ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 04 | April - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EFFECT OF INTRACAMERAL MOXIFLOXACIN (0.5 MG) ON CORNEAL ENDOTHELUM IN PHACOEMULSIFICATION SURGERY

Ophthalmology

Mohit Kumar* Post Graduate Junior Resident 3rd year,Ophthalmology Department, Government Medical College, Haldwani, Nainital, Uttarakhand, India. *Corresponding Author

Govind Singh Titiyal Professor, Ophthalmology Department, Government Medical College, Haldwani, Nainital, Uttarakhand, India.

Nitin Mehrotra Assistant Professor, Ophthalmology Department, Government Medical College, Haldwani, Nainital, Uttarakhand, India.

ABSTRACT

Introduction: Phacoemulsification for cataract is the standard surgery in recent times with very good results and least complications. Cornea is important part of eye .Our aim of this study to evaluate the effect of Intracameral moxifloxacin on morphology and cell density of corneal endothelium in phacoemulsification surgery. **Material And Methods:** Total 150 patients participated in study and divided into two groups .one group receiving intracameral moxifloxacin and other group not receiving any intracameral antibiotic in phacoemulsification surgery. Comparison of preoperative corneal morphology on post operative day 1 ,7 and 21 in terms of endothelial cell count, hexagonality, central corneal thickness and coeficient of variation in cell area of all 150 patients. **Results:** There is no significant change in corneal morphology of preoperative and postoperative patient. **Conclusion:** Intracameral instillation of antibiotics appears to be a safe and effective method to prevent post-cataract endophthalmitis. In the absence of definitive evidence against the beneficial effect of intracameral antibiotics, they may be routinely administered as prophylaxis post-cataract surgery.

KEYWORDS

INTRODUCTION

Postoperative endophthalmitis after cataract surgery is an infrequent (generally estimated at about 1:1000 cases globally) but potentially devastating complication that leads to permanent severe vision loss in about one third of cases.[1] Perioperative antibiotics have been a common mainstay of postoperative endophthalmitis prophylaxis for decades. Despite the fact that clinical outcome studies have not affirmed a definite protective effect of postoperative topical antibiotics in endophthalmitis prophylaxis, the most recent American Society of Cataract and Refractive Surgery (ASCRS) and European Society of Cataract and Refractive Surgeons (ESCRS) surveys indicate that nearly all surgeons prescribe topical antibiotics after cataract surgery.[2] Phacoemulsification for cataract is the standard surgery in recent times with very good results and least complications. Cornea is important part of eye .Our aim of this study to evaluate the effect of Intracameral moxifloxacin(0.5 mg) on morphology and cell density of corneal endothelium in phacoemulsification surgery.

Postoperative endophthalmitis is a rare but dreaded complication of cataract surgery. The reported rates of post cataract surgery endophthalmitis have reduced from 0.3-0.5% in the 1990s to 0.04-0.41% in the present day scenario.[3-5]

Previously it has also been reported that betadine instillation in the conjunctival sac, few minutes before surgery decreases the microbial load comparable to the use of preoperative antibiotic drops. However, it has been shown that when the two methods are combined, there is an additive effect in further decreasing the microbial load. Various drugs have been used for this purpose, latest being the use of intracameral moxifloxacin (0.5%).[6,7]

Moxifloxacin 0.5% ophthalmic solution (Vigamox) is supplied as a sterile isotonic solution that makes it compatible with the intraocular tissues. Moxifloxacin is also self- preserved, that does not contain benzalkonium chloride (BAK) or any other preservatives that have toxic effects on corneal endothelium.[8]

The objective of the intracameral injection is to deliver high drug levels to the anterior chamber instantaneously as high peak antibiotic levels are most closely associated with an antimicrobial effect. Most of the studies have evaluated the prophylactic role and effect of the drug on endothelial cell count and thickness. This study was undertaken to check for its safety on corneal endothelium taking the endothelial cell morphology into account.

AIM: To study the effect of intracameral moxifloxacin on corneal endothelial cell count and other morphology in phacoemulsification surgery.

OBJECTIVES:

1. To compare the Endothelial Cell Count in phacoemulsification surgery.
2. To compare the Hexagonality in phacoemulsification surgery.
3. To compare the Coefficient Of Variation (C.O.V) in Cell Area in phacoemulsification surgery.
4. To compare the Central corneal thickness (CCT) in phacoemulsification surgery.

MATERIAL AND METHODS:

This prospective study entitled "EFFECT OF INTRACAMERAL MOXIFLOXACIN (0.5 MG) ON CORNEAL ENDOTHELIUM IN PHACOEMULSIFICATION SURGERY" was conducted after clearance from Board of Studies and Ethical committee in the Department of ophthalmology, Dr. Sushila Tiwari Government Hospital, Haldwani, Nainital during the period 2019-21.

SAMPLE SIZE:

The study population has been calculated by using G-power software with 80% of the power and 5% of the significance level. The total sample size was determined to be 100 .50 in each group.

STUDY DESIGN;

Prospective, comparative, observational based hospital study.
The study subjects were chosen as per the inclusion and exclusion criteria:

INCLUSION CRITERIA:

1. Age group (40-80yr)
2. Senile cataract in patients associated with visual impairment.
3. Grade I - III cataract (grading will be done according to LOCS III classification

EXCLUSION CRITERIA:

1. Patients with any ocular pathology other than cataracts such as retinal vascular disorders and ARMD and Diabetic retinopathy.
2. Ocular condition like glaucoma and uveitis.
3. Those with other media opacities corneal or vitreous.
4. Subjects with traumatic cataract, complicated cataract, grade 4 cataract
5. Patient with known case of diabetes mellitus
6. Patients who underwent previous intraocular surgery other than cataract.
7. Any intraoperative complication

OBSERVATION AND RESULTS:

Table 1: Comparison of mean Endothelial Cell Count Pre-

operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2

Endothelial Cell Count	Group 1		Group 2	
	Mean	Standard Deviation	Mean	Standard Deviation
Pre-operative	2633.32	187.47	2590.10	178.25
Post-operative Day 1	2601.16	188.19	2567.08	178.88
Post-operative Day 7	2592.94	187.95	2558.82	178.69
Post-operative Day 21	2587.48	187.20	2551.06	174.90

Unpaired t-test# Non-significant difference

The mean Endothelial Cell Count Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 was compared between Group 1 and Group 2 using the unpaired t-test. There was no significant difference in mean Endothelial Cell Count Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2. The mean Endothelial Cell Count decreased from 2633.32±187.47 to 2587.48±187.20 among Group 1 and 2590.10±178.25 to 2551.06±174.90 among Group 2

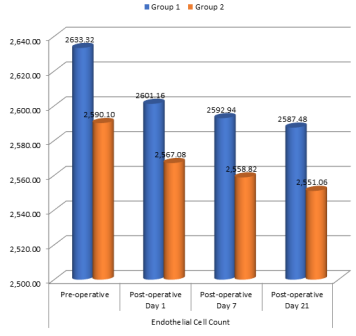

Fig. 1: Comparison of mean Endothelial Cell Count Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2.

Table 2: Comparison of mean Hexagonality Pre-operatively, Post-operative Day 1, Post- operative Day 7 and Post-operative Day 21 between Group 1 and Group 2

Hexagonality	Group 1		Group 2	
	Mean	Standard Deviation	Mean	Standard Deviation
Pre-operative	43.74	2.74	44.20	3.25
Post-operative Day 1	41.30	2.70	41.78	3.08
Post-operative Day 7	40.20	3.04	40.48	3.12
Post-operative Day 21	38.44	4.23	39.64	2.97

Unpaired t-test# Non-significant difference

The mean Hexagonality Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 was compared between Group 1 and Group 2 using the unpaired t-test. There was no significant difference in mean Hexagonality Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2. The mean Hexagonality decreased from 43.74±2.74 to 38.44±4.23 among Group 1 and 44.20±3.25 to 39.64±2.97 among Group 2.

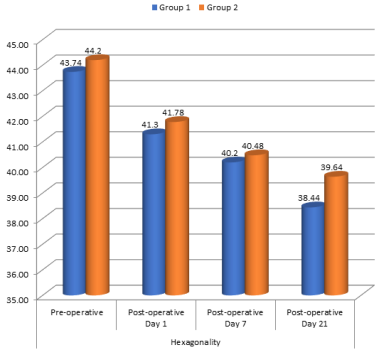

Fig. 2: Comparison of mean Hexagonality Pre-operatively, Post-operative Day 1, Post- operative Day 7 and Post-operative Day 21 between Group 1 and Group 2

Table 3: Comparison of mean coeficient of variation in Cell Area Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2

C.O.V in Cell Area	Group 1		Group 2	
	Mean	Standard Deviation	Mean	Standard Deviation
Pre-operative	29.84	4.75	34.02	2.46
Post-operative Day 1	32.90	4.83	38.60	2.53
Post-operative Day 7	36.16	4.56	41.42	2.69
Post-operative Day 21	38.76	4.39	44.10	2.65

Unpaired t-test# Non-significant difference

The mean Coeficient of variation (C.O.V) in Cell Area Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 was compared between Group 1 and Group 2 using the unpaired t- test. There was no significant difference in mean C.O.V in Cell Area Pre-operatively, Post- operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2. The mean C.O.V in Cell Area increased from 29.84±4.75 to 38.76±4.39 among Group 1 and 34.02±2.46 to 44.10±2.65 among Group 2.

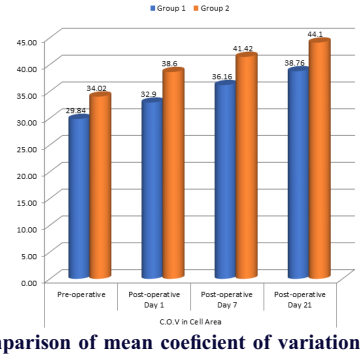

Fig. 3: Comparison of mean coeficient of variation in Cell Area Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2

Table 4: Comparison of mean central corneal thickness Pre-operatively, Post-operative Day 1, Post- operative Day 7 and Post-operative Day 21 between Group 1 and Group 2

Central corneal thickness (CCT)	Group 1		Group 2	
	Mean	Standard Deviation	Mean	Standard Deviation
Pre-operative	545.48	22.07	547.84	16.57
Post-operative Day 1	537.84	20.31	535.78	13.79
Post-operative Day 7	534.38	21.08	531.60	13.03
Post-operative Day 21	530.88	20.80	529.06	13.81

Unpaired t-test# Non-significant difference

The mean Central corneal thickness (CCT) Pre-operatively, Post-operative Day 1, Post- operative Day 7 and Post-operative Day 21 was compared between Group 1 and Group 2 using the unpaired t-test. There was no significant difference in mean CCT Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2. The mean Central corneal thickness (CCT) decreased from 545.48±22.07 to 530.88±20.80 among Group 1 and 547.84±16.57 to 529.06±13.81 among Group 2.

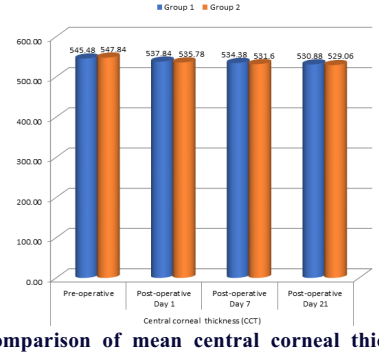

Fig. 4: Comparison of mean central corneal thickness Pre-operatively, Post-operative Day 1, Post- operative Day 7 and Post-operative Day 21 between Group 1 and Group 2

DISCUSSION:

Endothelial Cell Count:

There was no significant difference in mean Endothelial Cell Count Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2. The mean Endothelial Cell Count decreased from 2633.32±187.47 to 2587.48±187.20 among Group 1 and 2590.10±178.25 to 2551.06±174.90 among Group 2.

Similar to our study, Gimbel H.V. *et al.*[9] found that the changes in coefficient of variation in cell area and hexagonality in Group 2 did not show any significant difference from the study group. In the study by Malik *et al*.[10] the average pre-operative endothelial cell density in the Group 2 was 2116.00 cells/mm^2 changing to 2008.24 cells/mm^2 at 6 weeks, while the average endothelial cell density in group A was 2098.00 cells/mm^2 changing to 1984.76 cells/mm^2 at 6 weeks post-operatively. This change in moxifloxacin and Group 2 did not differ significantly between the groups.

Hexagonality:

There was no significant difference in mean Hexagonality Pre-operatively, Post- operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2.

Similar to our study, Gimbel H.V. *et.al.*[9] found that the changes in hexagonality in Group 2 did not show any significant difference from the study group. Malik *et al.* reported that mean value of preoperative hexagonality in group A Group 1s changed from 48.32% to 45.64 %. Mean value of preoperative hexagonality in group B changed from 48.04 % to 45.8 % at six eeks postoperatively, hence there was a decrease of 2.68% in group A compared to 2.24% decrease in Group 2 with difference statistically insignificant.

COEFICIENT OF VARIATION in Cell Area:

There was no significant difference in mean C.O.V in Cell Area Pre-operatively, Post- operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2.

Similar to our study, Gimbel H.V. *et al*.[9] found that the changes in coefficient of variation in cell area in Group 2 did not show any significant difference from the study group. Malik *et al*.[10] reported that mean value of preoperative C.O.V of size in group A Group 1s was 45.6 and changed to 45.87. Mean value of preoperative C.O.V in group B Group 1s was 43.5 and changed to 45.64 at six weeks postoperatively with no significant difference between the groups.

Central corneal thickness (CCT):

There was no significant difference in mean CCT Pre-operatively, Post-operative Day 1, Post-operative Day 7 and Post-operative Day 21 between Group 1 and Group 2.

In the study by Malik *et al*.[10] Mean value of preoperative CCT in group A Group 1 was 0.529 mm and changed to 0.532 mm; mean value of preoperative CCT in group B Group 1 was 0.534 mm and changed to 0.543 mm at six weeks postoperatively with the difference between them groups non- significant.

CONCLUSION:

The mean Endothelial Cell Count decreased from 2633.32±187.47 to 2587.48±187.20 among Group 1 and 2590.10±178.25 to 2551.06±174.90 among Group 2.

The mean Hexagonality decreased from 43.74±2.74 to 38.44±4.23 among Group 1 and 44.20±3.25 to 39.64±2.97 among Group 2.

The mean C.O.V in Cell Area decreased from 29.80±2.52 to 27.38±3.19 among Group 1 and 27.84±4.75 to 25.38±3.69 among Group 2. The mean Central corneal thickness (CCT) decreased from 545.48±22.07 to 530.88±20.80 among Group 1 and 547.84±16.57 to 529.06±13.81 among Group 2.

In the present-day scenario, the role of intracameral antibiotics remains controversial. The large-scale retrospective analysis points toward a significant beneficial trend of using intracameral antibiotics for endophthalmitis prophylaxis, which has led to the adoption of their routine usage as a preferred practice for many surgeons and institutions worldwide.

The commercial drug preparations for intracameral use may not be universally available and are not approved by the drug regulatory authorities. There is a risk of toxic adverse effects from the use of intracameral antibiotics itself. In addition, there are concerns about antibiotic resistance due to their widespread usage. There is a debate regarding the cost-effectiveness of routine intracameral antibiotic prophylaxis; however, in our view, the risk of developing a potentially sight-threatening disease such as endophthalmitis far outweighs the economic consideration of routine antibiotic usage.

Perioperative prophylactic measures against infection are mandatory in any surgical procedure, and the choice of antibiotic prophylaxis may be governed by a variety of factors including availability of commercial preparations of the drug, approval of the method by drug regulatory bodies, adverse effects, surgeon preference, and the risk-benefit ratio. With increasing preference for topical anaesthesia during phacoemulsification, intracameral instillation of antibiotics appears to be a safe and effective method to prevent post-cataract endophthalmitis. In the absence of definitive evidence against the beneficial effect of intracameral antibiotics, they may be routinely administered as prophylaxis post-cataract surgery.

REFERENCES:

1. Gimbel H.V, Sun R. Prophylactic intracameral vancomycin and CME (lett er). Ophthalmology. 2000; 107:1614-15.
2. Barry P, Seal D.V, Gettinby G, Lees F, Peterson M, Revie C.W. ESCRS study of prophylaxis of postoperative Endophthalmitis after cataract surgery; preliminary report of principal result from a European multicenter study; the ESCRS endophthalmitis study group. J Cataract Refract Surg. 2006; 32:407-10.
3. Miller J.J, Scott I.U, Flynn H.W, Smiddy W.E, Newton J, Miller D. Acute-onset endophthalmitis after cataract surgery (2000- 2004): incidence, clinical settings, and visual acuity outcomes after treatment. Am J Ophthalmol 2005;139:983-7.
4. Bell C.M, Hatch W.V, Cernat G, Urbach D.R. Surgeon volumes and selected patient outcomes in cataract surgery: a population-based analysis. Ophthalmology; 2007; 114:405–10.
5. Kessel L, Flesner P, Andresen J, Erngaard D, Tendal B, Hjortdal J. Antibiotic prevention of postcataract endophthalmitis: a systematic review and meta-analysis. Acta Ophthalmol (Copenh) 2015; 93:03–17
6. Ciulla T.A, Starr M.B, Masket S. Bacterial endophthalmitis prophylaxis for cataract surgery; an evidence-based update. Ophthalmology. 2002; 109:13–24.
7. Bratzler DW, Houck PM. Antimicrobial prophylaxis for surgery: an advisory statement from the National Surgical Infection Prevention Project; the Surgical Infection Prevention Guidelines. Clin Infect Dis 2004; 38:1706–15.
8. Masket S. Preventing, diagnosing, and treating endophthalmitis [guest editorial]. J Cataract Refract Surg 1998; 24:725–726.
9. Gimbel HV, Sun R. Prophylactic intracameral vancomycin and CME (letter). Ophthalmology 2000; 107:1614-15.
10. Malik V. K. Effect of Intracameral Moxifloxacin (0.5mg) on Morphology and Cell Densityof Corneal Endothelium in Phacoemulsification DOI:http://dx.doi.org/ 10. 7869/djo.218.