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Management of Complication After Lens Extraction Surgery in High Myopia Patients with Cataract: A Serial Case



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ABSTRACT

Introduction: Myopia is the most common refraction error. Its prevalence has increased in recent years. Complications after cataract surgery often occur in myopia patients, especially in severe myopia. Appropriate treatment is needed before and after the cataract surgery to deal with that complications.

Case Report: The first patient was a 63-year-old woman with BCVA of the right eye (RE) 6/48 and the left eye (LE) 6/30. The refraction was done subjectively, with result S-11.00 C-2.00x90° for RE and S-12.00 C-1.50x80° for LE. Both eyes had immature cataracts and were planned for phacoemulsification and implantation of capsular tension ring (CTR) and intraocular lens (IOL). Postoperatively, both

eyes' intraocular pressure (IOP) increased (RE 25 mmHg, LE 24 mmHg). The second patient was a 67-year-old woman with high myopia, astigmatism and immature senile cataracts. The same surgery as the previous patient was done. One month after surgery, posterior capsular opacification (PCO) occurred in both eyes, and they were treated by NdYag laser. After that procedure, visual acuity became better.

Conclusion: Cataract surgery in high myopia patients is challenging. Various complications may occur during and after surgery. The anticipation of these complications and appropriate treatment are essential for better visual acuity.

Keywords: High Myopia, Cataract, Lens Extraction Surgery

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INTRODUCTION

Myopia is the most common refractive disorders, and its prevalence has been increasing in recent years among all ages. Myopia can induce anatomic changes such as chorioretinal thinning with visual axis lengthening, lead to several complications such as glaucoma and rhegmatogenous retinal detachment.¹ Data of 2019 shows that 28% of the world's population experiences this condition, and it is even estimated that by 2050 the number will reach 50%. The prevalence of myopia varies between ethnicities, races and countries, with the highest, take place in Asian countries (the USA up to 2%, VINA 2,6%, and Japan 5,5%). Due to the increasing number, myopia becomes one of the leading causes of blindness, especially in European and East Asian countries.^{1,2}

Several studies suggest that myopia is associated with the increase of nuclear and posterior subcapsular cataracts, but not cortical cataracts. Complications after cataract surgery are still common in myopia patients with cataracts. One of the complications is an early and transient increase of intraocular pressure (IOP), an acute event that can sometimes be avoided.³ The best-corrected visual acuity (BCVA) has been shown to impact

an adult's quality of life. The previous study stated that refractive errors could significantly improve life quality compared to untreated refractive errors. Adults with severe myopia will feel disturbed when doing activities such as driving, exercising, using computers, and experiencing difficulties in social interactions and emotional disturbances.⁴

Lens extraction is the definitive treatment for cataracts. This procedure gives better visual improvement for patients. The appropriate preoperative preparation and careful follow-up can prevent complications after surgery, especially in high myopia patients. This report describes 2 cases of high myopia patients with cataracts who underwent lens extraction and experienced postoperative complications. We successfully managed these patients based on the type of complications.

CASE REPORT

Case 1

A 63-year-old woman complained of blurred distance vision and getting worse since last year. The patient has a history of wearing glasses for 20 years and had no history of allergies, hypertension and diabetes mellitus. Her siblings have also had myopia since childhood and wearing thicker glasses.

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She. The examination showed regular anterior segment for both eyes, except the lens opacity, were NO4NC4C2. Both posterior segments showed tigroid retina and lattice degeneration. The visual acuity (VA) result was 1/60 for both eyes. Using her glasses (S-7.00 C-1.00 x90° for RE and S-7.50 for LE), the BCVA was 6/48. The subjective refraction was S-11.00 C -2.00 x 90° (RE) and S-12.00 C -1.50x80° (LE), with new BCVA, was 6/15. Her IOP was 14 mmHg (RE) and 16 mmHg (LE). RE axial length was 25,06 mm, and LE was 25,41 mm. OCT ONH and RNFL results were expected for both

eyes. She was diagnosed with RLE High Myopia + myopia astigmatism compositum, immature senile cataract, and suspected refractive amblyopia. We performed a laser barrage in both of her eyes.

We treated cataracts with phacoemulsification and Capsular Tension Ring (CTR) + IOL implantation (17,5 D for RE and 16,5 D for LE). We planned to do the RE first. The VA's first day after surgery was 6/24 with anterior chamber reaction. The IOP increased by 25 mmHg. She was given topical and systemic steroids to minimize the inflammation. On the 7th day postoperatively, the VA was 6/12, standard anterior chamber, and the IOP reduce to 17mmHg. On the 14th day postoperatively, the VA was 6/12, with no anterior chamber reaction, but the IOP increased by 28mmHg. She was given additional acetazolamide 250 mg orally twice/day. In the next follow up, the VA and IOP were stable.

We did the same procedure for the LE. On the first day postoperative, the VA was 6/48 with anterior chamber reaction and normal IOP. A week later, the IOP of LE increased by 22 mmHg. We gave an additional Timolol eye drop for the LE. After one month, the BCVA of both eyes was 6/6 (RE with correction -0.5 D and LE with -1.00 -0.50x25°). Both eyes had normal IOP (12 and 16 mmHg).

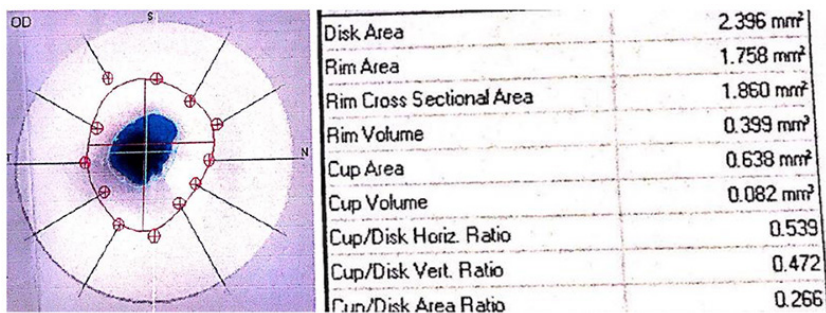


Figure 1. The figure of Right Eye OCT ONH on First Patient

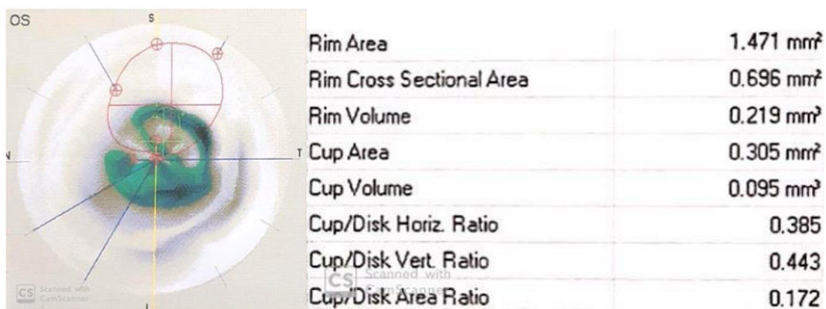


Figure 2. The figure of Left Eye OCT ONH on First Patient

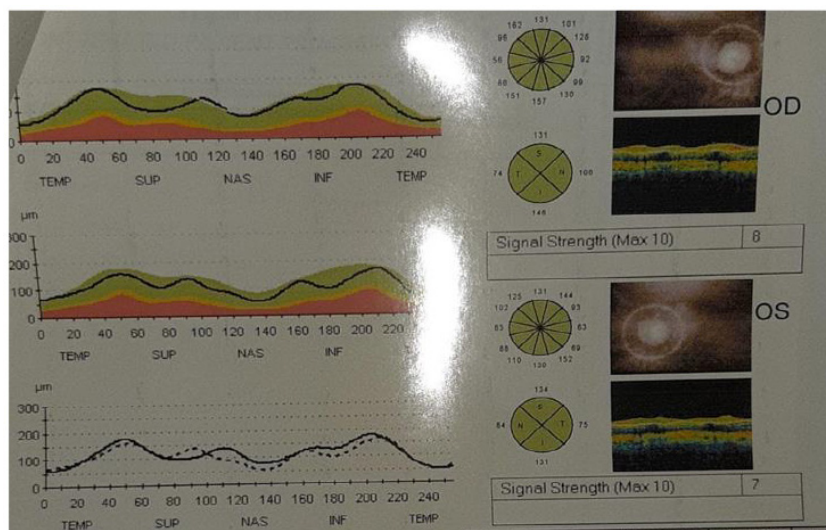


Figure 3. The figure of OCT RNFL on First Patient

Case 2

A 67-year-old woman presented with blurry vision a long time ago and uncomfortable with her glasses. She wore glasses since school age with the increasing power progressively. At present, the glasses were -9.25 D (RE) and -3.25 D (LE). No history of myopia and systemic disease in her family. She had no allergy.

The examination showed regular anterior segment for both eyes, except the lens opacity, were NO2NC1C1. Both posterior segments showed myopic crescent and tigroid retina. The VA result was 1/60 RE and 2/60 LE. By using her glasses (S-10.75 C-1.25 x96° for RE and S-3.00 C-0.75 x145° for LE), the BCVA was 6/20 (RE) and 6/30 (LE). The retinometry result were 0,9 for RE and 0,5 for LE. Her IOP was normal (20 mmHg for both eyes). She was diagnosed as RE High Myopia (ODS Myopia astigmatism compositum) + Amblyopia refractive anisometropia + immature senile cataracts.

She got a barrage laser on both eyes on the same day. We treated cataracts with phacoemulsification and Capsular Tension Ring (CTR) + IOL implantation (10,0 D for RE and 15,0 D for LE). We also gave acetazolamide for lowering IOP as prophylaxis. We did the surgery for the RE first. The VA's first day after surgery was 6/9, with no anterior chamber reaction and normal IOP. The condition of RE remained stable. We did the same procedure for the LE. On the first day postoperative, the VA was

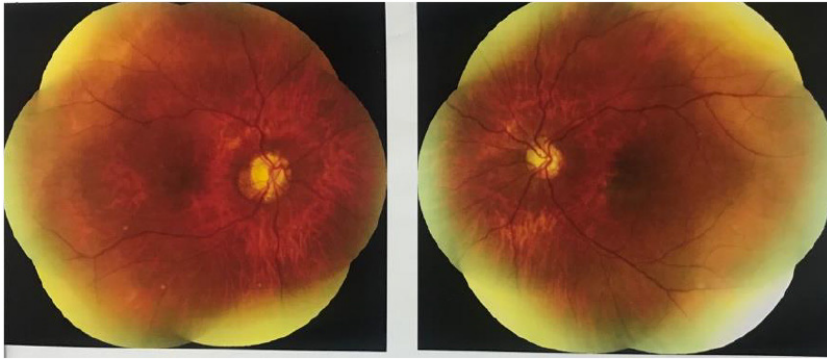


Figure 4. The figure of Fundus Photography on Second Patient

6/15, with no anterior chamber reaction and normal IOP. Two years later, she returned to the clinic due to the decrease of VA on both eyes (6/15 RE and 6/18 LE). We found posterior capsule opacification (PCO) on the examination, then we performed NdYag laser on the same day. The BCVA after NdYag laser was 6/6 (with correction C-1.00x130° on RE, no correction on LE).

DISCUSSION

Based on the power of the correction lens, myopia is classified into three types, namely (1) mild myopia (< -3.00 D), (2), moderate myopia (-3.00 D to -6.00 D), and (3) high myopia (> -6.00 D).⁵ Tang et al. stated that genetic factors also influence the severity of myopia, which involves the PAX6 gene involved in oculogenesis and eye globe growth. Parents who have a longer axial length than normal eyes will also give birth to a child with the same condition. A previous study showed family history as a significant risk factor for myopia.⁶ The first patient, in this case, was classified as severe myopia with a correction of S-11.00 C-2.00 x 90° (RE) and S-12.00 C -1.50x80° (LE), with BCVA of 6/15. Her siblings also had a similar condition; thus, following the theory that genetic factors affect myopia is high. The second patient diagnosed severe myopia only on her RE but did not have the same family history.

A cataract is a complication that often occurs in people with high myopia. The high myopia complexity makes cataract management more difficult in myopic eyes than emmetropic eyes. This condition is worsened by chorioretinopathy, choroid neovascularization and open-angle glaucoma. Another study stated that an initial transient increase in intraocular pressure is more common after cataract surgery in high myopia patients than in those with emmetropia. Another risk factor for the early transient elevation of IOP is sex. The Previous study showed that males had a higher risk of IOP elevation than females.³ In this report, both patients were female and had the presence of cataracts. In a study conducted by Zhu

et al., the incidence of IOP spikes within the first day and third day after surgery was significantly higher in the HMC group (highly myopic cataracts) than in the age-related cataract group at each follow-up.⁷ The first patient had theoretically postoperative IOP spikes, while the second patient did not.

The occurrence of an initial transient IOP spike in high myopia eyes is partly because they are at greater risk for Blood Aqueous Barrier (BAB) disorders than emmetropic eyes. The increased levels of inflammatory cytokines are also found in the aqueous humor in eyes with high myopia. Cho YK's research showed that the anterior chamber reaction could be observed for three weeks after cataract surgery, which may be due to the iris's large fluctuation during surgery.⁸

High myopic eyes also tend to have decreased aqueous humor flow through the trabecular meshwork. Chen Z et al. showed that the trabecular braid in the high myopic eye was thinner than that in the emmetropic eye. This condition may be due to eye globe lengthening as well as metabolic dysfunction. This worsens myopic eyes with an early increase of IOP due to abnormalities in the trabecular meshwork structure and Schlemm's canal. Additional investigations using anterior segment Optical Coherence Tomography are necessary for the management of such patients.⁹

Another reason for an early increase of IOP is the tendency for decreased ocular stiffness in the long eye, leading to susceptibility to surgical trauma. This condition can also cause deformity of ocular structures, such as the anterior chamber. Another study showed that the broader anterior segment makes relatively less trabecular meshwork development. As a result, there will be an increase of IOP due to initial postoperative inflammation, residual lens or viscoelastic material at the end of surgery.¹⁰ Until now, there has been no useful predictor for early transient IOP elevation after cataract surgery in eyes with high myopia despite the theory previously stated.¹¹ After cataract surgery, the first patient had an anterior chamber reaction. This condition may be caused by viscoelastic residual, worsen by long axial length.¹² The second patient did not experience an increase of IOP postoperatively because the operator has given IOP-lowering drugs to prevent possible complications.

The occurrence of peripheral retinal degeneration such as lattice degeneration, increases as well as the axial length of the eye globe. Thus, the prevalence of all types of retinal detachment increases with myopia's degree by more than 20x than emmetropic eyes. The incidence of posterior vitreous detachment due to the vitreous body's liquefaction is higher at a younger age in high myopia.¹³ We found tigroid retinal and lattice degeneration in both patients so that they were

consulted to the vitreoretinal division and found the thyroid retina condition and the presence of degeneration of the lattice so that the barrage laser was performed.

A complete and appropriate preoperative communication before cataract surgery is essential for high myopia patients. Apart from communication, the surgeon has to ensure that the patient is in stable condition during the postoperative period and treat every complication appropriately.¹⁴ Both patients were well informed about their eyes' condition, preoperative procedures, and postoperative evaluation periodically up to 1 month after surgery until stable condition.

Although there is a suspicion for the association between the axial ocular length and the incidence of PCO, studies show that axial myopia does not significantly increase the incidence of PCO.¹⁵ The implantation of CTR and IOL in patients with high myopia can reduce the risk of PCO and Nd YAG laser's need.¹⁶ The decrease of VA due to PCO usually occurs 2-5 years after surgery. Our patients had CTR and IOL implantation procedure, but only the second patient had PCO in 2 years postoperatively. This is probably because the first patient did not return to the eye clinic after three months of follow-up, while the second patient was still in control for up to 2 years after surgery, so that postoperative evaluation was still ongoing. The type of IOL also influences the incidence of PCO. Hydrophobic acrylic lenses can reduce the chances of developing PCO compared to hydrophilic lenses. Both patients used hydrophilic acrylic implanted lenses so that the likelihood of PCO occurring was greater.^{17,18}

CONCLUSION

Cataract surgery in high myopia patients is challenging. Various complications may occur during and after surgery. The anticipation of these complications and appropriate treatment is essential for better visual acuity.

ETHICAL CLEARANCE

The Ethical Committee has approved this case report of Sanglah Hospital (No.1850/UN14.1.1.VII.14/LT/2020).

CONFLICT OF INTEREST

None

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