

COMPLICATIONS VS EFFICACY OF ND-YAG LASER CAPSULOTOMY

Sofia Iqbal, Mohammed Naeem, Hina Mehwish Khan, Nasir Saeed

ABSTRACT

Objective: To evaluate efficacy and complications of Nd YAG laser capsulotomy in patients having posterior capsular opacification.

Materials and Methods: This prospective case study was conducted at the Department of Ophthalmology, Hayatabad medical complex, Peshawar, over a period of eighteen months from January 1, 2012 to June 30, 2013. Four hundred patients with significant posterior capsular opacity were subjected to laser treatment after performing pre laser assessment. Nd YAG laser posterior capsulotomy was carried out with Q-switched SYL 9000 YAG laser system under topical anesthesia with Abraham's capsulotomy lens. These patients were assessed for post laser visual acuity and possible complications.

Results: Out of 400 patients, 160 (40%) were male and 240 (60%) patients were female. The patients were subdivided into various age groups. The age group 1 was from 11 to 30 years, age group 2 was between 31 to 40 years, age group 3 was from 41 to 50 years and last group i.e., 4th group included patients who were more than 50 years of age. The age group 1,2,3 and 4 had a frequency of PCO of about 10 patients (2.5%), 24 patients (6%), 34 patients (8.5%) and 332 patients (83%) respectively. The time interval between cataract surgery and laser was from 3 months to 4 years. The best corrected visual acuity of 6/9-6/6 was achieved from zero to 76.5% whereas the frequency of poor best corrected visual acuity (6/60-CF) was reduced from 67.5% to 3% only.

Discussion: During and following Nd YAG laser capsulotomy, out of 400 patients, 88 (22%) of the patients developed complications while 312 (78%) patients remained free of any complication. About 60 patients (15%) developed intra ocular lens pitting. 20 patients (5%) developed rise in IOP. 4 patients (1%) showed rupture of anterior vitreous face, 4 (1%) patients developed cystoids macular edema.

Conclusion: The Nd YAG laser procedure is a safe and effective OPD procedure, leading to marked improvement in vision.

Key words: Nd, YAG laser, Posterior capsular opacification, Intra ocular lens.

INTRODUCTION

Cataract is the most common cause of avoidable blindness in the world.¹ Extra capsular cataract extraction (ECCE) with posterior chamber lens implant (PCIOL) is the most frequent surgical technique since the past decade.² Posterior capsule opacification (PCO) is a frequent complication of cataract extraction.³ The term posterior capsule opacification is actually a misnomer. It is not the capsule which opacifies, rather an opaque membrane develops as retained lens epithelial cells proliferates and migrates on the posterior capsular surface.⁴ PCO usually develops secondary to inflammatory process in which lens epithelial cells proliferate in response to several factors. Surgical trauma stimulates residual lens epithelial cells to produce cytokines such

as interleukin-1 (IL-1), IL-6, IL-8, basic fibroblast growth factor and transforming growth factor. These cytokines may play an important role in fibrous proliferation of lens epithelial cells via an autocrine pathway, paracrine pathway or both.⁵

Posterior capsule opacification is a frequently encountered complication of cataract surgery leading to decrease visual acuity, uniocular diplopia and glare.⁶ The reported frequency of posterior capsule opacification varies from 8.7 to 33.4%.⁷ Before the advent of Nd YAG laser capsulotomy the treatment of posterior capsule opacification was surgical capsulotomy which could result in serious complications such as endophthalmitis.⁸ Introduced by Dr. Aron-Rosa and Dr. Fankhauser in 1980s, Laser capsulotomy involves a quick-pulsed Nd YAG laser to apply a series of focal ablations in the posterior capsule and create a small circular opening in the visual axis.⁹ Topical anesthesia can be used to perform Nd YAG capsulotomy and it is performed at a slit lamp equipped with a YAG laser, while the patient is in a seated position.¹⁰ Most frequently encountered complications include transient intraocular pressure elevation, corneal edema, iritis, Intraocular lens dislocation into the vitreous, pitting of the intraoc-

Department of Ophthalmology, HMC, Peshawar

Address for correspondence:

Dr Sofia Iqbal

Associate Professor

Eye A Unit,

Khyber Girls Medical College, Peshawar

Cell: 0333-9254264

Email: sofiaiqbal71@yahoo.com

ular lens, retinal tears, retinal detachments and macular edema.¹¹

The incidence of intraocular pressure elevations are significantly reduced when patients are pretreated with apraclonidine which is a sympathomimetic drug and topical steroids. Intraocular pressure can be checked 30-60 minutes postoperatively. Iritis can be present after the capsulotomy, it is usually self-limited. It can be treated with a week long course of topical steroids (1% prednisone acetate or 0.5% loteprednol, 4 times daily).¹² According to past research, the Nd YAG laser capsulotomy is a safe, effective outpatient procedure to create an opening in opaque posterior capsule for the improvement in vision.¹³

MATERIALS AND METHODS

Four hundred patients were selected from the Outpatients Department of Khyber Institute of Ophthalmic Medical Sciences, Hayatabad Medical Complex, Peshawar. It was a prospective study done over a period of eighteen months i.e. from January 1st 2012 to 30th June 2013. The inclusion criteria was, patients having a significant posterior capsule opacification leading to decrease visual acuity, patients with satisfactory immediate post (cataract) operative visual acuity. Patient with no ocular co-morbidity.

The exclusion criteria was duration less than six months post cataract surgery, patients younger than ten years of age patients having amblyopia and other anterior and posterior segment co-morbidities.

The patients fulfilling the inclusion criteria were subjected to laser treatment after performing a proper pre-laser assessment. A special data collection Performa was filled for each patient and had a detailed record of the disease including name, age, gender, and address. The patients were divided into various age groups. The patients of 10-30 years were given a

single group because of less number of patients in this age group. Rest of the groups spanned over a period of 10 years while the fourth group included patients over fifty years of age. The assessment included checking of Visual Acuity using a Snellen chart. The best corrected visual acuity was recorded. A Slit lamp examination was carried out. Both Anterior and Posterior segments were examined thoroughly. The posterior segment was examined using a 90D and indirect ophthalmoscope. Ophthalmic ultrasound was performed where the posterior segment could not be visualized due to dense posterior capsule opacification. Any abnormal finding was recorded on a pre-designed Performa. The intraocular pressure was checked with a Goldmann tonometer and recorded in mmHg. The pupil was dilated using Tropicamide 1% drops. Nd YAG laser capsulotomy was performed with Q-switched SYL 9000 YAG Laser system under topical anaesthesia with proparacaine (Alcaine). Abrahams capsulotomy lens was used. The laser system was used to make a hole of 2-3mm in posterior capsule, using 1.5 to 8 mille joules of energy per pulse. Depending on the thickness of the capsule the energy and pulses were increased gradually till an opening was made. Following the procedure all patients were given topical antibiotics steroid combinations and topical glaucoma medications. The Intraocular pressure was checked after an hour and then after ten days. On the 10th day intraocular pressure and visual acuity was checked again. These patients were reviewed for complications on follow-up visits.

RESULTS

A Total of four hundred patients underwent Nd-YAG laser capsulotomy. There were 240 (60%) males and 160 (40%) females. The patients were divided into four groups based on their ages. Group 1 included patients whose ages ranged from 11 to 30 years. Group 2 had patients with an age range of 31 to 40 years. Pa-

Table 1

S.No	Age group	Age in years	No of patients
1	1	11-30	10 (2.5%)
2	2	31-40	24 (6%)
3	3	41-50	34 (8.5%)
4	4	≥ 50	332 (83%)

Table 2: Visual acuity assessment before and after Nd-YAG laser capsulotomy

Best corrected visual acuity	Before Nd-YAG Laser capsulotomy	After Nd-YAG Laser capsulotomy		
		No of cases	%age	No of cases
6/6-6/9	0	0%		306
6/12-6/18	30	7.5%		50
6/24-6/36	100	25%		32
6/60-CF	270	67.5%		12
TOTAL	400	100%		400
				100%

Table 3: Complications after Nd-YAG Laser capsulotomy

S.NO	Complication	No of patients	%
1	Pitting of IOL	60	15
2	Raised IOP	20	5
3	Rupture of anterior vitreous face	4	1
4	Cystoid macular edema	4	1
5	Retinal detachment	0	0

tients with an age range of 41-50 years were assigned to group 3, while group 4 included patients more than 50 years of age. The duration between cataract surgery and laser procedure was 03 months to 03 years. The frequency of posterior capsule opacification was 10 patients (2.5%), 24 patients (6%), 34 patients (8.5%) and 332 patients (83%) respectively in groups 1,2,3, and 4.

The best corrected visual acuity of 6/9-6/6 was achieved from zero to 76.5% where's the frequency of poorly best corrected visual acuity (6/60-CF) was reduced from 67.5% to 3% only.

As far as complications were concerned, out of 400 patients, 22% (n=88) of the patients had complications while 78% (n=312) remained free of any complications. Intraocular lens pitting was the most frequently encountered complication, accounting for about 15% (n=60). About 5% (n=20) patients developed rise in IOP. Only 04 patients (1%) showed rupture of anterior vitreous face and similarly 04 patients (1%) developed cystoids macular edema. No other complications like retinal detachment was observed in this study.

DISCUSSION

A total of 400 patients having posterior capsule opacification after cataract surgery were assessed in this study. Males were more affected than females in this study. This is comparable to other studies.¹⁴ The time interval between cataract surgery and laser was three months to four years. Patients were divided into 4 groups according to their ages. The patients of 10-30 years were given a single group as less number of patients was observed in this group. Rests of the groups were spanned over a period of ten years while the fourth group included patients over 50 years of age. Maximum numbers of patients were observed in this age group. The age group 1,2,3&4 had a frequency of posterior capsule opacification of about 10 patients (2.5%), 24 patients (6%), 34 patients (8.5%) and 332 (83%) patients respectively. Burq et al showed a mean age of 59.5 ± 6.2 years.¹¹ Other studies also correlated with our results with maximum no of patients observed in ages more than 50 years.⁷ The best corrected visual acuity of 6/9-6/6 was achieved from nil to 76.5% whereas the frequency of poorly best corrected visual acuity (6/60-CF) was reduced from 67.5% to 3% only. In our study, during and following Nd-Yag Laser capsulotomy, out of 400 patients, 88(22%) of patients developed complications while 312(78%) remained

free of any complications. About 60 patients (15%) developed intraocular lens pitting. Twenty (5%) developed rise in IOP. Four patients (1%) showed rupture of anterior vitreous face, 04 (1%) developed cystoids macular edema. None of the patients showed retinal detachment in our study. In a study carried out by Hassan et al visual improvement was noted in all patients. 40 eyes (23.25%) showed a significant rise in IOP of more than 5mmHg, iop in all these patients returned to base line level after one week of treatment with topical anti glaucoma medications.¹⁵ Dawood et al reported that following Nd-Yag Laser capsulotomy, the visual acuity improved in 93.92% and no improvement was seen in 6.08% patients. The main complications were temporary increase in intraocular pressure while 4 patients developed cystoid macular edema¹⁶. For post laser rise in IOP, topical steroids and beta blockers were used which proved to be beneficial. Awan et al showed that post laser rise in IOP, was controlled by topical steroids and beta blockers effectively.¹⁷ In another comparable larger study carried out in 500 patients, 8% developed the complications due to YAG laser capsulotomy which included iol pitting in 5.40% eyes, raised IOP in 0.80% vitreous in anterior chamber in 0.40% and cystoids macular edema in 0.20% patients eyes. None of the eyes developed sight threatening complications like retinal detachment or macular hole like our study.¹⁸ Based on the above discussion it is evident that the Nd YAG laser capsulotomy is a very effective and easy mode of treatment for PCO with minimal post laser complications.

CONCLUSION

YAG laser capsulotomy is a Safe and effective procedure but not without complications. Each patient must be followed up for its commonest complication of raised intraocular pressure

REFERENCES

1. Thylefors B, Negrel AD, Pararajasegaram R. Global data on blindness. Bull World Health Organ 1996; 74: 319-24.
2. Natchiar G, Robin AL, Thulasira R. Attacking the backlog of India's curable blind, the Arvind Eye Hospital model. Arch Ophthalmol 1994; 112: 987-93.
3. Georgalas I, Petrou P, Kalantzis G, Papaconstantinou D, Koutsandrea C, Ladas I. Nd: YAG capsulotomy for posterior capsule opacification after combined clear corneal phacoemulsification and vitrectomy. Ther Clin Risk Manag. 2009; 5: 133-7.

4. Francis L' Esperence (1983) Neodymium-YAG laser, Ophthalmic lasers. Mosby, 2nd edition, 79-83.
5. Nishi O, Nishi K, Fujiwara T, et al. Effects of the cytokines on the proliferation of and collagen synthesis by human cataract lens epithelial cells. *Br J Ophthalmol.* 1996; 80: 63-68.
6. Aslam TM, Patton N. Methods of assessment of patients for Nd: YAG laser capsulotomy that correlate with final visual improvement. *BMC Ophthalmol.* Sep 23 2004; 4:13.
7. Muhammad L, Jabeen M, Wazir F, Qadir A, Salim M, Ahmad I. Efficacy of Nd: YAG laser posterior capsulotomy in visual improvement of patients having posterior capsular opacification. *Gomal Journal of Medical Sciences* 2013, 11(1): 97-100.
8. Awan MT, Khan MA, Al-Khairy S, Malik S. Improvement of visual acuity in diabetic and nondiabetic patients after Nd: YAG laser capsulotomy. *Clin Ophthalmol.* 2013; 7: 2011-7.
9. Aron-Rosa D, Aron JJ, Griesemann M, Thyzel R. Use of the neodymium-YAG laser to open the posterior capsule after lens implant surgery: a preliminary report. *J Am Intraocul Implant Soc.* 1980; 6(4):352-1.
10. Longmuir S, Titler S, Johnson T, Kitzmann A. Nd: YAG laser capsulotomy under general anesthesia in the sitting position. *J AAPOS.* 2013; 17(4): 417-9.
11. Burq MA, Taqui AM. Frequency of Retinal Detachment and Other Complications after Neodymium: Yag Laser Capsulotomy. *JPMA* 2008; 58(10): 550-28.
12. Aslam TM, Devlin H, Dhillon B, Use of Nd:YAG laser capsulotomy. *Survey of Ophthalmology* 2003; 46(3): 594-612.
13. Khanzada MA, Jatoi SM, Narsani AK, Dabir SA, Gul S. Is Nd: YAG Laser a Safe Procedure for Posterior Capsulotomy? *Pak J Ophthalmol* 2008, 24(2) :73-8
14. Raza A. Complications after Nd YAG Posterior Capsulotomy. *JRMC*; 2007; 11(1): 27-29
15. Hasan KS, Adhi MI, Aziz M, Shah N, Farooqui M. Nd: YAG Laser Posterior Capsulotomy. *Pak J Ophthalmol* 1996; 12(1): 3-7.
16. Dawood Z, Mirza SA, Qadeer A. Review of 560 cases of Yag laser capsulotomy. *J Liaquat Uni Med Health Sci* 2007; 6(1): 3-7.
17. Awan AA, Kazmi SH, Bukhari SA. Intraocular Pressure Changes after ND-YAG Laser Capsulotomy. *J Ayub Med Coll Abbottabad* 2001;13(2):3-4.
18. Khanzada MA, Jatoi SM, Narsani AK, Dabir SA, Gul S. Experience of ND: YAG laser posterior Capsulotomy in 500 cases. *J Liaquat Uni Med Health Sci* 2007; 6(3):109-15.
19. Javed EA, Sultan M, Ahmad ZD. Nd: Yag laser capsulotomy and complications. *Professional Med J* 2007; 14(4):616-9.
20. Slomovic AR, Parish RK 2nd. Acute elevations of intraocular pressure following Nd: YAG laser posterior capsulotomy. *Ophthalmology* 1985; 92:973-6.

ONLINE SUBMISSION OF MANUSCRIPT

It is mandatory to submit the manuscripts at the following website of KJMS. It is quick, convenient, cheap, requirement of HEC and Paperless.

Website: www.kjms.com.pk

The intending writers are expected to first register themselves on the website and follow the instructions on the website. Author agreement can be easily downloaded from our website. A duly signed author agreement must accompany initial submission of the manuscript.