45 (70%) were having fibrosis, 20 (30%) elshnig pearls 0 (0%) wrinkling. Out of the fourth group, 60 (45%) were having fibrosis, 42 (32%) elshnig pearls & 30 (23%) wrinkling. The types of PCO were fibrosis in 67.8% eyes, Elschnig pearls in 20.4% eyes and wrinkling in 11.8% eyes.[2]

Posterior capsular opacification development was maximum between 03 to 12 months among the sample. Whereas in another study, the majority of patients 46% had PCO between 3 to 12 months postoperatively[2]. The time interval was after 1 year 25% cases; 2 years 37.5; 3 years 22% cases; 4 years 15.5% in another study.10

Before intervention, 150 (60%) cases were having poorest best corrected visual acuity (BCVA) i.e. 6/60-CF, 75 (30%) cases were having 6/24-6/36 and 25 (10%) cases were having vision 6/12-6/18 and 0 (0%) cases were having visual acuity 6/6-6/9.

After the procedure, BCVA was in 195 (78%) cases and 55 (22%) showed less significant improvement in BCVA. In another study, Pre-laser visual acuity was CF-6/60 in 52.4% eyes, 6/36-6/24 in 28.0% eyes and 6/18-6/12 in 19.6% eyes. Post-laser VA was improved to 6/9-6/6 in 74.4% eyes.[2] Majority of the patients (73%) revealed good visual acuity after Nd-YAG capsulotomy[6]. In another study, the best corrected visual acuity (VA) of 6/9 – 6/6 was achieved in 310 eyes (96.87%); whereas only 10 eyes (3.12%) did not have significant improvement in visual acuity. [8]

Frequency of post YAG laser complications was raised intraocular pressure (IOP) in 25 (10%) patients, IOL damage in 30 (12%), rupture of anterior vitreous face was in 13 (5.5%), anterior uveitis in 20 (8%), cystoid macular edema in 20 (8%) and retinal damage 5 (2%). In another study 18% was raised intraocular pressure (IOP); 7% was IOL damage; 0.3% cystoid macular edema;0.63% vitreous hemorrhage & No case of retinal damage,[1] In another study ten patients (4.68%) developed rise in intraocular pressure (IOP), 30 patients (9.37%) had intraocular lens damage, two patients (0.62%) ended up with rupture in anterior vitreous face and two patients (0.62%) developed cystoids macular edema.[10] In another study, 40 (8.0%) eyes developed the complications due to YAG laser which included IOL pitting in 27 (5.40%) eyes, raised IOP in 04 (0.80%), uveitis in 03 (0.60%), iris bleeding (hyphema) in 03 (0.60%), vitreous in anterior chamber in 02 (0.40%), and cystoids macular edema (CME) in 01(0.20%) eye. None of the eye developed sight threatening complications like retinal detachment or macular hole.[2] IOL pitting (10%) was the commonest complication after capsulotomy.[6]

Out of 320 patients 30 patients (9.37%) developed intraocular lens pitting, ten patients (4.68%) developed rise in intraocular pressure, two patients (0.62%) showed rupture in anterior vitreous face, two patients (0.62%) developed cystoids macular edema.[8]

CONCLUSION

In the light of our study we found that YAG Laser posterior capsulotomy is easy, effective and safe method.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.