

CATARACT SURGERY IN POST-LASIK PATIENTS

A growing number of patients who opted for LASIK in the early 90's now require cataract surgery. Managing post-LASIK patients with cataract can be challenging because the visual outcome may not be as predictable as in routine cataract surgery. The risk and treatment plan to address the potential residual refractive error should be thoroughly discussed with these patients who are used to having clear vision after LASIK. Realistic expectations must be established from the start. Though the current IOL calculations have improved significantly, one must remember not to over-promise.

Why can't it be as predictable?

Myopic laser vision correction (LVC) results in central flattening of the anterior corneal curvature as shown in Figure 1. Hyperopic LVC on the other hand results in central steepening of the anterior corneal curvature.

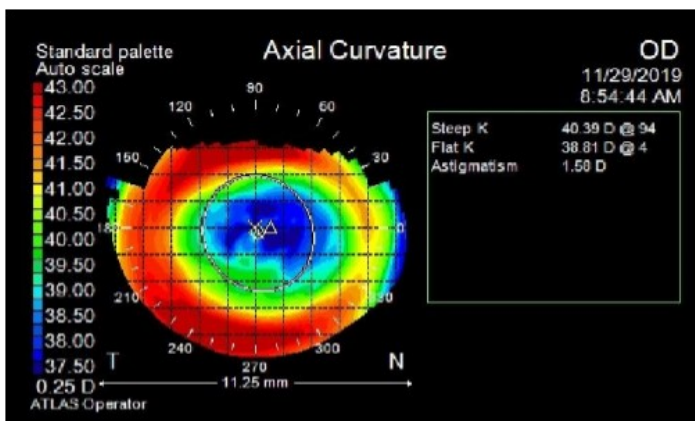


Figure 1: corneal topography of a post-LASIK patient

Most of the IOL formulae assume the cornea to be a sphero-cylinder and corneal power is usually measured based on only the anterior keratometric readings. Therefore in post-LASIK patients estimation errors occur as the measured optical zone is now either flatter or steeper depending on the type of LVC while the posterior corneal curvature remains unaltered.

The corneal refractive index is also different after the changed relationship of the anterior and posterior corneal curvature following LASIK. The anterior chamber depth is wrongly estimated to be shallow since calculation relies on the flat central cornea in myopic LVC resulting in a more anterior effective lens position (ELP). These errors result in post-operative significant hyperopic shift in myopic LVC and a myopic shift in hyperopic LVC if standard IOL formulae are used.

Various formulae have been derived to better estimate the true central corneal power in order to minimise these post-operative surprises. Over the years, there are many studies comparing the accuracy between these new formulae.^{1,2} Haigis-L and the online ASCRS post-LASIK IOL calculator (www.ascrs.org) are widely used. The Barrett True K Formula freely available at www.apacrs.org is currently one of the most reliable.

Pre-operative workup

Corneal topography is essential besides the standard ocular biometry. Identifying patients with an eccentric flap, irregular astigmatism, corneal ectasia and those with higher order aberration (HOA) is crucial since they pose more challenges to manage and are red flags to using premium IOLs.

Have a high index of suspicion when faced with either extremely flat or steep keratometric readings in patients who may not readily volunteer a previous history of LASIK.

Scheimpflug imaging and optical coherence tomography are able to measure the curvature of both corneal surfaces to reflect the true corneal power.

Intra-operative aberrometry is an added tool to reconfirm the IOL power prediction but still has its own limitations.

Treat any underlying dry eye disease to promote better tear film stability and ocular surface health prior to the surgery even though patients seem relatively asymptomatic.

IOL of choice

A monofocal IOL is an easy option for patients who are used to using reading glasses by now but wish to maintain the LASIK-like clear distance vision. It is also suitable for those who have been comfortable with blended mono-vision following LASIK. Choosing an aspheric lens is an added advantage in combatting the induced spherical aberration except those with previous hyperopic LVC. Corneal astigmatism should be addressed if significant.

Multifocal IOLs are generally not recommended since the accuracy of the IOL prediction is still not optimised. Higher myopic ablation and decentred ablation areas

induce significant corneal HOA which causes a reduction of contrast sensitivity and quality of vision. The associated dysphotopsiae and further loss of contrast sensitivity following a multifocal IOL implantation can thus be exacerbated.

Extended depth of focus (EDOF) IOLs are an excellent choice since it's more forgiving for small residual refractive errors and has been my default IOL for all post-LASIK patients. These patients benefit from the low add; giving them good reading, intermediate and distant vision with minimal loss of contrast sensitivity.

Dealing with post-op surprises

Don't panic if you've done all the necessary work-up! The importance of establishing realistic expectations right from the start of the doctor-patient partnership cannot be overstated.

Treat ocular surface diseases since this can exacerbate their underlying HOA.

Residual refractive error can be managed with glasses for those who don't mind wearing them.

The option of LASIK enhancement surgery in suitable candidates should be discussed. Piggy-back IOL may be considered in higher residual refractive errors and rarely IOL exchange may be an option.

Conclusion

The challenge remains at the IOL power prediction but we have gotten better over the years.

Having done the necessary, most of these patients will have satisfying results.

References

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2. Wang L, Tang M, Huang D, Weikert MP, Koch DD. Comparison of newer intraocular lens power calculation methods for eyes after corneal refractive surgery. *Ophthalmology.* 2015;122:2443–9.



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