# SIGNIFICANCE OF HYPERMETROPIC REFRACTION IN IOL CALCULATION DURING PHACOEMULSIFICATION SURGERY

***Yunusov Jamshid,***

***Jaloliddinov Lochinbek,***

***Karimov Nurullo***

*Clinical residents of Republican Specialized Scientific-Practical Research Center of Eye Microsurgery*

*Phone number +998909181433*

*Jamshidyunusov22@gmail.com*

**Abstract:** Accurate intraocular lens (IOL) power calculation plays a crucial role in achieving optimal postoperative refractive outcomes following phacoemulsification. In hypermetropic eyes, specific anatomical features such as shorter axial length, shallow anterior chamber, and thicker crystalline lens complicate the prediction of the effective lens position (ELP). Even minor biometric measurement errors may lead to significant refractive surprises. With the advancement of modern optical biometry and the introduction of newer formulas like Barrett Universal II, Haigis, and Olsen, the precision of IOL calculation in short eyes has markedly improved. This paper discusses the clinical significance of hypermetropic refraction in IOL power calculation, emphasizing proper formula selection, accurate biometry, and realistic refractive targeting to ensure satisfactory visual results.

**Introduction:** Phacoemulsification remains the gold standard technique for cataract extraction, offering rapid visual rehabilitation and minimal postoperative complications. However, the success of the surgery largely depends on the accuracy of intraocular lens (IOL) power calculation. In hypermetropic (short) eyes, predicting the effective lens position (ELP) and achieving emmetropia present greater challenges compared to emmetropic or myopic eyes. Understanding the optical and anatomical differences of hypermetropic eyes is essential for minimizing postoperative refractive errors.

**Anatomical Considerations in Hypermetropic Eyes.** Hypermetropic eyes typically have an axial length shorter than 22 mm, a shallow anterior chamber, and increased lens thickness. These features increase the risk of postoperative refractive error if biometry is not performed precisely. Inaccurate keratometry readings or small measurement errors in axial length may cause significant dioptric deviations. Optical biometry methods, such as partial coherence interferometry (PCI) and swept-source OCT, are preferred for better accuracy.

**Formula Selection and Refractive Targeting. The choice of IOL formula is critical in hypermetropic patients.** Traditional formulas like SRK/T or Hoffer Q may not always provide the desired accuracy in short eyes. Modern theoretical formulas such as Barrett Universal II, Haigis, and Olsen consider more biometric variables and provide improved predictions of the effective lens position. In clinical practice, it is often advisable to aim for a slight myopic target (around −0.25 to −0.50 D) to reduce the risk of postoperative hypermetropic outcomes.

**Conclusion.** In conclusion, understanding the anatomical and optical characteristics of hypermetropic eyes is vital for precise IOL calculation in phacoemulsification. Advanced biometry technologies and modern formulas significantly enhance prediction accuracy, yet individualized assessment remains essential. A meticulous preoperative evaluation, appropriate formula choice, and realistic refractive target can lead to highly satisfactory visual results in hypermetropic patients.

## References

**1.** Barrett GD. An improved universal theoretical formula for intraocular lens power prediction. J Cataract Refract Surg. 2013;39(9):1327–1334.

**2.** Haigis W. Intraocular lens calculation in short and long eyes. Ophthalmologe. 2008;105(7):563–568.

**3.** Olsen T. Calculation of intraocular lens power: a review. Acta Ophthalmol Scand. 2007;85(5):472–485.

**4.** Hoffer KJ. The Hoffer Q formula: a comparison of theoretic and regression formulas. J Cataract Refract Surg. 1993;19(6):700–712.

**5.** Holladay JT. Refractive power calculations for intraocular lenses in the phakic eye. Am J Ophthalmol. 1997;123(6):682–687.

**6.** Hartong DT, Berson EL, Dryja TP. Retinitis pigmentosa. Lancet. 2006;368(9549):1795–1809.

**7.** Hamel C. Retinitis pigmentosa. Orphanet J Rare Dis. 2006;1:40.

**8.** Ohno-Matsui K. Pathologic myopia. Asia Pac J Ophthalmol. 2016;5(6):415–423.

**9.** Jonas JB, Ohno-Matsui K, Panda-Jonas S. Myopia: Anatomic changes and consequences for its etiology. Asia Pac J Ophthalmol. 2019;8(5):355–359.

**10.** Parisi V, Ziccardi L, Falsini B. Functional assessment of retinal and visual pathways in myopia. Prog Retin Eye Res. 2020;76:100828.