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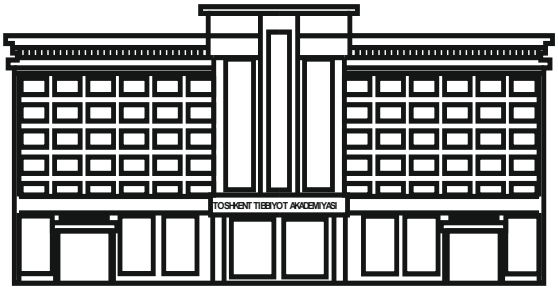

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REVIEW OF FACTORS INFLUENCING THE IOL CALCULATION IN CATARACT SURGERY IN POST VITRECTOMY EYES

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ОБЗОР ФАКТОРОВ, ВЛИЯЮЩИХ НА РАСЧЕТ ИОЛ ПРИ ХИРУРГИИ КАТАРАКТЫ НА ГЛАЗАХ ПОСЛЕ ВИТРЭКТОМИИ

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VITREKTOMIYADAN KEYIN KO'ZLARDAGI KATARAKTA JARROHLIGIDA IOL HISOBIGA TA'SIR QILUVCHI OMILLARNI TAHLIL

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Расчет интраокулярной линзы (ИОЛ) является важным шагом в хирургии катаракты, так как он помогает достичь желаемых визуальных результатов. Однако расчет подходящей оптической силы ИОЛ является сложной задачей в случаях, когда пациенты перенесли процедуры витрэктомии. Структурные изменения, происходящие в глазу после витрэктомии, могут повлиять на биометрические параметры, необходимые для расчета ИОЛ. Таким образом, этот обзор призван обобщить текущее состояние исследований по расчету ИОЛ в глазах после витрэктомии и возможные факторы, которые следует учитывать для точных расчетов.

Ключевые слова: *авитрия, катаракта, факоэмульсификация, расчет ИОЛ, витрэктомия.*

Ko'z ichi linzalarini (IOL) hisoblash katarakta jarrohligida muhim qadamdir, chunki u kerakli vizual natijalarga erishishga yordam beradi. Bemorlar vitrektomiya muolajalarini o'tkazgan hollarda tegishli IOL kuchini hisoblash qiyin bo'lishi mumkin. Vitrektomiyadan so'ng ko'zda yuzaga keladigan tarkibiy o'zgarishlar IOLni hisoblash uchun zarur bo'lgan biometrik parametrlarga ta'sir qilishi mumkin. Shu sababli, ushbu sharh vitrektomiyadan keyingi ko'zlarda IOLni hisoblash bo'yicha tadqiqotlarning hozirgi holatini va aniq hisob-kitoblar uchun e'tiborga olinishi kerak bo'lgan omillarni umumlashtirishga qaratilgan.

Kalit so'zlar: *Vitrektomiyadan keyingi ko'z, katarakta, fakoemulsifikatsiya, IOL hisoblash, vitrektomiya.*

Cataract surgery is one of the most commonly performed surgical procedures worldwide. The goal of cataract surgery is to remove the opacified lens and replace it with an IOL, thus restoring visual acuity. However, patients who have previously undergone vitrectomy procedures may present unique challenges for IOL calculation. Vitrectomy is a surgical procedure that removes the vitreous humor and replaces it with saline or other solutions. Vitrectomy is typically performed to address retinal detachment, vitreous hemorrhage, diabetic retinopathy, and other vitreoretinal diseases [5,7,9].

Intraocular Lens Calculation in Post Vitrectomy Eyes. The primary goal of IOL calculation in post-vitrectomy eyes is to determine the appropriate power of the IOL based on the changes in the eye's biometric parameters that occur following the procedure. Vitrectomy can affect several biometric parameters, including axial length, anterior chamber depth (ACD), lens thickness, and corneal curvature. These changes may affect IOL power calculations, particularly those that rely on formulas based on preoperative biometric measurements [8,11,12].

Axial length is an essential biometric parameter for IOL power calculation, as it determines the refractive power of the eye. After vitrectomy, the eye's axial length may either shorten or lengthen, depending on the specifics of the procedure. Various studies have indicated that the average change in axial length following vitrectomy ranges from 0.07 to 0.26 mm. Therefore, relying on preoperative axial length measurements may lead to inaccurate IOL power calculations. To address this challenge, recent studies have proposed several methods for measuring postoperative axial length. These include using optical coherence tomography (OCT) or intraoperative wavefront aberrometry [1,6,7].

Anterior Chamber Depth is another crucial factor in IOL power calculation, as it affects the distance between the cornea and the IOL. ACD is typically measured as the distance between the anterior corneal surface and the anterior lens capsule. After vitrectomy, ACD may increase due to several factors, such as ciliary body detachment or aqueous humor accumulation. However, some studies have reported a decrease in ACD following vitrectomy, possibly due to postoperative inflammation. Thus, accurate ACD measurement is critical for precise IOL power calculation in post-vitrectomy eyes [10].

Lens Thickness and Corneal Curvature. Changes in lens thickness and corneal curvature after vitrectomy may also affect IOL power calculations. Lens thickness may decrease following vitrectomy due to decreased ciliary body tone, which may cause anterior lens displacement. Consequently, using formulas based on preoperative lens thickness measurements may lead to inaccurate IOL power calculations after vitrectomy. Corneal radius measurements may also be challenging after vitrectomy, as the procedure may induce corneal curvature changes due to corneal edema, lens compression, or anterior chamber shallowing [1,5,11].

Possible Factors Affecting IOL Calculation following Vitrectomy. In addition to the changes in biometric pa-

rameters, other factors may affect IOL calculation following vitrectomy. These factors include age, preoperative refractive error, and the surgeon's experience. Younger patients are more likely to experience greater axial length changes following vitrectomy, which may lead to a higher risk of refractive error after cataract surgery [3].

Consequently, IOL calculation formulas for younger patients should take into account postoperative biometric changes. Similarly, preoperative refractive error may affect IOL power calculation, particularly in cases where astigmatism is present. Thus, preoperative keratometry and topography should be performed to provide a more accurate measurement of postoperative corneal curvature [1].

Surgeon's experience is also a crucial factor affecting IOL calculation, as the calculation process requires significant knowledge and clinical judgment. A study conducted by Auffarth et al. concluded that surgeons who evaluated IOL calculation before and after surgery in post-vitrectomy eyes showed up to 0.5 diopters of variance. Therefore, standardization of IOL power calculation protocols and surgeon education and training in this area could help reduce the risk of refractive error and improve visual outcomes [7,8].

The axial length of the eye is an important measurement that is used to calculate the optical power of the IOL. Axial length is the distance from the anterior surface of the cornea to the retinal pigment epithelium and is used to determine the effective strength of the cornea and IOL [4].

In vitrectomy eyes, the measurement of axial length may be distorted due to changes in the shape of the eye. In particular, the axial length can be shortened due to the removal of the vitreous body, which can lead to an anterior displacement of the retina. This can lead to an underestimation of the strength of the IOL, resulting in residual refractive error and suboptimal visual results [2,4].

New generation IOL formulas such as the Barrett Universal II Formula, Holladay 2, Haigis L have been researched to provide more accurate results in vitrectomy eyes compared to traditional formulas such as the SRK/T and Hoffer Q formulas. These new formulas are based on more accurate mathematical models that take into account the actual position of the lens in the eye, the effect of corneal curvature, and individual variations in lens shape and thickness. The Holladay 2 formula, for example, takes into account effective lens position, corneal strength, and lens strength, and has been shown to provide more accurate postoperative refractive results in vitrectomy eyes compared to the SRK/T formula [1,6,9].

Conclusion

IOL calculation in post-vitrectomy eyes is a complex process due to the structural changes that occur in the eye following the procedure. Patients who have undergone vitrectomy may experience changes in axial length, ACD, lens thickness, and corneal curvature, which are essential factors in IOL power calculation. Thus, calculating the appropriate IOL power is critical in achieving optimal visual outcomes after cataract surgery. Recent studies have proposed various methods for IOL calculation in post-vitrectomy eyes, such as using optical coherence tomography, intraoperative wavefront aberrometry, and specialized formulas. However, further research is needed to identify the most accurate and reliable methods for IOL calculation that can be standardized and implemented in clinical practice.

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REVIEW OF FACTORS INFLUENCING THE IOL CALCULATION IN CATARACT SURGERY IN POST VITRECTOMY EYES

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Intraocular lens (IOL) calculation is an essential step in cataract surgery, as it helps to achieve the desired visual outcomes. However, calculating the appropriate power of IOLs is challenging in cases where patients have undergone vitrectomy procedures. The structural changes that occur to the eye following vitrectomy may affect the biometric parameters that are essential for IOL calculation. Thus, this review aims to summarize the current state of research on IOL calculation in post-vitrectomy eyes and the possible factors that should be considered for accurate calculations.

Key words: *post vitrectomy eye, cataract, phacoemulsification, IOL calculation, vitrectomy.*