



Original Article

Risk of Macular Toxicity After Intra-Cameral 1mg/0.1 ml Cefuroxime for Endophthalmitis Prophylaxis in Phacoemulsification Cataract Surgery

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ABSTRACT

The world's leading culprit of preventable blindness is cataracts. For numerous decades, postoperative endophthalmitis has instilled terror as a potential complication of cataract surgery. **Objective:** To determine the frequency of retinal toxicity in terms of transient macular edema following using per-operative intracameral cefuroxime 1mg/0.1ml for endophthalmitis prophylaxis. **Methods:** A Descriptive case series was done at LRBT Eye Hospital, Lahore, from 15th Dec 2020 to 14th Jun 2021. A total number of 118 senile cataract patients were included. After cataract surgery, an intracameral 1 mg injection of cefuroxime was given to each patient. The optimally corrected visual acuity and macular thickness at the center of the retina on OCT were assessed postoperatively at week 1. If they were found to be elevated, it was labeled as retinal toxicity. Data were collected on data collection proforma. **Results:** The average age of the participants was 59.68 ± 5.28 years. Mean visual acuity before and after surgery was 2.01 ± 0.74 and 1.92 ± 0.94, respectively. Mean central macular thickness before and after surgery was 241.08 ± 4.73 and 248.74 ± 5.86 µm, respectively. There were 71 (60.17%) male and 47 (39.83%) female patients. There were 42 (35.59%) farmers, 40 (33.90%) job holders, 05 (4.24%) business people, and 31 (26.27%) non-working patients. Retinal toxicity was found in 54 (45.76%) patients. **Conclusions:** Intracameral injection of cefuroxime sodium can result in transient macular edema and retinal toxicity. In this study, retinal toxicity occurred in 45.8% of patients undergoing phacoemulsification.

INTRODUCTION

Cataracts are the leading cause of blindness worldwide, accounting for over 90% of blindness in wealthy economies. The prevalence of visually significant cataracts rises with age, and they are the leading cause of decreased visual acuity in the elderly, particularly nursing care residents [1]. The prevalence of age-related cataract subtypes, such as nuclear, cortical, and posterior subcapsular cataracts, varies by population [2]. Cataract surgery is a safe and cost-effective way to treat cataracts.

However, postoperative endophthalmitis is still a feared complication that results in poor visual outcomes [3, 4]. The "European Society of Cataract and Refractive Surgeons (ESCRS)" suggests using intracameral cefuroxime (1mg/0.1 ml) after cataract surgery to lower the risk of endophthalmitis, which has been found to reduce the risk of infection significantly [5]. While intracameral cefuroxime effectively avoids endophthalmitis, there are worries about its potential retinal damage, notably macular

edema. Cases of retinal edema following intracameral cefuroxime injection have been described in studies with varied incidence rates [6]. This study looks at retinal toxicity in the form of macular edema after a prophylactic intracameral injection of cefuroxime 1mg/0.1ml at the end of phacoemulsification cataract surgery. Because retinal edema induced by toxicity usually resolves within the first postoperative week, central macular thickness (CMT) assessed using spectral domain optical coherence tomography (SD-OCT) before and at the end of the first postoperative week [7, 8]. The findings of this study provided crucial information on the frequency of retinal toxicity after intracameral cefuroxime injection. This information aid in pre-operative patient counseling, informing them of the likelihood of toxicity and potential clouded vision following surgery. By notifying patients beforehand, we aim to reduce the morbidity of hazy vision and ensure improved postoperative results[9].

METHODS

A descriptive case series was done at LRBT Eye Hospital Multan Road, Lahore, from 15th Dec 2020 to 14th Jun 2021. The sample size of 118 patients is determined using the 95% confidence level, a 9% error margin, and the assumption that the anticipated percentage of retinal toxicity will be 46 ± 6. Non-probability consecutive sampling technique was utilized. Inclusion criteria were senile cataract patients booked (according to operational definition) for phaco with clear cornea and good pupillary dilatation, age group 51-70 years, and both male and female patients. Exclusion criteria were comorbidities such as diabetes (BSR > 200mg/dl), hypertension (BP>160/90), maculopathies, retinal vascular disorders, uveitis, NS+++, and more complex, complicated cataract surgery, previous ocular surgery, or trauma. After taking permission from the ethical committee of LRBT hospital and informed consent, patients enlisted for phacoemulsification were evaluated preoperatively and postoperatively. The preop assessment included visual acuity and fundoscopy to check the retina for comorbid and OCT. After cataract surgery, an intracameral 1 mg injection of cefuroxime was given to each patient. To prepare 1 mg cefuroxime, 250 mg cefuroxime injectable powder was admixed with 2.5 ml of normal saline. 0.1 ml of the resulting solution was diluted again in 0.9 ml of normal saline to achieve the desired concentration of 1 mg in 0.1 ml. The postop assessment included optimally corrected visual acuity and macular thickness at the retina's center on OCT at week 1. If found to increase, it was labeled as retinal toxicity. Data were collected on data collection performance. SPSS version 20.0 for Windows was used to analyze the data. To illustrate the age of the patients, the means and standard deviations

were employed. Frequency and percentage were used to present gender, occupation, and retinal toxicity. Effect modifiers such as age, gender, pre-operation visual acuity, and occupation were controlled through stratification. Chi-square analysis post-stratification was used. Statistically significant values were defined as p-values less than 0.05.

RESULTS

The participant of this study had an average age of 59.68 ± 5.28 years. The minimum and maximum ages were 51 and 70, respectively. Visual acuity score before surgery was 6/12 in 32 (27.1%) patients, 6/18 in 53 (44.9%) patients, and 6/24 in 33(28.0%) patients (Table 1). Stratification based on gender was also performed, and there was no association of gender with retinal toxicity. In males, retinal toxicity was found in 33 patients, and in females, retinal toxicity was found in 21 patients. This difference was statistically insignificant, with a p-value of 0.848.

Table 1: Descriptive statistics of visual acuity before surgery

Visual Acuity	Frequency (%)
6/12	32(27.1)
6/18	53(44.9)
6/24	33(28)

Mean visual acuity after surgery was 6/6 in 46 (39.0%) patients, 6/9 in 47 (39.8%) patients, 6/12 in 14 (11.9%) patients, and 6/18 in 11(9.3%) patients (Table 2).

Table 2: Descriptive statistics of visual acuity after surgery

Visual Acuity	Frequency (%)
6/6	46(39)
6/9	47(39.8)
6/12	14(11.9)
6/18	11(9.3)

The mean central macular thickness before surgery was 241.08 ± 4.73 µm. The minimum central macular thickness was 231 µm, and the maximum was 249 µm (Table 3).

Table 3: Descriptive statistics of central macular thickness before surgery

Central Macular Thickness before Surgery (µm)	
Mean ± SD	241.08 ± 4.73
Minimum	231
Maximum	249

The mean central macular thickness after surgery was 248.74 ± 5.86 µm. The minimum central macular thickness was 239 µm, and the maximum was 260 µm (Table 4).

Table 4: Descriptive statistics of central macular thickness after surgery

Central Macular Thickness after Surgery(µm)	
Mean ± SD	248.74 ± 5.86
Minimum	239
Maximum	260

Retinal toxicity was found in 54 (45.76%) and not in 64 (54.24%) patients (Figure 1).

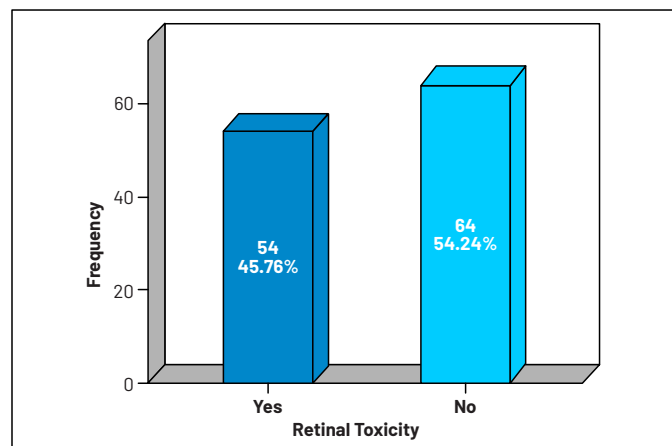


Figure 1: Frequency of retinal toxicity

Stratification was also done based on visual acuity score; in patients having pre-operative visual acuity of 6/12 to 6/18, retinal toxicity occurred in 34 patients and 20 patients having visual acuity of 6/24 (Table 5).

Table 5: Stratification of visual acuity before operation to determine the association of visual acuity before operation with retinal toxicity

Visual Acuity Before Operation	Retinal Toxicity		p-value
	Yes	No	
6/12 to 6/18	34	51	0.07
6/24	20	13	

There were more males as compared to females. There were 71 (60.17%) male and 47 (39.83%) female patients. On the frequency of occupation, there were 42 (35.59%) farmers, 40 (33.90%) job holders, 05 (4.24%) business people, and 31 (26.27%) not working patients. Age Stratification was performed, and age was not associated with retinal toxicity. In patients aged 51-59 years, retinal toxicity was found in 23; in patients aged 60-70, it was found in 31. This difference was statistically insignificant, with a p-value of 0.190 (Table 6).

Table 6: Stratification of occupation to determine the association of occupation with retinal toxicity

Occupation	Retinal Toxicity		p-value
	Yes	No	
Farmer	21	21	0.163
Job Holder	17	23	
Businessman	0	05	
Not working	16	15	

DISCUSSION

Our study investigated retinal toxicity following cataract surgery with intracameral cefuroxime. This contrasts with studies on endophthalmitis prevention and risk factors conducted by Ciulla et al., Montan et al., and the

Endophthalmitis Study Group [10-13]. While earlier research has demonstrated the usefulness and safety of intracameral cefuroxime in preventing endophthalmitis, our investigation focused on a significant possible side impact linked with cefuroxime use. This is especially significant given the widespread usage of cefuroxime as a prophylactic measure to avoid endophthalmitis, as Faure et al., and Czajka et al., have highlighted [14, 15]. We discovered a high rate of retinal toxicity (45.8%) in patients receiving intracameral cefuroxime after cataract surgery. This finding is similar to prior studies by Cardascia et al., and Brouzas et al., who also discovered retinal edema following cefuroxime injection. However, it is crucial to note that, as mentioned in our study, some previous studies reported lower occurrences of macular edema [16-18]. It is important to mention that cefuroxime has been utilized to prevent cataract surgery [19, 20]. For many years it has been used to assist in reducing the occurrence of endophthalmitis, as Besozzi et al., and Lam et al., have highlighted. However, our research underlines the potential retinal damage associated with its use, emphasizing the importance of further research [21-24].

CONCLUSIONS

Our findings demonstrate that intracameral administration of cefuroxime sodium can result in temporary macular edema and retinal toxicity. In this study, retinal toxicity occurred in 45.8% of patients undergoing phacoemulsification.

Authors Contribution

Conceptualization: MHJ, SZ

Methodology: AK, AS

Formal Analysis: MBA

Writing-review and editing: MHJ, SZ, AK, AA, MBA, FS

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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