Article

Not peer-reviewed version

IOL Power Calculation by Ray Tracing in Eyes with Previous Radial Keratotomy

Giacomo Savini *, Kenneth J Hoffer, Arianna Grendele, Catarina P. Coutinho, Andrea Russo, Domenico Schiano-Lomoriello

Posted Date: 9 December 2025

doi: 10.20944/preprints202512.0808.v1

Keywords: IOL power calculation; ray tracing; radial keratotomy

Article

IOL Power Calculation by Ray Tracing in Eyes with Previous Radial Keratotomy

Giacomo Savini [1,*], Kenneth J Hoffer [2,3], Arianna Grendele [4], Catarina P. Coutinho [4,5], Andrea Russo [6] and Domenico Schiano-Lomoriello [1,7]

[1] IRCCS Bietti Foundation, Rome, Italy
[2] St.Mary's Eye Center, Santa Monica, CA
[3] Stein Eye Institute, University of California, Los Angeles, CA
[4] Studio Oculistico d'Azeglio, Bologna, Italy
[5] Alma Mater Studiorum Università di Bologna, Dipartimento di Farmacia e Biotecnologie, Bologna, Italy
[6] Centro Oculistico Bresciano, Brescia, Italy
[7] Unicamillus-Saint Camillus International University of Health Sciences, Rome, Italy
* Correspondence: giacomo.savini@fondazionebietti.it; Tel.: +39.06.77052834

Abstract

Background/Objectives: To evaluate the accuracy of intraocular lens (IOL) power calculation by ray tracing in eyes with previous radial keratotomy (RK). **Methods**: A consecutive series of patients with previous RK was retrospectively analyzed. Preoperatively, all eyes underwent optical biometry to measure the axial length (AL) and anterior segment imaging by the MS-39 (CSO), which combines Placido disc corneal topography and anterior segment optical coherence tomography. The ray tracing software of the MS-39 was used to calculate the IOL power. For comparative purposes, the results of the Barrett True-K, EVO, Haigis-Total Keratometry and PEARL-DGS formulas were also investigated. The refractive outcomes were evaluated with Eyetemis. **Results**: Twenty-four eyes (24 patients) were investigated. The mean AL and keratometry were, respectively, 27.34 ±2.88 mm and 35.53 ±3.66 diopters (D). The mean prediction error (PE) was -0.03 ±0.65 D (range: -1.30 to +1.64 D). The mean and median absolute errors were 0.52 and 0.48 D. The percentage of eyes with a PE within ±0.25 D, ±0.50 D and ±1.00 D were 29.17%, 62.50% and 87.50%, respectively. A comparison to the other formulas was possible in 20 eyes and did not reveal any statistically significant differences, although they achieved a lower percentage of eyes with a PE within ±0.50 D (ranging from 50 to 60%, compared to 65% with ray tracing). **Conclusions**: Ray tracing is a relatively accurate solution to calculate the IOL power in eyes with previous RK. Paraxial formulas provide similar outcomes and should be considered in these patients.

Keywords: IOL power calculation; ray tracing; radial keratotomy

1. Introduction

Intraocular lens (IOL) power calculation in eyes with previous radial keratotomy (RK) is still a major challenge for cataract surgeons. In addition to the well-known sources of errors typical of eyes that have undergone excimer laser refractive surgery (i.e., the instrument error, the index of refraction error and the formula error) [1], other important factors reduce the accuracy of IOL power calculation after RK. First, the optical zone is often small, irregular and decentered; this makes it difficult to accurately measure the anterior corneal radius, due to the fact that keratometry (K) mires are projected onto the area representing the inflection point between the incised cornea and the flattened central region. Second, the irregularity of the optical zone can generate higher-order aberrations (HOAs) of the cornea, whose effect can hardly be taken into account by paraxial IOL formulas. Third, corneal flattening of both corneal surfaces can be much higher [2], so that some formulas cannot be used (the Barrett True-K, EVO and PEARL-DGS, for example, do not allow users to enter keratometry

 doi:10.20944/preprints202512.0808.v1

(K) values lower than 30 diopters (D)). Fourth, RK encompasses cases with different numbers of incisions leading to different degrees of flattening, which makes it hard to develop predictive models. Finally, eyes with prior RK are relatively rare compared to those that have undergone myopic LASIK or PRK and are prone to early hyperopic shift and diurnal variations [3].

For these reasons, the results of IOL power calculation after RK are poor compared to both calculations in virgin eyes and in eyes with previous excimer laser refractive surgery. Most studies have reported that, even with the best formulas, only about 50% of eyes show a prediction error (PE) within ±0.50 D [4–9], a percentage remarkably lower than those observed in unoperated as well as in post-LASIK eyes. The only exception is a paper by Turnbull et al., who found that more than 70% of eyes could achieve a PE within ±0.50 D with the Barrett True-K [10].

Exact ray tracing offers a potentially useful solution to calculate the IOL power in post-RK eyes, because it considers both corneal surfaces (and, therefore, is not affected by the keratometric index error), takes HOAs into account, can be adjusted according to the pupil size and does not need historical data. We previously found that the ray-tracing software available on the anterior segment optical coherence tomographer (AS-OCT) MS-39 (CSO) leads to accurate refractive outcomes after myopic LASIK [11]. In this study we aimed to assess its performance in eyes with previous RK.

2. Materials and Methods

This was a retrospective analysis of consecutive patients that underwent phacoemulsification and IOL implantation after previous RK at two institutions, Studio Oculistico d'Azeglio (Bologna, Italy) and Centro Oculistico Bresciano (Brescia, Italy), between 2019 and 2024. Deidentified data were transferred to and analyzed at IRCCS Bietti Foundation (Rome, Italy). The study was conducted in accordance with the Declaration of Helsinki and approved by the Comitato Etico Centrale IRCCS Lazio (protocol code CEC/157/15, date of approval March 31st, 2015). Informed consent was obtained from all subjects involved in the study. Exclusion criteria were any intraoperative or postoperative complication, postoperative corrected distance visual acuity equal to or lower than 20/40 and implantation of a pinhole IOL (as this may mask postoperative refractive errors). Subjective refraction was performed at 4 to 6 weeks postoperatively, as previously done by other authors in post-RK eyes [10], at a distance of 4 m.

2.1. Preoperative Measurements and Surgery

The same procedure as previously described in our study on post-LASIK eyes was followed [11]. Briefly, patients underwent anterior segment imaging by the AS-OCT combined with the MS-39 (software version 4.1.4), whose high repeatability of measurements has been previously demonstrated [12]. Only measurements with a good quality, as assessed by the instrument, were used. Optical biometry was performed with the IOLMaster 700 (software version 1.90.38.02, Zeiss). Cataract surgery was performed by 3 experienced surgeons using a temporal clear corneal incision, phacoemulsification and IOL implantation in the bag. In no case was a scleral approach deemed necessary in our series to reduce the risk of RK incisions opening. No intraoperative or postoperative complications occurred.

2.2. Intraocular Lens Power Calculation

The IOL power was calculated using the MS-39 software, which requires a few manual inputs: the AL, the target refraction, the pupil diameter and the IOL A-constant. As regards the pupil diameter, since 3 diameters are available (2.0, 2.5 and 3.0 mm) the value closest to the one measured by the MS-39 was selected. The A-constant was retrieved from the User Group for Laser Interferometry Biometry (ULIB, www.ocusoft.de), or IOLCon websites (https://iolcon.org, both accessed on November 14th, 2025). The A-constant is needed to refine the prediction of the IOL position through a proprietary method. Based on our previous study [11], AL was adjusted according to the polynomial equation described by Holladay for the Holladay 2 formula in the errata

 doi:10.20944/preprints202512.0808.v1

accompanying the letter by Wang et al. [13]. This adjustment was carried out using Holladay IOL Consultant Software & Surgical Outcomes Assessment (version 2022.0910, Bellaire, TX). The ray tracing software is based on Snell's law and specific refractive indices for each optical element. The method used to calculate the IOL power has been previously described in detail [11].

For comparative purposes, the IOL power was also calculated with the post-RK version of the Barrett True-K formula (www.apacrs.org), the EVO (www.evoiolcalculator.com) and PEARL-DGS (www.iolsolver.com, all accessed on November 15th, 2025) [14]. Other new generation formulas, like the Cooke K6, Hoffer QST and Kane could not be evaluated, as they do not offer a post-RK version. The Barrett True-K and EVO were used with both predicted and measured posterior corneal astigmatism (i.e., posterior keratometry (PK)). The IOLMaster 700 measurements, including posterior keratometry, were used in this case and the constants available on the formula websites were adopted. In addition, Total Keratometry values from the IOLMaster 700 were entered into the standard Haigis formula [15], since this combination has been previously found to be accurate in post-myopic LASIK eyes [5].

The PE was calculated as the difference between the measured and the predicted postoperative refractive spherical equivalent for the power of the implanted IOL, so that a negative PE was correlated to a more myopic result than planned and a positive PE to a more hyperopic result. The mean PE, its standard deviation (SD), the median absolute error (MedAE), the mean absolute error (MAE) and the percentage of eyes with a PE within ±0.25 diopters (D), ±0.50 D, ±0.75 and ±1.00 were calculated.

2.3. Statistics

MedCalc (software version 12.3.0.0, Ostend, Belgium) was used for statistical analysis. Correlation was used to evaluate the relationship between the PE and the preoperatively measured variables. While the primary aim of this study was to evaluate the accuracy of ray tracing for IOL power calculation after RK, a paired comparison was performed with the Barrett-True K, EVO, PEARL-DGS and Haigis-TK for the subset of eyes whose IOL power could be calculated with these methods (i.e., those with an average K > 30 D). For this purpose, Eyetemis was used (www.eyetemis.com, accessed on November 14th, 2025) [16].

Given a type I error of 0.05 and a power of 0.80, a mean difference of the PE of 0.50 D and a mean standard deviation of the difference of 0.70 D, PS Power and Sample Size (https://cqsclinical.app.vumc.org/ps/, accessed on November 14th, 2025) calculated a minimum sample size for paired comparisons of 18 eyes. A p-value <0.05 was considered statistically significant.

3. Results

Twenty-eight eyes of 27 patients with previous RK were identified. Four eyes of 3 patients with a pinhole IOL were excluded, thus leaving a dataset of 24 eyes of 24 patients (13 males (54%), mean age: 61.2 ±8.2 years, mean number of RK incisions: 10.4 ±3.1). Eight different IOL models were implanted and the most commonly used were the Tecnis Ehyance (Johnson & Johnson, n = 9), the toric AcrySof SN6ATx (Alcon, n = 5) and the non-toric AcrySof SN60WF (n = 4). The mean biometric measurements are reported in Table 1. On average, standard keratometry underestimated Total Keratometry by 0.16 ±0.20 D. In no case was the difference higher than 0.50 D and in 16 eyes (64%) the difference was lower than 0.25 D.

Table 1. Biometric measurements obtained with the IOLMaster 700 in the 24 eyes analyzed.

	Mean ± SD	Range (min / max)
Keratometry flat (D)	34.59 ± 4.01	26.86 / 41.59
Keratometry steep (D)	36.57 ± 3.41	29.34 / 41.76
Keratometry average (D)	35.53 ± 3.66	28.08 / 41.68

 doi:10.20944/preprints202512.0808.v1

Posterior Keratometry flat (D)	-4.38 ± 0.66	-5.41 / -3.1
Posterior Keratometry steep (D)	-4.74 ± 0.50	-5.49 / 3.82
Posterior Keratometry average (D)	-4.54 ± 0.58	-5.45 / -3.44
Total Keratometry (D)	35.47 ± 3.67	28.25 / 41.83
Anterior Chamber Depth (mm)*	3.34 ± 0.33	2.67 / 3.93
Lens Thickness	4.45 ± 0.35	4.01 / 5.2
Axial Length	27.33 ± 2.94	23.42 / 33.13

* measured from the corneal epithelium to the anterior surface of the lens.

Based on ray tracing, the mean PE was -0.03 ±0.65 D (range: -1.30 to +1.64 D). The MedAE was 0.48 D and the MAE was 0.52 D. The percentage of eyes with a PE within ±0.25, ±0.50, ±0.75 and ±1.00 D was 29.17%, 62.50%, 87.50% and 91.67%, respectively. All cases had a PE within ±2.00 D. When AL was <26 mm (n = 12), the percentage of eyes with a PE within ±0.50 D was 75%, compared to 50% when it was >26 mm (n = 12). The PE was not correlated to AL, K, ACD, LT or scotopic pupil diameter.

The Barrett True-K, EVO and PEARL-DGS formulas could not be used in 4 eyes whose average K was <30 D. In the remaining 20 eyes, the results (Table 2) were similar to those obtained with ray tracing and Eyetemis did not detect any statistically significant difference for trueness, precision or accuracy or for the percentage of eyes within each threshold.

Table 2. Comparison of IOL power calculation, according to ray tracing and other formulas, in 20 post-RK eyes.

	Mean PE ± SD (D)	MAE (D)	MedAE (D)	PE ≤ ±0.25 D	PE ≤ ±0.50 D	PE ≤ ±0.75 D	PE ≤ ±1.00 D
Ray tracing	0.01 ± 0.69	0.54	0.48	25%	65%	85%	90%
Barrett True-K P-PCA	-0.19 ± 0.74	0.56	0.44	35%	55%	80%	85%
Barrett True-K M-PCA	-0.05 ± 0.81	0.60	0.36	25%	60%	70%	80%
EVO P-PCA	-0.02 ± 0.74	0.53	0.35	40%	55%	70%	80%
EVO M-PCA	-0.13 ± 0.76	0.58	0.50	35%	50%	70%	70%
Haigis-TK	-0.28 ± 0.73	0.55	0.33	40%	65%	75%	80%
PEARL-DGS	0.00 ± 0.66	0.52	0.50	35%	50%	70%	90%

. M-PCA = measured posterior corneal astigmatism. P-PCA = predicted posterior corneal astigmatism TK = Total Keratometry.

4. Discussion

Our study confirms that IOL power calculation after RK is still a challenging task, since the refractive outcomes are usually worse than those achieved not only in virgin eyes, but also in eyes with previous myopic PRK or LASIK. In fact, in the event of previous myopic laser vision correction, most formulas lead to a PE within ±0.50 D in a percentage of eyes that ranges between 60 and 70% [17], but with the best formulas the percentage can be higher than 70% [11,18,19]. In our dataset of post-RK eyes, the highest percentage was obtained with ray tracing, which reached 62.5% across the whole sample (n = 24) and 65% in the subset (n = 20) used for formula comparison (Barrett True-K, EVO, Haigis-TK and PEARL-DGS). With the remaining formulas, only 50-60% of eyes resulted in a PE within ±0.50 D, with the exception of the Haigis-TK (65%). It should be highlighted that in post-myopic LASIK eyes, the same ray tracing technology enabled us to calculate a PE within ±0.50 D in a higher (77%) percentage of eyes [11]. Due to the retrospective nature of the study and the lack of postoperative AS-OCT measurements, we cannot assess whether the lower accuracy in post-RK eyes depends on an incorrect prediction of the postoperative IOL position, a postoperative change of corneal power or other factors.

In addition to the highest percentage of eyes with a PE within ±0.50 D, ray tracing offered a mean PE close to zero, thus showing that the combination of optimized constants derived from ULIB or IOLCon datasets and AL optimization previously adopted by our group in post-LASIK eyes is also a good approach in post-RK eyes [11]. On the other hand, the refractive outcomes of the Barrett True-K, EVO, Haigis-TK and PEARL-DGS did not show any statistically significant differences compared to ray tracing. All formulas had a PE <0.30 D and absolute PEs slightly higher or slightly lower than obtained with ray tracing. As a consequence, none of these methods should be discarded a priori when calculating the IOL power in eyes with previous RK, unless the average K is lower than 30 D. Another interesting observation regards PK: contrary to what has been observed in post-LASIK eyes [11], PK does not seem to significantly improve the accuracy of the Barrett True-K and EVO formulas.

With respect to previously published studies, our data suggest that ray tracing provides us with potentially accurate refractive outcomes. Voytsekhivskyy did not yield percentages of eyes with a PE within ±0.50 D higher than 53% [4]. None of the formulas investigated by other authors reached the value of 50% [6,7,9], except for the Barrett True-K and the ASCRS calculator average power, which obtained a PE within ±0.50 D in 56% of cases in a study by Shetty et al. [8]. However, the real exception is the paper by Turnbull et al., who found that more than 70% had a PE within ±0.50 D with the Barrett True-K [10]. This difference may depend on the lower AL of their sample, whose mean was 24.98 ±0.87 mm as compared to an average of 27.33 ± 2.94 mm in our dataset [10]. Although we did not detect a statistically significant relationship between the PE and AL, our subgroup analysis revealed that eyes with a shorter AL (<26 mm) can reach a higher percentage (75%) than eyes with a longer AL (50%). We can therefore argue that IOL power calculation after RK is more accurate in shorter eyes and that studies with a lower mean AL are likely to display better outcomes.

This study has some limitations. First, the sample size is small and for this reason we aim to collect a larger sample. However, since—apart from a single case report—[20] there are no published papers about IOL power calculation by ray tracing in post-RK eyes, we feel that our results are important for both ophthalmologists and patients, who can at least have preliminary information on the accuracy of this method. Second, no postoperative scans were available for the majority of eyes, so that we could not assess the influence of corneal power changes and error in IOL position predictions.

5. Conclusions

Our data show that ray tracing is a promising option to calculate the IOL power in eyes with previous RK, although the refractive accuracy is still lower than in eyes with previous laser vision correction. Paraxial formulas provide similar outcomes and should be considered in these patients.

Author Contributions: Conceptualization, G.S. and C.P.C.; methodology, G.S., A.G. and C.P.C.; investigation, G.S., A.G. and A.R.; data curation, G.S., A.G. and A.R.; writing—Original Draft Preparation, G.S.; writing—review & editing, G.S., K.J.H, A.G, C.P.C., A.R., D.S.L.; supervision, K.J.H.; funding acquisition, D.S.L.

Funding: The contribution of IRCCS Bietti Foundation was supported by Fondazione Roma and the Italian Ministry of Health.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved the Comitato Etico Centrale IRCCS Lazio (protocol code CEC/157/15, date of approval March 31st, 2015).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

doi:10.20944/preprints202512.0808.v1

Acknowledgments: None.

Conflicts of Interest: Dr. Giacomo Savini has received lecture fees from Alcon, Moptim, SIFI, Staar, Thea and Zeiss and received licensing fees from CSO and SIFI for the Hoffer QST formula. Dr. Kenneth J Hoffer licenses the registered trademark name Hoffer® to ensure accurate programming of his formulas to almost all commercial optical biometers manufacturers and most A-scan biometer manufacturers and has received licensing fees from CSO and SIFI for the Hoffer QST formula. Dr. Leonardo Taroni has received licensing fees from CSO and SIFI for the Hoffer QST formula. Eng. Catarina P. Coutinho and Dr. Arianna Grendele has received lecture fees from Zeiss. The remaining authors report no potentially competing interests to declare.

Abbreviations

The following abbreviations are used in this manuscript:

D	Diopters
RK	Radial keratotomy
PE	Prediction error
AL	Axial length
IOL	Intraocular lens
HOAs	Higher order aberrations
SD	Standard deviation
MAE	Mean absolute error
MedAE	Median absolute error

References

1. Hoffer, K.J. Intraocular lens power calculation after previous laser refractive surgery. *J Cataract Refract Surg* **2009**, *35*, 759-765. DOI: 10.1016/j.jcrs.2009.01.005.
2. Camellin, M; Savini, G; Hoffer K.J.; Carbonelli, M; Barboni, P. Scheimpflug camera measurements of anterior and posterior corneal curvature in eyes with previous radial keratotomy. *J Refract Surg* **2012**, 28:275-279. DOI: 10.3928/1081597X-20120221-03.
3. Schanzlin, D.J.; Santos, V.R.; Waring III, G.O.; Lynn, M.; Bourque, L.; Cantillo, N.; Edwards, M.A.; Justin, N.; Reinig, J.; Roszka-Duggan, V. Diurnal change in refraction, corneal curvature, visual acuity, and intraocular pressure after radial keratotomy in the PERK study. *Ophthalmoogy* **1986**, 93, 167-175. DOI: 10.1016/s0161-6420(86)33765-5.
4. Voytsekhivskyy, O. The VRF-L and VRF-G IOL power calculation methods after radial keratotomy. *Eye* **2024**, 38, 2947-2954. DOI: 10.1038/s41433-024-03195-x.
5. Wang, L.; Spektor, T.; de Souza, R.G.; Koch, D.D. Evaluation of total keratometry and its accuracy for intraocular lens power calculation in eyes after corneal refractive surgery. *J Cataract Refract Surg* **2019**, 45, 1416-1421. DOI: 10.1016/j.jcrs.2019.05.020.
6. Morshifar, M.; Sperry, R.A.; Altaf, A.W.; Stoakes, I.M.; Hoopes, P.C. Predictability of existing IOL formulas after cataract surgery in patients with a previous history of radial keratotomy: a retrospective cohort study and literature review. *Ophthalmol Ther* **2024**, 13, 1703-1722. DOI: 10.1007/s40123-024-00946-7.
7. Helaly, H.A.; Elhady, A.M.; Elnaggar, O.R. Accuracy of traditional and modern formulas for intraocular lens power calculation after radial keratotomy using standard keratometry. *Clin Ophthalmol* **2023**, 17, 2589-2597. DOI: 10.2147/OPTH.S417336.
8. Shetty, N.; Sathe, P.; Aishwarya, Francis, M.; Shetty, R. Comparison of intraocular lens power prediction accuracy of formulas in American Society of Cataract and Refractive Surgery post-refractive surgery calculator in eyes with prior radial keratotomy. Indian *J Ophthalmol* **2023**, 71, 3224-3228. DOI: 10.4103/IJO.IJO_3417_22.
9. Ma, J.X.; Tang, M.; Wang, L.; Weikert, M.P.; Huang, D.; Koch, D.D. Comparison of newer IOL power calculation methods for eyes with previous radial keratotomy. *Invest Ophthalmol Vis Sci* **2016**, 57 162-168. DOI: 10.1167/iovs.15-18948.

10. Turnbull, A.M.J.; Crawford, G.J.; Barrett, G.D. Methods for intraocular lens power calculation in cataract surgery after radial keratotomy. *Ophthalmology* **2020**, 127, 45-51. DOI: 10.1016/j.ophtha.2019.08.019.
11. Savini, G.; Hoffer, K.J.; Ribeiro, F.J.; Mendanha Dias, J.; Coutinho, C.P.; Barboni, P.; Schiano-Lomoriello, D. Intraocular lens power calculation with ray tracing based on AS-OCT and adjusted axial length after myopic excimer laser surgery. *J Cataract Refract Surg* **2022**, 48, 947-953. doi: 10.1097/j.jcrs.0000000000000902.
12. Savini, G; Schiano-Lomoriello, D.; Hoffer, K.J. Repeatability of automatic measurements by a new anterior segment optical coherence tomographer combined with Placido topography and agreement with 2 Scheimpflug cameras. *J Cataract Refract Surg* **2018**, 44, 471-478. DOI: 10.1016/j.jcrs.2018.02.015.
13. Wang, L.; Holladay, J.T.; Koch, D,D. Wang-Koch axial length adjustment for the Holladay 2 formula in long eyes. *J Cataract Refract Surg* **2018**, 44, 1291-1292. DOI: 10.1016/j.jcrs.2018.06.057. Errata: *J Cataract Refract Surg* **2019**, 45, 117.
14. Debellemanière, G; Mechleb, N; Bernier, T; Ancel, J.M.; Gauvin, M.; Wallerstein, A.; Saad, A.; Gatinel, D. The development of a thick-lens post-myopic laser vision correction intraocular lens calculation formula. *Am J Ophthalmol* **2024**, 262, 40-47. DOI: 10.1016/j.ajo.2023.09.023.
15. Haigis, W.; Lege, B.; Miller, N.; Schneider, B. Comparison of immersion ultrasound biometry and partial coherence interferometry for intraocular lens calculation according to Haigis. *Graefe's Arch Clin Exp Ophthalmol* **2000**, 238, 765-773. DOI: 10.1007/s004170000188.
16. Kan Tor, Y.; Abulafia, A.; Zadok, D.; Kohnen, T.; Savini, G.; Hoffer, K.J.; Yuval, B. Spherical equivalent prediction analysis in intraocular lens power calculations using Eyetemis: a comprehensive approach. *J Cataract Refract Surg* 2024, 50, 1128-1134. DOI: 10.1097/j.jcrs.0000000000001518.
17. Anter, A.M.; Bleeker, A.R.; Shammas, H.J.; Suraneni. S.; Kingrey, B.; Murphy, D.A.; Leal, S.; Ghalibafan, S.; Tonk, R.S.; Cooke, D.L,; Riaz, K.M. Comparison of legacy and new no-history IOL power calculation formulas in postmyopic laser vision correction eyes. *Am J Ophthalmol* 2024, 264, 44-52. DOI: 10.1016/j.ajo.2024.03.014.
18. Savini, G.; Barboni, P.; Carbonelli, M; Ducoli, P.; Hoffer, K.J. Intraocular lens power calculation after myopic excimer laser surgery: selecting the best method using available clinical data. *J Cataract Refract Surg* **2015**, 41, 1880-1888. DOI: 10.1016/j.jcrs.2015.10.026.
19. Kohnen, T.; Schug, T.; Kolb-Wetterau, C.; Jandewerth, T.; Bucur, J.; Lwowski, C.; Kaiser, K.P. Accuracy of intraocular lens calculation in a non-diffractive extended depth of focus intraocular lens after myopic LASIK. *J Refract Surg* **2022**, 41, e950-e957. DOI: 10.3928/1081597X-20250707-07.
20. Srujana, D; Shankar, S; Bhanot, R; Mohandas, R; Srikanth, S; Kumar, A. Ray tracing biometry in post radial keratotomy eye. Eur J Ophthalmol 2023;33:NP19-NP22. DOI: 10.1177/11206721221102268.