CASE REPORT

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# Clear Lens Extraction with Phacoemulsification Technique in High Myopia Patient : A Case Report

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## ABSTRACT

**Introduction**: Correction of high myopia by clear lens extraction surgery, with or without intraocular lens (IOL) implantation, is still controversial and is associated with a high risk of postoperative retinal detachment. However, rapid technological advances in cataract surgery have resulted in excellent surgical results with very low complication rates. In this article, the authors will present the outcome of the clear lens phacoemulsification procedure in the correction of high myopia in two eyes of one patient.

**Purpose**: To know improvement of the visual acuity in clear lens exchange phacoemulsification in high myopia patient.

**Case Report**: A 22 years old young woman came to the Balimed Hospital with blurry vision on the both eyes, with counting finger (0,5/60) visual acuity on the both eyes and history of high myopia in both eyes. Right eye S-18.00 and Left eye S-18.00. On ophthalmological examination finds optic nerve head round well demarcated, myopic crescent, CDR 0,3 aa/vv 2/3, tygroid retinal, macula reflex (+). She was underwent a barrage laser photocoagulation and clear lens exchange phacoemulsification on the both eyes (right eye on November 11st 2022 and left eye on November 25th 2022). One month after the clear lens exchange phacoemulsification, the visual acuity on the right eyes is 6/20 and left eye is 6/19. The operation was successfully performed and eye pressure is normal on the both eyes. Patient wear glasses with right eye: Sph.-1.75 Cyl. -2.50 Ax.180 and left eye: Sph.-3.00 Cyl. -1.50 Ax.180.

**Conclusion**: Clear lens phacoemulsification for high myopia correction is an effective procedure and can prove excellent visual outcome for a long-term period. It can be considered as an alternative method for high myopia management.

**Keywords:** High myopia, phacoemulsification

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## INTRODUCTION

Crystalline lens extraction can correct existing myopic refractive errors. Correction of high myopia by clear lens extraction surgery, with or without intraocular lens (IOL) implantation is still a controversial matter. This surgical technique is associated with high post operative risks, the main and most serious complication being retinal detachment. This high risk is generally found in operation with side techniques or linear extraction of the lens which was originally proposed by Fukala in 1890.[1-3]

The major advances made in cataract surgery in the last decade, in the form of phacoemulsification machines, the use of viscoelastics and the latest IOL designs and materials, have resulted in excellent surgical outcomes with very low complication rates. This raises enthusiasm for cataract surgeons to perform refractive surgery for myopia correction with phacoemulsification and low power IOL implantation, supported by the ease and success of this technique in producing good results and comparable to other refractive surgery techniques.[1,4,5]

## CASE REPORT

A 22 years old young woman came to the Balimed Hospital with blurry vision on the both eyes, with finger counting (0,5/60) visual acuity on both eyes and history of high myopia in both eyes. Right eye S-18.00 and Left eye S-18.00. Orthotropia eyeball position, no movement restriction in all directions. The intraocular pressure (IOP) was 11 mmHg and the left eye was 11 mmHg. Examination of the anterior segment of both eyes were within normal limits. On the posterior segment, finds optic nerve head round well demarcated, myopic crescent, CDR 0,3 aa/vv 2/3, tygroid retinal, macula reflex (+) on the both eyes.

The patient was diagnosed with high myopia and retinal thinning on both eyes. She was underwent a barrage laser photocoagulation (right eye on October 11st 2022 and left eye on October 18th 2022 ) and clear lens exchange phacoemulsification on the both eyes (right eye on November 11st 2022 and left eye on November 25th 2022 ).

Patient has done operation on November 11st 2022 with clear lens exchange phacoemulsification in the right eye with IOL +4.00 D + CTR. One day after the operation on November 12nd 2022, ophthalmology examination visual acuity (6/48) on the right eye and visual acuity (0,5/60) on the left eye, IOP RE 11

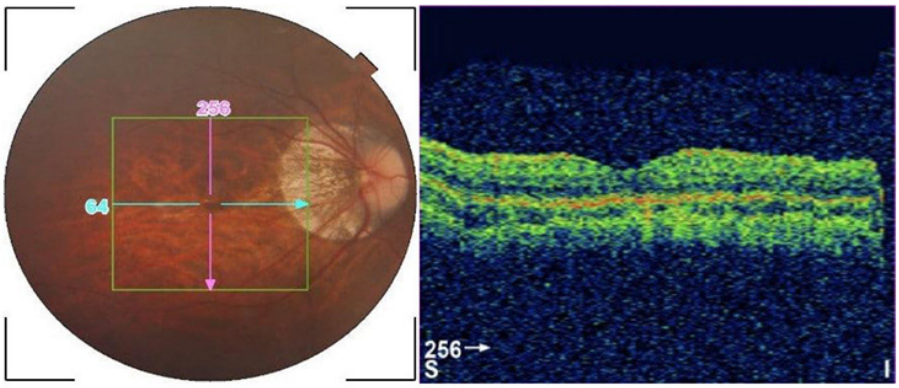


**Figure 1.** The results of Fundus Photo and Optical Coherence Tomography (OCT) on Right Eye on November 10th 2022 shows the optic nerve head round well demarcated, myopic crescent, CDR 0,3 aa/vv 2/3, tygroid retinal, macula reflex (+)

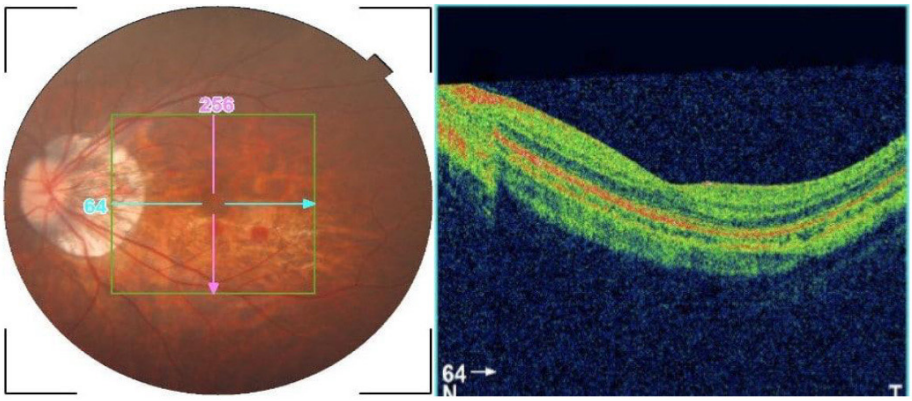


**Figure 2.** The results of Fundus Photo and Optical Coherence Tomography (OCT) on Left Eye on November 10th 2022 shows the optic nerve head round well demarcated, myopic crescent, CDR 0,3 aa/vv 2/3, tygroid retinal, macula reflex (+)

and IOP LE 11. The anterior segment RE is within normal limit, cornea is clear, isocor pupil, and the lens is IOL, the posterior segment on the both eyes show the optic nerve head round well demarcated, myopic crescent, CDR 0,3 aa/vv 2/3, tygroid retinal, macula reflex (+). The patient received ciprofloxacin 2x500 mg tablets, mefenamic acid 3x500 mg tablets, methylprednisolone 1x48 mg tablets for three days, xitrol eye drops 6 times/day RE.

One week postoperative on November 17th 2022, follow up visit showed ophthalmology examination visual acuity (6/24) on the right eye and visual acuity (0,5/60) on the left eye, IOP RE 11 and in LE 12. Examination of anterior segment of right eye and left eye was still the same as day one post-operative. The patient was received eye drop therapy xitrol eye drops 6 times/day RE.

Patient has done operation on November 25th 2022 with clear lens exchange phacoemulsification in the left eye with IOL +5.00 D + CTR. One day after the operation on November 26th 2022, ophthalmology examination visual acuity (6/24) on the right eye and visual acuity (6/38) on the left eye, IOP RE 11 and IOP LE 13. The anterior segment LE was within normal limit, cornea is clear, isocor pupil, and the lens is IOL, the posterior segment on both eyes showed the optic nerve head round well demarcated, myopic crescent, CDR 0,3 aa/vv 2/3, tygroid retinal, macula reflex (+). The patient received ciprofloxacin 2x500 mg tablets, mefenamic acid 3x500 mg tablets, methylprednisolone 1x48 mg tablets for three days, xitrol eye drops 6 times/day LE.

One week postoperative on December 8th 2022, follow up visit showed ophthalmology examination visual acuity (6/24) on the right eye and visual acuity (6/38) on the left eye, IOP RE 11 and in LE 12. The patient was received medication therapy xitrol eye drops 6 times/day LE.

One month postoperative on December 30th 2022, the intraocular pressure is normal, IOP RE 11 and IOP LE 11. The operation was successfully performed and there is an improvement of visual acuity (6/24) on the right eye and visual acuity (6/20) on the left eye. Patient got glasses with UCVA RE (6/24) size Sph. -1.75 Cyl. -2.50 Ax. 180 with BCVA (6/9,5) and UCVA LE (6/20) size Sph. -3.00 Cyl. -1.50 Ax. 180 with BCVA (6/9,5).

## DISCUSSION

*Clear Lens Phacoemulsification* (CLP) is an effective alternative for high myopia therapy, especially for patients who cannot achieve optimal vision with corrected glasses or contact lenses. The CLP procedure is a one-stage procedure and does not require enhancement measures as in refractive surgery procedures with an excimer laser to correct residual myopia which often occurs in cases of high myopia.[7] Patients also do not require the use and replacement of eye glasses on a regular basis so that the overall costs incurred are more affordable with the CLP procedure.

The CLP procedure is a simple and effective technique for correction of high myopia because it has high predictability if the IOL power calculation is done correctly and the postoperative vision improvement remains stable in the long term. The choice of IOL calculation formula is crucial in achieving emmetropic vision in eyes with extreme axial length (axial length more than 27 mm). The use of a regression formula such as SRK II is highly discouraged in eyes with extreme axial length because it gives poor postoperative refractive results.[1,5,12,13] It is reported that in eyes with extreme axial length, the Barrett Universal II formula, SRK /T, and Haigis have a similar level of accuracy but the Barrett Universal II formula has the lowest predictive error rate. In this case,

the authors use the SRK/T formula, which is suitable for eyes with an axial length of 26 mm to 33 mm.

Another option for the correction of high myopia is the implantation of a phakic IOL (PIOL) with an iris claw lens or an implantable collamer lens. PIOL has the advantage of safely and effectively correcting larger refractive errors than refractive surgery with an excimer laser. The surgical skills required are similar to those for cataract surgery and the equipment required is less expensive than the excimer laser. PIOL still has limitations in that there is no multifocal type, so implantation in patients over 40 years of age cannot overcome the problem of presbyopia patient. The patient with a wide mesopic pupil (>6.0 mm) they may also experience glare and halos due to the small optical diameter of the PIOL (5.0-5.5 mm). Both of these limitations need to be discussed with the patient to prevent postoperative visual discomfort that the patient may experience. Special concern regarding this technique is the potential for damage to the anterior chamber structure, especially corneal endothelial loss and chronic increase in intraocular pressure with iris claw lens implantation and contact between the IOL and crystalline lenses can cause cataracts in implantable collamer lens implantation. Patients with anterior chamber depth less than 2.8 mm, low endothelial cell count (<2500 cells/mm2 if over 21 years and <2000 if over 40 years), history of uveitis and glaucoma and abnormalities in the posterior segment of the eyeball is a contraindication for PIOL implantation, so other refractive surgery techniques are recommended. The age of patients who are over 40 years has also caused morphological changes in the crystalline lens where there is an increase in the thickness of the crystalline lens (the thickness of the crystalline lens in the two patients is above 4 mm) and is coupled with the movement of the anterior pole of the crystalline lens to the left. anterior during accommodation, this will increase the incidence of contact between the posterior surface of the PIOL and the anterior surface of the crystalline lens thereby increasing the risk of cataracts.[1,8-11]

There is a difference with iris claw lenses or implantable collamer lenses where the availability of both lenses is still difficult to obtain, especially with minus power, the IOL in CLP is an IOL that is commonly used in cataract surgery and the availability of IOL with low power is quite easy to obtain so that CLP is a technique alternative for correction of high myopia which is easy to apply in daily practice. Selection of an IOL with a higher power than biometric measurements in the right eye of both patients is because for a power smaller than +10.00 D there is no power IOL in multiples of 0.50 D and this is also to avoid the occurrence of postoperative hyperopia with the selection of IOL power. Optimum postoperative refractive targets for patients with high myopia are recommended towards mild and moderate myopia because patients with myopia are accustomed to seeing up close without eyeglasses.[14-15] Loss of accommodation is one of the drawbacks of the CLP procedure, especially in young patients under 40 years of age when monofocal IOL implantation is performed. Youth under 40 years is also a relative contraindication for CLP if posterior vitreous detachment (PVD) is not found. So that in patients younger than 40 years it is recommended to perform phakic IOL rather than CLP to reduce the risk of retinal detachment, in addition to maintaining accommodation.[6]

The technique of the small incision phacoemulsification with IOL implantation in the capsular bag in today's modern era has enabled us to perform CLP in eyes with high myopia with low incidence of intra and postoperative complications.[5,6,16] High myopia and phacoemulsification each is a risk factor for retinal detachment as the most important vision-threatening complication. Ripandelli, et al.[17] reported an increase in the incidence of retinal detachment after phacoemulsification of 8% in eyes with high myopia (axial length from 29.70 mm to 35.55 mm) compared to control eyes of 1.2% even though the procedure phacoemulsification was not complicated. Alio et al.[18] reported the incidence of retinal detachment after phacoemulsification without complications it was lower by 2.7% in eyes with high myopia (mean axial length 27.88 + 2.11). Horgan, et al.[19] also reported a low incidence rate of 3.2% after uncomplicated CLP procedures in eyes with axial length from 25.25 mm to 33.38 mm. This study showed that the overall incidence of post phacoemulsification retinal detachment was low when there were no complications and the higher incidence was associated with longer axial length (33.6 mm to 35.5 mm). In this case report, there was no incidence of retinal detachment in both eyes in the patient until post operative CLP follow up, but a longer follow up is needed to confirm the occurrence of retinal detachment.

## CONCLUSION

We conclude that CLP procedure in high myopia is an effective procedure and provides excellent final vision results in the long term because we place the optical correction near the nodal point and behind the pupil thereby increasing image resolution and reducing optical aberrations. The use of the IOL calculation formula with the SRK/T formula and the supracapsular phacoemulsification technique is recommended to obtain an optimal visual outcome.

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