

**INTRAOCULAR PRESSURE BEFORE AND AFTER THE YAG LASER POSTERIOR CAPSULATOMY.**Nazullah¹, Samina Karim², Najmul Hassan³**ABSTRACT**

BACKGROUND: The most frequent long-term side effect of cataract surgery is posterior capsule opacification, sometimes it is also called a "secondary cataract". **OBJECTIVE:** to evaluate the variations in intraocular pressure change (IOP) before and after Yag laser posterior capsulotomy (LPC) for posterior capsule opacification (PCO). **MATERIAL AND METHODS:** This was a descriptive study which was done on the subjects of posterior capsular opacity (PCO) in the department of ophthalmology Hayatabad Medical Complex Peshawar. It was conducted from August 2022 to January 2023. **RESULTS:** Total 80 patients were included, 48(60%) men and 32(40%) women. The age was range from 20 to 70 years. Out of 80 patients, 60(75%) cases were operated by extra-capsular extraction and in 20(25%) patients the lens was removed by phacoemulsification. The mean IOP is increased immediately and after one hour but it return to normal after seven days of Yag laser. Similarly the IOP is also raised with increased in the amount of energy and number of pulses. **CONCLUSION:** It was concluded that intra ocular pressure (IOP) is significantly rise after Yag laser capsulotomy for posterior capsular opacity specially with the increase in the amount of laser energy and number of laser pulses.

KEYWORDS: Yag Laser Posterior Capsulotomy (Yag LPC), IOP, PCO

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INTRODUCTION

The most frequent long-term side effect of cataract surgery is posterior capsule opacification, sometimes it is also called a "secondary cataract".^{1,2} The most frequent side effects or issues associated with posterior capsule opacification (PCO) are monocular diplopia, low contrast sensitivity, reduced visual acuity, and impaired glare sensitivity. The patient's quality of life is impacted by all of these issues. So it is necessary to treat these problems³.

Now a days the most recommended treatment for posterior capsular opacity after cataract surgery was Nd Yag laser capsulotomy which has a 95% success rate. In the Yag laser capsulotomy, a small circular opening in the visual axis of the posterior capsule is created by applying a series of focal ablations. Although the Yag laser capsulotomy is a safe procedure but still it is associated with certain serious eye complications such as raised intra ocular pressure (IOP), retinal detachment and cystoid macular edema⁴⁻⁵.

The raised intra ocular pressure (IOP) can occur after Yag laser due to a few mechanisms which include trabeculitis caused by shock waves, in which the debris that released obstruct the trabecular mesh work. The additional processes include pupillary obstruction, neovascular mechanism, and inflammatory swelling of the ciliary body or iris root related to the angle closer.⁶

Sometime the Yag laser may also associated with the shift of the position of the intra ocular lens and this shift will cause a change in the effective power of the lens and finally change the refractive power of the patient. So as to achieve the best vision the patient then need refraction⁷,

While the complication of cystoid Macular edema is occurred by movement in the

vitreal cavity, disruption of the blood aqueous barrier and the release of inflammatory mediators.⁸ With incidences ranging from 0% to 3.6%, retinal tears and detachments are other recognized complications following Nd:YAG capsulotomy.⁹

The purpose of this study was to compare the intraocular pressure changes in patients with posterior capsular opacity, which can develop following cataract surgery, before and after Yag laser capsulotomy.

MATERIAL AND METHODS

This was a descriptive study which was done on the subjects of posterior capsular opacity (PCO) in the department of ophthalmology Hayatabad Medical Complex Peshawar. It was conducted from August 2022 to January 2023.

Inclusion criteria of the study were:

1. All patients above 20 years of age and history of 3 months post cataract surgery were included in the study.
2. Clear cornea
3. Posterior chamber IOL
4. Intra ocular pressure (IOP) range from 11 to 21mmHg before yag laser

Exclusion criteria:

1. Previous history of glaucoma
2. History of traumatic cataract surgery
3. Previous history of uveitis

All the patients were examined before the yag laser capsulotomy by checking the visual acuity, slit lamp examination of the anterior segment and intra ocular pressure was also measured with gold Mann applanation tonometer by applying topical anesthetics, oxybuprocaine 0.4% drops and fluorescein strips after dilating the pupil with tropicamide 1% eye drops. The intra ocular pressure (IOP) was measured before,

immediately after, one hour and seven days after yag laser capsulotomy. The amount of laser energy and the number of pulses during yag laser capsulotomy were also entered in the proforma.

All the findings were documented in the pre design proforma and the data was analyzed by using SSPS software. The level for significance was p values of 0.05 were used.

RESULTS

Total 80 patients were included, 48(60%) men and 32(40%) women. The age was range from 20 to 70 years. Out of 80 patients, 60(75%) cases were operated by extra-capsular extraction and in 20(25%) patients the lens was removed by phacoemulsification.

The mean intra ocular pressure (IOP) changes before, immediately, one hour and seven days after Yag laser capsulotomy is given in table 1.

While the mean difference in intra ocular pressure with the amount of energy and laser pulses is given in table 2 and figure 3.

In 35(43.7%) cases there was a total energy consumption of ≤ 50 mJ during the procedure, while in 45(56.3%) cases >50 mJ total energy was used. There was a significant correlation between higher energy use and higher IOP immediately after the laser and at 1 hr i.e. (2.09 & 1.82, $p < 0.001$), however this effect was not seen at 7 days 0.32, $p = 0.057$). Table-1

The mean IOP is: 12.91 ± 1.5 mmHg before posterior capsulotomy; then immediately after laser: 15.79 ± 2.5 mmHg; after one hour: 15.73 ± 2.1 mmHg; and at 7 days: 13.95 ± 1.6 mmHg (Table 2).

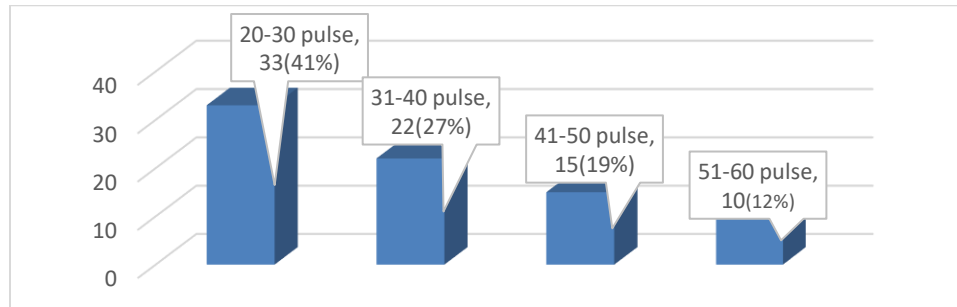
The most laser pulse interval used is 20-30 pulses in 33(41.2%) cases, followed by 31-40 pulse in 22(27.5%) cases, 41-50 pulses in 15(18.7%) cases and 51-60 pulses in the remaining 10(12.5%) cases, there is no significant relationship between the number of pulses emitted and the rise in IOP at one hour after Nd-yag LPC ($p = 0.213$).

Table-1: Mean \pm SD of Intraocular Pressure

IOP	Mean (mmHg)	\pm SD (mmHg)	P value
Before laser	12.91	1.5	
Immediately after	15.79	2.5	<0.001
After 1 hour	15.73	2.1	<0.001
7 days	13.95	1.6	<0.001

Table-2: comparison of change in IOP before and after laser

IOP	≤ 50 mj	Difference	>50 mj	Difference	P value
Before laser (preop)	14.51	0.5	13.90	2.09	0.001
Immediately after	15.01		15.99		
After 1 hour	14.98	0.47	15.72	1.82	0.001
After 7 days	14.58	0.07	14.22	0.32	0.057

Figure3: Number of laser pulses

DISCUSSION

In simple ECCE, PCO is the most frequent late complication. Generally, older patients at the time of surgery are at higher risk of having a posterior capsulotomy. The reason for this could be linked to the decline of lenticular hyperplasia with age ¹⁰. The prevalence of after-cataract has increased significantly due to the fact that over half of patients acquire an opaque posterior capsule following ECCE. In order to prevent posterior capsule opacity, several techniques can be used. A vacuum is used to clean the capsule's interior and a polish is applied to it. Through the use of laser ridges and convex posterior surfaces, Elschning's pearls have been mechanically prevented from forming. There are several types of posterior capsule opacification:

Primary opacification: A remnant posterior subcapsular plaque composed of soft, transparent cortex attached to the posterior capsule. In addition to being partially absorbed by the aqueous's action, it frequently shuts down due to the leftovers adhering to the posterior capsule. Elsching Pearls and fibrous membrane are other types of opacification. ¹¹

It is important to note that opacity observed under either oblique or retro-illuminated conditions do not always imply low visual acuity. For determining the significance of

capsular opacity, the following three factors need to be considered:

The opacification has a slit-lamp appearance. The second requirement is a decline of at least two lines on the Snellen chart. A macula appearance assessment is used to evaluate visual potential in the third step. This subsequent opacification of the posterior capsule is treated with the Yag laser. Solid state lasers produce infrared light with a wavelength of 1064 nm that cannot be seen by the human eye. As a result of the Yag laser's pulsed mode, Rapid delivery of a significant amount of energy to a specific place; rather than producing heat, it produces a very localized plasma. Cutting or perforating can be done precisely where necessary while preserving nearby tissues. A posterior capsulotomy can be performed as an outpatient, non-invasive procedure ¹².

In light of the fact that the mechanism behind the spike in IOP following Yag LPC remains unknown, a number of hypotheses have been suggested to explain the temporary rise in IOP after Yag LPC. There are several possible causes:

As a result of aqueous debris (released lens material) getting stuck in Schlemm's canal internal pores or juxta-trabecular meshwork, outflow resistance may increase ¹³. This

releases neuropeptides and increases intracranial pressure. Radiation from shock waves can also cause trabeculitis. When the anterior vitreous face is moved by the Yag LPC, pupillary obstruction may cause an increase in IOP ¹⁴.

IOP increases after posterior Yag LPC varied significantly after one hour, one day, and seven days. Based on our research, we accept with Covell L et al's ¹⁵ 2016 findings that IOP significantly increased after 1 hour and 7 days. In addition, our results are consistent with those obtained in 2016 by Glain M et al after 1 hour and 7 days. ¹⁶ In our study, two patients had IOP values exceeding 22 mmHg one hour after laser treatment because they had IOP values greater than 18 mmHg before capsulotomy, which required hypotonizing monotherapy using beta-blockers with IOP values adjusting to the control after seven days.

On the other hand, Armaly M ¹⁷ asserts that with an intact capsulorhexis over the lens optic rim, the trabecular meshwork in eyes treated with the phacoemulsification technique is not obstructed by cellular debris or vitreous because there is no communication between the aqueous and vitreous compartments. The ECCE approach (manual or phacoemulsification) does not offer a protective effect as a result of our series. Although some studies, like the one by Minello A ¹⁸, have employed 0.5% timolol eye drops to minimize rises in IOP, they do not provide complete protection. Although glaucomatous individuals are more likely than nonglaucomatous patients to need long-term supplemental care after laser capsulotomy, they were excluded from our study.

CONCLUSION

It was concluded that intra ocular pressure (IOP) is significantly rise after yag laser capsulotomy for posterior capsular opacity

specially with the increase in the amount of laser energy and number of laser pulses.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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CONFLICT OF INTEREST: No competing interest declared.

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