Changes of Intra Ocular Pressure After Nd: Yag Laser Capsulotomy in Rangpur Medical College Hospital

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Abstract

Background:
Posterior capsule opacification is the most common disabling sequelae of modern cataract surgery. In Bangladesh we are practicing Nd: YAG laser capsulotomy in treating posterior capsule opacification.

Objective:
This study was carried out to evaluate intraocular pressure before and after performing Nd: YAG laser capsulotomy in posterior capsular opacification.

Methods:
A prospective study conducted at Ophthalmology Department, Rangpur Medical College Hospital from July to December 2018 focused on diagnosing and treating posterior capsular opacification with Nd: YAG laser of 50 patients. Patients underwent thorough ophthalmic evaluations before receiving laser treatment by a consultant ophthalmologist. Key information including patient details, pre-laser IOP measurements, laser parameters, and post-procedure IOP measurements were recorded after 60 minutes, 24 hours, 7 days, 14 days, 30 days in a specially designed proforma.

Results:
The baseline average IOP was 13.24. After one hour of ND: YAG Laser capsulotomy, 41 patients (82%) had raised IOP. There were no changes in IOP in 9 patients (18%). Six of the nine patients were in the 40-60 mj energy group, while three were in the 61-80 mj energy group. All patients who received high energy (81-100 mJ) had a statistically significant rise in IOP. IOP returned to baseline levels within 7 days of ND:YAG Laser capsulotomy with no intervention, and remained normal after 14 and 30 days.

Conclusion:
The result suggested that a transient rise of intraocular pressure occurs almost invariably. High energy level used during Nd:YAG Laser capsulotomy had significantly more chances of raised IOP. But IOP comes to almost baseline within 7 days without any interventions. It is recommended that each patient undergoing Nd:YAG laser capsulotomy should receive minimum amount of energy and patient should be followed up for rise in IOP and managed accordingly.

Keywords: Posterior capsule opacification, Nd:YAG Laser capsulotomy, Laser energy, IOP

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Introduction:

Posterior Capsular Opacification (PCO) is the most common delayed postoperative complication of cataract surgery. The proliferation, migration and abnormal differentiation of residual lens epithelial cells and fibers in the capsular bag have been implicated in the pathogenesis of posterior capsule opacification. The incidence of posterior capsular opacification is highly variable. One study done between 2003 and 2006 in Farabi Eye Hospital, Tehran, Iran reveals the incidence of PCO in those who had undergone cataract surgery at least one

year ago was 10.9%, while it was 22.7% in those who had received surgery at least 4 years ago.[1] In another study conducted at Holy Family Hospital, Rawalpindi, Pakistan from May,2003 to May, 2005 shows that incidence of PCO was 35%.[2] Another study conducted from May 2012 to May 2013 at Khyber Eye Foundation Peshawar, Pakistan shows that frequency was 1.6%, 12.3% and 26.5% at 1, 2 and 3 years respectively after cataract surgery.[3] It has a significant impact on visual acuity and contrast sensitivity. Though surgical capsulotomy is an option of treatment of PCO but the most popular and effective treatment of posterior capsular opacity is Nd:Yag Laser Capsulotomy. This procedure is non-invasive, relatively safer, less time consuming and free from infections but has been associated with complications, like raised intraocular pressure (IOP), IOL pitting, cystoid macular oedema and retinal detachment. Raised intraocular pressure (IOP) remains one of the frequent complications of Nd: YAG laser capsulotomy.[4-6] It is usually acute but transient. The mechanism for the increased IOP is believed to be a decrease in outflow, secondary to the shock wave or entrapment of capsular fragments and debris in the filtration angle. Correlation of the total amount of laser energy used to the rise in IOP following Nd: YAG capsulotomy was rarely evaluated quantitatively in most of the local and international studies. It may be an important factor leading to raised IOP after laser capsulotomy. On the other hand, there are rarely any study in Bangladesh on this field. Therefore, we decided to conduct study on this important but less attended aspect.

Methods:

This prospective study was conducted in the Ophthalmology Department, Rangpur Medical College Hospital, Rangpur, from July 2018 to December 2018 on 50 patients with posterior capsule opacification. Diagnosis of posterior capsular opacification was made from the history taking, symptoms presented by the patients and signs found during examination by an ophthalmologist. All patients were treated with Nd: YAG laser by the same consultant ophthalmologist with the same technique. Name, age, gender, address and contact number of all the selected patients having PCO, were entered in the specially designed proforma. Before performing Nd: YAG laser posterior capsulotomy, all patients underwent a thorough ophthalmic evaluation including the best corrected visual acuity, slit lamp examination, IOP measurement by Goldmann Applanation tonometer, and detailed fundus examination to rule out any pre-existing pathology. Steroid and antibiotic drops were given. No IOP lowering agent was given. The measurement of pre-laser IOP was entered in the proforma. The pupil was dilated with 1% tropicamide eye drops. Proparacaine hydrochloride eye drops were used for topical anaesthesia, one drop 1-2 times about 2-3 minutes before applying contact lens (ABRAHAM CAPS YAG LENS). Nd:YAG laser (Nidek YC1800,Japan) was used for capsulotomy. An opening of 3-4 mm was made in the posterior capsule, by one single consultant ophthalmologist, using minimum possible pulses of Nd: YAG laser, with energy level of 2.0-6 mJ/pulse. The total amount of energy used in YAG laser capsulotomy procedure was noted, as viewed on the control display panel of Nd: YAG laser machine and was recorded in the proforma. IOP was measured after 60 minutes, 24 hours, 7 days, 14 days, 30 days and notes were taken and entered in the proforma. Data analysis was done using SPSS version 20.

Results:

Among the patients, the average age was 64.08 years, 60% of the patients were between 50-60 years age, 30% of patients were between 61-70 years age and 10% of patients were between 70-80 years age. Male was predominant (56%). (Table-I)

Table-I: Demographic characteristics of the patients (N=50)

Demographic characteristics	no. (%)
Age group (years)	
50-60	30(60)
61-70	15(30)
70-80	5(10)
Sex	
Male	28(56)
Female	22(44)

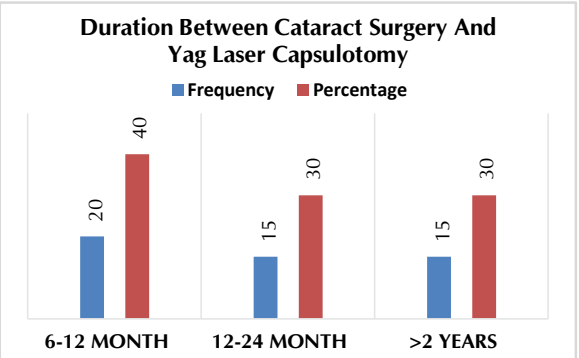

Figure-1:Duration between Cataract Surgery and Yag Laser Capsulotomy (N=50)

Figure-2 showed that 40-60mJ and 61-80 mJ of energy was used in each 40 % patients whereas 20% of patients got 81-100 mJ of energy.

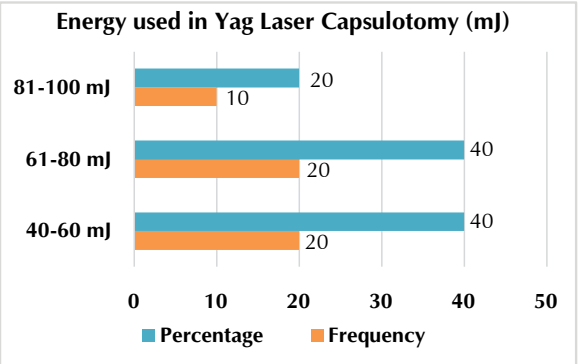

Figure-2: Energy used in Yag Laser Capsulotomy (N=50)

Figure-3 showed that among the 50 patients there were no change of IOP after laser capsulotomy in 9 patients (18%). Elevation of IOP after 1 hour were seen in rest of the patients (82%).

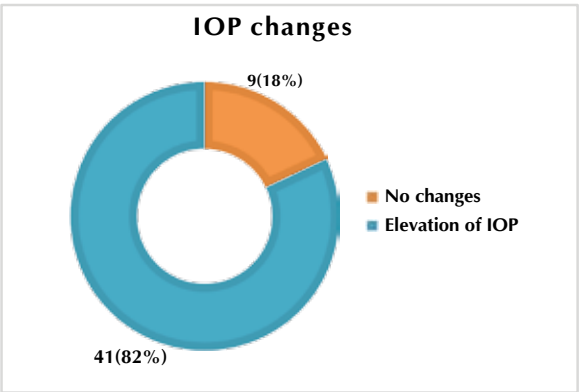

Figure-3: Changes of IOP after laser capsulotomy (N=50)

The baseline average IOP was 13.24. After one hour of ND: YAG Laser capsulotomy, 41 patients (82%) had elevated IOP. In nine patients (18%), the IOP remained unchanged. Six of the nine patients were in the 40-60 mJ energy group, and three were in the 61-80 mJ energy group. All patients who received high energy (81-100 mJ) experienced a statistically significant increase in intraocular pressure. IOP returned to baseline levels within 7 days of ND: YAG Laser capsulotomy with no intervention and remained normal at 14 and 30 days (Table-II).

Table-II: Changes of IOP with respect to time interval after laser capsulotomy and relation to energy used in laser capsulotomy (N=50)

Pre Laser mean IOP	Energy Used in Laser	IOP after 1 hour (p-value)	IOP after 24 hour (p-value)	IOP after 7 Days (p-value)	IOP after 14 Days (p-value)	IOP after 30 days (p-value)
13.24	40-60	15.6 (0.001)*	14.8(0.001)*	13.3(0.649)	13.05(0.201)	13.15(0.309)
	61-80	17.35(0.001)*	15.7(0.001)*	13.45(0.096)	13.15(0.385)	13.25(0.249)
	81-100	18.6(0.001)*	16.8(0.001)*	13.6(0.057)	13.3(0.053)	13.3(0.053)

*=significant

Discussion:

The Study was conducted in Ophthalmology Department, Rangpur Medical College Hospital. A total of 50 patients were included. In this short-term study, the main aim was to evaluate the changes of intraocular pressure after Nd: Yag Laser Capsulotomy and to see the relation between intraocular pressure and different magnitude of burn used in Nd: Yag Laser Capsulotomy.In the study the age limit of the patient was 50 to 80 years. The mean age of the patients were 57.98 years. Among 50 patients 28 patients were male (56%). A similar trend was reported in the study conducted by Hossain MI, et al,[7] there were 330

male patients and 170 female patients out of 500 patients aged from 40-80 years. Male patients with PCO report more in hospitals than female because male need finer vision as they had to work outside for family income. All the patients had undergone SICS+PCIOL.This study includes evaluation of the relationship of YAG capsulotomy with intraocular pressure. IOP elevation is the major complication of Nd:YAG laser capsulotomy.[8] Immediate elevation of IOP is well known and occurs in about one third of eyes and pressure level peak within 1-4 hours and most cases normalize within 24 hours.[9] In our study out of 50 patients, 41(82%) patients showed transient rise in IOP. Gore VS[10] and Maqsood A, et al [11] also concluded transient IOP rise in 59.4% and 56.2% of cases respectively. Flohrl et al[12] and Mohammad YK et al[13] found elevation in >75% and 84% of cases respectively in their studies which is comparable to our study. In our study 9 patients showed no changes of IOP after laser capsulotomy.In a study by Singh M, et al[14] the rise in IOP from baseline at 1 hour, 3 hour, 5 hour and 24 hours post-procedure was not found to be significant in the groups receiving ocular hypotensive drug where as in the groups receiving placebo, the rise of IOP reached statistical significance at 1,3 and 5 hours post-laser which came down to insignificant levels in 24 hours. Different studies had explained various factors for IOP rise after laser capsulotomy which were presence of IOL in the bag or sulcus fixation, baseline IOP, glaucomatous patients, different types of PCO, different timing of IOP recording, capsulotomy size, initial pre-procedure treatment prescribed etc.In the present study pre-laser mean IOP was 13.24. After 1 hour the mean IOP was 15.9 at energy used 40-60mj (p=0.001). Mean IOP after 1 hour was 17.45 at energy 61-80(p=0.001). Mean IOP was 18.6 at energy 81-100 (p=0.001). After 1 day the mean IOP was 14.9 at energy 40-60 mj (0.001). The mean IOP was 15.85 at energy 61-80 mj after 1 day (0.001). The mean IOP was 16.8 at energy 81-100 mj after 1 day (0.001). After 7 days the mean IOP was 13.3 at energy 40-60 mj (p=0.649). The mean IOP was 13.45 at energy 61-80 (p=0.096). The mean IOP was 13.6 at energy 81-100 mj (p=0.057). After 14 days mean IOP was 13.05 at energy 40-60 mj (p=0.201). Mean IOP was 13.15 at energy 61-80mj (p=0.385). The mean IOP was 13.3 at energy 81-100mj (p=0.053). After 30 days the mean IOP was 13.15 at energy 40-60 mj (p=0.309). The mean IOP was 13.25 at energy 61-80 after 30 days (p=0.249). The mean IOP was 13.3 at energy 81- 100 (p=0.053). In this study IOP were raised in 41 patients (82%) after 1 hour of ND: YAG Laser capsulotomy. Significant rise of IOP were seen in all patients where high energy (81-100mj) was used. There was no change of IOP in 9 patients (18%). Among these 9 patients 6 patients were of the group where energy used 40-60 mj and 3 patients were of group where energy used 61-80 mj. Significant rise of IOP were seen in all patients where high energy (81-100mj) was used. Our study corresponds with the studies conducted by Ge J et al[15] and Dawood Z et al[16] where they concluded transient IOP rise within 1-4 hours and 1-3 hours after laser capsulotomy procedure respectively and then declined towards pre-laser IOP value in their study. The result of the current study showed IOP was related to amount of energy used. IOP changes were more common when more energy was used, which agrees with Chanel and Beckman et al study.[17] The more the energy used the more the rise of IOP occurs. In other study it was also found that rise of IOP were related to energy used.[18-20] The IOP were highest after 1 hour of Nd:YAG laser Capsulotomy. IOP were more than baseline but within normal range of IOP. After 24 hours IOP were raised then baseline IOP but it were less than IOP after 1 hour of Nd:YAG laser capsulotomy. IOP was reduced to baseline IOP after 7 in all patients without any intervention.

Conclusion:

It was difficult to compare different studies due to different techniques of cataract surgery and different intraocular lens implant materials, their designs and the thickness of PCO. However, the present results have sufficient grounds to suggest that energy level of Nd:YAG Laser was certainly one of the key factor in the elevation of the IOP.

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