Original Article

Comparison of Anti-inflammatory Effect between Intracameral Triamcinolone Acetonide and Topical Dexamethasone after Phacoemulsification

Asif Manzoor, Muhammad Moin

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See end of article for authors affiliations

Correspondence to:
Asif Manzoor
VR Fellow Department of Ophthalmology, Lahore General Hospital, Lahore.
Email: asifmanzoor259@gmail.com

Purpose: To compare the role of single dose intracameral injection of triamcinolone acetonide versus topical dexamethasone to control post-operative inflammation after phacoemulsification.

Study Design: Randomized controlled trial.

Place and Duration of Study: Ophthalmology Department, Lahore General Hospital, Lahore, from March 2015 to August 2015.

Material and Methods: A total of 60 patients of 40 – 70 years of age of either gender undergoing phacoemulsification for cataract were included. Selected patients were placed randomly into two groups by using lottery method. Group A patients were given 1 mg/0.1 ml triamcinolone acetonide into anterior chamber at the end of surgery and no topical steroids were given post-operatively. Group B were not given intracameral injection but topical dexamethasone eye drops were given 4 hourly for one week and then four times a day for 4 weeks. Outcome variable was control of post-operative inflammation, which was noted at day 1, 7 and 28.

Results: Mean age of patients in group A was 58.63 ± 7.30 years and in group B was 56.63 ± 5.87 years. Out of 60 patients, 34 (56.67%) were males and 26 (43.33%) were females. The male to female ratio was 1.3:1. The difference in efficacy between the two groups was statistically non-significant.

Conclusion: Single dose Intracameral injection of triamcinolone acetonide controls post-operative inflammation after phacoemulsification without the use of any eye drops and is equally as effective as topical dexamethasone for post-operative inflammation

Keywords: Cataract, inflammation, Phacoemulsification, Triamcinolone.

Cataract is the leading cause of treatable blindness in the world[1]. In Pakistan, 51.5% blindness is due to cataract[2]. Amongst all people with visual impairment due to cataract in the world, about 65% are above 50 years of age[3]. More than 50% of people over the age of 65 develop age-related cataract with significant decrease in vision[4]. Globally, with increase in population, age and lifespan of people, cataract cases are expected to increase in number. Cataract is the leading cause of vision loss in developed and developing countries[5].

Cataract surgery is the most commonly performed procedure done by ophthalmologists worldwide[6]. Approximately 18 million cataract surgeries are performed every year in the world and expected to

increase as the population and lifespan increases[7]. Small-incision cataract surgery using Phacoemulsification has become the most popular modern technique and gold standard in cataract surgery[8]. Inspite of improved surgical techniques and intraocular lenses postoperative inflammation is one of the most common postoperative complications. Blood aqueous barrier is damaged due to surgical trauma which causes leakage of proteins and inflammatory cells into the anterior chamber. Uncontrolled postoperative inflammation can increase recovery time, increased intraocular pressure (IOP), synechiae formation and cystoid macular edema[9, 10].

Routinely topical steroids are used in treatment of postoperative inflammation after cataract surgery. Other routes of delivery of steroids in eye include intracameral, sub-tenon, sub-conjunctival and intravitreal injections[11]. A study by Coronel MCG et al[12] showed that intracameral triamcinolone use is safe and post-operative inflammation was resolved in 100% cases after four weeks of phacoemulsification. A study held in Pakistan by Waseem M[13] showed that topical dexamethasone 0.1% resolved post-operative inflammation in 98% cases after five weeks of phacoemulsification. No study has been published in Pakistan on use of intracameral triamcinolone after phacoemulsification.

Topical steroids are effective in controlling post-operative inflammation but they have few disadvantages like poor compliance due to multiple time dosage daily, tear film disruption and irritation. The purpose of this study was to see the comparison between efficacy of single dose intracameral triamcinolone injection and topical dexamethasone in controlling post-operative inflammation after phacoemulsification in our population. On the basis of these results, some practical recommendations can be made in our routine practice for reducing post-operative inflammation after phacoemulsification in order to reduce the morbidity and improving patient compliance.

METHODOLOGY

Study was conducted in Ophthalmology department, Lahore General Hospital, Lahore, from March 2015 to August 2015. Study design was Randomized controlled trial and Non-probability, consecutive sampling technique was used.

After approval from the ethical review committee a total of 60 patients between 40 - 70 years age of either gender were admitted to Ophthalmology Unit-II, Lahore General Hospital, Lahore to undergo phacoemulsification for cataract. Patients with anterior uveitis, any ocular pathology, any complication during cataract surgery like posterior capsular rupture and vitreous loss, previous surgery and co-morbid conditions were excluded. All patients were operated by the same consultant ophthalmologist (at least 10 years of experience) by phacoemulsification procedure with foldable intraocular lens implantation under topical anaesthesia.

After taking written, informed consent for participation in the study, a total of 60 cases were selected and were divided in two groups by lottery method.**Group A** comprising of 30 patients were given single intracameral injection of triamcinolone acetonide 1mg at the end of surgery using a 27-guage cannula. Post-operatively Moxifloxacin 0.5% eye drops (one drop every six hours) given for 4 weeks. **Group B** comprising of 30 patients were not given intracameral triamcinolone acetonide injection. Post-operatively Dexamethasone 0.1% eye drops (one drop every four hours) and Moxifloxacin 0.5% eye drops (one drop every six hours) were given for 4 weeks with gradual tapering of dose of dexamethasone eye drops. All patients in both groups were evaluated by same consultant at 1st, 7thand 28thday after surgery for anterior chamber inflammation (Cells and Flare). Anterior chamber cells were examined in 1x1mm slit beam field and grading was done as: **Grade 0 = <5 cells, Grade 1 = 6 - 15 cells, Grade 2 = 16 - 25, Grade 3 = 26 - 50, Grade 4 = > 50**. Grading of Aqueous flare was done as following: **0 = none**; **1 = mild** (just detectable); **2 = moderate** (iris details clear); **3 = marked** (iris details hazy), and **4 = severe** (heavy with fibrin deposits and clots).

All the data was recorded on a predesigned proforma. The data was entered and analyzed by SPSS version 20.Comparison between the groups with respect to efficacy was analyzed by chi square. P value ≤ 0.05 was considered significant.

RESULTS

Range of Age of patients in this study was from 40 - 70 years with mean age of 57.35 ± 6.57 years. Mean age of patients in group A was 58.63 ± 7.30 years and in group B was 56.63 ± 5.87 years. Majority of the patients 37 (61.67%) were between 56 to 70 years of age as shown in Table 1. Among 60 patients, 34 (56.67%) were males and 26 (43.33%) were females and male to female ratio was 1.3:1 as shown in figure 1.

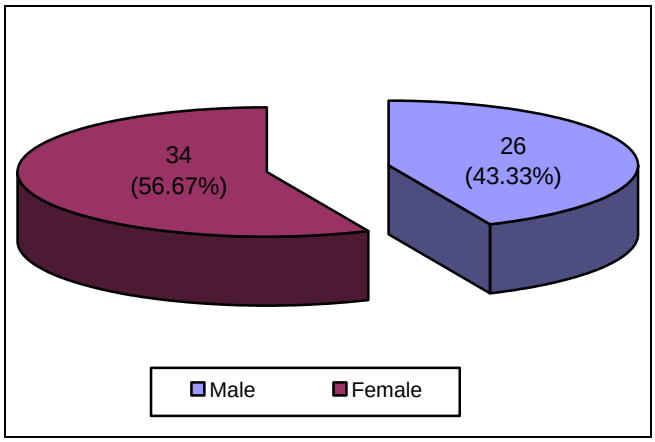

Fig. 1: %age of Patients According to Gender.

Table 2 shows the mean post-operative inflammation (anterior chamber cells and flare) at day 1 and day 7 in both treatment groups. Flare was resolved in majority of the cases at day 7 and at 28th day post-operative inflammation (cells and flare) was completely resolved in both groups. Both drugs were equally effective in controlling post-operative inflammation with a p-value > 0.05 that was statistically non-significant.

Intraocular pressure was monitored in all patients pre-operatively and all post-operative visits. Pre-operative mean IOP in group A and B was 15.67 and 15.83 mmHg respectively. Post-operative mean IOP in group A and B was 16.33 and 16.17 mmHg at post-op day 1 and 14.83 and 14.93 mmHg at post-op day 28.The change in IOP was not significant in both groups as shown in Table 3. There was no case of post-operative endophthalmitis or secondary glaucoma in both groups.

Table 1: Age distribution for both groups (n = 60).

Age (Years)	**Group A (n = 30)**		**Group B (n = 30)**		**Total (n = 60)**	
	No. of patients	%age	No. of patients	%age	No. of patients	%age
40 - 55	11	36.67	12	40.0	23	38.33
56 - 70	19	63.33	18	60.0	37	61.67
Mean ± SD	**58.63 ± 7.30**		**56.63 ± 5.87**		**57.35 ± 6.57**	
P-Value	0.12					

- P-value is >0.05 which is statistically non-significant.

Table 2: Efficacy of both Groups.

		Group A (n = 30)		**Group B (n = 30)**		**p-value**
		Mean	**Range**	**Mean**	**Range**	
Cells	Day 1	1.7	0 - 2	1.8	0 - 2	0.41
	Day 7	0.2	0 - 1	0.23	0 - 1	0.14
	Day 28	0.0	0 - 0	0.0	0 - 0	1.0
Flare	Day 1	0.23	0 - 1	0.27	0 - 1	0.42
	Day 7	0.07	0 - 1	0.10	0 - 1	0.64
	Day 28	0.0	0 - 0	0.0	0 - 0	1.0

- P-value is > 0.05 which is statistically non-significant.

Table 3: Mean Intraocular Pressure of both Groups.

		Group A (n=30)	Group B (n=30)	p-value
		Mean	Mean	
Intra-Ocular Pressure (IOP) (mmHg)	Pre-Op	15.67	15.83	0.98
	Day 1	16.33	16.17	0.61
	Day 7	15.36	15.40	0.18
	Day 28	14.83	14.93	0.26

- P value is > 0.05 which is statistically not significant.

DISCUSSION

Management of inflammation is thus a main focus in modern era cataract surgery[14]. Steroids have strong anti-inflammatory effect that act on a number of intercellular inflammatory mediators. Corticosteroids are being used by ophthalmologists since 1950s to reduce post-operative intraocular inflammation by controlling inflammatory cell leakage and inhibiting proliferation of fibroblasts and formation of granulation tissue[15]. There are different methods to use corticosteroids in eye like topical eye drops, subconjunctival, subtenon and retrobulbar injections or systemic steroid in the form of oral medication, intramuscular or intravenous injections. So, we have conducted this study to compare the efficacy of single dose intracameral injection of triamcinolone acetonide versus topical dexamethasone in preventing post-operative inflammation after phacoemulsification in patients with cataract.

Triamcinolone acetonide is being used to treat posterior segment inflammatory diseases in the form of intraocular injections. Oh *et al*[16] injected triamcinolone acetonide into anterior chamber of rabbit eyes to check its effect on corneal endothelium. They examined after 2 hours of injection and found there was decrease in microvilli but no statiscally significant difference noted on endothelial cell count and central corneal thickness. Chang *et al*[18] also found some toxic effects of triamcinolone acetonide on cultured endothelium. Despite toxic effects of triamcinolone acetonide on corneal endothelium shown by some studies, triamcinolone acetonide is being used to control postoperative inflammation after cataract surgery. Gills and Gills[18] injected different doses of triamcinolone acetonide in anterior chamber to control post cataract surgery inflammation. They started with 0.25 mg and gradually increased to 3.0 mg and 4.0 mg in patients with diabetes mellitus but they could not find appropriate dose. They suggested that increasing the dose of triamcinolone acetonide decreased the requirement of postoperative steroid use from 45% to 2% with 1.8 - 2.1 mg dose.

In a prospective study[19] 60 patients were randomized into two groups. Half of the patients had to receive single intracameral injections of triamcinolone acetonide and gentamicin at the end of phacoemulsification and then followed by topical tobramycin eye drops four times daily for one week (IC TA group, n = 30). Other half of patients had to use topical dexamethasone-tobramycin combination eye drops after phacoemulsification for four times daily until no inflammation was seen (Topical group, n = 30). They found no significant difference between the two groups in anterior chamber cells at one day and one week after surgery (p = 0.50 and 0.328, respectively). However they observed that the anterior chamber cells were significantly less in the IC TA group than in the Topical group at one month postoperatively (p = 0.006). No significant difference was seen between two groups in terms of mean BCVA or IOP at any time point (p > 0.05). No significant complications like endophthalmitis were observed.

Intracameral and intravitreal triamcinolone injected after performing phacoemulsification, in combination with standard postoperative corticosteroid eye drops, has beneficial role in uveitic eyes[20-21]. Gills JP et al[18] successfully replaced postoperative steroid drops use with higher concentrations of intracameral steroid injection after cataract surgery. Chang DTW et al[17] in a study used intracameral dexamethasone at the end of cataract

surgery and found that it significantly decreases postoperative inflammation in eyes with and without glaucoma.

Postoperative inflammation after cataract surgery is treated with topical corticosteroids and they prove to be effective but they have some side effects like poor compliance due to frequent use of eye drops after cataract surgery, toxic effects of topical drops and preservatives on cornea, irritation in eyes due to tear film disruption, and substantial cost of topical drops. To minimized these side effects of topical eye drops alternate routes of corticosteroids use are under trials.[22]

Karalezli A et al[23] reported effective suppression of post-operative inflammation with intracameral triamcinolone acetonide injection after cataract surgery. He concluded that intracameral steroids and topical prednisolone are equally effective in controlling post cataract surgery inflammation. Intracameral steroids improve patient compliance and help to avoid side effects of topical eye drops like corneal melting, dry eyes and conjunctival irritation.

Intracameral injection of triamcinolone can have advantage in complicated cases when chances of postoperative inflammation are higher. Intracameral injection of triamcinolone can reduce cystoid macular edema after posterior-capsular rupture and chances of macular edema in diabetic patients by gaining access to posterior segment through zonules. So, on the whole it is concluded that intracameral triamcinolone injection is an effective way to reduce post-operative inflammation after phacoemulsification. It may be an alternate option to the topical dexamethasone and should be used routinely in our general practice.

CONCLUSION

This study concluded that single dose Intracameral injection of triamcinolone acetonide and post-operative topical dexamethasone are equally effective in controlling post-operative inflammation after phacoemulsification. So, we recommend that Intracameral injection of triamcinolone acetonide can be used routinely per-operatively in these particular patients instead of topical dexamethasone in order to prevent multiple and frequent use of eye drops that are usually prescribed after phacoemulsification.

Author's Affiliation

Dr. Asif Manzoor (FCPS Ophthalmology)
Ophthalmology Department. Lahore General Hospital, Lahore.
House # 570. G- Block. Gulshan-e-Ravi, Lahore.

Dr. Muhammad Moin (Professor of Ophthalmology)
Ophthalmology Department. Lahore General Hospital, Lahore.

Role of Authors

Dr. Asif Manzoor
Data Collection, Manuscript Writing, Data Analysis

Dr. Muhammad Moin
Manuscript Review, Study Design

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