

Correction of Postoperative Aphakia with Verisyse® Aphakia Phakic Intraocular Lenses: One Year Follow-Up

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Abstract

Purpose: To show our one-year experience with the correction of postoperative Aphakia in elderly patients by implantation of Verisyse Aphakia phakic intraocular lens (IOL).

Materials and Methods: A retrospective, multicenter study is conducted in order to analyze current postoperative results in patients who underwent secondary phakic IOL implantation (Verisyse/Artisan Aphakia IOL) in one eye. Preoperatively, all patients underwent standard preoperative examination procedure, with uncorrected and best spectacle corrected visual acuity (UCVA, BSCVA) evaluation, intraocular pressure (IOP) measurement, and detailed slit lamp examination of the anterior and posterior eye segments. Additional diagnostic procedures included B-scan ultrasound examination and IOL Master phakic intraocular lens power calculation for each individual patient. All patients underwent secondary phakic intraocular lens implantation in topical anesthesia with the lens in-clavation on top of the iris plane, or behind the iris. Standard postoperative topical treatment regimen was used in all cases, with topical antibiotic/corticosteroid eye drops 5 times per day, as well as artificial tears 8 times per day. Follow up period included regular examinations 1 and 7 days, as well as 1, 3, 6 and 12 months postoperatively.

Results: During the follow up period (October 2014 - October 2015), we have implanted 303 Verisyse Aphakia phakic intraocular lenses in our two surgical centers; 184 implants were fixated on top of the iris plane and 119 behind the iris. Compared to preoperative UCVA (0.09 ± 1.81) and BSCVA (0.59 ± 0.24), UCVA 1 year postoperatively was significantly improved, with the mean value of (0.79 ± 0.10). There were no intraoperative complications, while one year postoperatively in 4 cases re-fixation had to be performed due to the lens subluxation in the anterior chamber. Furthermore, all IOLs were stable and there was no danger to corneal endothelium.

Conclusion: Verisyse aphakia phakic intraocular lenses are safe intraocular implants for correction of postoperative aphakia. Re-inclavation in 4 cases has shown that the quality of the iris tissue is crucial for the lens stability.

Keywords: Postoperative aphakia; Verisyse Aphakia IOL; Refractive error correction

Introduction

In the newer refractive surgical history, phakic intraocular lenses have made their way to the premium group of implants for correction of high refractive errors, as well as postoperative or congenital Aphakia. Today, these lenses have become implants of choice for many high myopic, astigmatic, and even high hyperopic patients in some instances. Rarely, but still significantly important, they are used for the correction of postoperative Aphakia or ectopic lens dislocation [1].

Verisyse Aphakia phakic intraocular lens was the first alternative to standard intraocular lens implants for postoperative Aphakia. Even though there are now many techniques for three-piece intraocular lens sulcus fixation in aphakic patients, many surgeons today decide to use anterior chamber iris claw phakic intraocular lenses mostly because of the simple implantation technique, good postoperative refractive results, and no if any postoperative complications. Some surgeons even prefer lens placement behind the iris, creating the same anterior segment anatomy as if the posterior chamber IOL was implanted [2].

The purpose of this study was to present our one year results with Verisyse Aphakia iris claw phakic intraocular lenses.

Materials and Methods

This retrospective, multicenter study was designed to analyze and present postoperative results in case series who underwent secondary Verisyse Aphakia phakic intraocular lens implantation due to postoperative Aphakia. Technical characteristics of this lens are shown in Table 1.

Material	PMMA CQ-UV
Haptics	Iris claw
Overall Ø	8.5 mm
Body Ø	5.4 mm Biconvex*
A-constant**	115.0 (A Scan) 115.7 (IOL Master; SRK T) 115.7 (IOL Master; SRK II) -0.160 (IOL Master; Haigis a0) 0.400 (IOL Master; Haigis a1) 0.100 (IOL Master; Haigis a2) 3.62 (IOL Master; Hoffer-Q pACD) -0.08 (IOL Master; Holladay 1 sf)
Dioptric Powers	+2.0 D to +30.0 D (1.0 D increments) +14.5 D to +24.5 D (0.5 D increments)
Also available	Artisan Aphakia 4.4/6.5 mm and 4.4/7.5 mm designed for small eyes.

Table 1: Verisyse/Artisan phakic IOL for aphakia.

Standard preoperative procedure was conducted for every patient. Uncorrected and best spectacle corrected visual acuities (UCVA and BSCVA) were determined in each case using Snellen chart. Intraocular pressure (IOP) was measured with applanation technique using Goldmann applanation tonometer (Goldmann, Haag Streit GmbH, Wedel, Germany), followed by detailed anterior and posterior segment slit lamp examinations.

Additional diagnostic procedures that were applied to each patient included B-scan ultrasonography (Quantel Medical Cournon-d'Auvergne, France) for thorough and consistent retinal exam, as well as the IOL Master (Carl Zeiss Meditech, Jena, Germany) measurement for exact intraocular lens power calculation, as well as anterior chamber dept (Oculus Pentacam II, Oculus Optikgeräte GmbH, Wetzlar, Germany).

All secondary implantations were done under topical anesthesia using simple surgical technique: a 5.5 mm to 6.0 mm clear cornea incision was made at 12 o'clock; anterior chamber was then filled with a mix of dispersive and cohesive viscoelastic (AmVisc Plus, Bausch and Lomb, Rochester, NY, USA), followed by anterior vitrectomy in those cases where the vitreous was present in the anterior chamber; or there was significant posterior capsule or zonular damage; phakic iris claw intraocular lens was then inserted and positioned at 3-9 O'clock in the central pupillary zone; the lens was then fixated by its haptics to the anterior or posterior iris tissue; corneal incision was then closed by one continuous 10/0 nylon suture, viscoelastic was rinsed out of the anterior chamber and intracameral antibiotic (Vancomycin 0.005%, Lek, Ljubljana, Slovenia) was instilled.

Follow up period included regular exams 1 and 7 days, as well as 1, 3, 6 and 12 months postoperatively. Uncorrected visual acuity, intraocular pressure and position of the lens within the anterior chamber were determined on each visit. Postoperative endothelial cell count on follow ups was not measured in this study.

Results

From October 2014 to October 2015 we have implanted 103 Verisyse Aphakia phakic intraocular lenses; 84 were implanted in Special Eye Hospital “Svjetlost” Zagreb, Croatia, and 19 in Eye Clinic “Svjetlost” Banja Luka, RS, Bosnia-Herzegovina. Demographics of the patients is shown in Table 2.

Gender	Male: 71
	Female: 32
Age	
Aphakic eye	Right Eye: 68
	Left Eye: 35
Mean preoperative UCVA	0.14 ± 0.10
Mean preoperative BSCVA	0.59 ± 0.24

Table 2: Demographics of the patients.

At first postoperative day almost all patient had mild to moderate stromal corneal edema, which was expected after anterior chamber implant positioning and fixation to the iris. UCVA was then expectedly poor and the mean value was 0.14 ± 0.10, which gradually improved and had a mean value of 0.79 ± 0.10 at one year postoperatively.

Verisyse Aphakia		
Follow up period	Visual Acuity Mean Value	The Worst and The Best Visual Acuity Values
1. postoperative day	0.14 ± 0.10	0.05–0.3
7 days postoperatively	0.23 ± 0.17	0.1–0.7
1 month postoperatively	0.29 ± 0.21	0.1–0.8
3 months postoperatively	0.36 ± 0.18	0.2–0.7
6 months postoperatively	0.42 ± 0.22	0.2–0.9
1 year postoperatively	0.79 ± 0.10	0.7–1.0

Table 3: Visual acuity after Verisyse Aphakia phakic intraocular lens implantation.

Intraocular pressure was good and within normal values in all cases at 12 month follow up and neither of the patients had to use topical anti glaucoma therapy.

We haven’t had any intraoperative complications, including significant intraocular inflammation. However, in 4 cases there was a subluxation of one haptic one year postoperatively. All four subluxated lenses were previously enclaved to the anterior iris surface and the exclavation occurred at one haptic only. We cannot determine when exactly this dislocation occurred, but it was sometime between 6 months and 12-month checkup.

Discussion

Even though post-cataract refractive surprises are rare in modern ophthalmology, in some rare cases or instances we can still encounter postoperative or posttraumatic aphakia.

It is well known that choice of intraocular lenses and techniques for their safe placement and fixation within the eye are numerous, but phakic intraocular lenses for aphakia still have a significant and important place in this refractive error correction.

As it could have been expected, most of our patients with the secondary Verisyse implantation were elderly people, from 46 to 74 years of age. Similar data can also be seen in the work of other researches, but the number of implanted aphakic intraocular lenses was much smaller compared to our case study [3,4]. The reason for this can be found in the past historical events that affected our region almost 30 years ago, when the only method of senile and traumatic cataract removal was intracapsular cataract extraction (ICCE). Furthermore, shifting to phacoemulsification was a slow and demanding process and intraoperative complications emerged even more, which led to the increase of postoperative aphakia.

Preoperative uncorrected and best spectacle corrected visual acuities were as expected and according to the eye's refraction in aphakia. All of our patients have had poor uncorrected vision prior to the surgery and could not perform everyday activities by themselves. It is also true that all of them had their refractive error partially corrected, either with spectacles or daily contact lenses, but even so the comfort of life was limited. Correction of all preoperative refractive errors with the mean spherical refraction of $+10.22 \pm 2.95$ and improvement in vision from 0.14 ± 0.10 of UCVA to 0.59 ± 0.24 of BSCVA shows how important good refraction is to the patient. Slight deviation from $+2.00$ to $+4.00$ D of preoperative sphere correction can be found in the similar articles of other researchers [4], but it can be disregarded because it all leads to the same improvement in vision in all cases.

Postoperative visual acuity improvements were also seen in all cases of secondary Verisyse Aphakia IOL implantation. Although those improvements were small at first postoperative visits, at one year follow up it reached the mean value of 0.79 ± 0.10 . Other available data [5,6] also shows good postoperative results after implantation, with similar results at 22.4 months of follow up. Kheirkhah, *et al.* [7] go even further and report 20/20 vision in patients with secondary phakic IOL implantation at 37 month of follow up.

Fixation point of the Verisyse Aphakia IOL is also an interesting topic of discussion among refractive surgeons today. Many of them still prefer the old fashion way and fixate the lens on top of the iris plane, while others tend to prevent any possible damage to the endothelium and claw the lens to the posterior iris. Even though both techniques have similar refractive results, we used both of them and implanted 84 lenses to the anterior iris plane and 19 lenses to the posterior iris tissue. Anterior chamber dept did not play a role in the position of implantation, since all aphakic patients usually have deep anterior chambers. We have encountered no damage to the corneal endothelium whatsoever, nor any extensive postoperative inflammation from the posterior iris. Faria, *et al.* [8] in their latest article state excellent postoperative outcomes with "behind the iris" phakic IOL fixation, while Schmidt, *et al.* [9] point out the need for IOL constant optimization due to unpredictable postoperative refractive results. Regardless of the technique used in our case series, all patients were satisfied with their visual outcomes and there were no any refractive surprises.

Late postoperative complications with iris claw lenses are all related to the corneal endothelial cell damage due to the lens instability, or an increase in intraocular pressure. Some authors [10] also report the presence of cystoid macular edema, which had to be treated for poor visual outcomes. Out of 103 implantations we had, only 4 of them had to be re-enclaved due to late postoperative dislocation. Since all of our patients were elderly, slight exclamation or dislocation of the IOL could be expected due to the iris atrophy and lack of the tissue flexibility. It is not clear at this point if the enclavation was better performed to the posterior iris compared to the anterior surface enclavations, but the fact is that the lenses enclaved posteriorly were more stable and less mobile. Furthermore, it is well known that the amount of tissue enclaved anteriorly is less than the amount of the posterior iris tissue due to the lack of lens support to anterior iris and easier approach to the posterior iris tissue in aphakia. Intraocular pressure was stable and within normal limits in at the beginning of the first postoperative day until the end of the follow up at one year. Intracameral vancomycin did not cause any postoperative complications, despite some new findings when it comes to the hemorrhagic occlusive retinal vasculitis [11].

Conclusion

In conclusion, we can say that Verisyse Aphakia phakic intraocular lens is safe and predictable alternative to postoperative aphakia correction. Very low incidence of postoperative complications and excellent visual outcomes makes it our implant of choice for postoperative aphakia. Our future studies on this subject will focus more on the endothelial cell loss and possible corneal decompensation.

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