

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

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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 moxifloxacin (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 $2702 \pm 336/\text{mm}^2$, 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, no apparent adverse effect of 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

Dear Editor:

Despite the known high risk of postoperative endophthalmitis for cases of posterior capsular rupture (PCR)¹, no specific prophylaxis has been proposed. One previous study using an *in vivo* PCR model demonstrated that an intracameral injection of levofloxacin can reduce the risk of endophthalmitis². We conducted an experiment using an *ex vivo* PCR model in which intraocular lenses (IOLs) were inserted. However, using this design, we found only a slightly increase in the antibiotic concentration within the vitreous following the intracameral injection of moxifloxacin (MFLX), which might be because the site of PCR was covered by IOL. In contrast, when surgery was continued after PCR using an antibiotic containing solution, the concentration of antibiotics within the vitreous significantly increased³. In recent years, the safety of intracameral MFLX has been established⁴⁻⁷. Therefore, we have been performing cataract surgery in cases of PCR using an irrigating solution that contains MFLX.

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

After surgery, the intraocular pressure was 15.3 ± 2.3 mmHg, endothelial cell density was $2702 \pm 336/\text{mm}^2$, retinal thickness was 238 ± 12 µm, and corrected visual acuity was $\geq 20/25$ 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.

Sobaciet *al.* have verified the effects of using an irrigating solution that contained antibiotics during cataract surgery and observed endophthalmitis in two cases of PCR in which an irrigating solution containing antibiotics was not used⁸. The antibiotics used by Sobaciet *al.* (gentamicin and vancomycin) have been reported to cause retinal toxicity and postoperative CME⁹⁻¹¹. Given that antibiotic concentration in the vitreous reliably increases following PCR, the risk of complications is also likely to increase. On the other hand, despite an increasing number of reports using intracameral MFLX, no clear reports of intraocular toxicity have been documented. One *in vivo* study using rabbits failed to find retinal toxicity even when high concentrations of MFLX (500 µg/ml) were introduced in the vitreous¹².

In the present study, we employed a solution containing MFLX at a concentration of 50 µg/ml. This concentration was chosen so that if half of the vitreous was replaced with the solution, then the remaining concentration in the vitreous (25 µg/ml) would be sufficient to cover a wide range of bacteria. Prospective PCR studies to assess the efficacy of an irrigating solution containing MFLX are difficult to conduct because they would require an extremely large number of PCR cases. However, as described above, the use of an irrigating solution containing antibiotics in a PCR model has been shown to reliably increase the antibiotic concentration in the vitreous. Here, we found no apparent adverse effects of an irrigating solution that contained MFLX. Given the lack of reports of retinal toxicity and low minimum inhibitory concentration for 90% of bacteria, we assert that irrigating solution containing MFLX 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 capsular rupture.

Apparent changes in ocular parameters were not evident, and all values were within the normal range. Because of limited number of the cases, statistical analyses were not performed.

=best-correlated visual acuity, CC=corneal endothelial cell counts (cell/mm²), IOP=intra ocular pressure (mmHg), sulcus= IOL was implanted in the ciliary sulcus, suture= IOL was sutured, 3M-12M=3-12 months postoperatively.

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Pt I.D.	1	2	3	4	5	6	7	8	9	Average
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Parameters											±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	-	-	+	-	-	+	-	+	+		

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80 3M~12M=3-12 months postoperatively.

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83 COMPETING INTERESTS

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85 The author has no financial or proprietary interest in any material or method mentioned.

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139 DEFINITIONS, ACRONYMS, ABBREVIATIONS

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

