Need of anti-glaucoma drug following Nd-YAG laser capsulotomy

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The Neodymium-Yttrium Aluminum Garnet (Nd-YAG) laser which is used for opening the opacified posterior capsule in a pseudophakic eye is a solid state laser which has a wavelength of 1064 nm and disrupts ocular tissues by an instantaneous release of energy which causes total ionization of the medium and formation of plasma followed by a hydrodynamic shock wave which originates at the energy zone boundary. The temperature at the site of laser contact does not exceed 2*10-30c, which is not harmful to the eye. The procedure also requires no anesthesia and does not involve introduction of any foreign material into the eye. The aiming accuracy, the small diameter of the laser beam(50u) and the use of selector pulses makes Nd-YAG so precise that the risk of damage to the other structures are reduced1.

Today this effective method for opening the opacified post capsule has become the standard of care.

The mechanism proposed is blockage of the trabecular meshwork by capsular and inflammatory debris2. Shock wave induced inflammation to the meshwork appears to contribute to the IOP elevation 3. Gimbel et al4 demonstrated that IOL fixation plays an important role in determining pressure spikes.

MATERIALS AND METHODS

We conducted an observational prospective study between 1stOctober 2015 to 30th of August 2016,on 120 patients with mild to moderate PCO, to know the amount and duration of pressure spike following YAG capsulotomy and if an anti-glaucoma agent is needed to control the same. Patients with known history of glaucoma or ocular hypertension or steroid responder or with history of complicated cataract surgery were excluded from the study.

PCO was graded in three groups, mild, moderate and severe based on the evaluation by retro illumination.

PCO obstructing the red glow when occupying less than 30% were categorized in grade 1(mild), 30-60% were categorized into grade 2(moderate) and more than 60% were grouped in grade 3 (severe). Mild to moderate cases were included in the study.

Intraocular pressure was measured using Goldmann applanation tonometer (GAT) just before, on day 1(next day), day 7 and day 14 subsequently.Pupils were dilated before the laser for grading in all cases. Laser was fired with attenuator at 1 (1mj) and 6-8 shots were fired in cross hair fashion.

The patients were randomized into two groups. The control group was prescribed brimonidine (0.15%) with loteprednol (0.5%) ophthalmic solution in tapering doses for 2 weeks at the end of the procedure. The study group was prescribed onlyloteprednol (0.5%)ophthalmic solution in tapering doses at the end of the procedure.

Doctor performing the yag laser capsulotomy and applanation tonometry was blindfolded about the group status of the patient.

RESULTS

All patients were followed up after 24 hours of Laser to record their visual acuity and IOP. They were also followed up after 1 and 2 weeks for IOP recording. Patients who did not comply with their medication or missed a follow up were excluded from the analysis. Thus first 60 patients from each group who completed the study guidelines were included for analysis.

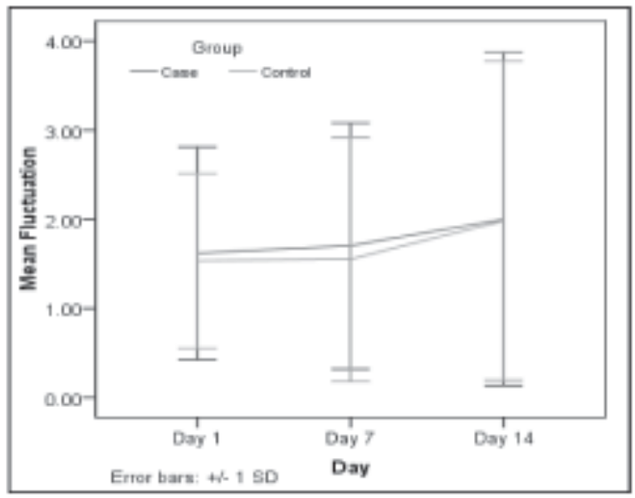
Table 1
Comparison of mean IOP in different days by group

IOP	Mean ± SD			t	p
	Case (N=60)	Control (N=60)	Total (N=120)		
Pre YAG IOP	14.28±2.68	13.93±2.82	14.11±2.75	0.697	0.487
Day 1	15.07±2.76	14.23±2.58	14.65±2.69	1.708	0.09
Day 7	15.22±2.95	14.68±2.9	14.95±2.93	0.998	0.32
Day 14	15.78±2.78	15.28±2.66	15.53±2.72	1.007	0.316

Table 2
Comparison of mean fluctuation of IOP

Fluctuation in IOP	Mean ± SD			t	p
	Case (N=60)	Control (N=60)	Total (N=120)		
Fluctuation Day 1	1.62±1.19	1.53±0.98	1.58±1.09	0.417	0.677
Fluctuation Day 7	1.70±1.38	1.55±1.37	1.63±1.37	0.597	0.552
Fluctuation Day 14	2.00±1.87	1.98±1.79	1.99±1.82	0.050	0.960

Fig. 1: Comparison Mean IOP by group



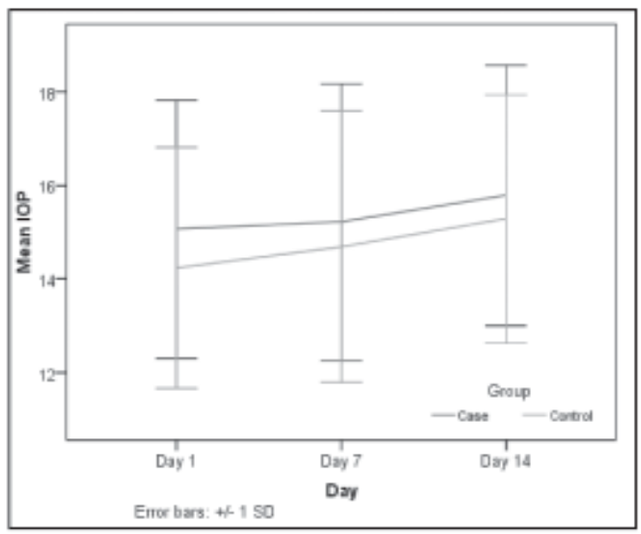


Fig. 2: Comparison Mean Fluctuation in IOP by group

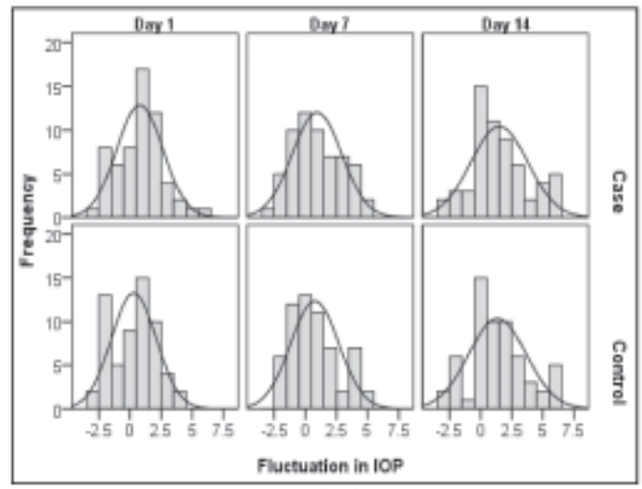


Fig. 3
Frequency distribution (histogram) of Fluctuation in IOP

Table 1

Comparison of mean IOP in different days by group

IOP recorded in 60 cases and 60 control were statistically analyzed using SPSS 16 software. In order to compare the IOP between case and control at each stage of follow up independent sample 't' test was applied to evaluate the significant difference of mean IOP and the fluctuation of IOP between the two groups. With p value >0.05 the difference of the change of IOP between the two groups were found to be statistically insignificant.

DISCUSSION

Review of literature showed several studies that addressed IOP fluctuation following Nd-YAG laser capsulotomy. In the study that we conducted, the IOP fluctuation was not found to be much significant at day 1 and day 7 compared to the baseline values.

Similar studies were done by Slomovic et al5 in which it was proved that patients with no history of glaucoma, the use of prophylactic anti glaucoma medications was not needed since the IOP elevation in the first 24 hrs. appeared to be a self-limited process in uncomplicated cases.

N. Anand et al6 in their study proved that the fluctuation of IOP was more dependent on the position of the intraocular lens in the eye, in pseudophakic cases. While IOP of 'in the bag' fixated group did not show any significant increase, the increase in IOP in the sulcus fixated group or in the haptic in/out group was found to be significant.

The presence of capsular rim following proper continuous curvilinear capsulorrhexis (CCC) and placement of the IOL in the bag obstructs the cellular debris from blocking the trabecular meshwork thus prevents fluctuation of IOP5

Flohr et al7found that a short term IOP elevation after Nd-YAG laser capsulotomy was much more common in glaucomatous eyes than when compared to non-glaucomatous eyes in which a transient elevation was seen in 25% of non-glaucomatous eyes.

With a contraindicating finding Channell MM3 and Awan AA, Kazim SH8 proved significant IOP elevation post YAG laser capsulotomy who were treated with anti-glaucoma medications.

The US Food and Drug Administration report of Nd-YAG capsulotomies, the major complications cited was elevation of IOP9. The maximum increase occurred between 1.5 to 4 hours and usually return to baseline within 24 hrs.

Steinert et al10 had estimated an incidence of glaucoma developing in 1% - 6% of patients after capsulotomy.

Leys et al11 studied 67 eyes of 65 patients for a span of 2 months' post capsulotomy and documented a statistically significant decrease in IOP compared with the pre capsulotomy IOP.

CONCLUSION

No significant rise of IOP was observed after Nd-YAG laser post capsulotomy. So it is recommended that every patient who undergo Nd-YAG laser capsulotomy should receive minimum possible laser energy and anti-glaucoma medication be reserved for high risk group and not needed prophylactically in all cases.

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