

MANAGEMENT CASE OF POST PHAKIC INTRAOCULAR LENS IMPLANT IN HIGH MYOPIA WITH COMPLICATED CATARACT AFTER VITRECTOMY: POST SURGERY CHALLENGES

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Abstract

Introduction: To highlight the therapeutic dilemma in managing complications in high myopia patient with complicated cataract after vitrectomy who previously had refractive surgery.

Case Report: A 37-years old man, presented with half the right eye view was being blocked by a black curtain for one week before admission. He had a history of high myopia on both eyes and underwent phakic intraocular lens (PIOL) implantation 12 years ago. Presenting visual acuity (VA) of the right eye was hand motion (HM). Retinal detachment (RD) on inferior side, and clear lens with anterior chamber (AC) PIOL were found in the examination. Patient underwent vitrectomy, endolaser, and silicone oil in the next four days. A sudden severe pain with red-eye was found one month after surgery, intraocular pressure (IOP) was increased to 43 mmHg, the lens was white opaque with lens material seen in AC.

Discussion: The diagnosis of traumatic cataract and lens-particle-induced glaucoma was made. Lens mass evacuation surgery was performed after initial antiglaucoma medication. Posterior capsule rupture was found intraoperatively with only a small amount of lens mass remaining. Visual acuity result after the second surgery is still dissatisfied with the presence of rubeosis iridis, with the possibility of retinal re-detachment was still present.

Conclusion: High myopia still poses a greater risk of ocular complications. It can be corrected by refractive surgery, with expensive cost and it will not prevent potential future ocular problems. Repeated assessment before and after refractive surgery procedure is mandatory in order to prevent sight-threatening complications of high myopia which might lead to other blinding complications.

Keywords: high myopia, refractive surgery, retinal detachment, lens-particle glaucoma

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INTRODUCTION

High myopia is defined by a condition in which the spherical equivalent objective refractive error is more than -5.00 D in either eye.¹ High myopia

was estimated to affect 2.7% of the world population in 2010.² When a patient is dissatisfied with spectacle or contact lens correction, vision can be treated by performing refractive surgery. Phakic IOL implantation is one of the refractive surgery procedures chosen in high myopia cases.³

High myopia is characterized by axial length elongation and consequent stretching of the posterior eye wall causes various complications.⁶ The Eye Disease Case-Control Study was identified refraction as the major risk factor for retinal detachment (RD), with an adjusted odds ratio of 4.4 for refractions in the range -1 to -3 D, increasing to 9.9 in the range of -3 D to -8 D.⁷ Study by Tsai et al⁸ in Singapore found that myopia was the most common risk factor for pediatric RD and was present in 40.9% eyes. Meanwhile, research by Irfani I et al⁹ in Indonesia found myopia as the second most common etiology to rhegmatogenous RD (23%), following trauma.

Retinal detachment is best treated with vitrectomy and endolaser application. Even though vitreoretinal surgery is generally well tolerated, risks of complication are still present.^{10,11} Elhousseini et al¹² found the incidence of lens touch during pars plana vitrectomy (PPV) was 3.7% with 94% of them developed traumatic cataract. In the lens touch group, 11% of cases had posterior capsule rupture. Furthermore, PPV may result in elevated IOP by a number of mechanisms with lens particle glaucoma as a consequence of posterior capsule rupture after PPV being one of them.¹³ The prevalence of lens-particle glaucoma in one study in India was 4%.¹⁴

Both prevention and treatment for high myopia remain a challenge. Hereby we present a case of high myopia who underwent refractive surgery and

presented with retinal detachment along with other complications years after. In this case report, we would like to highlight the therapeutic dilemma in managing complications in high myopia patient who previously had refractive surgery.

CASE REPORT

A 37 years old man, presented with a blurred vision of the right eye since 1 week before admission. Visual acuity (VA) of the right eye was hand motion (HM) and there was retinal detachment (RD) on the inferior side of the right eye with lattice degeneration on the superior side. The lens was clear and there was a phakic anterior chamber IOL. The left eye's retina appeared to be tigroid. The patient had a background history of iris-claw anterior PIOL implantation on the right eye 12 years ago to correct high myopia. He had myopia with -10.0 D on both eyes since he was a kid. However, the patient never went to an ophthalmologist for a routine eye examination after the PIOL implantation procedure.

The patient underwent vitrectomy, endolaser, and silicon oil surgery of the right eye four days after the initial examination. There were no complications reported during the operation. The VA was improving to 0.5/60 and the retina looked attached with silicone oil tamponade after the surgery.

However, one month after surgery patient was complaining of redness and pain in the right eye. Visual acuity was dropped to HM with wrong projection and intraocular pressure (IOP) was elevated to 43 mmHg. There was microcystic cornea edema and lens material present within the anterior chamber (Figure 1).

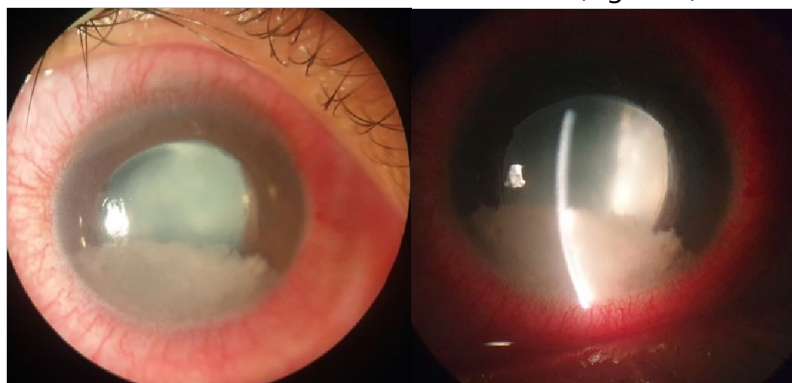


Figure 1. Examination of the right eye after vitrectomy showing lens particle within the anterior chamber causing lens-particle induced glaucoma

On gonioscopy examination, the anterior chamber angle of the right eye was open with grade 3 Schaffer on four quadrants and grade 4 Schaffer after indentation. The lens was entirely white-opaque and lens particle was filling a third part of the anterior chamber. He was given timolol maleate 0,5% two times daily, latanoprost eye drop one time daily, potassium aspartate one time daily, and acetazolamide 3x250 mg to control the IOP. Lens mass evacuation surgery was performed one month after anti-glaucoma medication. Earlier before surgery, the IOP had been controlled to 13 mmHg and lens particles in the anterior chamber had been reduced.

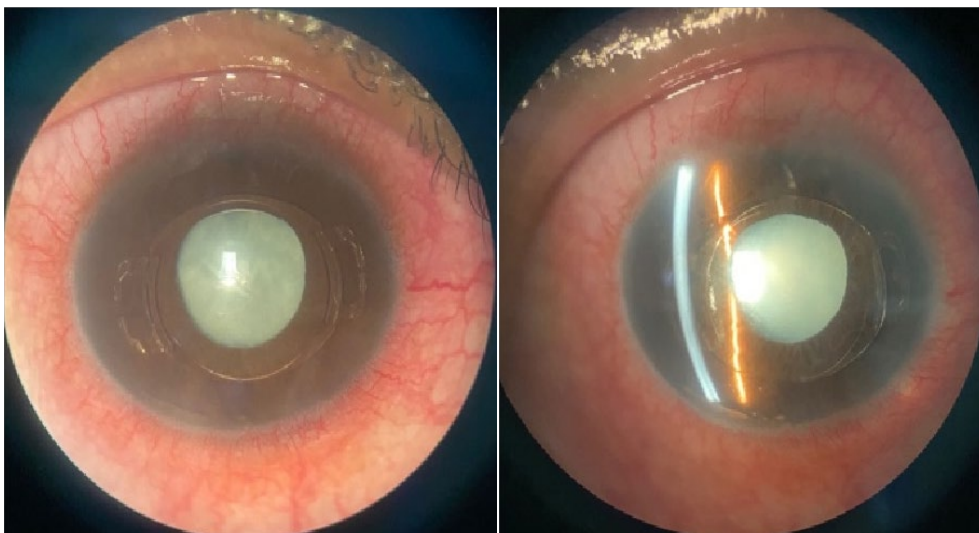


Figure 2. Right eye after one month (left) and two months (right) after glaucoma medication. Lens particle within anterior chamber decreased and IOP had reduced significantly

During the surgery, posterior lens capsule rupture was found with minimal lens mass remaining in the capsular bag. Aspiration of the remaining lens mass was done at that time with PIOL was left in the anterior chamber (Figure 4). IOP in the right eye was lowered to 9 mmHg following surgery, and VA remained HM with good projection.

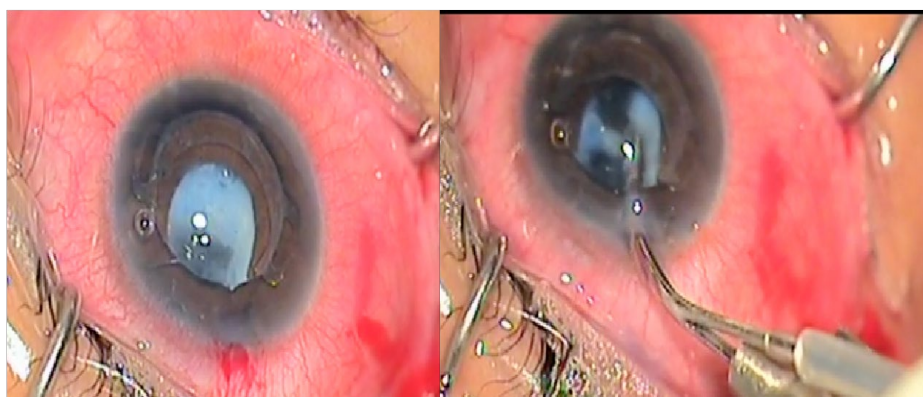


Figure 3. We found posterior capsule rupture intraoperatively, seen as the loss of lens mass at 6 to 8 o'clock (left). Afterward, we aspirated the residual lens mass (right)

The patient was lost to follow up due to fear of the COVID-19 pandemic. He was able to come control 3 months after. The right eye's IOP was down to 7 mmHg with 1 mm of coagulum and rubeosis iridis. There was an anterior lens capsule fibrosis, making the assessment to the posterior segment difficult. In ultrasound examination the retina condition could not be concluded due to the presence of silicone oil with the possibility of re-detachment was still present. Patient was planned to do another surgery to inject anti vascular endothelial growth factor and clearance of the visual axis through explant anterior chamber IOL, secondary implant of IOL in the sulcus, and posterior pars plana capsulotomy.

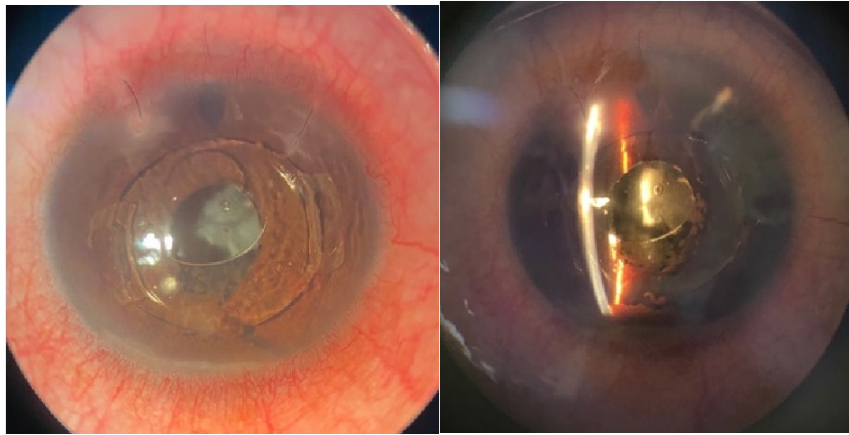


Figure 4. **Right eye three months after surgery. There was a 1-mm coagulum in the anterior chamber, anterior lens capsule fibrosis, and rubeosis iridis**

DISCUSSION

Over the last few decades, refractive surgery for the treatment of myopia has gained popularity as a cosmetic procedure to reduce dependence on contact lenses or glasses for use in routine daily activities.¹⁵ The desire to eliminate the need for eyeglasses or contact lenses and see clearly can encompass a wide range of age groups from all walks of life.³ Despite the high success rate in refractive surgery nowadays, it is also important that the patient understand that the treatment only liberates their spectacle dependence. They need to realize that refractive surgery will not alter the course of eventual presbyopia, nor will it prevent potential future ocular problems such as cataract, glaucoma, or retinal detachment.¹⁶ Increased axial elongation in myopes may lead to mechanical stretching and thinning of the choroid and retinal pigment epithelium with concomitant vascular and degenerative changes. Chorioretinal abnormalities seen in myopic eyes include retinal breaks, chorioretinal atrophy, Fuch's spot, lacquer cracks, pigmentary degeneration, lattice degeneration, posterior staphyloma, and white without pressure.⁶ Accordingly, the prevalence of any type of retinal detachment is increased according to the degree of myopia. The incidence of retinal detachments per year is 0.015% in patients with less than 4.75 diopters (D) myopia and increases to 3.2% when myopia is greater than 6 D.^{7,8} Study by Tsai et al⁸ in Singapore found that myopia was the most common risk factor for pediatric RD and was present in 40.9% eyes. Meanwhile, research by Irfani I et al⁹ in Indonesia

found myopia as the second most common etiology to rhegmatogenous RD (23%), following trauma.

In our case, the patient developed retinal detachment 12 years after implantation of PIOL. The mechanism of retinal detachment is most likely due to the progressive degenerative changes in the vitreous and peripheral retina. A retrospective, multicenter, case series study in India reported 10 out of 1248 eyes with PIOL developed retinal detachment and the mean time interval between PIOL and development of retinal detachment was 32 ± 35 months (range 1.5-106 months).¹⁷ This study results in line with a previous study that reported an incidence rate of 1.5% (8 over 530 highly myopic eyes) and a mean time between PIOL implantation and detachment of 23.63 ± 18.12 months. A traumatic history, similar to our case, was presented before retinal detachment was detected in half the cases. The characteristics of retinal detachment after PIOL implantation were not different significantly from the natural history of retinal detachment in high myopic eyes. PIOL implantation for surgical correction of severe myopia does not seem to increase the risk of retinal detachment.^{17,18}

Pars plana vitrectomy for retinal detachment is generally a safe procedure, but the risks of complication are still present. The development or progression of preexisting cataracts is the most common and inevitable complication of PPV, causing visually significant cataracts in 80% of patients within the first year.¹⁰

Traumatic cataract can develop rapidly in injury cases such as trauma following surgery, the same history as our case. Injury to the lens capsule is causing impaired lenticular capsule integrity and permeability. Hence, the aqueous humor can enter into the lens lamella, leading to swelling and denaturation of the lens, and irreversibly causing opacification of the lens.¹⁹⁻²¹ Elhousseini et al¹² found the incidence of lens touch during PPV was 3.7% with 94% of them developing traumatic cataracts.

Because the lens mass was leaking from the capsular bag, naturally it caused the development of secondary glaucoma. One month after surgery, the patient developed secondary glaucoma due to lens-particle induced. While the cortex causes low-grade inflammation and cortical remnants may be reabsorbed, the nucleus causes a strong and damaging inflammatory response. The occurrence of glaucoma depends on the amount of lens material liberated, the inflammatory response of the eye, and the ability of the trabecular meshwork to clear the foreign matter.^{22,23} Generally, lens-induced glaucoma will generate a few days after the precipitating event. In rare cases, the lens material can be released long after surgery or trauma.^{13,22}

When we removed the remaining lens material intraoperatively, we discovered a posterior capsular rupture, which confirmed the diagnosis of lens-particle glaucoma. This was similar to a case report in China that reported lens particle glaucoma three months after PPV.¹³ Asaria et al.²⁴ also reported three patients who had lenticular touch causing posterior capsule ruptured during vitrectomy.

After three-month period of missing follow-up, we found rubeosis iridis and coagulum in the anterior chamber. The visual acuity still remained HM in the right eye. Etiology that induces production of angiogenic factors in rubeosis iridis were diabetic retinopathy, retinal vein occlusion, carotid occlusion syndrome, ocular ischemic syndrome, and chronic retinal detachment.^{25,26} The vitreous humor apparently also contains an endogenous inhibitor of angiogenesis. This mechanism also accounts for why rubeosis iridis are more common after cataract

extraction with capsular disruption and after vitrectomy in eyes with vascular retinopathy. Finally, vitrectomy and cataract surgery cause inflammation, which may further serve as a stimulus to neovascularization.^{4,25} The next plan needs to be calculated carefully since the visual prognosis is in doubt.

CONCLUSION

In summary, this case shows an unfortunate end from what was expected to be a perfect vision. Patients that were initially motivated to have refractive surgery to gain good vision with spectacle independence may have higher expectations regarding postoperative refractive results. In our patient, VA of the right eye still remains HM despite repeated surgery he had. Further complications, rendering the restoration of optimum visual function by additional procedures difficult to achieve. In considering a follow-up procedure for the purpose of gaining vision, it is important to analyze the safety of the procedure on the anterior segment by controlling inflammation and intraocular pressure as well as assessing the data on specular microscope examination. Furthermore, the visual prognosis in this patient is doubtful because the condition of the retina cannot be assessed. Hence, all these things need to be considered and discussed with the patient each time before performing further surgery.

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