

## REFRACTIVE SURGERY FOR HIGH AMETROPIES, A FEW CONCLUSIONS

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### Abstract

This paper presents a few clinical cases of patients with high ametropies and/ or anisometropia, who underwent one or two surgical procedures in our clinic, in order to obtain independence of glasses or contact lenses.

Twenty cases of high ametropies were included in our study, with or without astigmatism, with transparent lenses, who presented in our clinic for surgical treatment to correct their refractive errors.

Postoperatively, we analyzed the results and took decisions for each case in particular; sometimes a second surgical procedure was needed.

**Keywords:** High ametropies, Anisometropia, Refractive Lens Exchange, ReLex, PRK

### Introduction

High ametropies' surgical treatment is a continuous challenge in refractive surgery.

Classical corneal refractive LASER procedures such as PRK/ LASEK and LASIK or even much modern ones, like FemtoLASIK, failed to correct high refractive errors, but they had a high success rate in correcting small to medium ametropies, associated or not with anisometropia [1].

At present, we benefit from the revolutionary, third generation corneal refractive procedure, the new technique called ReLEX Smile (Refractive Lenticule Extraction). It combines femtosecond technology with high precision lenticule extraction that provides a minimally invasive refractive correction. Together with ReLex Smile a refractive lenticule is created in the intact cornea, which is removed

through a 4 mm incision, without ablation or flap creation. It can only correct myopia with or without myopic astigmatism, but up to 10 diopters, only spherical or combined.

Alternative non-corneal surgical techniques that are able to correct high ametropies are Refractive Lens Exchange (RLE) and Phakic Intraocular Lens Implantation (PIOL). We did not perform the second one in our clinic, so our experience is limited [1,2].

We have a vast experience with the RLE technique, and, we have obtained excellent refractive results so far. We implanted monofocal, multifocal (bi or trifocal) and personalized IOLs, multifocal or toric multifocal ones. For personalized IOLs, the calculation is done by the producer, according to the patient's keratometry, ACD (anterior chamber depth) and AL (axial length). Complications like posterior capsule rupture, retinal detachments (high

myopic patients) and PCO (posterior capsule opacification) may occur very rarely. We can correct any residual refractive errors by using a bioptic procedure.

An important role in correcting high refractive errors is occupied by combined refractive procedures, bioptic procedures, planned or unplanned, performed in order to correct residual errors from previous ocular surgeries [1,2].

### Clinical Cases

We have performed our retrospective study on some selected cases that we operated in our clinic from January 2014 until March 2015. Twenty patients (34 eyes) were included, all had transparent lenses, wanted to correct their refractive error (with one or two procedures). Twelve extreme hyperopic eyes or with hyperopic astigmatism (35,29%) and 22 eyes with extreme myopia or myopic astigmatism (64,70%).

We did not include any ReLex patients yet, even though the results we obtained so far for high myopia are very good, as we have been performing this procedure since November 2014 and those cases will be the object of our future studies.

From the hyperopic cases, we have selected the following for presentation:

A 27-year-old male, with BCVA 0,4-0,5 (+14 Dsf), having cycloplegic refraction for the right eye: +18Dsf/ +1Dcyl ax 4 and for the left eye: +17Dsf/ +0,75Dcyl ax 1. Lens power was calculated to +54 D for the right eye and + 50 D for the left eye, with IOL  $\Phi=9,8\text{mm}$  and optical zone  $\Phi=6\text{mm}$  (ACL=3,1mm; AL=14,73mm). The surgeries and postoperative evolution were good. Regarding refraction, we have done the measurements after one day and one week from the surgeries, but did not take them into consideration so much as it was the recovery period.

After six weeks, UCVA was 0,2 for both eyes and the cycloplegic refraction for the right eye was +4 Dsf and for the left eye it was +2,5 Dsf/ +1,5 Dcyl ax 120. The next examination was done after 3 months, when the BCVA was 0,4-0,5. After six months from the implantation, BCVA for the right eye was 0,5 (+4Dsf) and for the left eye was 0,4cc (+2,5Dsf/ +1,5Dcyl ax120) and then we decided to perform PRK in order to correct the

residual refractive error. We followed up the refraction after PRK at six weeks, one, three and six months, the UCVA=0,4-0,5, the patient was completely glasses independent with a spherical equivalent of +0,5 D.

From our myopic cases, we have chosen the following one for presentation:

A 39-year-old male with extreme myopia and reduced astigmatism with BCVA for the right eye 0,4cc (-25 Dsf) and for the left eye 0,4 cc (-21Dsf). The cycloplegic refraction for the right eye was -20,25 Dsf/ -1,25 Dcyl 119 and for the left eye was -16,50 Dsf/ -1,75 Dcyl 163. We implanted monofocal IOLs in both eyes: +1,5D for the right eye and +3,5D for the left eye, due to financial reasons. The powers of the implants were calculated by using Holladay formula, with a medium axial length (AL) of 29,51mm for both eyes. Again, like in every other situation, we examined the patient at one, three and six months after surgeries, when BCVA for right eye was 0,8 cc (-2 Dsf/ -0,5 dcyl 110) and for left eye was 0,8 cc (-1,75 Dsf/ -1,5 Dcyl ax 160). At six months, we decided to perform a LASEK procedure for both eyes as the patient's wish was to be glasses independent for far vision and have reading glasses. After LASEK at one, three and six months, UCVA for both eyes was 0,8 and the cycloplegic refraction for the right eye was +0,25Dsf/ -0,50Dcyl 156 and for the left eye was +0,50Dsf/ -0,75Dcyl 135.

For both cases presented, we have obtained the best results by using a bioptic procedure, both intraocular and corneal refractive surgeries (RLE+PRK/ LASEK).

## Results and conclusions

Intraocular refractive surgery is a suitable option to correct high ametropies [3]. The higher the level of ametropia, the more difficult it is to obtain an accurate measurement of refraction, and after the ametropia is reduced, a more reliable evaluation of refraction can be achieved. In order to treat high ametropies, another refractive procedure, associated with the intraocular one, BIOPTIC CONCEPT (RLE+ PRK/ LASEK), has to be performed to correct any residual refractive errors [3].

The results obtained among patients included in our study were good; visual acuity

has improved in all the cases. Best results were obtained by bioptic concept; still, we never performed LASEK or PRK earlier than six months after RLE. Mean preoperative spherical equivalent for myopia was -18,5D to +/- 5,50D and for hyperopia was +16,5D to +21,5D. After RLE and before LASEK/ PRK, the spherical equivalent was -2,5 D to +/- 3 D and for hyperopia form +4 D to +1,5D. After corneal refractive surgery was performed, the cylinder did not exceed 1D, and postoperative spherical equivalent +/- 1 D. Patients were all glasses independent;

In conclusion, we think that a combined procedure appears to be safer and more predictable for the treatment of high ametropia than any other surgical option currently available, that it is an innovative approach, which is growing in popularity [4]. We also have to take into consideration the fact that is already

well known that the higher the refractive error, the higher the possibility of a biometrical error. Also, if it is possible, it is advisable to postpone the surgical treatment until the patient is 35 or 40 years old.

#### Disclosure

Financial disclosure: Alcon, Oftafarma, Zeiss.

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