ABSTRACT

OBJECTIVE: To determine the efficacy of 0.5% levobunolol in preventing acute rise in intraocular pressure after Neodymium-Yttrium-Aluminum-Garnet (Nd: YAG) laser posterior capsulotomy.

STUDY DESIGN: A Quasi experimental study.

PLACE AND DURATION: Department of Ophthalmology, Sir Ganga Ram Hospital, Lahore. One year from 1st August 2006 to 31st July 2007.

METHODOLOGY: Sixty patients were selected and randomly divided into two equal groups (A and B). One hour before capsulotomy, in group A patients, one drop of 0.5% levobunolol was instilled whereas in group B, patients received one drop of placebo drug (polyvinyl alcohol 1.4% with povidone 0.6%). Immediately after capsulotomy, these drugs were repeated. The IOP was measured 1, 3 and 24 hours postoperatively and at the end of first week.

RESULTS: In the levobunolol group (group A), the mean Intra ocular pressure after one hour and three hours was significantly lower (P=0.001) than in the placebo group (group B). After 24 hours and after one week there was no statistically significant difference (P>0.05) in the mean intra ocular pressure, of the two groups.

CONCLUSION: 0.5% levobunolol, given prophylactically, is an effective drug for acute intra ocular pressure rise following Nd: YAG laser posterior capsulotomy.


INTRODUCTION

Cataract is the leading cause of loss of vision in the world and surgical treatment involving intraocular lens implantation following cataract extraction is the only treatment option for visually significant cataract.\(^1\) In all of the surgical procedures the posterior capsule as well as a rim of anterior capsule is left intact. This helps in-the-bag placement of intraocular lens and the posterior capsule acting as a barrier between anterior and posterior segments of the eye.\(^7\) The only disadvantage of leaving posterior lens capsule intact is its subsequent opacification thereby decreasing postoperative visual acuity and hence is also termed “after cataract”. It is caused by migration and proliferation of residual lens epithelial cells from the equatorial region of the capsular bag.\(^24\)

Nowadays the standard treatment to restore the visual acuity is to open the posterior capsule using a neodymium: yttrium aluminum garnet (Nd:YAG) laser.\(^1\) The basic mechanism of Nd:YAG laser is photodisruption. The laser shot produces extreme heat along with an acoustic shock wave which disrupts the posterior capsule and creates an opening in it.\(^1\) One of the complication of Nd:YAG capsulotomy is an acute postoperative rise in the intraocular pressure (IOP). This acutely raised intraocular pressure can damage the optic disc resulting in loss of central field, and visual field deterioration or both.\(^4\) The acute rise of intraocular pressure is mainly caused by mechanical obstruction of the trabecular meshwork by the dispersed debris during the procedure.\(^7\)

Various pharmacologic agents have been tried to decrease the incidence and severity of intraocular pressure rise after YAG capsulotomy. These include beta adrenergic antagonists (beta-blockers), alpha2 adrenergic agonists, miotics, and carbonic anhydrase inhibitors.\(^4\) Beta-blockers cause a decrease in intraocular pressure by reducing the secretion of aqueous humor by ciliary epithelium. Levobunolol is a topical beta-blocker that has a selective action on eye than on pulmonary
system. Its effect on aqueous secretion starts one hour after instillation and reaches its peak at about 2-6 hours. Beta-blockers including levobunolol are preferred agents for lowering intraocular pressure after YAG capsulotomy. This study was performed to determine the effect of levobunolol on the acute rise of intraocular pressure after YAG capsulotomy and to evaluate its efficacy in lowering this spike of intraocular pressure.

METHODOLOGY

The study used the quasi experimental study design in which sixty patients were selected from ophthalmology department, Sir Ganga Ram Hospital Lahore and they were divided into two groups (A and B) by simple randomization using lottery method. Informed consent was obtained from the patients. All the patients were undergone ophthalmic assessment of both eyes including visual acuity, un-dilated fundus examination, slit lamp anterior segment biomicroscopy and applanation tonometry (baseline intraocular pressure).

One hour before capsulotomy, in group A patients, one drop of 0.5% levobunolol was instilled whereas in group B, patients received one drop of placebo drug (polyvinyl alcohol 1.4% with povidone 0.6%). One drop of Proparacaine hydrochloride 0.5%, was instilled a few minutes prior to laser application as topical anaesthesia. Abraham YAG laser capsulotomy contact lens (by ocular instruments inc. USA) was used and a Q switched Nd:YAG laser machine (model: NANOLAS® by Biophysic Medical, France) utilized for performing Nd:YAG posterior capsulotomy. An opening of about 2-3 mm in the center of the opacified capsule is created using minimum laser energy.

Immediately after capsulotomy one drop of levobunolol was repeated in group A patients and placebo drop was repeated in group B patients. The Intraocular pressure was measured at 1, 3 and 24 hours postoperatively and at the end of first week and was recorded on the proforma. All the patients were also given combination of dexamethasone 0.1% and tobramycin 0.3% one drop twice a day for the following one week.

In placebo group (group B) the patients developed an IOP of greater than 30 mm of Hg and were immediately treated with additional anti glaucoma drugs to lower their IOP to normal level.

DATA ANALYSIS: SPSS version was used 10 and data analysis accordingly. The study variables were age, sex, time interval between cataract surgery and capsulotomy, average energy of YAG laser applied, number of laser shots applied and IOP at baseline, after one hour, after three hours, after 24 hours and after one week to compare the significance between the two groups. P<0.05 was considered as significant.

RESULTS

Sixty patients were enrolled for the study and they were divided into two groups (A and B) the mean age of the patients in group A was 62.30±8.71 years and mean age in group B was 60.23±10.86 years. In group A, there were 18 (60%) male patients and 12 (40%) female patients and in group B, there were 17 (56.7%) male patients and 13 (43.3%) female patients.

In group A, the mean time interval between cataract surgery and capsulotomy was 11.87±3.95 months and in group B, the mean time interval between cataract surgery and capsulotomy was 11.63±3.94 months with not significant p value of 0.80.

In group A, the mean average energy of YAG laser applied was 2.83±1.16 mJ (millijoules) and in group B, the mean average energy of YAG laser applied was 2.91±1.13 mJ with not significant p value of 0.78.

In group A, the mean number of shots applied was 13.60±4.28 shots and in group B, the mean number of shots applied was 12.47±4.42 shots with not significant p value of 0.32.

In group A, the mean intraocular pressure (IOP) at baseline was 13.63±2.11 mmHg and in group B, the mean IOP at baseline was 13.77±2.01 mmHg with not significant p value of 0.81 (Table - I).

In group A, the mean IOP after one hour was 18.33±4.78 mmHg and in group B, the mean IOP after one hour was 23.93±4.42 mmHg with significant p value of 0.001. In group A, the mean IOP after three hours was 23.46±2.08 mmHg and in group B, the mean IOP after three hours was 23.80±4.62 mmHg with significant p value of 0.001. In group A, the mean IOP after 24 hours was 13.46±2.53 mmHg and in group B, the mean IOP after 24 hours was 13.60±2.53 mmHg with not significant p value of 0.82. In group A, the mean IOP after one week was 13.06±1.48 mmHg and in group B, the mean IOP after one week was 13.37±1.52 mmHg with not significant p value of 0.44 (Table II).

| TABLE-I: DISTRIBUTION OF PATIENTS BY BASELINE INTRAOCULAR PRESSURE (N=60) |
|-----------------------------|-----------------------------|-----------------------------|
| IOP (mmHg) | Group A (n=30) | Group B (n=30) |
| 11-15 | 20 (66.7%) | 25 (83.3%) |
| 16-20 | 10 (33.3%) | 5 (16.7%) |

Key: 
SDStandard deviation 
IOPIntraocular pressure
Levobunolol is safe and effective prophylaxis against these IOP spikes after Nd: YAG laser treatment, thereby reducing the incidence of IOP spikes/or lowered IOP if it happens. In the present study we evaluated the effect of 0.5% levobunolol in preventing the acute IOP elevation in patients undergoing Nd: YAG laser posterior capsulotomy for posterior capsule opacification post cataract surgery. The mean age of patients in this study was 61 years. In the study conducted by Awan et al8 the mean age of the patients was 63.6 years. The mean baseline IOP in group A was 13.63±2.11 mmHg and in group B was 13.77±2.01 mmHg. According to Latif et al8 the mean baseline IOP in group A was 12 mmHg and in group B was also 12 mmHg.

In our study, after one hour follow up the mean IOP increased 4.70±2.67 mmHg in group A and 10.16±2.41 mmHg in group B (Table II). According to the study of Ladas et al, after one hour follow up the mean IOP increased 1.1±3.6 mmHg in dorzolamide group, 1.3±3.1 mmHg in acetazolamide group and 5.3±6.9 mmHg in placebo group. We observed greater rise in IOP in both the groups, but even then the rise in IOP in levobunolol group was significantly lower than that of placebo group.

In our study, after three hours follow up the mean IOP increased 4.47±2.18 mmHg in group A and 10.03±2.61 mmHg in group B (Table II). According to the study of Ladas et al, after three hours follow up the mean IOP increased 1.8±3.8 mmHg in dorzolamide group, 1.5±2.8 mmHg in acetazolamide group and 6.0±4.0 mmHg in placebo group.

In our study, after twenty four hours follow up the change in mean IOP was −0.17±0.03 mmHg in group A and −0.17±0.05 mmHg in group B (Table II). As compared to the study of Ladas et al after twenty four hours follow up the mean IOP increased 0.3±1.9 mmHg in dorzolamide group, 0.3±1.6 mmHg in acetazolamide group and 0.7±2.0 mmHg in placebo group.

These findings support the idea that 0.5% levobunolol is effective and safe option as prophylactic medication for Nd: YAG laser posterior capsulotomy. We also noted that the IOP elevation occurs during the initial few hours after Nd:YAG laser posterior capsulotomy and after 24 hours the IOP becomes normalized. Therefore, there is no need to frequently repeat the medication and only two doses one given one hour before the procedure and the second one given immediately after capsulotomy are sufficient to serve the purpose.

CONCLUSION

It is concluded from this study that 0.5% levobunolol, given prophylactically, is an effective drug for acute intraocular pressure rise following Nd:YAG laser posterior capsulotomy.

REFERENCES


10. Latif E, Khalid M, Aaqil M, Aasi NA. Use of topical apraclonidine to prevent intraocular pressure elevation.