Original Article

Efficacy of Intracameral Moxifloxacin as Endophthalmitis Prophylaxis in Phaco-emulsification Cataract Surgery

Hasan MM[1], Kajmina N[2], Haque A[3]

1. **Lt Colonel Md. Murad Hasan**
   MBBS, DO, MCPS, FCPS
   Classified Specialist in Ophthalmology
   Combined Military Hospital, Rangpur
2. **Colonel Natasha Kajmina**
   MBBS, FCPS
   Classified Specialist in Ophthalmology
   Combined Military Hospital, Dhaka
3. **Major Ariful Haque**
   MBBS, FCPS
   Classified Specialist in Anaesthesiology
   Combined Military Hospital, Saidpur

Correspondence to:
Lt Colonel Md. Murad Hasan
MBBS, DO, MCPS, FCPS
Classified Specialist in Ophthalmology
Combined Military Hospital, Rangpur.
E-mail: muradhasan18718@gmail.com
Mobile: 01717-202686

Submission Date : 05 February 2023
Accepted Date : 12 March 2023

Abstract:
Background: Cataract is the number one cause of blindness worldwide, which is curable with removal of cataractus lens with IOL implantation. Every year a huge number of cataract operation is done to restore vision of patients. Postoperative endopthalmitis is a serious complication that led to loss of sight or even loss of eye. To prevent this devastating complication postoperative intracameral moxifloxacin is being used effectively in various centers all over the world. **Objective:** The study was carried out with a view to evaluate the efficacy of intracameral moxifloxacin as endophthalmitis prophylaxis in phaco-emulsification cataract surgery. **Materials and method:** This is a Prospective interventional study conducted from June 2017 to December 2017 in Department of Ophthalmology, Combined Military Hospital (CMH), Dhaka. Data was collected regarding pre and post operative visual acuity, post operative cornea, anterior and posterior segments reactions of 100 patients of age related cataract undergoing Phaco-emulsification cataract surgery. **Result:** 100 eyes of 100 patients of Phaco-emulsification surgery were evaluated. Among them 63 male and 37 female patients of age ranges from 40 to 70 years, 92 patients had preoperative visual acuity 6/60 or less and 6/36 in 8 patients. On 1st POD unaided visual acuity was 6/12 or better in 68 patients and in all patients after 1 month. On 1st POD corneal edema was 1+ or less in 84 patients and all patients develop clear cornea after 1 month. 91 patients had 1+ or less cells in anterior chamber on 1st POD and after 1 month 92 patients had no cell and only 8 patients had 0.5+ cells in anterior chamber. No vitreous haze in 82 patients on 1st POD and no patients had vitreous haze after 1 month. 92 patients had got BCVA 6/6 and 8 patients have got 6/9 after 1 month. **Conclusion:** Peroperative intracameral moxifloxacin is safe and can be used as endophthalmitis prophylaxis in phaco-emulsification cataract surgery.

Keywords: Cataract, Phoco-emulsification, Visual acuity, Moxifloxacin

Introduction:

Cataract is one of the major preventable causes of blindness in our country. A huge amount of cataract surgeries are done each year. The amount of postoperative endophthalmitis after cataract surgery is still endangering visual outcome by affecting a higher number of patients in comparison to developed countries.

Bangladesh is part of the South East Asia region and cataract is responsible for approximately 80% of blindness in this region.[1] The only known treatment for cataract is surgical removal and subsequent correction of the optical error that develops.[2] Improvements in surgical technique over the last decade, particularly the routine use of phaco-emulsification allowing small suture-less incisions and continuous curvilinear capsulorrhexis ensuring in-the-bag placement of

the intraocular lens (IOL), has improved the predictability of postoperative refraction.[3]

But cataract surgery is complicated by postoperative infection (endophthalmitis mainly) that can lead to loss of sight or even loss of the eye. Endophthalmitis can occur despite of taking various prophylactic measures. Preoperative povidone-iodine antisepsis has been widely adopted and is considered the standard of care.[4] Other peroperative measures to prevent infectious endophthalmitis have been advocated to prevent the sight threatening devastating condition and use of prophylactic per-operative intracameral moxifloxacin is one of them, although the choice of antibiotic agentsand administration regimens vary greatly.

It is speculated that intraocular tissue reaction towards the fluidics, intracameral antibiotic, efficiency of the surgeon and the machine used may have contributed to this. We have tried to evaluate the ocular tissue effect with intracameral moxifloxacin along with ringer's lactate solution as a prophylaxis of endophthalmitis.

Intracameral drug toxicity could lead to endothelial cell loss or diffuse into the posterior segment of the eye resulting in macular edema. The effects of moxifloxacin on endothelial cell loss and macular thickening were not reported in The European clinical studies.

Materials and method:

This Prospective interventional study was done from June 2017 to December 2017 in the Department of Ophthalmology, Combined Military Hospital, Dhaka. The study was approved by the ethical review committee of CMH Dhaka. A total number of 100 subjects at age range from 40 to 70 years both male and female were included in this study.

After taking informed written consent, detailed Data was collected regarding pre and post operative visual acuity, post operative cornea, anterior and posterior segment reactions of 100 patients of age related cataract undergoingphaco-emulsification cataract surgery. After initial selection of the patients a comprehensive ocular examination was performed. Beside this, keratometry and biometry was measured for IOL power calculation. Patients who had a history of intraocular surgery or showing signs of ocular pathologies detected at the examination were excluded. Systemic conditions leading to exclusion were diabetes mellitus, uncontrolled hypertension, and heart or renal failure.

0.1 ml of 0.5% ophthalmic moxifloxacin solution containing 500µg of moxifloxacin has been used as the last step of phaco-emulsification cataract surgery.

All the patients were attended for follow up. They were evaluated thoroughly; visions were tested, anterior chamber reaction was checked and all other condition of the eye and its surrounding was evaluated. Complete follow up were given at first post operative day then at seventh day, then after one month.

In this study we performed ocular examination meticulously which included visual acuity was measured by Snellen's chart, Slit lamp biomicroscopy, 90D condensing lens and Direct ophthalmoscopy were done in every patient.

Result:

Table-I: Age distribution of the patients (n=100)

Age in year	No of patients	Percentage (%)
40-45	12	12%
46-50	16	16%
51-55	34	34%
56-60	27	27%
61-65	07	07%
66-70	04	04%

Table-I shows respondents were not equally distributed among the age group.

Table-II: Gender distribution of the patients (n=100)

Gender	No of patients	Percentage (%)
Male	63	63%
Female	37	37%

Table-II shows respondents were not equally distributed according to sex.

Table-III: Visual Acuity (VA) in patients

Visual Acuity	Preoperative	Postoperative		
		1st POD	7th POD	1 month
6/6	-	-	28	69
6/9	-	14	34	15
6/12	-	54	22	13
6/18	-	16	14	3
6/24	-	12	2	-
6/36	8	4	-	-
6/60	58	-	-	-
3/60- <6/60	34	-	-	-
CF- <3/60	-	-	-	-

Table-III shows the visual acuity in patients of pre and post operative periods.

Table-IV: Postoperative Best Corrected Visual Acuity (BCVA) in patients (n=100)

BCVA after 1 month	No. of patients	Percentage (%)
6/6	92	92%
6/9	08	08%
6/12	-	-
6/18	-	-
6/24	-	-
6/36	-	-
6/60	-	-
<6/60	-	-
Total	100	100%

Table-IV shows the 92% of patients have 6/6 post operative best corrected visual acuity.

Table-V: Postoperative Corneal reaction (Corneal edema) (n=100)

Corneal edema	No. of patients		
	1st POD	7th POD	1 month
No edema	22	83	100
1+	62	15	-
2+	16	2	-
3+	-	-	-

Table-V shows corneal conditions of different post operative periods.

Table-VI: Postoperative Anterior chamber reaction (Cell) (n=100)

Anterior chamber reaction (Cell)	No. of patients		
	1 POD	7 POD	1 month
0 (<1)	22	57	92
0.5+ (1-5)	52	28	08
1+ (6-15)	17	15	-
2+ (16-25)	09	-	-
3+ (26-50)	-	-	-
4+ (>50)	-	-	-

Table-VI reveals postoperative Anterior chamber reaction of different post operative periods.

Table-VII: Postoperative posterior segment reaction (Vitreous Haze) (n=100)

Posterior segment reaction (Vitreous Haze)	No. of Patients		
	1st POD	7th POD	1 month
0 (Good view of NFL)	82	97	100
1+ (Clear disc & vessels but hazy NFL)	16	03	-
2+ (Disc & vessels hazy)	02	-	-
3+ (Only disc visible)	-	-	-
4+ (Disc not visible)	-	-	-

Table-VII reveals postoperative posterior segment reaction of different post operative periods.

Discussion:

Among all reversible blindness cataracts are on the top of all over the world at present. The incidence of infection in post surgical cases is not less. All surgeons, including surgical units are very keen to give their best effort and try to take all measures to prevent infection.

In 2007, Espiritu et al. [5] reported the application of intracameral 0.5% moxifloxacin (Vigamox) without complications. The same year, Arshinoff[6] presented a poster indicating that intracameral moxifloxacin did not show secondary effects in more than 1,000 eyes. Subsequently, several groups reported that intracameral moxifloxacin is safe in the anterior and posterior segments of the eye.[7,8,9] There have been few studies regarding the incidence of postoperative endophthalmitis when applying intracameral moxifloxacin. A large multicenter cohort study published in 2011 by Arshin off et al. [10] reported one case out of 35,194 operated eyes, a very low rate of this complication (0.003%). Moreover, in 2012 Shorstein et al.[11,12] reported one case out of 1,890 operated eyes with intracameral moxifloxacin (0.053%). Friling et al.[13] in 2013 reported that in 6,897 patients in which intracameral moxifloxacin was used, the rate of acute postoperative endophthalmitis was 0.029%.

In this study, we have used a single surgeon for phacoemulsification to avoid the surgeon's factor for outcome variables. 0.1 ml of 0.5% ophthalmic moxifloxacin solution containing 500µg of moxifloxacin has been used as the last step of phaco-emulsification cataract surgery.

In this study about 100 patients were examined

thoroughly to evaluate the post operative condition. All these patients were given intracameral moxifloxacin. All the patients were evaluated up to one month after operation. The age groups selected were between 40-70 years, because people of this age group mostly develop cataract. Among these ages we found that 34 patients were between 51-55 years and 27 patients were between 56-60 years, which was 61% of total patients, probably due to, people in these age groups are still active and visual impairment affects their day to day life. Only 4 patients were between 66-70 years, as because people of this group are mostly inactive and their visual requirements also have been reduced.

Both genders were included in this study.63 were male patients (63%) and 37 were female patients (37%). Male:Female ratio was 1.7 : 1. Male patient was near about twice of female patient, as male are mostly earning member of family, so they reports more as visual impairment affects their day to day life and thus on financial status of the family.

After thorough examination of all the patients at first postoperative day, they were asked to come after seven days and then after one month. They were properly counseled and advised to report if they feel any problem. The visual acuity and reaction of cornea, anterior chamber and posterior chamber of every patient was properly evaluated. Among the three follow up, the condition of each patient was evaluated and recorded. Preoperative visual outcome and postoperative visual outcome was recorded efficiently.

Among the patients preoperative visual acuity was<6/60-3/60 of 34 patients (34%), 6/60 of 58 patients (58%), 6/36 of 8 patients (8%). Unaided Visual acuity was 6/12 or better in 68 patients on 1st Postoperative day, in 84 patients on 7th Postoperative day and in 97 patients after 1 month. One month after operation we evaluated the Best Corrected Visual Acuity (BCVA) and found 6/6 in 92 patients, 6/9 in 8 patients.

We assessed post operative corneal reaction (edema) of the patients by doing slit lamp examination. The corneal edema was limited to 1+ and 2+. We examined the patients at all three follow up. At first post operative day22 patients (22%) had no corneal edema, whereas, 62 patients (62%) had 1+ corneal edema, 16 patients (16%) had 2+ corneal edema. After seven days at second follow up 83 patients (83%) had no corneal edema, whereas, 15 patients (15%) had 1+ corneal edema, 2 patients (2%) had 2+ corneal edema.

We assessed post operative anterior Chamber reaction of the patients by doing slit lamp examination. The reactions (cell and flare) were limited to 1+ and 2+. We examined the patients at all three follow up. At first post operative day 22 patients (22%) had no cell, whereas, 52 patients (52%) had 0.5+ (1-5) cell, 17 patients (17%) had 1+ (6-15) cell, 9 patients (9%) had 2+ (16-25) cell. After seven days at second follow up 57 patients (57%) had no cell, whereas, 28 patients (28%) had 0.5+ (1-5) cell, 15patients (15%) had 1+ (6-15) cell. At third follow up after 1 month, 92 patients (92%) had no cell, 8 patients (8%) had 0.5+ (1-5) cell.

We assessed post operative posterior segment reaction (vitreous haze) of the patients by doing slit lamp examination with +90D condensing lens. The reactions (vitreous haze) were limited to 1+ and 2+. We examined the patients at all three follow up. At first post operative day 82 patients (82%) had no vitreous haze, whereas, 16 patients (16%) had 1+ (Clear disc and vessels but hazy NFL) vitreous haze, 2 patients (2%) had 2+ (Disc and vessels hazy) vitreous haze. After seven days at second follow up 97 patients (97%) had no vitreous haze, whereas, 3 patients (3%) had 1+ (Clear disc and vessels but hazy NFL) vitreous haze. After 1 month, no patient has vitreous haze.

Conclusion:

As the study was done with small population and small duration in a fixed setup no adverse effect was detected. Prophylactic intracameral moxifloxacin in cataract surgery appears safe and effective and can be used as endophthalmitis prophylaxis in phaco-emulsification cataract surgery.

Reference:

1. World Health Organization. Elimination of avoidable blindness in South East Asia.Vision 2020- the to sight. New Delhi, India: WHO Regional office for South East Asia,1999.
2. Snellingen T, Evans JR, Ravilla T, Foster A. Surgical interventions for age-related cataract. Cochrane Database Syst Rev2002;

(2): C00013-23.
3. Minassian DC. Extracapsular cataract extraction compared with small incision surgery by phacoemulsification: a randomised trial. Br JOphthalmol2001; 85(7): 882 889
4. Dr. (Mrs) Gyanam G. Murthy. Aetiopathogenesis of post-operative endophthalmitis. 2001;11 (1-3): 8-11.
5. Espiritu CR, Caparas VL, Bolinao JG. Safety of prophylactic intracameral moxifloxacin 0.5% ophthalmic solution in cataract surgery patients. J Cataract Refract Surg. 2007; 33:63–68.
6. Arshinoff SA. Advantages and Use of Intracameral Moxifloxacin for Bacterial Prophylaxis in Cataract Surgery. Poster presented in the ASCRS Symposium on Cataract, IOL and Refractive Surgery; San Diego, USA. 2007. [Accessed August 27, 2013]
7. Lane SS, Osher RH, Masket S, Belani S. Evaluation of the safety of prophylactic intracameral moxifloxacin in cataract surgery. J Cataract Refract Surg. 2008;34:1451–59.
8. Arbisser LB. Safety of intracameral moxifloxacin for prophylaxis of endophthalmitis after cataract surgery. J Cataract Refract Surg. 2008;34:1114–20.
9. EkinciKoktekir B, Aslan BS. Safety of prophylactic intracameral moxifloxacin use in cataract surgery. J OculPharmacolTher. 2012;28:278–82.
10. Arshinoff SA, Bastianelli PA. Incidence of postoperative endophthalmitis after immediate sequential bilateral cataract surgery. J Cataract Refract Surg. 2011; 37:2105–14.
11. Shorstein NH, Winthrop KL, Herrinton LJ. Decreased postoperative endophthalmitis rate after institution of intracameral antibiotics in a Northern California eye department. J Cataract Refract Surg. 2013;39:8–14.
12. Galvis V, Tello A. Intracameral antibiotics and endophthalmitis incidence. J Cataract Refract Surg. 2013;39:312–13.
13. Friling E, Lundström M, Stenevi U, Montan P. Six-year incidence of endophthalmitis after cataract surgery: Swedish national study. J Cataract Refract Surg. 2013;39:15–21.