Need of Anti-Glaucoma Drug Following Nd-YAG Laser Capsulotomy

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ABSTRACT

Objective: Study to evaluate the need of an intra-ocular pressure (IOP) lowering topical agent after Neodymium-Yttrium Aluminum Garnet (Nd-YAG) laser capsulotomy.

Methods: 120 patients with mild to moderate posterior capsular opacification (PCO) were randomized into two groups; one group was prescribed brimonidine (0.15%) at the end of the procedure with loteprednol (0.5%) in tapering doses. The other group was prescribed only loteprednol in tapering doses. IOP was measured using applanation tonometer just before the procedure, on day 1, 7, 14 subsequently. Any patient with known history of glaucoma or ocular hypertension or steroid responder were excluded. Patients with history of complicated cataract surgery were also excluded. Laser was fired with attenuator set at 1(1mj), 6-8 shots in a cross-hair fashion.

Results: Immediate day 1 showed a mean fluctuation of (1.62+1.19) mm hg in the study group and (1.53+0.98) mm hg in control group. Normal levels on day 7, 14 in both groups.

Conclusion: IOP lowering agents are not required in YAG capsulotomy if cases are properly selected.

Keywords: Nd-YAG, Anti-Glaucoma, IOP, Topical Steroids.

INTRODUCTION

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*10³°C, 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 reduced.¹

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 debris.² 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 1st October 2015 to 30th of August 2016, on 120 patients with mild to moderate posterior capsular opacification (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.

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 only loteprednol (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.

IOP recorded in 60 cases and 60 controls 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.

### Table 1: Comparison of mean IOP in different days by group

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

### Table 2: Comparison of mean fluctuation of IOP

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

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 al 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 al 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 IOP. Flohr et al. found 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 MM and Awan AA, Kazim SH 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 IOP. The maximum increase occurred between 1.5 to 4 hours and usually return to baseline within 24 hrs.

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

REFERENCES

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