

# ICL Implantation in A Long Standing and Challenging Pseudophakic Ametropia

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Received: 15 July 2018; Accepted: 26 August 2018

**Citation:** Cuneyt Karaarslan. ICL Implantation in A Long Standing and Challenging Pseudophakic Ametropia. Ophthalmol Res. 2018; 1(2): 1-5.

## ABSTRACT

*I examined a 36 year old pseudophakic male patient with ectopic pupil, high myopia and astigmatism in left eye at December 2017, He had an ophtalmic surgery history before he came to me, First one had an extracapsular cataract extraction and PMMA iol implantation into his left eye in 14 years old hence blunt eye trauma. Four years after this operation he had to go bilateral strabismus surgery for divergent strabismus probably due to low vision.*

*He came to me after 18 years from his last operation with the intend of a good vision without glasses or contact lenses. His visual acuity was 18/20 in right eye and counting fingers from 2 meters in left eye without correction. As for with glasses 20/20 in right eye with -0.25(-0.25x180) and 2/20 in left eye with -7.25(-3.25x170), Intraocular pressure (IOP) was 12 mmHg in both eyes.*

*Then the left eye was implanted posterior chamber VTICMO13.7 Staar Toric ICL. Even in the first postoperative day his refraction was +1(-2,00x20) and uncorrected distance visual acuity UDVA was 10/20 whereas corrected distance visual acuity CDVA was 16/20. IOP was 18mmHg and no complications were detected.*

## Keywords

Traumatic cataract, Pseudophakia, Intraocular collamer lens (ICL), Recovery of visial acuity.

## Introduction

Pseudophakic ametropia can be corrected by spectacles, contact lenses, intraocular lens (IOL) supplementation or exchange iol and corneal refractive surgeries [1,2]. Spectacles offer an inconvenient approach and contact lenses have potential risks of dry eye and infectious keratitis [3]. IOL exchange is a difficult option with potential complications of capsule tear, vitreous loss, and retinal detachment, especially if the lens is adherent to the capsular bag [4].

Corneal refractive surgeries can be used to correct lower amount of refractive errors when corneal thickness is in the safe range, but corneal scarring or haze, flap complications and regression may be the complications [5]. In cases of higher refractive errors, the posterior chamber implantable collamer lens (ICL V4c) provides an alternative approach, as corneal thickness may not meet the requirements of large refractive corrections. The new 360 µm

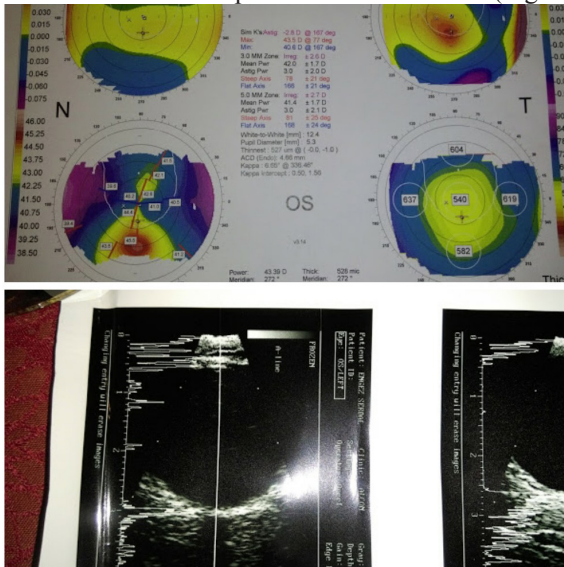
central hole design of ICL V4c allows for the natural flow of aqueous humor without the need for a peripheral iridotomy [6]. This study investigates the clinical outcomes of correcting high myopia of an adult in the management of pseudophakic ametropia using TICL V4c.

## Case Report

The patient was a 36-year-old pseudophakic male who had exhibited slightly oval and temporally ectopic pupil with high myopia and astigmatism in the left eye since the age of 14. I first examined him in 2017 December; his visual acuity was counting fingers from 2 meters without correction while the intraocular pressure (IOP) was 12 mmHg in this eye.

He exhibited an open visual axis, clear cornea, His Anterior Chamber Depth (Endo) was 4.66mm, White to White distance was 12,4mm and his previous PC IOL was in the capsular bag with a minimal capsular fibrosis and opacification. No pathology was detected in the posterior segment by direct fundus examination, ultrasonography, or optical coherence tomography.

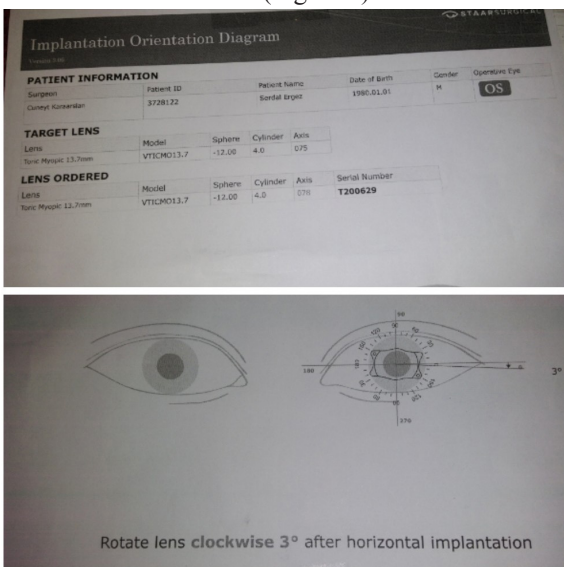
His manifest refraction was  $-7.25(-3.25 \times 170)$  and his UDVA was counting fingers from 2 meters and his CDVA was 2/20 in left eye. He had an urgent desire to get better visual ability without glasses. The patient was not a suitable candidate for corneal laser refractive surgeries because of the steep and thin lower cornea (Figure 1).



**Figure 1:** Pre-op corneal topography and Postop orbital ultrasonography.

Then ICL was implanted in the sulcus, leaving the previously implanted IOL in the capsular bag of this eye. ICL power calculations were performed by the manufacturer (STAAR Surgical) using a modified vertex formula. The size (length) of the implanted ICL was determined based on the patient's anterior chamber depth (ACD) and white-to-white (WTW). The selection and calculation of the ICL was a key and difficult point for the pseudophakic eye due to the fact that the ACD enlarged after cataract surgery and IOL implantation.

Therefore, the ACD of the right eye was referred to that of the left eye. Then the left eye was implanted posterior chamber VTICM013.7 Staar Toric ICL (Figure 2).



**Figure 2:** Properties and parameters of ICL.



**Figure 3:** Pre-op and Post-op anterior segment photography.

Even in the first postoperative day his refraction was  $+1(-2,00 \times 20)$  and uncorrected distance visual acuity UDVA was 10/20 whereas corrected distance visual acuity CDVA was 16/20. IOP was 18mmHg and no complications were detected.

### Discussion

Refractive surgery options strictly depend on certain conditions in each patient. Excimer Laser and SMILE surgeries are not appropriate in this patient because of significantly thinner and steeper lower cornea [7,8].

On the other hand, intraocular lens replacement is a difficult and risky surgical option too. Because it has been a long time since the primary operation and there is an oval pupil due to adhesion. Intraocular lens exchange for the correction of pseudophakic ametropia is feasible if the following surgery can be performed early. It would be difficult to replace an IOL into the bag, if anterior and posterior lens capsules were adhered to each other after a long-term primary surgery. Once the capsule shrinks around a IOL in the eye, complications such as capsular tear, vitreous loss, and retinal detachment may always occur [9,10].

Implantation of supplementary lens for the correction of residual refractive error in pseudophakic eye is another option. Anterior chamber IOLs may cause endothelial cell loss and need a larger incision for insertion. The technique of implanting two IOLs in the posterior chamber was described as “piggyback”, the traditional piggyback referred to that a conventional in-the-bag IOL was implanted in pseudophakic eye, which may cause interlenticular opacities because two IOL optics are placed close to each other. So, intraocular pressure may increase and IOL shift and pupil capture may occur postoperatively [11,12].

ICL compare favorably with IOL as the enough vault between the ICL and the primary IOL may contribute to decreasing the opacity. Also, toric ICL can correct the astigmatism. However, inappropriate ICL may rotate and this wrong positioning in pseudophakic eye can bring new astigmatism. So, these patients may have severe vision loss or disturbances and readjustment of toric ICL position may be needed [13].

At present, the ICL V4c decreases the rate of opacity and intraocular pressure increase without peripheral iridotomy because of the central hole design. Besides, pupil capture rarely occurs as the ICL haptics were placed in the ciliary sulcus [14,15].

The option of ICL size is a problem for pseudophakic eyes. Both the ICL length evaluation and the power calculation were originally designed for phakic eyes, Fortunately, parameters of the pseudophakic eye were similar with phakic eye except ACD. Therefore, the selection of ICL size in phakic eye is a reference to pseudophakic eye [16].

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