UNDER PEER REVIEW

Letter To Editor

Employing the intraocular irrigating solution containing moxifloxacin in cases of posterior capsular rupture

ABSTRACT

Introduction: Although the high risk of postoperative endophthalmitis in cases of posterior capsular rupture (PCR) has been well-known, no specific prophylaxis has been proposed. In recent years, the safety of intracameral MFLX has been established. Therefore, we have been performing cataract surgery in cases of PCR using an irrigating solution containing MFLX.
Methods: We retrospectively examined the clinical records of nine patients (nine eyes) who suffered PCR during cataract surgery between 2012 and 2014. Once PCR was confirmed, surgery was continued using an irrigating solution containing MFLX (100-fold dilution: 50µg/ml). We investigated the ocular parameters at 3–12 months postoperatively (6.2 ± 2.4 months).
Results: After surgery, the intraocular pressure was 15.3 ± 2.3 mmHg, the endothelial cell density was 2702 ± 336/mm^2, the retinal thickness was 238 ± 12 µm and the corrected visual acuity was 20/25 or greater in all patients. None of the patients developed endophthalmitis or complications related to MFLX administration such as cystoid macular edema (CME) or toxic anterior segment syndrome.
Conclusions: In the present study, the safety of treating PCR using an MFLX-containing irrigating solution was indicated. Because the minimum inhibitory concentration of MFLX for 90% of bacteria is low and there have been no reports of its retinal toxicity, we believe that the MFLX-containing irrigating solution is a rational choice for treating vitreous contamination following PCR.

Keywords: irrigating solution, moxifloxacin, cataract surgery, endophthalmitis, prophylaxis, posterior capsular rupture

Editor,

Although the high risk of postoperative endophthalmitis in cases of posterior capsular rupture (PCR) has been well-known, no specific prophylaxis has been proposed. A previous study using an *in vivo* PCR model demonstrated that intracameral injection of levofloxacin reduces the risk of endophthalmitis[1]. We conducted an experiment using an *ex vivo* PCR model in which intraocular lenses (IOLs) were inserted. In this study, however, the antibiotic concentration within the vitreous was only slightly increased by intracameral injection of moxifloxacin (MFLX). This was because the site of the PCR was covered by the IOL. In contrast, when surgery was continued after PCR using an antibiotic containing solution, the concentration of antibiotics within the vitreous increased significantly[2]. In recent years, the safety of intracameral MFLX has been established[3]. Therefore, we have been performing cataract surgery in cases of PCR using an irrigating solution containing MFLX.

We retrospectively examined the clinical records of nine patients (nine eyes) who suffered PCR during cataract surgery between 2012 and 2014. Once PCR was confirmed, surgery was continued using an irrigating solution containing MFLX (100-fold dilution: 50µg/ml). The IOL was sutured in one patient and implanted in the ciliary sulcus in eight patients. We investigated the ocular parameters at 3–12 months postoperatively (6.2 ± 2.4 months). The study was approved by the Nojima Hospital Review Board. Written informed consent was obtained from each patient.

After surgery, the intraocular pressure was 15.3 ± 2.3 mmHg, the endothelial cell density was 2702 ± 336/mm^2, the retinal thickness was 238 ± 12 µm and the corrected visual acuity was 20/25 or greater in all patients (Table 1). None of the patients developed endophthalmitis or complications related to MFLX administration such as cystoid macular edema (CME) or toxic anterior segment syndrome.

UNDER PEER REVIEW

Sobaci et al. verified the effects of using an irrigating solution containing antibiotics during cataract surgery and observed endophthalmitis in two cases of PCR in which an irrigating solution containing antibiotics was not used[4]. Either gentamicin or vancomycin was used in their report. These antibiotics, however, have been reported to cause retinal toxicity and postoperative CME, respectively. Because the antibiotic concentration in the vitreous readily increases in cases of PCR, the risk of complications is likely to increase even further. On the other hand, although the number of reports regarding the intracameral MFLX is increasing, there have been no clear reports of intraocular toxicity. A study involving an *in vivo* experiment using rabbits reported that no retinal toxicity was noted even when high concentrations of MFLX (500 µg/ml) were introduced in the vitreous[5].

In the present study, we employed a solution containing MFLX at a concentration of 50µg/ml. If half of the vitreous was replaced with the solution, the concentration in the vitreous would still be 25 µg/ml, which is considered to cover quite a wide spectrum of bacteria. Prospectively proving the efficacy of the irrigating solution containing MFLX in cases of PCR is realistically impossible because it requires an enormous number of cases of PCR. However, as stated above, use of an irrigating solution containing antibiotics in a PCR model was shown to reliably increase the antibiotic concentration in the vitreous. In the present study, the safety of treating PCR using an MFLX-containing irrigating solution was indicated. Because the minimum inhibitory concentration of MFLX for 90% of bacteria is low and there have been no reports of its retinal toxicity, we believe that the MFLX-containing irrigating solution is a rational choice for treating vitreous contamination following PCR.

Table 1. Ocular parameters of patients in which moxifloxacin containing solution was used following posterior capsilar rupture

BCVA=best-correlated visual aquity, CC=corneal endotherial cell counts (cell/mm^2), IOP=intra ocular pressure (mmHg), sulcus= IOL was implanted in the ciliary sulcus, suture= IOL was sutured, 3M~12M=3-12 months

Parameters \ Pt I.D.	1	2	3	4	5	6	7	8	9	Average ±S.D.
Age	75	66	78	68	70	58	71	68	55	67.7±7.4
Sex	M	M	M	F	F	F	M	M	F	
BCVA (Snellen) (3M~12M)	20/20	20/20	20/25	25/20	20/20	25/20	25/20	18/20	20/20	
CC (Preoperative)	1945	3627	2761	2829	2718	2833	3165	2646	2832	2817±445
CC (3M~12M)	2355	3118	2225	2861	2708	2596	3202	2420	2834	2702±336
Foveal thickness (3M~12M)	253	230	241	247	237	228	223	224	256	238±12
IOP (Preoperative)	12	17	14	15	15	14	13	17	18	15.0±2.0
IOP (3M~12M)	13	14	14	16	16	16	12	19	18	15.3±2.3
IOL insertion	sulcus	sulcus	suture	sulcus	sulcus	sulcus	sulcus	sulcus	sulcus	
Anterior Vitrectomy	−	−	+	−	−	+	−	+	+	

UNDER PEER REVIEW

postoperatively.

REFERENCES

1. Uda T, Suzuki T, Mitani A, Tasaka Y, Kawasaki S, Mito T, Ohashi Y (2014) Ocular penetration and efficacy of levofloxacin using different drug-delivery techniques for the prevention of endophthalmitis in rabbit eyes with posterior capsule rupture. J Ocul Pharmacol Ther 30: 333-339 DOI 10.1089/jop.2013.0204
2. Matsuura K, Suto C, Akura J, Inoue Y (2013) Comparison between intracameral moxifloxacin administration methods by assessing intraocular concentrations and drug kinetics. Graefes Arch Clin Exp Ophthalmol 251: 1955-1959 DOI 10.1007/s00417-013-2294-7
3. Arshinoff SA, Bastianelli PA (2011) Incidence of postoperative endophthalmitis after immediate sequential bilateral cataract surgery. J Cataract Refract Surg 37: 2105-2114 DOI 10.1016/j.jcrs.2011.06.036 S0886-3350(11)01489-1 [pii]
4. Sobaci G, Tuncer K, Tas A, Ozyurt M, Bayer A, Kutlu U (2003) The effect of intraoperative antibiotics in irrigating solutions on aqueous humor contamination and endophthalmitis after phacoemulsification surgery. Eur J Ophthalmol 13: 773-778
5. Gao H, Pennesi ME, Qiao X, Iyer MN, Wu SM, Holz ER, Mieler WF (2006) Intravitreal moxifloxacin: retinal safety study with electroretinography and histopathology in animal models. Invest Ophthalmol Vis Sci 47: 1606-1611 DOI 10.1167/iovs.05-0702

DEFINITIONS, ACRONYMS, ABBREVIATIONS

PCR: posterior capsular rupture, **MFLX**: moxifloxacin