



POSTERIOR CAPSULOTOMY; COMPLICATION AFTER ND YAG LASER IN OUR SETUP

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ABSTRACT... Objective: To study the complications of ND: YAG laser capsulotomy. **Design:** Clinical trial. **Setting:** Department of Ophthalmology KHYBER Medical University Institute of Medical Sciences Teaching Hospital Kohat Development Authority (KDA) Kohat. **Period:** Jan 2007 to June 2008. **Material and methods:** A total number of 250 patients with posterior capsular opacification were studied and look for complications after ND: YAG Laser application. One hundred and thirty five (54%) were male and one hundred fifteen (46%) patients were female. 63% of patients had right eye involvement while 37% had left eye were involved. Patients were thoroughly examined before and after the procedure. All patients were followed for minimum six months after the procedure. Data was analyzed by SPSS version 16. Chi square test was calculated for the significance of analysis. **Results:** After Nd YAG laser capsulotomy there was significant improvement in visual acuity of my patients. There was transient rise of IOP in 25 (10%) of patients. Mild anterior uveitis in 20 (8.0%) of patients. Intra-ocular Lens pitting or cracks in 30 (12%) of cases. Macular edema in 20 (8.0%) of cases. Retinal detachment in 5 (2.0%) of cases. **Conclusions:** Nd YAG laser is safe, effective and non-invasive procedure outdoor procedure by which we can get better visual outcome. Which had also some serious complication for that we have to avoid and educate the patient about the complications of procedure.

Key words: Nd YAG laser (Neodymium-Yttrium Aluminum Garnett), Abraham's lens, PCO (Posterior Capsule Opacification), IOL (Intra-ocular Lens), IOP (Intra-Ocular Pressure), Uveitis, Macular edema, R/D (Retinal Detachment).

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INTRODUCTION

Cataract is still a most common avoidable cause of blindness worldwide^{1,2}. To treat this avoidable blindness cataract extraction with posterior chamber intraocular lens implantation is the most frequent surgical procedure performed all over the world³.

A part of new surgical procedure like Extra-Capsular Cataract Extraction (ECCE), phacoemulsification and manual small incision cataract extraction with or without posterior chamber intraocular lens implantation (PC-IOL) Posterior Capsular Opacification (PCO), after cataract, or secondary cataract is a still most common complication⁴. PCO results in decrease

in visual performance of the patient. The factors contributing to develop posterior capsule opacification elicit by the help of retro illumination photography⁵. Posterior capsule opacification is due to the proliferation of the remaining anterior epithelial cell of capsular bag, some cells migrate on the non-epithelial posterior capsule lead to opacification and causing decrease visual acuity depending on the capsular thickness. As it is very difficult to remove the entire lenticular epithelial cell during surgery⁶. However there are multiple factors leading to develop posterior capsule opacification like age of the patient, post-operative period, type, shape and material of IOL implantation, surgical technique, and post-operative treatment⁷. The incidence of PCO is

documented is for 10 – 50% of patients between two to five years post operative period^{4,8}. The incidence is higher in younger age group. To minimize the posterior capsule opacification we have to reduce all the risk factors leading to posterior capsule opacification.

PCO previously was treated by surgical capsulotomy at the time of surgery or secondary intervention. Due to the serious complications of surgical capsulotomy, it is replaced by Nd YAG laser which is now definitive, safe, effective, easy, and as an outdoor procedure. The potential complications of surgical capsulotomy were avoided when slit lamp- coupled nanosecond laser was first introduced to ophthalmology by Kransnov in 1974⁹. Non-linear laser tissue intervention known as multiphoton ionization or dielectric breakdown, in which a short-pulsed laser focused in a tight spot can produce extremely high light intensities ($>10^{10}$ w/cm²). Producing plasma in a focal spot. Plasma energy converting to heat results in rapid vaporization of focal volume, producing shock wave and cavitations bubbles. Rapidly expanding and collapsing bubbles can dissect tissue (Photodisruption) which initially used by Fankhauser for iris and trabecular meshwork¹⁰. Common techniques applied are circular or cruciate shape posterior capsulotomies under topical anaesthesia¹¹. However there are rare but significant complication of this procedure as well¹². The purpose of this study to look for the complication after Nd YAG laser procedure in our setup.

MATERIAL AND METHODS

This study was conducted in the department of ophthalmology KMU institute of medical sciences Teaching Hospital KDA Kohat from Jan 2007 to June 2008. A total of 250 number of Patients were treated with Nd YAG laser for therapeutic and for diagnostic purpose. Subjective patients complained significant decrease in visual acuity, glare or diplopia due to posterior capsule opacification were included in this study. All were treated as outdoor patients. Proper detail ocular and systemic history was taken. Followed by

detailed ocular and systemic examination were performed. For detail ocular examination with and without corrected visual acuity measurement, intraocular pressure (IOP), with dilated pupil anterior and posterior segment examination with slit lamp and indirect ophthalmoscopy were carried out to look for ocular co morbidity. In case of dense posterior capsular opacification B-scan ultrasonography was done to exclude posterior segment pathology. Pre and post YAG photographs were taken with anterior segment camera attached with slit lamp. Patients were educated about the procedure. And informed consent form was signed. Inclusion criteria patients over the age of 10 years with posterior capsule opacification. Posterior capsule opacification with decrease two or more than two lines of snellen's acuity chart minimum three months after cataract surgery.

Patients under the age of 10 years with posterior capsule opacification. Patients with ocular comorbidity like glaucoma, uveitis, subluxated Intraocular lens, Iris or IOL capture, rubiosis iridis, retinal detachment, diabetic or other retinopathies were excluded from the study.

Three times with five minute interval a single drop of topical anesthetic proparacaine hydroxide 0.5% were poured into the eye. After comfortable position the patients were seated on slit lamp with head properly fixed. Most of the cases were done without the use of contact lens. Abraham's posterior capsulotomy contact lens was applied in some cases for proper focusing, positioning, stability and proper delivery of Nd YAG laser. Nd YAG of Zeiss Q. switched was applied in all cases. The focus red dots of helium neon focusing beam was used so that one dot was found on posterior capsule to protect the intra-ocular lens. Pulses with minimal energy level (01 – 05mj) were used initially and increased gradually. An opening in posterior capsule up to 3 to 4mm was produced. Where a large capsulotomy to more than 4mm was required the pupil was pre operatively widely dilated, as when vitreo retinal surgery or Argon laser treatment of retinopathies was desired. Once the procedure was completed one drop of

Dexamethasone and one drop of Levabenalol was instilled. After one hour intra-ocular pressure were recorded. Than advise Dexamethasone 0.1% four time a day and levabenolol eye drops two times a day for ten days. Patients follow up was done on second day, at one week, at one month, and then when required. Minimum follow up were six months recoded. As patient were educated about the procedure and its complications. He or she consulted as soon as they had any ocular complain. On each follow up day visual acuity, IOP, anterior segment and posterior segment detailed examination was done and its complications were noted

RESULTS

The total 250 number of patients Nd YAG laser capsulotomy was well tolerated by all the patents. In which one hundred and thirty five patients were male and one hundred fifteen patients were female. The common age group was between the age of 51 to 60 years which were 50.0% of the all age groups. Followed by 20.0% between the age group of 41 to 50 years. Shown in (Table – I).

Age groups	No. of patients	%age
21-30	12	05
31-40	25	10
41-50	50	20
51-60	125	50
61-70	38	15

Table-I. Age distribution for complication of ND: Yag laser posterior casulotomy (N=250)

The most common type of posterior capsule opacification were Elschinig’s pearl which were 125 (50.0%) of the total numbers of my patients. Followed by capsular fibrosis which was 110 (44.0%) of the total numbers. And least common type was capsular wrinkling which were 15 (6.0%). Shown in (TABLE II).

The most common complication were the IOL pitting or cracking 30 (12.0%). The transient rise intra-ocular pressure after Nd YAG laser

Elschnig’s pearl	125 (50.0%)
Capsular fibroids	110 (44.0%)
Capsular wrinkling	15 (06.0%)

Table-II. Type of posterior capsular opacification N=250

capsulotomy which occur in 25 (10.0%) of patients followed my mild anterior uveitis 20 (8.0%) and macular edema 20 (8.0%). Rupture of the anterior vitreous face 13 (5.5 %). Least common complication in all of my patients was retinal detachment 5 (2.0%). Shown in (Table=III).

Complications	No. of patients	%age
Transient rise in IOP	25	10
Mild anterior uveitis	20	8.0
IOL pitting and cracks	30	12
Macular oedema	20	8.0
Retinal detachment	05	02
Anterior vitreous	13	5.5

Table-III. Complications of ND: YAG laser capsulotomy (N=250)

Pre procedure visual acuity were counting fingers to 6/60 in One hundred and fifty patients which were (60.0%) of my patients. Followed by seventy five (30.0%) of patient had visual acuity of 6/36 – 6/24. While twenty-five (10.0%) of the patients had visual acuity of 6/18 – 6/12.

Which were improved by (78.0%) 195 patients 6/9 – 6/6. Thirty patients (12.0%) had 6/12 - 6/ 18. Twenty (8.0%) of cases had a visual acuity improved by 6/24 – 6/36. Five patients (2.0%) had visual acuity of less 6/36.

DISCUSSION

Posterior capsular opacification is the most common complication of uncomplicated extra capsular cataract surgery. Elschinig pearls are the most common type of PCO in this study followed by capsular fibrosis. This is similar to the data of

the study done by Firdous M et al¹³. The cause of posterior capsular opacification following cataract extraction is multifactorial. It depends on IOL optic material, IOL design, and different surgical techniques. Certain material and design like acrylic material in contrast to Poly -methyl methacrylate (PMMA) and silicone lenses and a square edge optic appears to inhibit or decreases the chances of formation PCO¹⁴. The capsular bending ring significantly reduces anterior capsular fibrosis and shrinkage as well as posterior capsular opacification. The ring may be useful in patients who are at high risk of developing eye complications from capsular opacification that require YAG Laser capsulotomy¹⁵. Implanting a lens with complete anterior capsule overlap on the IOL also reduce posterior capsular opacification¹⁶. In general minimum shots and energy should be used. In cases where the thickening is due to Elschnig pearls, a minimum energy setting of less than 1 mj and usually less than 10 shots are necessary for an adequate opening. On the other hand, if there is a thickened fibrotic posterior capsule, a greater power of 3 mj or more and as many as 50 to 100 shots may be necessary for adequate opening. An average size of capsular opening is 3-4 mm. There is merit in making a smaller opening as this tend to result in less vitreous disturbance. One of the main complications after Nd: YAG laser capsulotomy is temporary elevation of intraocular pressure and this occurs one to three hours after treatment¹⁷. There was no correlation between intraocular pressure elevation and number of laser shots applied or amount of laser energy delivered in our clinical observation. Elevation of intraocular pressure may be caused by many other factors like amount of lens cortex liberation, condition of already compromised angle, presence or absence of IOL, injury to liquefied vitreous (myopia and vitreoretinal disease), vitreous prolapse in anterior chamber and large capsular opening. Long-term elevation of intraocular pressure above the precapsulotomy baseline is often present in glaucoma patients and in those who experience a significant intraocular pressure increases within hours after the capsulotomy^{18,19}. As compare to our study (10.0%) transient rise intraocular pressure

as compare to (27.0%) by Raza A at et¹⁸, while long term elevation are (1.43%) by Dawood Zat el¹⁹. Mild uveitis was seen in (8.0%) and managed with topical steroid and diclofenac sodium eye drops as compare with (7.0%) by Raza A at el¹⁸. And Latif who reported a (5.5%) incidence of uveitis²⁰. And was more (33.5%) in patients with YAG laser capsulotomy by Gore V.S²¹. Intra-ocular lens (IOL) Pitting/cracks. were observed in (12.0%) of my cases as compare to (4.0%) noted by Raza A¹⁸. The actual level of damage incurred seems to be dependent on various factors. Intraocular lens type affects amount of damage depending on both material and design. Various studies have shown some IOL materials to be more resilient to laser damage than others. Trinaverat et al determined the energy level required to induce a 50% incidence in IOL damage in various foldable IOLs compared to a PMMA lens²². Rates of damage have been quoted at between 4% to 40% of cases²³. While cystoids macular edema (CME) many studies have reported on the incidence of CME following laser capsulotomy, with most experimenters producing a figure of between 0.7% to 4.9%^{24,25}. While CME were observed in (8.0%) of my cases.(4.0%) of the Gore V.S²¹. And (0.36%) by Dawood Z at el¹⁹. 2.0% of cases had retinal detachment as equal to Raza A¹⁸. Retinal detachment and cystoid macular edema may develop many months after capsulotomy therefore patients undergoing YAG laser capsulotomy require long term follow up to detect and treat these serious complications.

CONCLUSIONS

There are many methods tried for the treatment of PCO but YAG laser capsulotomy remains the most common and safe and effective procedure. When correctly done with proper patient selection and thorough fundus examination and at least after three months after cataract surgery. It is very economical, convenient, fast and non invasive outdoor procedure with immediate results which is easily mastered with some practice. Although non invasive and generally considered safer it carries a low but definite risk of complications. These complications are rare and rarely sight threatening. Therefore we should be alert of

development of cystoids macular edema, retinal detachment. Persistent rise in IOP during follow up of patients with ND: YAG laser posterior capsulotomy.

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REFERENCES

- Thylefors B, Negrel AD, Pararajasegaram R. **Global data on blindness Bull world Health Organ** 1996; 74: 319-24.
- World Health Organization. **Prevention of blindness and deafness. Global initiative for the elimination of avoidable blindness.** Geneva: WHO; 2000. WHO document WHO/PBL/97.61 Rev2.
- 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.
- Apple DJ, Solomon KD, Tetz MR, Assia EI, Holland EY, Legier UF, 1992. **Posterior capsular opacification, Surv Ophthalmol.** Sep-oct; 32 (2): 73–116.
- Buehl W, Findl O, Menapace R, **Reproducibility of standardized retro illumination photography for quantification of posterior capsule opacification.** J Cataract Refract Surg 2002; 28 : 265 – 70.
- Nishi O (1997). **After cataract. The last big hurdle in cataract surgery.** Int . J . Ophthalmol. 2: 9 – 11.
- Iqbal Z, Palmiar P. **Risk factor for earl posterior capsular opacification and morbidity following Nd-YAG laser capsulotomy.** Pak J Ophthalmol. 2002; 18 : 98 – 101.
- Green WR, Mc Danell PJ (1985) **Opacification of posterior capsule.** Trans. Ophthalmol mop. Soc. UK 104: 727 -39.
- Krasnov MM. Q – **Switched laser goniopuncture.** Arch ophthalmol. 1974; 92 (1): 37 – 41.
- Aron-Rosa D, Aron JJ, Griesemann M, Thyzal R. **Use of the neodymium-YAG laser to open the posterior capsule after lens implant surgery: a preliminary report.** J Am Intraocular Implant SOC. 1980; 6 (4) : 352–354.
- Sheikkh ZA. **Racquet shaped posterior capsulotomy using Nd: YAG laser.** Pak j ophthalmol 1999;15: 10–14.
- S I Mian, K Fahim, A Marcovitch. **Nd YAG capsulotomy rates after use of the AcrySoft acrylic three piece and one piece intraocular lenses.** Br J Ophthalmol 2005; 89: 1453 – 1457.
- Firdous M. **Posterior capsular opacification following cataract surgery.** J Coll Physicians Surg Pak. 2001; 11(6): 352-4.
- Sacus S, Findl O, Menapace R, Buehl W. **Influence of optic edge design, optic material and heptic design on capsular bend configuration.** J Cataract Refract Surg. 2005 Oct; 31 (10): 1888-94.
- Nishi O, Nishi K, Menapace R, Akara J. **Capsular bending ring to prevent posterior capsular opacification.** J Cataract Refract Surg. 2001; 27 (9):1359-65.
- Smith SR, Daynes T, Hinckley M, Wallin TR, Blosan JR. **The effect of lens edge design versus anterior capsule overlap on posterior capsular opacification.** Am J Ophthalmol. 2004; 138(4):521-525.
- Ficker LA Steele AD. **Complications of Nd YAG laser posterior capsulotomy.** Trans Ophthalmol Soc U.K 1985; 104: 529 – 32.
- Raza A, **Complications after Nd YAG laser posterior capsulotomy.** Journal of Rawalpindi Medical College (JRMC); 2007; 11 (1): 27-29.
- Dawood Z, Mirza A S, Qadeer A, **Review of 560 cases of YAG laser capsulotomy.** JULMHS January – April 2007. 03-07.
- Latif M. **Treatment of post operative pupillary membranes Nd YAG laser.** Pak Journ Ophthalmol 1996; 12(1): 8-12.
- Gore V.S. **The Study of Complications of ND: YAG Laser Capsulotomy.** International Journal of Bioinformatics Research, ISSN: 0975-3087 & E-ISSN: 0975-9115, 2012; Volume 4, (2) 265-268.
- Trinavarat A, Atchaneeyasakul L, Udompunturak S: **Neodymium:YAG laser damage threshold of foldable intraocular lenses.** J Cataract Refract Surg 27:775–80, 2001.
- Tariq M. Aslam at el. **Use of Nd YAG laser capsulotomy Survey of Ophthalmology volume 48.** Number 6. Nov – Dec 2003.
- Liesegang TJ, Bourne WM, Ilstrup DM: **Secondary surgical and neodymium-YAG laser discissions.** Am J Ophthalmol 100:510–9, 1985.
- Miyake K, Sugiyama S, Norimatsu I, Ozawa T:

Prevention of cystoid macular edema after lens extraction by topical indomethacin (III) radio-immunoassay measurement of prostaglandins in

the aqueous during and after lens extraction procedures. Albrecht Von Graefes Arch Klin Exp Ophthalmol 209:83-8, 1978.

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