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# Bilateral Pseudo-Phakic Macular Edema Post-Cataract Surgery in Diabetic Patients: A Case Report

Ahmed Ibrahim Abdel Alim Mostafa [1], Ahmed Atef Abdelhamid Shabana*[2]

1. Ophthalmology Specialist, NMC Royal Hospital, Sharjah, UAE.

2. Ophthalmology Specialist, Saudi German Hospital, Dubai, UAE.

**Corresponding Author: Ahmed Atef Abdelhamid Shabana,** Ophthalmology Specialist, Saudi German Hospital, Dubai, UAE.



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## *Abstract*

***Purpose:*** *To define management of macular edema after cataract surgery.*

***Methods:*** *Case report of bilateral macular edema in diabetic cataractous eye. A male patient aged 44 years old with uncontrolled IDDM, the uncorrected visual acuity (UCVA) was 6/18 and counting fingers (CF) and the best corrected visual acuity (BCVA) was 6/12 and 6/36 in the right and left eyes, respectively.*

***Results:*** *Surgery was done in the left eye with posterior capsular rent (PCR), anterior vitrectomy and implantation of 3-piece IOL on sulcus was performed. Complications on the first day was cornea edema, vision hand motion, while IOL in place. Vision improved to 6/60 with mild corneal edema after one week, however macular edema occurred later on resolved with medical therapy and last vision one month later was 6/6. In the right uneventful cataract surgery was performed with PC IOL implantation, one month postoperatively, it developed macular edema and treated by the same regimen, vision improved to 6/6.*

***Conclusion:*** *Once Psuedo-phakic macular edema occurred in one eye, there is a high risk of developing the same condition in the other eye . In these patients, the various surgical parameters should be optimized to minimize the incidence of PCR. It is also necessary to bear in mind the signs of early PCR. The use of NSAIDs and steroid eye drops has a major role in reversing the developed macular edema.*


## Introduction

The outcome of cataract phacoemulsification today is excellent. However, despite the advances in the field of cataract surgery, surgical complications still occur. Posterior capsular rent (PCR) is the most common potentially sight threatening intraoperative complication during cataract surgery. An improperly managed PCR, with or without a vitreous loss (VL), can adversely impact the excellent outcome associated with routine cataract surgery **[**1**]**.

Macular edema including cystoid macular edema (CME) is one of the main causes of unfavorable visual outcomes after cataract surgery. The incidence of clinically significant cases is 1% to 2%, whereas the incidence of angiographic cases is up to 9% to 19%.

In most cases, CME regresses spontaneously; however, macular thickness elevation persists in some cases and can lead to permanent visual deterioration. Increased central macular thickness (CMT) itself may also cause visual deterioration without intraretinal cystoid edema. **[**2**]**

Diagnosis of macular edema previously depended on slit-lamp microscope examination and fundus fluorescein angiography; however, this approach is limited in its ability to obtain objective and quantitative data, and the interpretation of results varies between examiners. Recently, the introduction of optical coherent tomography (OCT) enabled morphologic and quantitative evaluation of macular status **[**3**]**. Several studies have reported the development of macular edema after cataract surgery **[**4,5**]**. Most of these studies employed slit-lamp examination or fundus fluorescein angiography to assess the pathological changes in the macula. There are few large-scale studies focused on evaluation of serial macular changes after cataract surgery by using OCT images. Kim et al. **[**4**]** reported the result of 50 cases using OCT; however, they only enrolled patients with diabetes mellitus (DM).

Reporting a case like this put a spot of light on the importance of such cases and their management to avoid visual impairment after cataract surgery especially in diabetic patients.

## Case Presentation

Insulin-dependent diabetic patient (uncontrolled diabetes), 44 years old with bilateral cataract, uncorrected visual acuity (UCVA) 6/18 (LogMAR = 3.2) and count finger (CF) (LogMAR = 40) in the right and left eyes, respectively and the best corrected visual acuity (BCVA) was 6/12 (LogMAR = 2.0) and 6/36 (LogMAR = 6.3), respectively.

Cataract surgery was performed in the left eye in Aug 15, 2022. During operation at the end of phacoemulsification PCR occurs while removing the last nuclear fragment, during aspiration of the cortex. Once it occurs, first the surgeon pulls out the probe, as this disturbs the intraocular pressure equilibrium, causing the PCR to enlarge and the vitreous to prolapse out. The surgeon then injected dispersive viscoelastic through the side port with the non-dominant hand while holding the dominant hand steady. Once the dispersive viscoelastic tamponades the break, stabilizes any remnant nuclear fragments, and fills the AC, the probe was gently withdrawn. The next step is to analyze the situation, as further management depends on when the PCR occurred. Anterior vitrectomy was performed by anterior vitrectomy machine (Centorion, USA), then intraocular lens (IOL) implantation of 3-piece IOL (3-Piece Alcon, USA) on the sulcus was done.

Postoperative medications were prescribed including antibiotics (Vigamox eyedrops, 5 times a day), anti-inflammatory eyedrops (Predfore eyedrops every 2 hours) with routine instruction to the patient after cataract surgery. Examination of the patients was done at the first day postoperatively (16/8/2022) revealed corneal edema, vision was hand movement (LogMAR = 50), IOL in place. After one week (23/8/2022) unaided vision improved to 6/60 (LogMar =10) with mild corneal edema. OCT was performed at 3/9/2022 revealed macular edema managed by Brofix eyedrops, Predforte eyedrops, and Alphagan eyedrops.

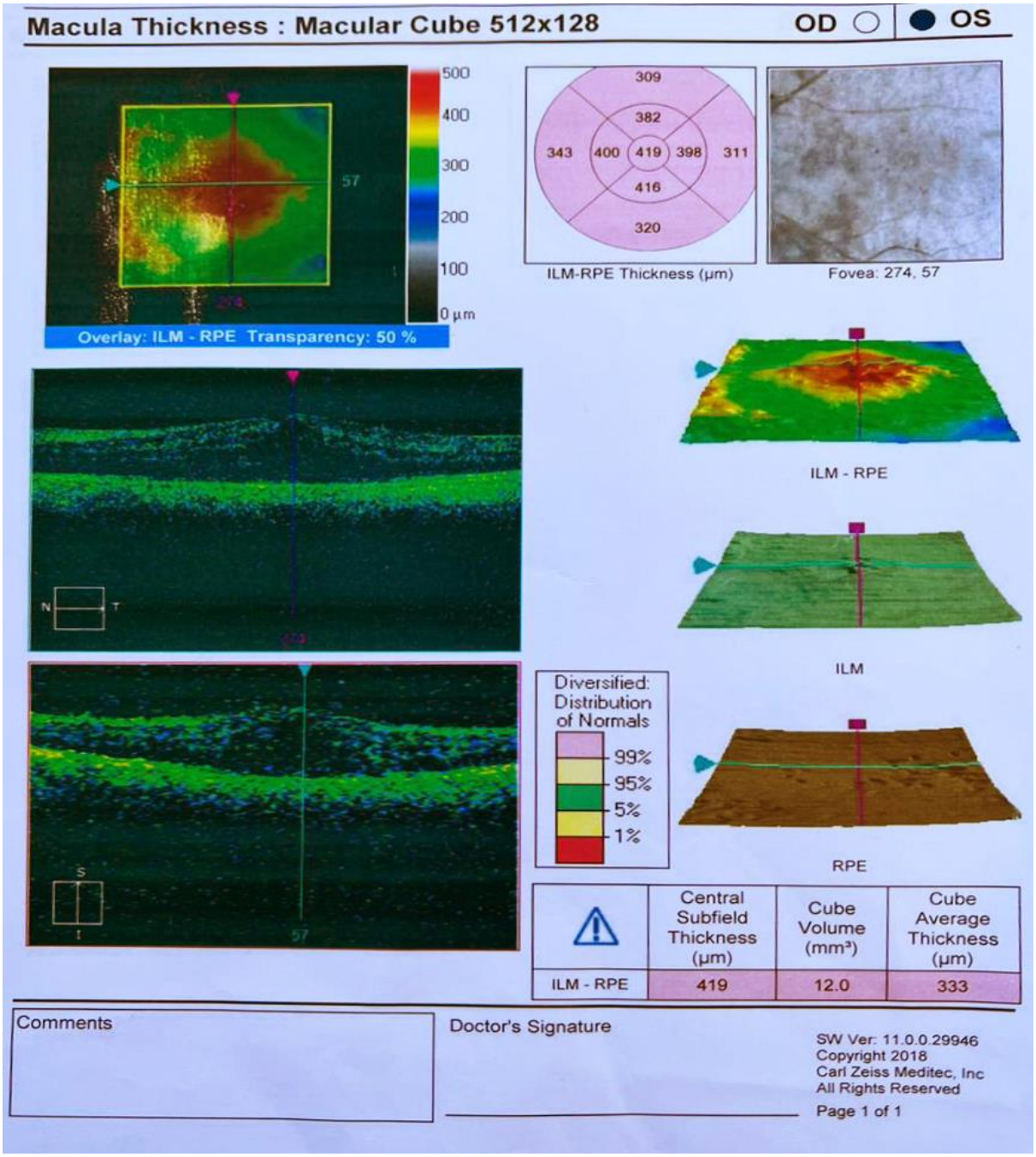
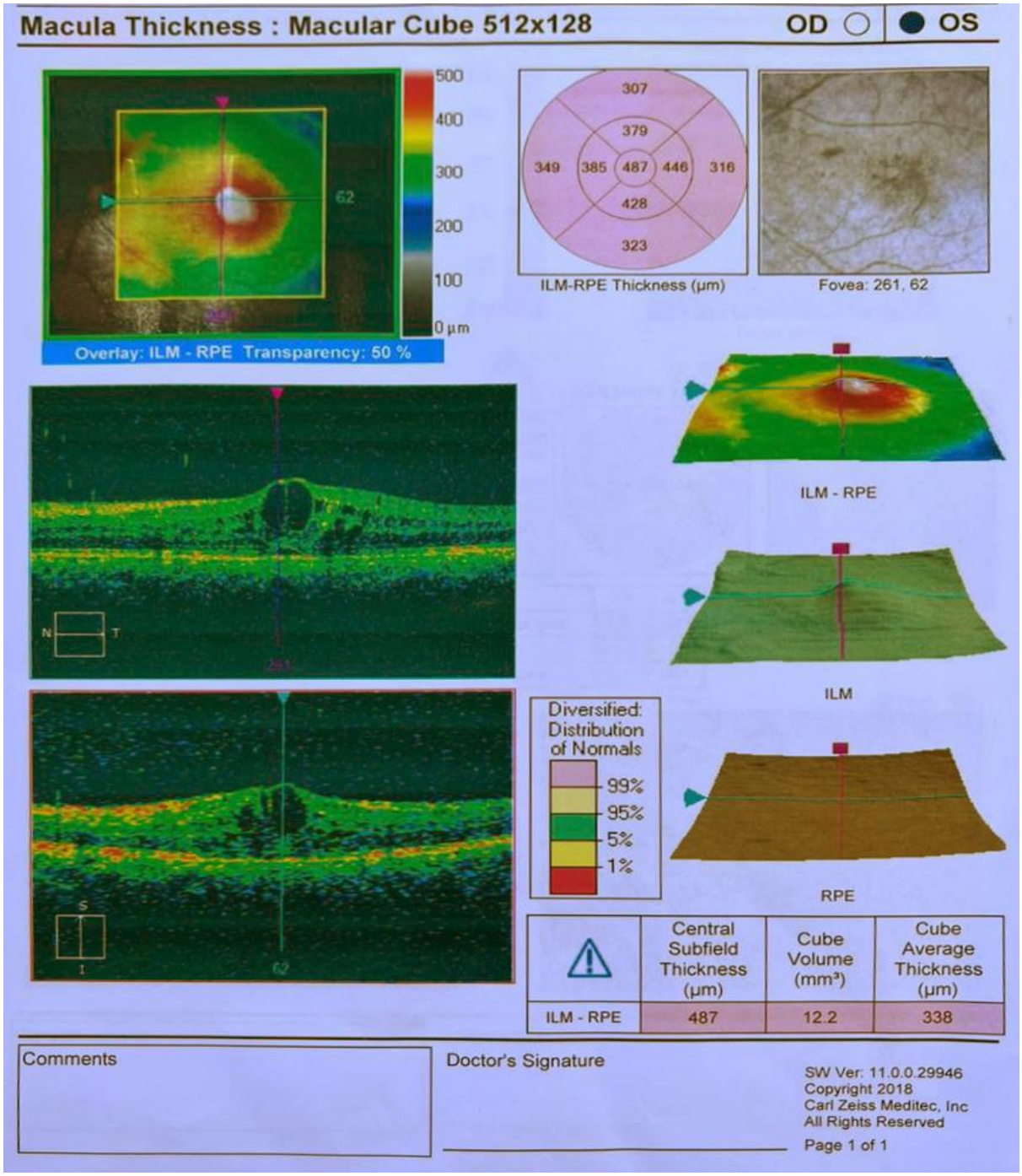



**Figure 1**

In the right eye, uneventful cataract surgery was performed with posterior chamber IOL implantation (Eyhance Technis 1-Piece, Johnson & Johnson Vision) without significant complications, however, it developed macular edema one month after surgery. The treatment regimen given to the left eye was repeated again in the right eye. Finally, sutures were removed from the main wound after one month of surgery, vision improved to 6/6 (LogMAR = 0) in the left eye and 6/6 (LogMAR = 0), (Figures 1-7).

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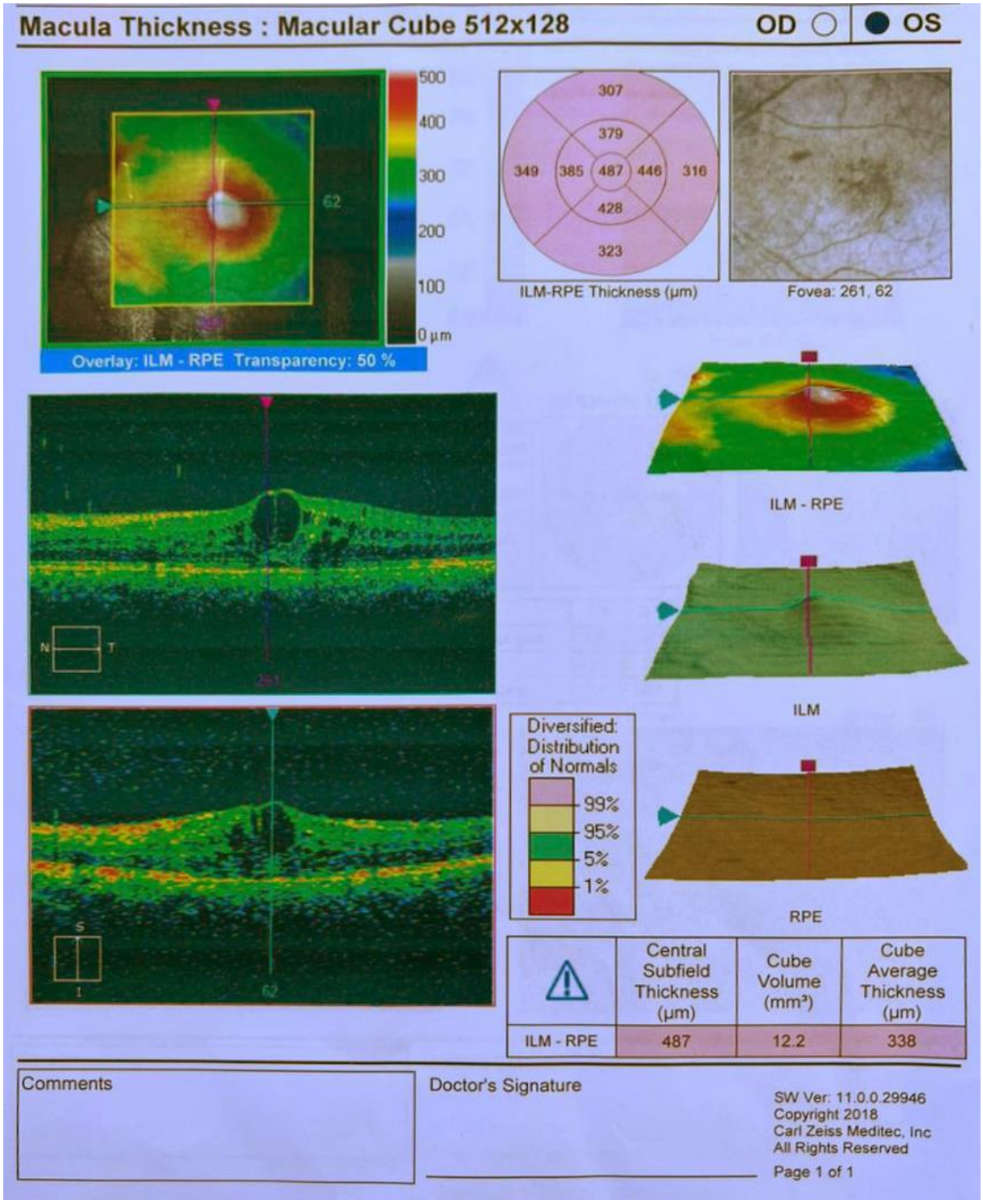
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**Figure 03**

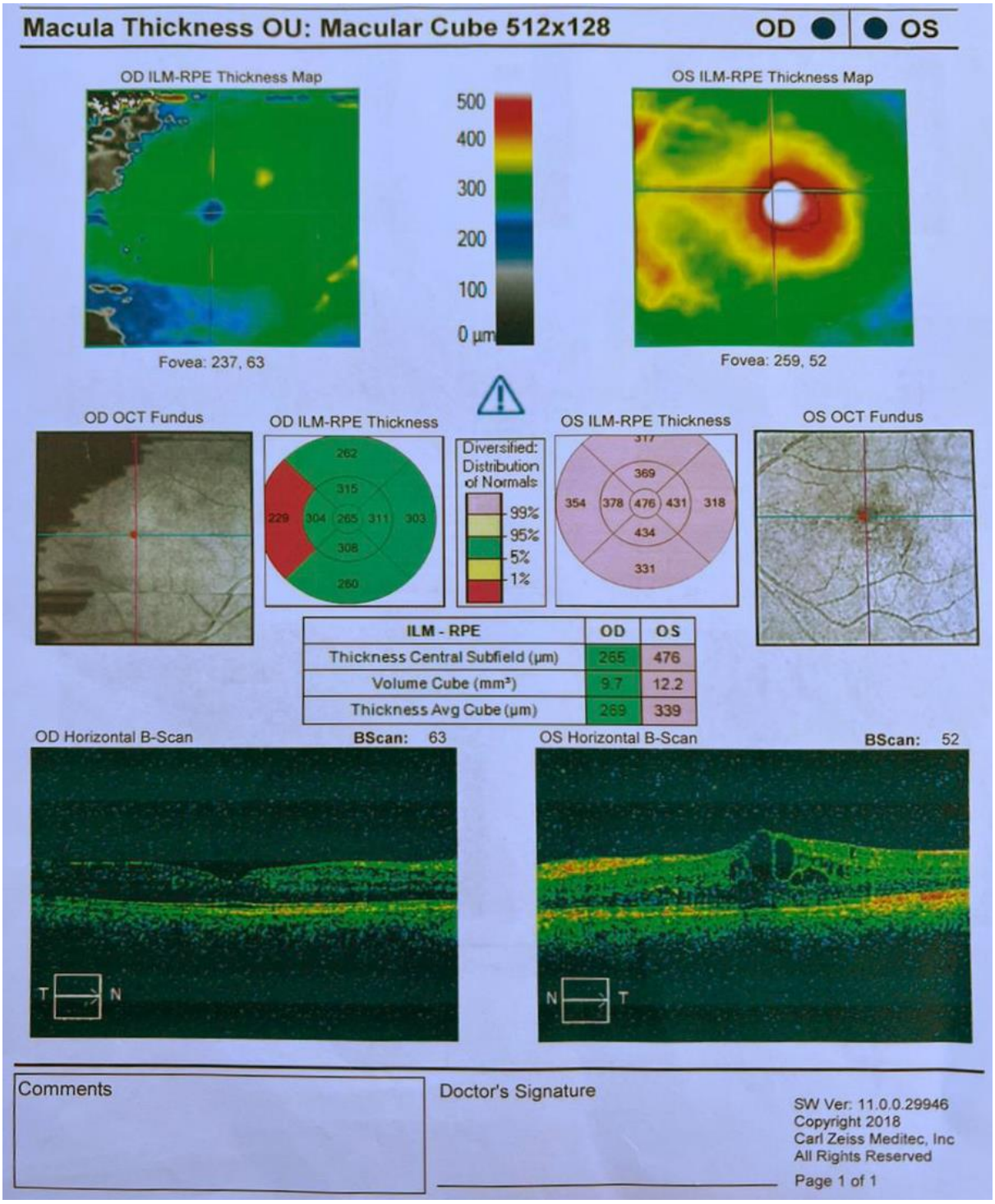
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**Figure 04**

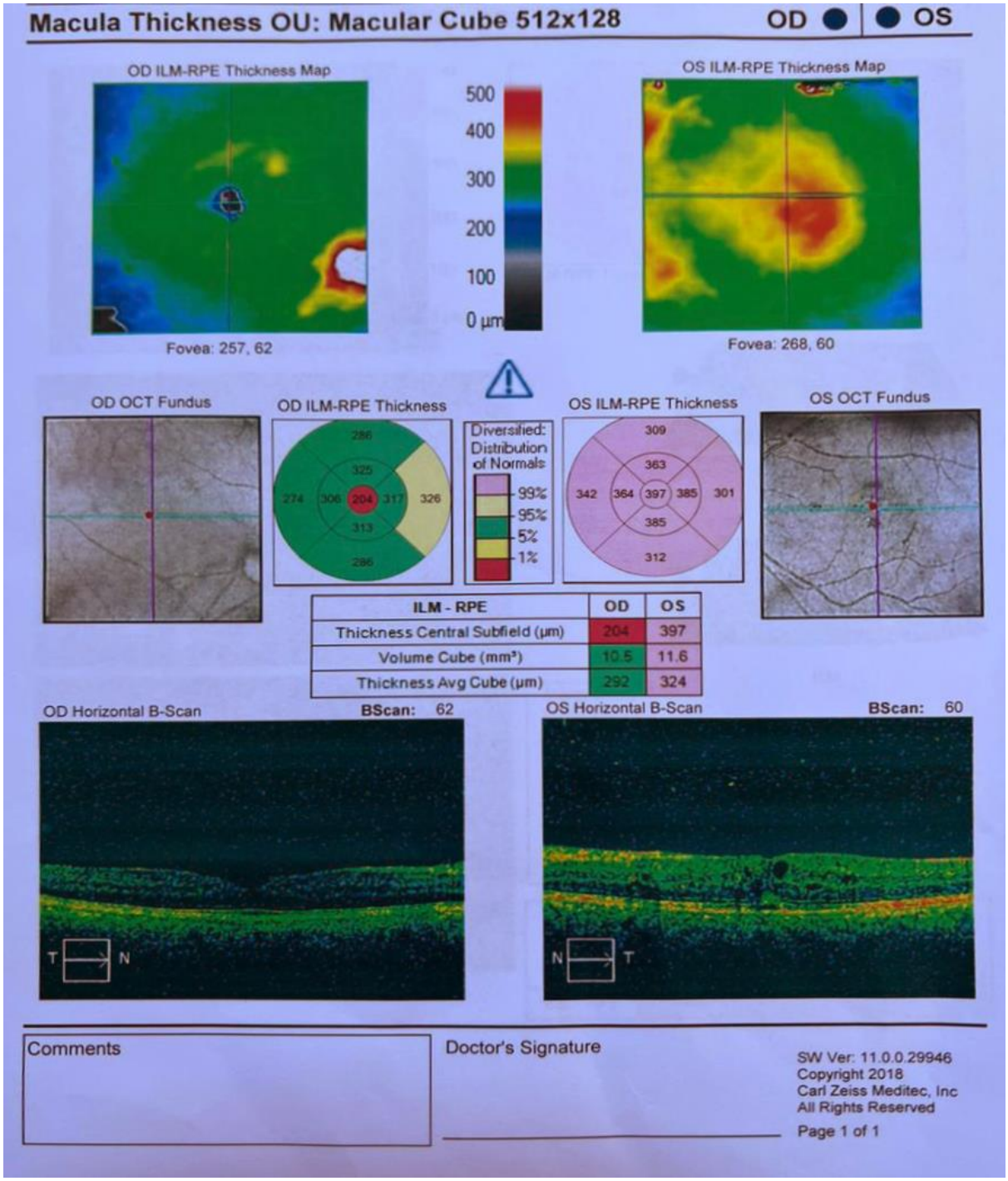
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**Figure 05**

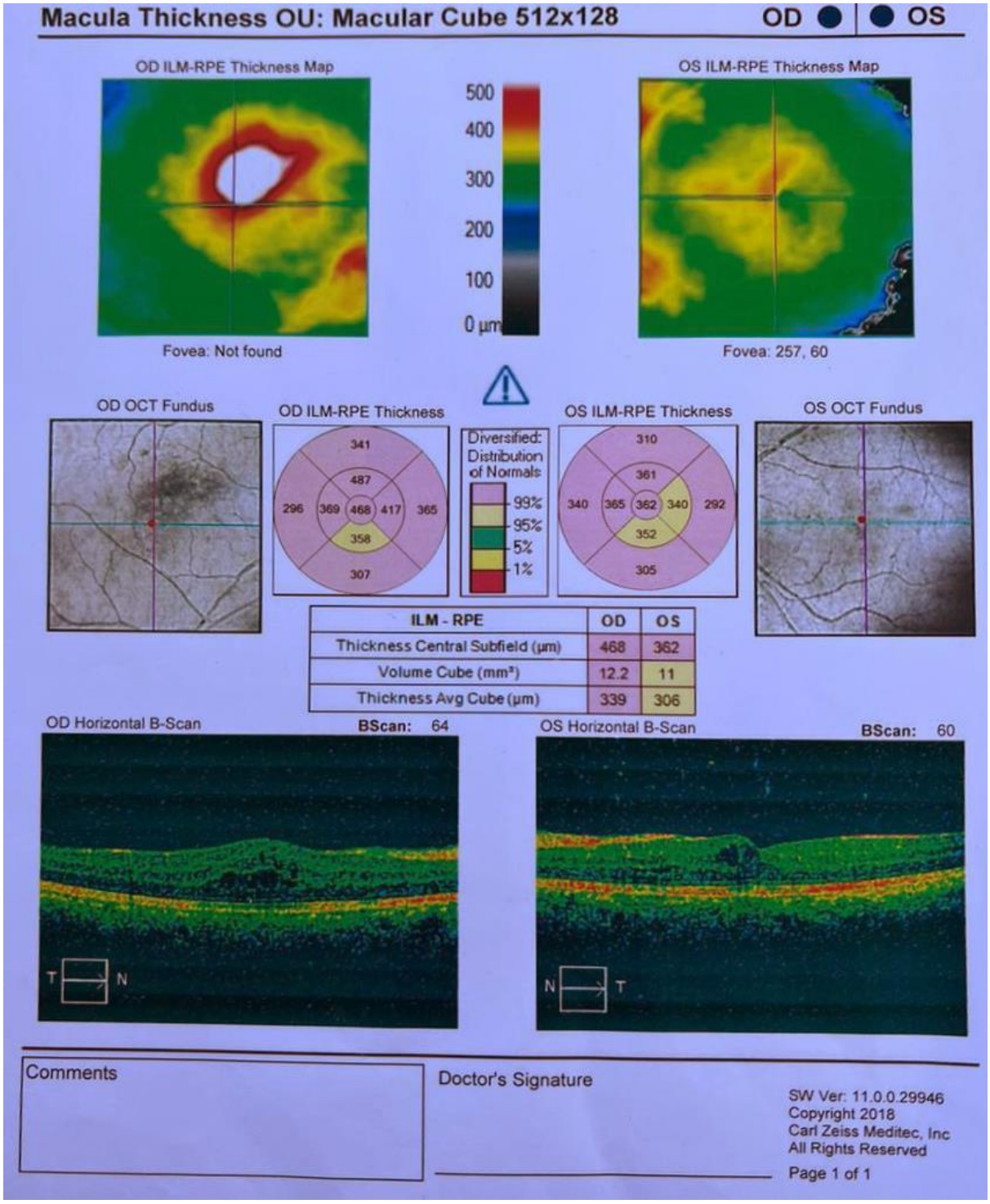
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**Figure 06**

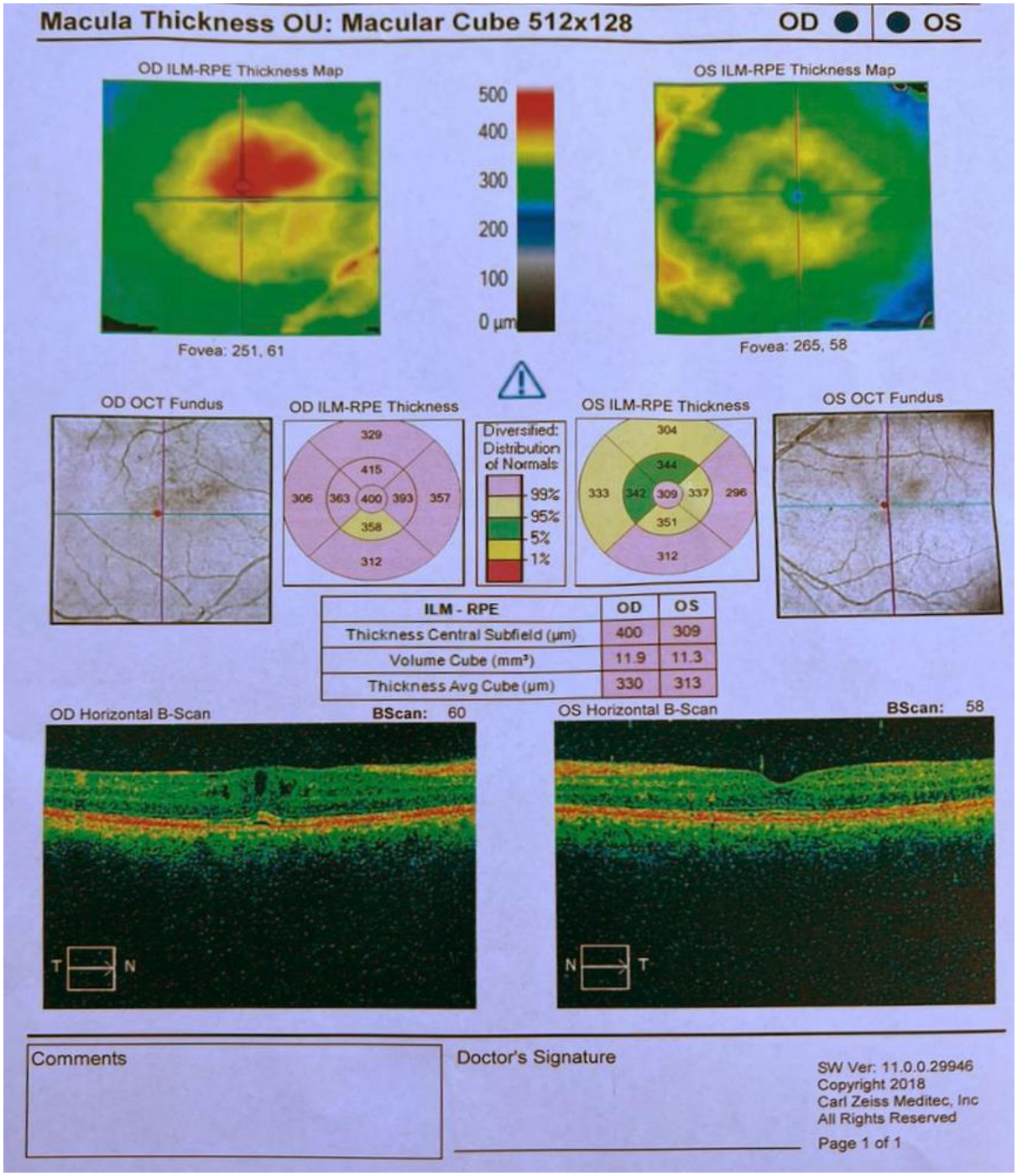
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**Figure 07**

## Discussion

In this case study, we objectively evaluated the macular thickness and the occurrence of macular edema after whether complicated (left) or uncomplicated (right) cataract surgery using OCT. OCT has already been reported as a reliable tool for evaluating macular thickness in normal population and patients with DM, with high reproducibility **[**6**]**. There have been many reports on macular edema after cataract surgery. However, to the best of our knowledge, there was no study objectively investigate the occurrence of bilateral ME after phaco in diabetic patient and the clinical course of increased CMT after uncomplicated or complicated cataract surgery using OCT.

Mentes et al. **[**7**]** reported that the incidence of clinical and angiographic CME in patients without specific underlying conditions was 0% and 9.1%, respectively. Although they assessed macular thickness using fundus fluorescein angiography, the results of their study were in agreement with those of our case.

The majority of symptoms and signs of clinically significant increase in CMT appear 4 to 12 weeks post-surgery, with peak incidence typically occurring between 4 to 6 weeks **[**8,9**]**. The incidence of ME in our study appears earlier than these studies which may be due to the uncontrolled insulin-dependent diabetes mellites being in our case.

Our case study reported incidence of ME within the first month postoperatively. This agreed with Kim et al. **[**2**]** who found that eyes with subclinical macular edema or CME had elevated CMT compared to those with no macular edema at 1-month post-surgery in their study. However, the difference in CMT did not appear between no macular edema and subclinical macular edema group at that time point. They hypothesized that changes in CMT could be examined in detail and more accurately by using OCT rather than by using BCVA. In other words, OCT images can provide better information about macular status after cataract surgery than BCVA.

A previous study using an animal model to investigate the pathophysiology of the retina in myopia using vitreous fluorophotometry revealed that the blood-retinal barrier in myopia is abnormal. The inward permeability significantly increased, and the outward permeability decreased compared to that of emmetropic eyes. This suggested that the active transport mechanism at the blood-retinal barrier decreases in myopia **[**10**]**. However, contrary to expectations that myopic eyes will be prone to postoperative central macular thickness (CMT) augmentation, there was no significant correlation between axial length and CMT. Giansanti et al. **[**11**]** also reported that the incidence of CMT elevation does not increase in patients with severe myopia after uncomplicated cataract surgery. Lowering the bottle height during phacoemulsification in order to prevent excessive anterior chamber deepening,

which might cause posterior capsular rupture and vitreous protrusion, may have biased the results of our study. The only factor that affected macular thickness was the intracameral injection of epinephrine during the surgery [2].

Epinephrine is known to contribute to elevated macular thickness, especially when applied to aphakic eyes. Although pupil dilation is maintained with preoperative topical mydriatic eye drops, at times, additional intracameral injection of epinephrine is required since secured visualization of a surgical field is crucial for proper outcome of surgery [2]. Bozkurt et al. [12] reported that intracameral injection of epinephrine (1 : 5,000) does not increase the risk of macular edema due to CMT elevation in eyes with no risk factors in the context of uneventful phacoemulsification with IOL implantation. However, bisulfite-free epinephrine was used in their study.

Kim et al. [2] found 16 of 25 eyes (64%) that received intracameral injection of epinephrine during the surgery had elevated CMT at 1-month post-surgery, whereas 8 of 11 eyes (72.7%) that did not receive epinephrine injection had elevated CMT at 2 months post-surgery. The time to onset of elevated CMT was earlier in the epinephrine group than that in the non-epinephrine group.

The earlier onset and the increased treatment demand owing to elevated CMT for the epinephrine use is explained by Kim et al. [2]: One is the possibility that the adrenergic effect of epinephrine mediates the dilatation of retinal vessels increasing the blood flow in the central macula. The other is that epinephrine acts as a cofactor for the synthesis and release of prostaglandins, which can induce arteriolar vasodilation by iontophoresis [13]. Another possibility is that the alterations of the blood-aqueous barrier function [14].

The final visual acuity and CMT in most patients with macular edema, including subclinical macular edema, normalized post-surgery without any treatment. CME cases were objectively followed up until 6 months post-surgery using OCT to evaluate the clinical course of CME and the final visual outcomes. The overall visual outcome at 6 months after the operation was favorable [2]. Therefore, surgeons should be aware of the complications, causes of ME and should not abuse it unnecessarily. It is recommended to examine CMT by OCT bilaterally for detection of ME, even if the cataract surgery was performed without any intraoperative complications.

## Conclusion

Once Psuedo-phakic macular edema occurred in one eye, there is a high risk of developing the same condition in the other eye. In these patients, the various surgical parameters should be optimized to minimize the incidence of PCR. It is also necessary to bear in mind the signs of early PCR.

The use of NSAIDs and steroid eye drops post operatively has a major role in reversing the developed macular edema.

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