The Outcome of Management of High Myopia by Intraocular Collamer Lens

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Abstract

Purpose: To evaluate the outcome of treatment for high myopia by posterior phakic intraocular lens lens implantation

Setting: ophthalmology department, Sohag University Hospital, Sohag Faculty of Medicine.

Methods: 23 eyes of 16 highly myopic patients were included in the study. The mean age was 25.4 years (range 18 to 35 years), the mean spherical equivalent (SE) -14.64 diopters (D) (range 8 to 28 D), 23 eyes of 16 patients received posterior chamber phakic IOL (ICL) 10 females and 8 males the age ranges from (18-35 years).

Results The spherical equivalent refraction at the last examination was within 1.0 D of the targeted refraction in 22 eyes (91.3% ) and within 0.5 D in 11 eyes (47.8%). One case (4.3%) complained of glare in the 1st week postoperative which improved, One case (4.3%) developed anterior subcapsular cataract after 1 year.

Conclusion: Surgical management of high myopia by posterior chamber phakic IOL (ICL), is safe and predictable

INTRODUCTION

High myopia has always been a refractive challenge. Surgical techniques based on modification of corneal curvature, which became very popular in the last decade, fall short of correcting high refractive errors. Complications include lack of predictability, regression, corneal ectasia, and introduction of high order optical aberration. Alternative surgical procedures that leave the corneal plane intact, like clear lens extraction and phakic intraocular lens (IOL) implantation, have been revived in part due to recent advances in technology.

The optical consequences of corneal refractive surgery are now well known and limit today its clinical indications. On the contrary, PIOLs respect the cornea and have a predictable behavior. Image quality and higher
and 7 males the age ranges from (18-35 years).

**Surgical technique**

**Implantable collamer lens insertion**

All ICL implantations were done under general anesthesia, The ICL is well-suited to a temporal clear cornea, Approach 3.2 mm. Paired 1.0-mm paracentesis incisions are placed at the 6:00 and 12:00 positions, the viscoelastic is injected into the anterior chamber. Methylcellulose , The preloaded injector mechanism is brought into the operative field, and the tip of the cartridge is inserted into the clear cornea wound . Using gentile posterior pressure, the footplates are tucked one at a time under the iris., the pupil is pharmacologically constricted with Miochol (Novartis, Cambridge, Mass). A peripheral iridectomy is done using a vitreous cutter.

**Postoperative care and follow up:**

All cases are examined at one day , one week, one months, 6 months, 12 months and 18 months postoperative as routine vists, visual acuity , IOP evaluation , refraction, stability of the IOL , detection of any complications, All patients were advised to contact us and apply for an extra visit any time they feared a possible complication.

- No eye pathology (maculopathy, cataract, uveitis, and glaucoma

**Methods**

All patients had been examined, slit lamp anterior segment examination to exclude anterior segment pathology, IOP had measured to exclude any rise of IOP, dilated full retinal examination to exclude maculopathy , retinal holes or tears by indirect ophthalmoscopy and panfandoscopic lens, fluorescein angiography and macular OCT has been done in suspicious macula, and negative cases only included in this study.

Manifest and cycloplegic refraction are recorded; UCVA and BCVA are examined, Scheimflug imaging has been done to evaluate the anterior chamber depth, corneal k reading and white to white diameter, white to white is reevaluated manually by a caliber. 2 cases revealed peripheral retinal tears and received retinal argon laser photocoagulation. The patients had been divided to three groups depends on the patient choice after explaining the issues of each surgery , and anterior chamber depth (AC depth) had been taken in consideration, 23 eyes of 16 patients received posterior chamber phakic IOL (ICL) 9 females

Figure (1 ) shows the implantation of The ICL below the iris

**Results**
Refractive outcome and postoperative UCVA were analysed as the efficacy of the procedure. The refractive outcome at 1 day, 1 week, and 1, 6, 12, and 18 months were analyzed. The refractive outcome in patients with at least a 1-month follow-up was evaluated as the primary measure of refractive stability. The efficacy index is calculated (the mean postoperative UCVA after 1 month / the mean preoperative BCVA).

**Refractive Outcome**

At 1 month, the mean spherical equivalent refraction was $-0.099 \pm 0.839$ (SD). The spherical equivalent refraction at the last examination was within 1.0 D of the targeted refraction in 22 eyes (91.3%) and within 0.5 D in 11 eyes (47.8%).

**Intraocular Pressure**

After (ICL insertion), the mean preoperative IOP was $13.9 \pm 2.6$, the mean IOP at 1 day postoperative is $22.79 \pm 5.79$, at 1st week it was $18.56 \pm 4.34$ and became $16.12 \pm 3.09$ mm Hg at 1 month, to be $14.47 \pm 2.14$ mmHg at 6 months and $14.10 \pm 1.88$ mmHg at 12 months, $14.05 \pm 2.17$ mmHg at 18 months.

**Visual Acuity**

After (ICL PIOL) insertion, the preoperative best corrected visual acuity (BCVA) was $47.8\% > 0.4$, the visual acuity was $\geq 0.2$ in 91.3% of cases and $\geq 0.4$ in 30.4% in the 1st day postoperative, which increased to 43.4% of cases $\geq 0.4$ after 1st week to increase after 1st month postoperative to 56.5% $\geq 0.4$ , 52.1% after 6 months, 52.1% are $\geq$ after 12 months, to be 47.8% after 18 months postoperative.

The difference between the preoperative BCVA and postoperative UCVA after one month. Is shown in table 1

<table>
<thead>
<tr>
<th>Preop BCVA</th>
<th>0.434 $\pm$ 0.165</th>
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</thead>
<tbody>
<tr>
<td>Postop UCVA at 1 month</td>
<td>0.429 $\pm$ 0.155</td>
</tr>
<tr>
<td>$P$ value</td>
<td>0.846</td>
</tr>
<tr>
<td>Efficacy index=$\frac{\text{Postop UCVA}}{\text{preop BCVA}}$</td>
<td>98.8%</td>
</tr>
</tbody>
</table>

**UCVA**= uncorrected visual acuity, **BCVA**= Best corrected visual acuity

**Complications:**

In this study (implantable contact lens PIOL), 4 cases 17.3% of cases developed increased IOP $> 21$ mmHg in the 1st day postoperative and 3 of them the IOP decreased after 2 weeks with topical treatment and one continued till 3 months on topical comination of antiglaucoma (timolol & dorzolamide). One case (4.3%) complained of glare in the 1st week postoperative which improved markedly later on, One case (4.3%) development anterior subcapsular cataract after 1 year.

**DISCUSSION:**

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Patients with high myopia are often welling to have a refractive procedure performed to become spectacle or contact lens independent. Our study tried to assess the efficacy and safety of the posterior chamber phakic IOL (star collamer vision ICL).

Figure (2) shows anterior subcapsular cataract after ICL.

In our study there was statistically significant change in the early postoperative period in the 1st month although of a patent peripheral iridectomy. That is mostly attributed to residual viscoelastic and a slightly larger ICL diameter than actual W-t-W diameter which may be due to an error in the measurement (mainly by caliper), which coincides with shallow AC depth and increase vault off the ICL, but the shallow AC after that improved much after 1 week and IOP decrease considerably and vault decrease which may be due to absorption of the remaining viscoelastic substance and adaptation of posterior chamber to the newly implant. Other study done by Stephen S. Bylsma et al(7), reported pupillary block glaucoma in the 1st week after ICL implantation which aggressive antiglaucoma medications were applied followed by peripheral iridectomy, he also reported mechanisms other than phakic PC IOL pupillary block may elevate IOP, remaining anterior chamber viscoelastic block. When viscoelastic material remains anterior to the phakic PC IOL, high IOP results from impaired outflow through the trabecular meshwork. This condition is managed by aggressive ocular hypotensive therapy until the IOP returns to normal, signaling the clearance of the viscoelastic material from the anterior chamber(7). Laurent Kodjikian et al(8), reported a case of postoperative malignant glaucoma which did not respond to medical treatment, and surgical aspiration of vitreous with ICL removal was needed. Others reported postoperative corticosteroid glaucoma (9), pigment dispersion glaucoma (6).

One case 4.3% develop anterior subcapsular cataract associated with nuclear cataract after 6 months postoperative which is mostly due to either operative trauma or chronically inadequate aqueous perfusion or chronic inflammation. A study (9)A meta-analysis of cataract development after posterior chamber pIOL surgery
found an overall incidence of cataract formation to be 9.60 % (9). The 3-year data of the U.S. Food and Drug Administration of Posterior chamber PC IOLs, found, cataract of anterior subcapsular opacities of 2.7% (5). In another study, The incidence of anterior subcapsular (AS) opacities was 7.7%, and no eye developed clinically significant cataract during the mean follow-up of 13.2 months (5). One case 4.3% complained of transient glare which mostly due to large peripheal iridectomy. No reported case of vitreoretinal complications.

CONCLUSION
Surgical management of high myopia may be of great help to the patient for a better quality of life, and the the posterior chamber phakic IOL is effective and safe for high myopia

REFERENCES