COMPARISON OF LEVOBUNOLOL 0.5% WITH BRIMONIDINE 0.2% TO PREVENT MEAN INTRAOCULAR PRESSURE ELEVATION AFTER NEODYMIUM: YATRIUM-ALUMINIUM GARNET LASER CAPSULOTOMY

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ABSTRACT

Objective: The objective was to compare 0.5% levobunolol with 0.2% brimonidine in terms of mean reduction of intraocular pressure to prevent post neodymium: Yatrium-aluminium garnet (Nd:YAG) laser capsulotomy pressure spike.

Study Design: Randomized controlled trial.

Place and Duration of Study: The study was conducted at Ophthalmology Department of Combined Military Hospital Peshawar from Mar 2014 to Sep 2014.

Material and Methods: A total of 190 patients (95 in each group) were included in this study. In group-1 and group-2 patients, one drop brimonidine 0.2% and levobunolol 0.5% was instilled one hour before the Nd:YAG laser capsulotomy, respectively. Posterior capsulotomy was carried out with Nd:YAG laser. One drop of the respective drug instilled just after the laser treatment to each group. Intraocular pressure was measured with goldman applanation tonometer (GAT) 2 hours after Nd:YAG laser capsulotomy.

Results: Mean age was 62.64 ± 4.48 years for group-1 and 62.76 ± 4.50 years for group-2. Gender distribution was as follows: 56 patients (59.0%) were male and 39 patients (41.0%) were female in group-1 while 59 patients (62.1%) were male and 36 patients (37.9 %) were female in group-2. In group-1 baseline mean IOP was 13.72 ± 2.24 and in group-2 it was 13.94 ± 1.98 (p=0.474). At 2 hours post YAG, IOP was 14.92 ± 2.21 and 15.85 ± 1.98 in group-1 and group-2, respectively (p=0.003).

Conclusion: Present study provide substantial evidence in favour of brimonidine for prevention of rise in IOP after Nd:YAG laser posterior capsulotomy.

Keywords: Brimonidine, Capsulotomy, Levobunolol, Neodymium.

INTRODUCTION

Neodymium: Yatrium-aluminium garnet laser (Nd:YAG laser) capsulotomy is the standard treatment of posterior capsular opacification which is the most common late complication of cataract surgery[1,2], affecting almost 20-40% of the patients[1,3]. Nd:YAG capsulotomy involves the creation of an opening in the posterior capsule[4]. The laser works by the mechanism of photodisruption in which there is formation of plasma which mechanically displaces and disrupts the surrounding tissue[5]. Nd:YAG laser capsulotomy is a simple outdoor procedure though associated increase in intraocular pressure (IOP) is inevitable without treatment[6]. The distribution of IOP within the general population has a range of 11–21 mmHg. The rise in intraocular pressure can be controlled by using topical β-blockers and topical α-2 agonists. Both 0.5% levobunolol and 0.2% brimonidine have prophylactic role in controlling intraocular pressure after Nd:YAG capsulotomy[5,7,8]. Levobunolol is beta-adrenergic receptor blocker and reduces IOP by decreasing aqueous secretion. Brimonidine is alpha 2 adrenergic receptor agonist and it lowers IOP by reducing aqueous production and increasing the uveoscleral outflow of aqueous humor. Mean IOP

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rise was 13.02 ± 3.18 when beta-adrenergic blocker (0.5% levobunolol) was used after Nd:YAG capsulotomy[5] and mean IOP rise was 10.1 ± 1.7 mmHg when alpha 2 adrenergic agonist (Brimonidine) was used[8].

Locally we are using 0.5% levobunolol and 0.2% brimonidine after Nd:YAG capsulotomy. Different studies have already been done separately on the efficacy of these drugs and found that both these drugs are effective in preventing intraocular pressure elevation after Nd-YAG capsulotomy. But these drugs have never been compared with each other. This study will help us in finding which drug is better in term of alleviating intraocular pressure rise after Nd:YAG laser capsulotomy.

PATIENTS AND METHODS

This randomized controlled trial was conducted at Ophthalmology Department of Combined Military Hospital Peshawar from March 2014 to September 2014. After taking permission from hospital ethical committee, patients fulfilling the inclusion criteria (Individuals between 50-70 years of age irrespective of gender having posterior capsular opacification diagnosed on slit lamp examination and more than six month's follow-up after cataract surgery) and exclusion criteria (cases of glaucoma, IOL implant in traumatic cataract, combined procedure, diabetic retinopathy or any other retinal disease and postoperative complications such as endophthalmitis) were selected.

Patients were explained about the study and a written consent was taken from the willing patients. Patients were divided equally into two groups, group-1 and group-2, by randomization (lottery method).

All patients were subjected to a comprehensive ophthalmic examination including vision, refraction, slit lamp examination, measurement of intraocular pressure and dilated fundus examination.

In group 1 and group 2 patients, one drop of brimonidine and levobunolol were instilled one hour before the Nd:YAG capsulotomy, respectively. Posterior capsulotomy was carried out with Nd:YAG laser. One drop of the respective drug was instilled just after the laser treatment to each group. Intraocular pressure was measured with GAT, two hours after Nd:YAG laser capsulotomy.

All the data were collected and recorded in a performa.

Confidentiality of the patient's record was maintained. Data analysis were computer based with the use of SPSS version 10. The variables to be analyzed included quantitative data like intraocular pressure, duration of cataract surgery and age which was analyzed as mean and standard deviation. Categorical variables were presented by frequency and percentages.

Table-I: Distribution of patients by age.

Age (Year)	Group-1 (Brimonidine)		Group-2 (Levobunolol)	
	No.	Percentage (%)	No.	Percentage (%)
50-60	33	34.7	29	30.5
61-70	62	65.3	66	69.5
Total	95	100.0	95	100.0
Mean ± SD	62.64 ± 4.48		62.76 ± 4.50	

Table-II: Distribution of patients by gender.

Gender	Group-1 (Brimonidine)		Group-2 (Levobunolol)	
	No.	Percentage (%)	No.	Percentage (%)
Male	56	59.0	59	62.1
Female	39	41.0	36	37.9
Total	95	100.0	95	100.0

A 2 sample unpaired t-test was used to compare the mean IOP measurements obtained under the effect of two drugs. Level of significance was taken as $p \leq 0.05$.

RESULTS

A total of 190 patients (95 in each group) were included in this study. Regarding age distribution, 33 patients (34.7%) in group-1 and 29 patients (30.5%) in group-2 were between 50-60 years of age. Sixty two patients (65.3%) from group-1 and 66 patients (69.5%) from group-2 were between 61-70 years old. Mean age was 62.64 ± 4.48 years and 62.76 ± 4.50 years in group-1 and group-2, respectively (table-I).

Gender distribution was as follows: 56 patients (59.0%) were male and 39 patients (41.0%) were female in group-1 while 59 patients (62.1%) were male and 36 patients (37.9%) were female in in group-2 (table-II).

Comparison of mean IOP measurements obtained under the effect of two drugs was carried out. In group-1, baseline IOP mean was 13.72 ± 2.24 and in group-2 it was 13.94 ± 1.98 (p=0.473). At 2 hours post YAG capsulotomy, IOP was 14.92 ± 2.21 and 15.85 ± 1.98 in group-1 and group-2, respectively (p=0.003) (table-III). Mean duration of time since the cataract surgery in group-1 was 18.04 ± 11.22 and in group-2 were 23.20 ± 12.60 months.

Stratification with regard to age and gender are presented in tables-IV & V.

Table-III: Comparison of mean IOP measurements obtained under the effect of two drugs.

Group	Baseline	2 hours post YAG
Group-1 (Brimonidine)	13.72 ± 2.24	14.92 ± 2.21
Group-2 (Levobunolol)	13.94 ± 1.98	15.85 ± 1.98
p-value	0.474	0.003

Table-IV: Stratification with regard to age.

Group	Age (Year)	IOP measurement (2 hrs post YAG)	
		Mean	SD
Group-1 (Brimonidine)	50-60	14.45	2.04
	61-70	15.16	2.27
	p=0.02		
Group-2 (Levobunolol)	50-60	15.86	1.74
	61-70	15.85	2.09
	p=0.98		

Table-V: Stratification with regard to gender.

Group	Gender	IOP measurement	
		Mean	SD
Group-1 (Brimonidine)	Male	14.93	2.31
	Female	14.90	2.10
	p=0.94		
Group-2 (Levobunolol)	Male	15.88	1.82
	Female	15.81	2.25
	p=0.79		

DISCUSSION

Posterior capsular opacification is one of the major complications after the extracapsular cataract extraction or phacoemulsification[10]. Posterior capsular opacification is caused by proliferation and migration of residual lens epithelial cells which can produce visual loss

through two mechanisms[11]. They can form swollen, abnormal shaped lens cell called Elschnig's pearls, which migrate over the posterior capsule into the visual axis[12]. Standard treatment of posterior capsular opacification consists of opening the posterior capsule Nd: YAG laser[13,14].

The laser shots produce plasma around the target spot which bursts, producing a shock wave resulting in a hole in the posterior capsule[9]. The Nd-YAG laser in pulse mode was adopted for use in ophthalmology, and the first posterior capsulotomy in the human eye was performed in January 1979 by Aron-Rosa[15]. The Nd-YAG laser capsulotomy is a very simple procedure which can be performed on outdoor basis, so it saves a lot of inconvenience and time both on the part of surgeon as well as patient[16]. The rise in intraocular pressure can be controlled by using topical ß-blockers[17]. Topical 0.5% timolol maleate and 0.5% levobunolol are ß-blockers, which effectively known to control the rise of intraocular pressure[16].

In ophthalmology, Nd: YAG laser posterior capsulotomy is a routine procedure, since up to 40% of the patients submitted to cataract surgery with IOL implantation develop posterior capsule opacification despite the progress made in surgical techniques[10].

Although Nd:YAG laser is considered to be a safe procedure, it can cause several complications, namely retinal detachment, iritis, macular edema, IOL cracks and pits and IOP spike[10].

In the present study comparison was made between 0.5% levobunolol with 0.2% brimonidine in terms of mean intraocular pressure rise after Nd:YAG capsulotomy.

Both groups were consistent with regard to age, gender and mean baseline IOP levels. There was no statistically significant difference was found between 0.5% levobunolol and 0.2% brimonidine group at baseline.

Two hours post YAG intraocular pressure was 14.92 ± 2.21 and 15.85 ± 1.98 in Group-1 (Brimonidine) and Group-2 (Levobunolol), respectively. Statistically significant difference was observed between two groups (p=0.002). Our results are consistent with the studies of Nisar et al[5] and Minello et al[8].

In another study carried out by Yeom et al[18] had also documented similar observations where IOP decreased from the baseline in the group who were instilled with 0.2% brimonidine.

CONCLUSION

Present study suggest that 0.2% brimonidine is more effective than 0.5% levobunolol in the prevention of rise in IOP after Nd:YAG laser posterior capsulotomy.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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