



Original Article

Effect of Intracameral Moxifloxacin on Endothelial Cell Count and Endophthalmitis Prophylaxis After Cataract Surgery

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ABSTRACT

One of the most feared side effects of contemporary cataract surgery is still endophthalmitis. Prophylactic measures include the use of antibiotics: topical, subconjunctival, and intracameral, to avoid endophthalmitis. Moxifloxacin 0.5% has been used most frequently in preventive late-stage regimens. **Objective:** To ascertain how well moxifloxacin prevented endophthalmitis in patients having cataract surgery. **Methods:** This was a descriptive case study and was conducted at Eye Departments of Allama Iqbal Medical College, Jinnah Hospital, Lahore and Ameer-ud-Din Medical College, Lahore General Hospital, Lahore. The study was commenced after approval of the synopsis and completed in 6 months. **Results:** In this study, 23.75%(n=19) were between 40-50 years, 61.25%(n=49) between 51-60 years and 15%(n=12) had >60 years of age, and their average was calculated as 53.99+6.22 years. 58.76%(n=47) were males and 41.25%(n=33) were females in the study. Mean endothelial cell count before cataract surgery was calculated as 2776 +177 while post-operative the average endothelial count was calculated as 2424 +72.8. while the frequency of effect of moxifloxacin, in the prevention of endophthalmitis in patients undergoing cataract surgery was recorded as 22.5%(n=18) while 77.5%(n=62) had no effect of moxifloxacin while preventing endophthalmitis in patients undergoing cataract surgery. **Conclusions:** We conclude that the effect of moxifloxacin, in preventing endophthalmitis in patients undergoing phacoemulsification surgery is not significantly higher and may be used in our setup for prevention of endophthalmitis, being a risk factor for blindness. Moxifloxacin does not affect the corneal endothelial cells significantly.

INTRODUCTION

Ocular inflammation known as endophthalmitis is brought on by the growth of bacteria or fungi in the posterior region of the eye [1,2]. Devastating complications after cataract surgery include acute endophthalmitis, which has an estimated incidence rate of 10% Gram-negative and 0.15% Gram-positive. There has been debate on the usefulness of antibiotics in preventing endophthalmitis. It has not been demonstrated that topical medication for three days before to surgery lowers the risk of infection, but it can lower the bacterial count [3-6]. One of the serious side effects of cataract surgery is endothelial toxicity, which can result in corneal decompensation [7]. It is frequently

iatrogenic and arises from mechanical or drug-induced assault to the endothelium. In young individuals, the typical endothelial cell density is higher than 3000 cells/mm². Within the cataract age group, the average density is 2250 [8]. Since vancomycin and cefuroxime may cause problems, moxifloxacin, a fourth-generation fluoroquinolone, appears to be a better option for preventing endophthalmitis due to its broad-spectrum coverage and mode of action, which includes gram-positive and negative micro-organisms, and anaerobes [5,9-11]. For topical and systemic application, it is safe and effective; however, there is little information on its

prophylactic intracameral administration for the prevention of endophthalmitis. Numerous investigations have found no negative effects of intracameral moxifloxacin on endothelial cell count following cataract surgery [12-15].

The current study's goal was to ascertain how intracameral moxifloxacin affected the number of endothelial cells in our environment, so facilitating a better understanding of the dynamics at play and illuminating strategies for preventing endophthalmitis, a risk factor for blindness.

METHODS

This multi-center descriptive case research was carried out in the Ophthalmology Departments of Ameer-ud-din Medical College and Allama Iqbal Medical College in Lahore, Pakistan. The study was carried out following the institutional review board of each hospital's acceptance of the summary vide letter No. AIMC/ERB/2023/4313 dated 01.02.2023. Using the WHO sample size calculator, we determined the sample size of 80 patients, assuming a 9.5% mean reduction with a 95% confidence interval and a 6.5% margin of error [13]. The study's patients were included after non-probability, purposeful sampling. We enrolled patients in the study following the selection criteria as individuals of every gender above 40 years old having age-related cataracts identified by ophthalmoscopy diagnosis and preoperative endothelial cell count was 2200-3000 cells/mm² calculated by specular microscopy. Tonometry and OCT were used to diagnose glaucoma and patients having glaucoma were excluded from the study. Conditions of the cornea identified by slit-lamp biomicroscopy, such as corneal ectasias (keratoconus keratoglobus), corneal dystrophies or degenerations, corneal scarring, and corneal oedema. Patients with prior neurological illness history, such as multiple sclerosis, and those with history of ocular trauma and any issue that arises during surgery were excluded. Patients who met the inclusion and exclusion criteria were recruited from the cataract units of Lahore General and Jinnah Hospitals in Lahore after the study was approved by the hospital's ethical review board. Every patient provided written and informed consent. Every patient had their name, age, and gender collected, among other demographic data. Using specular microscopy, the pre-operative endothelium count was determined. Every procedure was carried out by a single, skilled surgeon who has completed at least 500 separate surgeries in order to prevent bias. As the final stage of phacoemulsification, each patient received 0.1 mL of intracameral moxifloxacin 0.5% ophthalmic solution, which included 500 µg of moxifloxacin. Using specular microscopy, we were able to observe the impact of moxifloxacin in 80 patients whose postoperative 1-month corneal endothelial cell count had

been evaluated. SPSS version 24.0 was used to enter and analyze all of the data. quantitative factors expressed as mean standard deviation, such as age and endothelial cell count. Frequency and percentage were used to represent qualitative characteristics like effect and gender. Using stratification, effect modifiers such as age (<50 and >50) and gender might be controlled.

RESULTS

Eighty cases that met the inclusion and exclusion criteria were recruited to evaluate the efficacy of moxifloxacin in preventing endophthalmitis in patients having cataract surgery. After the patients' ages were distributed, it was determined that 23.75% (n = 19) were between the ages of 40 and 50, 61.25% (n = 49) were between the ages of 51 and 60, and 15% (n = 12) were older than 60 years. The mean + SD were computed as 53.99 + 6.22 years. The patients' gender distribution revealed that 41.25% (n=33) were female and 58.76% (n=47) were male. The mean endothelial cell count before surgery was determined to be 2776 +177, whereas the mean endothelial cell count after surgery was determined to be 2424 +72.8 (p-value: 0.385)(Table 1).

Table 1: Change in the endothelial cell count before and after cataract surgery using intracameral moxifloxacin

Age (years)	Endothelial Cell Count (cells/mm ²)		p-value
	Pre-Operative	Post-Operative	
< 50	2841 ± 187	2591 ± 102	0.451
≥ 50	2678 ± 152	2387 ± 76.5	0.513
Total	2776 ± 177	2424 ± 72.8	0.385

The percentage of patients who experienced a moxifloxacin-related endophthalmitis prevention after cataract surgery was found to be 22.5% (n = 18), whereas 77.5% (n = 62) showed no moxifloxacin-related endophthalmitis prevention after cataract surgery (Table 2).

Table 2: Frequency of effect of moxifloxacin, in prevention of endophthalmitis in patients undergoing cataract surgery (n=80)

Endophthalmitis Prevention	No. of patients (%)
Yes	18 (22.5)
No	62 (77.5)
Total	80 (100)

The age-based stratification of the moxifloxacin impact in preventing endophthalmitis in patients undergoing cataract surgery is given in Table 4. Of the 18 cases that showed endophthalmitis reduction, 7 patients were younger than 50 years old, and 11 patients were older than 50 (Table 3). A gender-based stratification of the effectiveness of moxifloxacin in preventing endophthalmitis in patients following cataract surgery revealed that of the 18 cases, 61.11% (n = 11) were male and 38.89% (n=7) were female (Table 3).

Table 3: Stratification of effect of moxifloxacin, in prevention of endophthalmitis in patients undergoing cataract surgery with regards to age and gender (n=18)

Variables		No. of patients (%)
Age	<50	7 (38.9)
	≥50	11 (61.1)
	Total	18 (100)
Gender	Male	11 (61.1)
	Female	7 (38.9)
	Total	18 (100)

DISCUSSION

One of the most dreaded side effects of contemporary cataract surgery is still endophthalmitis. Between 0.03% and 0.4% of cases have surgical endophthalmitis. Endophthalmitis can arise for a number of reasons, although the precise pathophysiology of endophthalmitis following cataract surgery is uncertain [16-20]. Many prophylactic treatments, such as the use of topical, subconjunctival, and intracameral antibiotics, are used to prevent endophthalmitis. Other preventive measures, such as the use of povidone-iodine 5%, watertight wound architecture, injectable IOL, etc., are also employed [9,15]. For obvious reasons, moxifloxacin 0.5% has been used most frequently in preventive late-stage regimens. To better understand the dynamics at play and provide strategies for preventing endophthalmitis, a risk factor for blindness, the current study was designed to ascertain the impact of intracameral moxifloxacin on endothelial cell count in our setup. In this study, the mean + standard deviation was calculated as 53.99 + 6.22 years, with 23.75% (n=19) between 40 and 50 years old, 61.25% (n=49) between 51 and 60 years old, and 15% (n=12) older than 60. Pre-operative mean endothelial cell count was calculated as 2776 + 177, while post-operative mean endothelial cell count was calculated as 2424 + 72.8. The frequency of moxifloxacin's effect in preventing endophthalmitis in patients undergoing cataract surgery was recorded as 22.5% (n=18) and 77.5% (n=62) of patients had no moxifloxacin in their treatment regimen. The study's results are consistent with a study conducted by CRG. Espiritus at the American Centre in Manila, Philippines, to assess the impact of intracameral moxifloxacin on endothelial cell count. The mean endothelial cell count of all 65 eyes was 2491.52 cells/mm² preoperatively and 2421.58 cells/mm² postoperatively [14]. At 70 cells/mm², the mean difference is not statistically significant (p<0.737). It was a 3% mean reduction. Preoperative and postoperative mean endothelial cell counts in our investigation were not statistically significant, nor was the frequency of impact higher. The goal of this study is to prevent the disastrous consequences of intraocular

infections. Moxifloxacin is a useful addition to our toolkit for the prevention and treatment of bacterial endophthalmitis because of its simple administration, broad antibacterial range, safety, excellent penetration into the anterior chamber, and constant levels. Surgeons frequently employ topical antibiotics after surgery to lower the incidence of endophthalmitis, however, there is not enough information to support this practice. Due to the low incidence of problems that could endanger vision, routine patient reviews on the first postoperative day are not required after straightforward cataract surgery. On the other hand, patients who have undergone complex cataract surgery, surgery on an eye that already has a co-existing condition (such as glaucoma or uveitis), surgery on a single eye, or who do not have easy access to eye services should have a review on the first day.

CONCLUSIONS

We found that there is no discernible increase in the effectiveness of moxifloxacin in preventing endophthalmitis in patients having cataract surgery, however, it is safe to use in our setup.

Authors Contribution

Conceptualization: SR, UH,

Methodology: SR, SJ, IR, AJ

Formal analysis: SJ, IR, AJ

Writing-review and editing: SR, SJ, IR, AJ, UH

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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