Original Article

Efficacy of 0.5% Timolol Maleate and 0.2% Brimonidine Tartrate in Control of Raised Intra Ocular Pressure after Neodymium Yttrium Aluminium Garnet Laser Capsulotomy

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ABSTRACT

Objective: To compare the efficacy of 0.5% timolol maleate and 0.2% brimonidine tartrate with respect to the reduction in intra ocular pressure after Neodymium YAG laser capsulotomy.

Study Design: Randomized Controlled Trial study

Place and Duration of Study: This study was conducted at the Department of Ophthalmology, Ayub Teaching Hospital Abbottabad for 8 months from 1st November, 2021 to 30th June 2022.

Materials and Methods: The sample size was 60 (30 patients in each group) selected from eye OPD using consecutive sampling. Data was collected on a specially designed proforma. Data analysis was done using SPSS 20.0.

Results: The mean age of study participants was 60.82±6.96 years with 26(43.33%) males and 34(56.67%) females. The efficacy of the timolol maleate was 25(83.3%) while efficacy of brimonidine tartrate was 14(46.6%) for reduction in intraocular pressure with a significant difference between the groups (p= 0.003)

Conclusion: Timolol maleate was found to be superior in controlling spikes of raised intraocular pressure as compared to brimonidine tartrate. However when efficacy was stratified by age and gender of study participants, no statistically significant association was noted.

Key Words: Brimonidine, Efficacy, Intraocular pressure, Timolol

Citation of article: Maaz ul Haq Q, Aaqil B, Nazneen Z, Siddiqi A, Faisal Z, Salam Z. Efficacy of 0.5% Timolol Maleate and 0.2% Brimonidine Tartrate in Control of Raised Intra Ocular Pressure after Neodymium Yttrium Aluminium Garnet Laser Capsulotomy. Med Forum 2023;34(4):30-32.

INTRODUCTION

Among the various causes of blindness and visual impairment globally, cataract is a leading cause with 6.0% prevalence rate above 50 years of age.[1] The occurrence of cataract surgery has markedly increased internationally over the past years[2] .Cataract surgery comes up with many complications, the most common being Posterior capsular opacification(PCO).

Within three years after phacoemulsification, PCO happens as a late sequel in about one-third of eyes.[3] For this complication, the treatment of choice in adults remains Neodymium: Yttrium Aluminium Garnet (YAG) laser capsulotomy. However, this treatment itself presents with many clinical consequences such as rise in intraocular pressure, cystoid macular edema, intraocular lens dislocation and retinal detachment.[4]

Raised intra ocular pressure following YAG laser capsulotomy is usually transient but in patients susceptible to glaucoma may end up with visual field loss[5]. It is a routine practice in post YAG laser capsulotomy treatment protocols to give Anti glaucoma drugs to prevent rise in intra ocular pressure like alpha agonists (brimonidine), diuretics like Dorzolamide, beta blockers (Timolol) and latanoprost.[6,7]

In a study conducted in Lahore, the effectiveness of timolol maleate in reduction of intraocular pressure was 71.43% while effectiveness of brimonidine tartrate was 34.29%. [8]

Timolol maleate and brimonidine are relatively cheaper but effective drugs for reduction in raised intra ocular pressure. Their efficacy has not been studied in the local population so the objective of this study is to compare the effects of two anti-glaucoma drugs with respect to the reduction in intra ocular pressure after Nd: YAG laser capsulotomy. The results of the study will help us to form protocol for using the most

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Received: November, 2022
Accepted: February, 2023
Printed: April, 2023

effective anti-glaucoma drug for maintaining intra ocular pressure. Therefore, it will benefit both patients and health system by reducing the expenditure that is encountered in terms of use of drugs which are less effective and costly.

MATERIALS AND METHODS

It was 8 months randomized controlled trial conducted in ophthalmology department of Ayub Teaching Hospital Abbottabad from 1st November, 2021 to 30th June 2022. The sample size was 60 (30 in each group) calculated by using WHO software based on 5% significance level and 80% power. In a previous study, 71.43% proportion of patients showed effective control of intra ocular pressure with 0.5% timolol maleate and 34.29% with 0.2% brimonidine tartrate.[8] Non probability consecutive sampling technique was used for selection of patients.

The study was started after approval from Hospital Ethics Committee. Patients aged 40 to 70 years with posterior capsular opacification were selected after taking informed consent for Nd: YAG laser capsulotomy. Patients who had Nd: YAG laser for some other purpose like iridotomy, history of traumatic or other complicated cataract extraction, uveitis, glaucoma, pseudo exfoliation, pigment dispersion syndrome, retinal detachment and use of current or previous steroids were excluded. Using blocked randomization, patients were divided into group A receiving 0.5 % timolol maleate and group B receiving 0.2% brimonidine tartrate. Instillation of medicine was done 1 hour prior to procedure and recording of intraocular pressure was done at 3 and 24 hours after procedure by using a tonometer. Effectiveness was labeled as rise of less than or equal to 5 mmHg of intra ocular pressure from the baseline.

Data analysis was done using SPSS 20.0. Quantitative variables such as age and intraocular pressure were determined as mean ± standard deviation. Categorical variables such as gender and effectiveness were described as frequencies and percentages. Difference in efficacy was determined by using chi-square test at 5% level of significance. Efficacy was stratified by age and gender to deal with effect modifiers. Post stratification chi-square test at 5% significance was used.

RESULTS

The mean age of study participants was 60.82±6.96 years with 26(43.33%) males and 34(56.67%) females. The mean intraocular pressure 1 hour before procedure was 13.50±2.51mmHg while post procedure it was 18.18±2.51mmHg after 3 hours and 17.50±3.34 after 24 hours. The minimum and maximum values can be seen in table no. I

The efficacy of the timolol was 83.33% while efficacy of brimonidine was 46.67% for reduction in intraocular pressure with a significant difference between the groups (p= 0.003) as illustrated in table no. II. Hence timolol maleate was found to be superior in controlling spikes of raised intraocular pressure. However when efficacy was stratified by age and gender of study participants, no statistically significant association was noted.

Table No. I: Descriptive statistics (n=60)

Variable	Mean	Standard Deviation	Minimum	Maximum
Age (years)	60.82	6.96	47	77
Pre YAG IOP (mmHg)	13.50	2.51	8	18
Post YAG IOP (mmHg) at 3 hours	18.18	3.38	12	26
Post YAG IOP (mmHg) at 24 hours	17.18	3.34	10	25

IOP = intraocular pressure

Table No.2: Comparison of Efficacy of drugs (n=60)

Efficacy	Treatment Group		Total	p value
	Timolol	Brimonidine		
Effective	25 (83.33%)	14(46.67%)	39	0.003*
Ineffective	5(16.67%)	16(53.33%)	21	
Total	30	30	60	

*=significant

DISCUSSION

Cataract is a progressive blinding disease which can affect infants, adults and old people, predominantly affecting latter group. Patients benefit from refractive glasses to some extent in early cases of lens opacities but as the opacification advances surgery is advisable.[9] With advancement in medical science, cataract surgery has improved in recent years but PCO still remains the most frequent occurring complication of cataract surgery. [10] Research has shown comparable success rates for Neodymium: Yttrium Aluminium Garnet (YAG) laser capsulotomy in those circles which are deficient in modern intraocular lenses and phacoemulsification.[11] Although it is very effective technique but leads to many undesired outcomes like raised IOP.[12] This study was aimed to compare the efficacy of anti-glaucoma drugs used after Neodymium: Yttrium Aluminium Garnet (YAG) laser capsulotomy.

A study from Lahore analyzed these two drugs (0.5 % timolol maleate and 0.2 % brimonidine Tartrate) for their effectiveness in controlling intra ocular pressure. After 3 hours of Nd:YAG laser procedure, 93.3% of patients showed effective control in lowering IOP (p< 0.001).[13] Our study depicted almost same results with

timolol showing a good efficacy of 83.33% and brimonidine showing a little lower efficacy of 46.67% (p=0.003). The differentiating point between the two was measurement of IOP at 1 and 3 hours while in our study it was 3 and 24 hours after procedure.

Another quasi-experimental study conducted in Lahore demonstrated comparative effectiveness between brimonidine and timolol with respect to reduction in intraocular pressure (p value of 0.002). Our results are in agreement with this study.[8]

CONCLUSION

This study concludes significant difference in efficacy of Timolol maleate as compared to brimonidine tartrate. Timolol maleate was found to be superior in controlling spikes of raised intraocular pressure as compared to brimonidine tartrate. However when efficacy was stratified by age and gender of study participants, no statistically significant association was noted.

It is suggested that Timolol maleate should be used for the reduction in raised intraocular pressure after YAG laser capsulotomy which is superior in efficacy as well as cost effective in comparison to brimonidine tartrate. This will help to both patients and health system by reducing the expenditure that is encountered in terms of use of drugs and thus strengthen the healthcare delivery system which is important in a developing country like Pakistan.

Acknowledgement: The idea of this research was obtained from some similar studies conducted previously in other setups. We want to acknowledge some of our trainee medical officers and paramedical staff who helped us in data collection. We also want to thank the head of institution for their cooperation and granting permission and the patients who participated in the trial.

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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