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RESEARCH ARTICLE

APRACLONIDINE VERSUS TIMOLOL COMBINATION TO PREVENT INTRAOCULAR PRESSURE ELEVATION AFTER LASER CAPSULOTOMY

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ABSTRACT

Background & Objective: The increase of pressure in addition to cornea pain and edema could result in ischemic optic neuropathy. Different drugs can be employed for cutting down the intraocular pressure. The aim of this study was assessment the effect of Apraclonidineversus timololin decreasing intra ocular pressure after laser capsulotomy.

Methods and Materials: This is a double blind clinical trial study that has been done on 200 patients with posterior capsular opacity that had been candidate for laser capsulotomy, were evaluated through tonometry method. Then the patients were divided randomly into two groups and each group was treated by timolol or apraclonidine. Then their intra ocular pressure was recorded 3 and 24 hours after the operation. Collected data were analyzed by statistical methods in SPSS.16.

Results: The mean age of patients in timolol group was 65.7±12.04 yearand in Apraclonidine group was 67.8±9.7 year. The mean intra ocular pressure in timolol group was 15±3.8 before, 13.9±4.6 three hours, and 12.6±2.6 mmHg 24 hours after the operation. The Mean intra ocular pressure in apraclonidine group was 14.7±3.8 before, 14.1±3.3 three hours, and 13.04±2.6 mmHg 24 hours after the operation. The effect of apraclonidine in decreasing intra ocular pressure was the same as timolol.

Conclusion: Apraclonidine can be suggested as the chosen drug with minimal side effects, in patients undergone laser posterior capsulotomy.

INTRODUCTION

The posterior capsular opacity, as one of the most common and significant side effects of modern cataract surgery, reduces the visual function of the patient and the ability of surgeon in fundus view (Wormstone, 2002; Bertelmann *et al*., 2001). Laserposterior capsulotomy as an effective and relatively safe technique without any requirement of open surgery of the eye eliminates the posterior capsular opacity and can be used as a standard method (Fankhauser *et al*., 1982; Syam *et al*., 2004).
The side effects of applying such a technique which may entail visualdisorder, comprise intra ocular pressure rise, retinal detachment,intraocular lens damage, endophethalmitis,iris inflammation, cystoids macular edema, cornea edema, vitreous and macular edema (Ranta *et al*., 2000). After laser capsulotomy, significant augmentation in the intra ocular pressure,has been observed and recorded (Safi *et al*., 2001; Beheshtnejad *et al*., 2002).The increase of pressurein addition to cornea pain and edemacould result in ischemic optic neuropathy. This pressure increase might entail other numerous side effects, which is likely to lead to several problems and hospitalizations. Thus, coming upon a remedy with greater efficiency can reduce the intraocular pressure, and is likely to decrease these impairments and consumption expenses for solving such problems (Safi *et al*., 2001). Different drugs such as beta blockers (timolol, betaksolol), clonidine, and its derivations such as apraclonidine, astazolamid, etc. can be employed for cutting down the intraocular pressure (Beheshtnejad *et al*., 2002; Cullom *et al*., 1993).Currently beta blockers, particularly Timolol,are the standard and chosen remedy and their potential effect oncontrolling the intraocular pressurehas been confirmed (Wormstone, 2002).

Timolol, because of its beta blocking effectand alarge number of beta adrenergic receptorsall around thebody organs,could be of high side effect;yet for its intraocular pressure decreasing power has been selected as a drug for this purpose (Bertelmann *et al*., 2001). Apraclonidine is another drug for this purpose which belongs to alpha 2 agonists. Many studies have discussed its potentialand beneficial effects on reduction of intraocular pressure via affecting alpha 2 adrenergic receptors which brings about vasodilation and evacuation of anteriorchamber and ultimately intraocular pressure decline (Cai *et al*., 2008).Regarding the high frequency of cataract surgery and posterior capsule opacity as its complication which usually requires laser capsulotomyon the one hand, and the increase of intraocular pressure following laser capsulotomy on the other hand, the aim of this study was compareApraclonidine versus timolol combination to prevent intraocular pressure elevation after laser capsulotomy.

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METHODS AND MATERIALS

The is adouble blind (nor patient had any information about the type of drug, neither did the researcher) clinical trial study that has been done on 200 patients. The criterion for taking the patients in study was posterior capsule opacity which was recognized through clinical examination of eye using Slit Lamp after cataract surgery by specialist. The exclusion criteria involved being under treatment because of glaucoma, having a glaucomasurgery, active intraocular inflammation, anterior segment impairments either congenital or resulting from surgery.All patientswere informed and written consent formwas obtained from them.One hour prior to laser capsulotomy, the cases under study were checked for intraocular pressure, usingaplanation tonometry.The patients were randomly assigned into two groups of treatment and comparison and were treated by one of the two regiments of timolol.5% (made by Sina Daru Company) or apraclonidine 0.5% (made by AlkanCompany). The first group was treated by timolol and the second one by apraclonidine. All patients were followed three and 24 hours after capsulotomy. Collected data were analyzed by statistical methods in SPSS.16.

RESULTS

The mean age of patients in timolol and apraclonidine groups was 65.68±12.14 and 67.88 ± 9.74, respectively (range: 24-84). There was no significant difference between two groups regarding their age and gender.

Table 1. The state of different variables in two groups of study

variables	Drug	mean	SD	p-value
Pre laser capsulotomy intraocular pressure	Timolol	14.96	3.79	0.04
	Apraclonidine	14.72	3.75	
three hours after capsulotomy	Timolol	13.88	4.63	0.26
	Apraclonidine	14.11	3.3	
24 hours after capsulotomy	Timolol	12.6	2.55	0.001
	Apraclonidine	13.04	2.57	
Energy(ml jul)	Timolol	52.03	28.04	0.32
	Apraclonidine	55	26.72	
Pulse (number)	Timolol	19.38	12.25	0.42
	Apraclonidine	18.71	10.37	

The intraocular pressure was measured in three stages: before surgery, 3 hours and 24 hours after posterior laser capsulotomy, for the both groups. The results revealed that the mean intra ocular pressure in timolol group was 15±3.8, 13.9±4.6, and 12.6±2.6 mmHg, before capsulotomy, and 3 and 24 hours after it, respectively. The Mean intra ocular pressure in apraclonidine group in the above mentioned intervals was 14.72±3.75, 14.11±3.3, 13.04±2.57 mmHg, before capsulotomy, and 3 and 24 hours after it, respectively, (Table 1). The decreasing rate of intra ocular pressure in 24 hours after posterior laser capsulotomy significantly difference between two groups. (P=0.001) Apraclonidine contrary to timolol didn't lower the intra ocular pressure significantly, 3 hours after posterior laser capsulotomy. The comparison of two drugs with each other revealed no significant difference between them (P=0.04), that means both of them acted in a similar way in reducing the intra ocular pressure after posterior laser capsulotomy (table1). Repeated Measurements revealed that the mutual effect of drug and time was not significant.Furthermore, the mean difference of pressure between two groups was not also meaningful in subsequent intervals i.e. the effect of both drugs was similar.

DISCUSSION

In the present study it was observed that, apraclonidine could lower the IOP after yag laser capsulotomy in a significant way. Its effect was similar to timolol's effect which is considered as a standard drug for preventing from intraocular pressure rise following capsulotomy. Beheshtnejad *et al*. (2002), in a study undertaken in Tehran, investigated the effect of timolol0.5 % on IOPincrease after posterior laser capsulotomy over 96 cases. They came up withthe marked effect of timololand, introduced it as a preferred medicine for this purpose (Beheshtnejad *et al*., 2002).

However, the current studywas conducted over 200 patients suffering from posterior capsule opacity who were candidate for undergoing yag laser posterior capsulotomy. Randomly, 100 eyesreceivedTimolol 0.05%one hour before operation (initiation of affecting after 30 min and maximum effecttime 1-2 hours) and each eye's IOP was measured one hour before and 3 hours after surgery (the maximum IOP after surgery), and 24 hours after operation.It was found that Apraclonidine could decrease IOP after yag laser capsulotomy to a significant amount. This behavior of apraclonidine is much the same of timolol. Celik and *et al* in a study showed that similar to this study, both of eye drops Apraclonidine versus brinzolamide-timololcombination are effective for prevention and Apraclonidine is enough for most of routine cases.

Brinzolamide-timololmay be an option for the eyes those need more IOP reduction such as pre-existing glaucoma patients who are at higher risk for postoperative IOP elevations. (Celik *et al*., 2016). InastudydesignedbyCai *et al*, evaluating the effective prophylaxisof0.5% timolol maleate for IOP rise following YAGlaser capsulotomy, they concluded that pre-treatment with a topical application of 0.5% timolol is effective in preventing IOP elevation after YAG laser capsulotomy. In another study comparing the effectiveness brinzolamide and apraclonidinefor IOP spikesafter Nd:YAGcapsulotomy,it wasreportedthatbothdrugswereeffectiveinpreventingpostlaserIOP spikes (Cai *et al*.,2008; Unal *et al*., 2006). In a prospective, randomized, double - masked study, comparing the safety and efficacy of FCBT versusdorzolamide 2% +timolol 0. 5%, designed by Manni *et al*, they demonstrated that mean IO Preduction with FCB Tranged from 7.2 to9.1 mm Hg, representing 28% to 35% reductions from baseline; and they concluded that FCBT produced clinically meaning fulIOPreductionsfrombaselinethat were non-inferior to those seen with dorzolamide 2%+timolol 0.5%, additionally with a

better ocularcomfort. (Manni *et al*., 2009). Cullom *et al*. (1993), in an investigation in England examined the effect of apraclonidineon IOP reduction in patients with glaucoma who had undergone laser posterior capsulotomy. They discerned although apraclonidine could significantly decrease IOP in such patients, it didn't reduce IOP more than other available standard drugs (Cullom *et al*., 1993). Our findingsalso confirmed the similar effect of the drug with other standard drugs in IOP decrease. Inasmuch as the drugs used in the present study were prescribed in a way that the patients underwent yag laser capsulotomy in the peak of their effect time, i.e. apraclonidine 0.5 %was prescribedone hour prior to surgery,(peak of effect 1-2 hours after consumption), and timolol 0.5 %one hour prior to surgery (peak of effect 1-2 hours after consumption). Hereupon it is reasonable to claim the statistics and the results of the present study were of more validity. In our study, IOP was also measured three hours after surgery which is the peak of IOP after laser capsulotomy to come up with the results that are more valid and reliable. Therefore, it can be claimed that profilactic use of one dose apraclonidine 0.5%, 1 hour before surgery is effective and lower side effects than the same amount of timolol 0.5% on prevention of IOP rise , 1 hour before yag laser capsulotomy. (Cullom *et al*., 1993; Beheshtinejad *et al*., 2002).

Conclusion

Taking the lower side effects of apraclonidine into account, it can be used as an appropriate remedy for reducing the intra ocular pressure of patients undergone posteriorlaser capsulotomy. However, taking the accessibility and the more reasonable price of timolol compared with apraclonidine and their similar pressure decreasing effect into account, it seems logical to use timololexchangeably with apraclonidine, in the case that there is no use prohibition for it.

Conflict of Interest: none-declared

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