Original Article

Effects of Intra-Cameral Dexamethasone after Uncomplicated Phacoemulsification

Muhammad Saad Ullah, Muhammad Usama Rahim and Hassan Shoaib

ABSTRACT

Objective: To assess the efficacy of administering dexamethasone through intra-cameral injection in comparison to the conventional application of topical steroids for individuals undergoing phacoemulsification.

Study Design: Quasi experimental trial study

Place and Duration of Study: This study was conducted at the department of Ophthalmology Ghazi Hospital Dera Ghazi Khan form September 2022 to August 2023.

Methods: Eighty patients of age 55-80 years were enrolled in the study and divided into two groups 1 and 2. In group 1 patient were given intra-cameral dexamethasone and in group 2 equal amount of 0.01 ml normal saline was administered.

Results: At 1st post-operative day mean IOP in group 1 was 14.75±2.55 and in group 2 was 17.85±2.22. Similarly, at day 7 mean IOP in group 1 was 13.18±2.14 and in group 2 it was 12.44±1.74. In comparison pre operative IOP was in group 1 and 2 was 16.19±2.54 and 12.44±1.74 respectively.

Conclusion: Intraoperative inflammation following phacoemulsification surgery can be effectively managed by administering intra-cameral dexamethasone injection, resulting in decreased flare and anterior chamber cells, with comparable impacts on IOP and visual acuity when compared to the use of topical steroids.

Key Words: Dexamethasone, Effectiveness, Intra ocular pressure, Intra-cameral injection, Phacoemulsification.

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INTRODUCTION

Phacoemulsification, a contemporary and widely adopted surgical technique in ophthalmology for cataract removal, emerged as an advancement over the mid-20th-century standard method, extracapsular cataract extraction (ECCE)[1], wherein the entire cloudy lens was removed intact, preserving the outer capsule. Credited to American ophthalmologist Dr. Charles Kelman in the 1960s[2], phacoemulsification innovatively utilizes ultrasound to fragment the lens material, allowing for aspiration through a small incision, revolutionizing cataract surgery[3,4]. Ongoing technological advancements in phacoemulsification machines, marked by superior ultrasound technology, advanced fluidics, and sophisticated control systems, have significantly enhanced the safety and precision of cataract surgery[5, 6].

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However, a prevalent complication associated with this technique is the potential for patients to undergo prolonged inflammation, resulting in elevated intraocular pressure, ocular irritation, and the development of cystoid macular edema, often necessitating additional medications or interventions[7].

Corticosteroids, widely employed in ophthalmology for years, exhibit anti-inflammatory and immunosuppressive attributes[8], proving effective in managing various inflammatory eye conditions[9]. Typically administered as topical eye drops or injections, these steroids are prescribed postoperatively to control inflammation, with topical drops used for a specified duration. Intraocular steroid injections may also be employed intra-operatively or post-operatively, particularly in cases with elevated inflammation risk or pre-existing inflammatory conditions[10, 11].

The findings of this study may contribute to the optimization of postoperative management strategies in cataract surgery, providing evidence-based guidance for the use of intra-cameral dexamethasone in routine clinical practice. Understanding the specific benefits and potential risks associated with this approach could lead to improved patient outcomes, enhanced surgical recovery, and a more tailored and effective postoperative care protocol for individuals undergoing uncomplicated phacoemulsification.

METHODS

Study involved 80 patients having age between 55-80 years and admitted at hospital for phacoemulsification under topical anesthesia. Study was started after approval from chairman authorized committee and consent was obtained from patients after detailed description of procedure and study. Demographic, pre-operative examination findings and post-operative findings at day 1 and day 7 were recorded on predesigned performa. Furthermore, before 1 week of procedure biometry was performed. Patients diagnosed as grade II and IV cataract from nuclear sclerosis, intraocular pressure in normal range and 6/12 or above visual acuity were enrolled in the study. Patients with history of previous ocular surgery, recently using non-steroidal anti-inflammatory drugs, having additional disease of eye, steroid susceptibility and use of immunosuppressant drugs were excluded from the study.

One hour before intervention 0.5% Proparacaine Hydrochloride solution was administered to the pointed eye. After establishment of standard anesthesia phacoemulsification was done with soft intraocular acrylic lens implantation. At the end of surgery, injection of intracameral dexamethasone sodium phosphate was given in group 1 patients at 0.4mg/0.1ml concentration. In group 2, equal volume of normal saline was injected as control. All procedures were performed by same ophthalmic surgeon and uneventfull surgeries were projected. Post operative steroids and antibiotics were given as per ward protocol.

Post-operative examination was done at day 1 and 7 and outcomes were assessed which include intraocular pressure (IOP) that was measured on Goldmann Applanation Tonometer, visual acuity was measured on Snellen chart. Anterior segment was examined on slit lamp. Anterior chamber flare grading was assessed by using scoring system of SUN Working Group Slit Lamp Grading Scheme. SPSS version 27 was used for data analysis. After application of significance test p value below 0.05 was considered significant.

RESULTS

In group 1, age of patients was 62.73±6.28 years and in group 2 64.37±6.09 years. Regarding gender group 1 comprised 11 (27.5%) females and 29 (72.5%) males and in group 2, 13 (32.5%) females and 27 (67.5%) males. The mean pre-operative visual acuity was in group 1 was 0.68±0.21, at 1st post-operative day 0.29±0.09 and it was 0.22±0.07 at 7th day. Similarly visual acuity in group 2 was 0.76±0.18, 0.35±0.08, and 0.23±0.10 in pre-operative, 1st post-operative day and 7th post-operative respectively. Notably, the visual acuity at these time points was comparable between the two groups and showed no statistically significant differences (Table I).

The anterior chamber flare scores in group 1 at day was not found in any patient in 3 (7.5%) patients, in 16 (40.0%) patients it was faint, in 16 (40.0%) patients it was moderate, intensive in 3 (7.5%) patients and marked in 2 (5.0%) patients. In Group II, the corresponding scores showing zero results were 2.5% or 1 patient, faint results were found in 27.5% or 11 patients and moderate results in 57.5% or 23 patients, marked in 10.0% or 4 patients, and intensive in 2.5% or 1 patient. The difference in anterior chamber flare scores at day 1 between the two groups was ($p>0.050$). At day 7, the anterior chamber flare scores in Group I included none in 28 (70.0%) patients, faint in 9 (22.5%) patients, moderate in 2 (5.0%) patients, marked in 1 (2.5%) patient, with no patients exhibiting intensive scores. In Group II, the corresponding scores were none in 12 (30.0%) patients, faint in 23 (57.5%) patients, and moderate in 5 (12.5%) patients. The difference in anterior chamber flare scores at day 7 between the two groups was found to be $p<0.050$ according to Table II.

At 1st post-operative day mean IOP in group 1 was 14.75±2.55 and in group 2 was 17.85±2.22. Similarly, 7th post-operative day mean IOP in group 1 was 13.18±2.14 and in group 2 it was 12.44±1.74. In comparison pre operative IOP was in group 1 and 2 was 16.19±2.54 and 12.44±1.74 respectively. However, the observed differences in mean IOP between the two groups showing $p>0.050$, as indicated in Table III.

Table No. 1: Baseline characteristics and demographics

Characteristic	Group 1	Group 2	p-value
Age (years)	62.73±6.28	64.37±6.09	0.401
Gender			
Male	29 (72.5)	27 (67.5)	0.626
Female	11 (27.5)	13 (32.5)	
Visual Acuity			
Pre-operative	0.68±0.21	0.76±0.18	0.077
1st Post-operative day	0.29±0.09	0.35±0.08	0.010
7th Post-operative day	0.22±0.07	0.23±0.10	0.572

Table No. 2: Anterior chamber cells and flare score

Grading	Group 1	Group 2	p-value
	At Day 1		
None	3 (7.5)	1 (2.5)	0.303
Faint	16 (40.0)	11 (27.5)	
Moderate	16 (40.0)	23 (57.5)	
Marked	2 (5.0)	4 (10.0)	
Intensive	3 (7.5)	1 (2.5)	
At Day 7			
None	28 (70.0)	12 (30.0)	0.002
Faint	9 (22.5)	23 (57.5)	
Moderate	2 (5.0)	5 (12.5)	
Marked	1 (2.5)	0 (0.0)	
Intensive	0 (0.0)	0 (0.0)	

Table No. 3: Intraocular Pressure parameters of the study groups

Intra Ocular Pressure (mmHg)	Group 1	Group 2	p-value
Pre-operative	16.19±2.54	17.85±2.22	0.250
1st Post-operative day	14.75±2.55	14.54±3.81	0.815
7th Post-operative day	13.18±2.14	12.44±1.74	0.098

DISCUSSION

Due to the historically linked undesirable side effects of cataract formation and elevated intraocular pressure associated with intraocular triamcinolone in phakic eyes, we have chosen to employ dexamethasone as an alternative for treating eye inflammation, addressing relevance about triamcinolone crystalline nature and its potential impact on intraocular pressure[12].

The mean age of patients was 62.73 ± 6.28 years in Group 1, while in Group 2, it was 64.37 ± 6.09 years. A previous study by Jan et al[13] found a comparable mean age of 71 ± 9.4 years in Group 1 and 69.8 ± 10.5 years in Group 2. Additionally, El-Haddad et al[14] found non-significant effect of intracameral triamcinolone on IOP. But, anti-inflammatory outcomes were highly effective. Contrast observations were reported by Shaheen et al[15], that topical dexamethasone and intracameral triamcinolone have similar effectiveness when used following phacoemulsification procedure. Another study was conducted by Elkhodary et al[16] and reported that intracameral triamcinolone utilization have much better outcomes on post-operative outcomes following phacoemulsification.

In the present study a statistically significant difference was observed between anterior chamber cells and flare at 7th post-operative day as p value <0.05. But regarding intraocular pressure and visual acuity this difference was not statistically significant p value >0.05. These findings are in concordance with findings of study conducted by Albialy et al[17] reporting significant impact of anterior chamber cells and flare but insignificant regarding IOP. Manzoor et al[18] highlighted anterior chamber reaction as a predominant factor in their findings. Conversely, Gungor et al[19] observed no significant difference in anterior chamber cells and flare between intra-cameral dexamethasone and topical steroid formulation. Interestingly, our study concurs with findings of Gungor et al regarding IOP and visual acuity. Tan et al[20] conducted a study and on comparison of topical drops of dexamethasone and intracameral dexamethasone but no difference was observed regarding outcomes of visual acuity and post-operative inflammation.

Another study was conducted on pediatric population by Khan et al[21], in that study 50% of patients were administered dexamethasone intracameral and other half were administered sub-conjunctival dexamethasone. At the end of study variation was observed regarding ocular inflammation as higher frequency 26.7% was observed in group of sub-conjunctival patients and intracameral administration observed 6.7% inflammation.

Limitations: If the study is conducted at a single center, it might lack external validity. Different healthcare settings, patient populations, and surgical practices in other centers may influence the generalizability of the findings.

Recommendations: Stimulate further research on the long-term effects and cost-effectiveness of intra-cameral dexamethasone. Provide evidence for the integration of intra-cameral dexamethasone in routine phacoemulsification procedures to enhance postoperative outcomes.

CONCLUSION

Intraoperative inflammation following phacoemulsification surgery can be effectively managed by administering intra-cameral dexamethasone injection, resulting in decreased flare and anterior chamber cells, with comparable impacts on IOP and visual acuity when compared to the use of topical steroids.

Author's Contribution:

Concept & Design of Study:	Muhammad Saad Ullah
Drafting:	Muhammad Usama Rahim, Hassan Shoaib
Data Analysis:	Hassan Shoaib
Revisiting Critically:	Muhammad Saad Ullah, Muhammad Usama Rahim
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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