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A STUDY TO COMPARE THE EFFECTIVENESS OF TIMOLOL 0.5% VERSUS BRIMONIDINE 0.2% FOR CONTROL OF RISE IN INTRAOCULAR PRESSURE AFTER ND-YAG LASER CAPSULOTOMY

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ABSTRACT

PURPOSE: A study to compare the effectiveness of Timolol 0.5% eye drops versus Brimonidine 0.2 % eye drops for control of rise in intraocular pressure after Nd-YAG laser capsulotomy.

STUDY DESIGN: Randomized controlled trial.

METHODS: The study was done on 80 patients (one eye of each patient) of age group 45 to 70 year with posterior capsular opacification planned for Nd-YAG laser capsulotomy in the Department of Ophthalmology Mathuradas Mathur Hospital (Dr S. N. M. C.) Jodhpur. Patients were divided into two groups X and Y of 40 each. The baseline intraocular pressure of all patients was measured by applanation tonometer before instillation of eye drops. Group X instilled one drop of Timolol 0.5% and group Y instilled 1drop of Brimonidine 0.2% one hour before capsulotomy. Intraocular pressure was noted 1 and 4 hour after the laser procedure.

RESULTS: There were 40 patients in each group. The baseline IOP was 16±2.16 for group X, and 15±2.56 for group Y. There was no statistically significant reduction between the two groups in the mean IOP changes at 1 hour after Nd-YAG laser capsulotomy but after 4 hours, the mean reduction in IOP was -1.54 mmHg for group X and -1.85 for group Y ($p<0.5$).

CONCLUSION: Our study revealed that both Timolol 0.5% eye drops and Brimonidine 0.2% eye drops are comparatively equally effective in controlling raised intraocular pressure after Nd-YAG laser capsulotomy.

KEYWORDS :

INTRODUCTION

Posterior capsular opacification (PCO) is the most frequently occurring complication of extra-capsular cataract surgery techniques including phacoemulsification and small incision cataract surgery. It is the most common cause of diminished postoperative vision.[1] Posterior capsular opacification is caused by a proliferation of epithelial cells of lens, which leads to fibrotic changes and crumpling of the posterior capsule. [2, 3, 4, 5] Nd-YAG laser capsulotomy is considered as standard treatment for PCO and has been found to be an effective method.[6] Acute but transient rise in intraocular pressure (IOP) is a frequent complications of Nd-YAG laser capsulotomy.[7] Mean intraocular pressure (IOP) peaked by three hours with a mean increase of 13 mmHg, remained elevated by 5 mmHg at 24 hours but returned to baseline by one week.

MATERIALS AND METHODS

The study was done on of 80 patients (one eye of each patient) with posterior capsular opacification planned for Nd-YAG laser capsulotomy in the Department of Ophthalmology Mathuradas Mathur Hospital (Dr S. N. M. C.) Jodhpur .The study period was from December 2019 to February 2020. Patients of age group 45 to 70 of both genders, with non glaucomatous eyes, vision less than 6/24 and cataract surgery with PCIOL within 6-12 months were included. Patients with history of surgery for traumatic cataract, pseudo-exfoliation and pigmentary glaucoma, open or closed angle glaucoma, uveitis and prior use of corticosteroids for long time were excluded from the study.

The name, age, gender, contact numbers were noted of all patients included in study. After taking written informed consent where the benefits and side effects of both Nd-YAG laser capsulotomy and use of Timolol and Brimonidine were described to the patient, ophthalmic evaluation was done. The ophthalmic examination included: BCVA (best corrected visual acuity), slit lamp examination, intraocular pressure measurement and fundus examination after dilating the pupil with 1% tropicamide to rule out any pathology.

The selected patients were divided into two groups of 40 each. The baseline intraocular pressure of all patients was measured by applanation tonometer before instillation of eye drops . Group X instilled one drop of Timolol 0.5% and group Y instilled 1drop of Brimonidine 0.2% one hour before capsulotomy. Topical anesthetic (proparacaine hydrochloride) eye drop was instilled one drop 1-2 times about 2-3 minutes before Nd-YAG laser. The power in mJ and the number of shots for each patient was decided on the basis of thickness of PCO. Central 3-4 mm papillary area was cleared in the posterior capsule by one single ophthalmologist. The total amount of energy used in YAG laser capsulotomy procedure was recorded, as viewed on the control display panel of Nd-YAG laser machine. Intraocular pressure was noted 1 and 4 hour after the laser procedure.

Intraocular Pressure Measurement:

Intraocular pressure was measured by use of Goldman applanation tonometer which is based on Imbert-Fick law (pressure inside globe is equals the force necessary to flatten its surface divided by the area of flattening i.e. P=F/A).

Data analysis:

The collected data was analyzed by SPSS computer software. The comparison of two groups was done using Chi-Square test. P value equal or less than 0.05 was considered statistically significant.

RESULTS

A total of 40 patients were selected in each group. The mean age was 57.50 in group X and 58.66 in group Y. The baseline IOP was 16±2.16 for group X, and 15±2.56 for group Y. There was no statistically significant reduction between the two groups in the mean IOP changes at 1 hour after Nd-YAG laser capsulotomy but after 4 hours, the mean reduction in IOP was -1.54 mmHg for group X and -1.85 for group Y ($p<0.5$).

Changes in IOP at 1 and 4 hour

	Baseline IOP(mmHg)	Change in IOP at 1 hour(mmHg)	Change in IOP at 4 hour(mmHg)
Group X	16	0.42	-1.54
Group Y	15	0.45	-1.85

DISCUSSION

Posterior capsular opacification (PCO) is one of the most frequent visually disabling complications of cataract surgery. Nd-YAG laser capsulotomy is the standard treatment for PCO.[6] Although non-invasive and good safety profile, capsulotomy can many complications can occur after Nd-YAG capsulotomy, like acute transient rise in IOP, IOL damage, uveitis, subluxation of IOL and even cystoid macular edema.[8] The most important complication of posterior capsulotomy is increased IOP because raised IOP may have damaging effect to optic nerve, especially if it is already susceptible or compromised. It has been reported in several studies that rise in IOP generally reaches its peak within the first three hours after laser treatment.[9] Many IOP lowering agents have been tried to decrease the incidence and severity of IOP rise after Nd-YAG laser posterior capsulotomy with varying degree of success.[10]

Timolol is a non-selective beta blocker that lowers IOP by reducing aqueous humour production. It's time of onset of action is 10-20 minutes of administration and lasts for at least 24 hours with peak action at 2-3 hours. Side effect of Timolol are mainly systemic (cardiac and pulmonary) rather than local (burning sensation and redness).[11]

Brimonidine is a selective alpha 2 adrenergic agonist which decreases IOP by reducing the aqueous humour production as well as enhancing the uveo-scleral outflow. Brimonidine causes allergic reaction and drowsiness but having no effect on cardiac and pulmonary functions.[11]It has its peak of action at 3-4 hours. In our study, the mean age of the patients included in the Timolol group was 57.50 years and in the Brimonidine group was 58.66 years. At baseline measurement, mean IOP in group A was 16 mmHg and in group B it was 15 mmHg. The difference between the two groups was not statistically significant.

In the Timolol group, a slight rise in the mean IOP was seen at the end of 1st hour but when this value was compared to the baseline the difference was not statistically significant.IOP reduction was observed after 4 hours of the procedure and the difference was statistically significant when compared from baseline In the Brimonidine group, slight rise in the mean IOP at the end of 1st hour was observed but when this value was compared to the baseline mean IOP the difference was not statistically significant. The IOP reduction was at 4 hours after laser procedure and the difference when compared from the baseline was statistically significant. Chen et al also found a reduction in mean IOP from baseline in the Brimonidine group from 1st hour till 24 hours and reported point of maximum IOP reductionl to be 24 hours after laser procedure When two groups were studied for their IOP lowering efficacy it was observed that after the end of 4th hour 1.54 mmHg reduction of IOP in the Timolol group and 1.85mmHg reduction in the Brimonidine group was observed.

CONCLUSION

This study revealed that both topical Brimonidine and Timolol were effective in preventing rise in IOP after capsulotomy when given as a single dose administration 1 hour before Nd-YAG laser capsulotomy. Moreover considering that both the drugs are safe, topical Brimonidine 0.2% may be considered to have better IOP lowering effect after Nd-YAG laser capsulotomy as compared to Timolol 0.5%.

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