EVO+ implantable collamer lens KS-aquaPORT location, stability and impact on quality of vision and life.

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ABSTRACT

Purpose: To determine the longitudinal variation in the KS-aquaPORT central hole location of the phakic EVO+ implantable collamer lens (ICL) and analyze its influence on visual performance, quality of vision (QoV) and quality of life (QoL).

Methods: A prospective study was performed including 36 EVO+ ICL patients. KS-aquaPORT central hole location (cartesian and polar coordinates) was determined with respect to the pupil center and visual axis. The effect of time (6-months follow-up) on central hole location was analyzed using linear mixed models. The effect of KS-aquaPORT location on visual and QoV and QoL parameters was assessed with multivariate regression models.

Results: With respect to the visual axis, no significant changes in KS-aquaPORT location were found during follow-up. With respect to the pupil center, X-coordinate and *radius* of KS-aquaPORT location showed modest, but significant ($P \leq 0.05$) differences between 1-week and 3-month postoperative visits, and between 1-week and 6-months. X-coordinate variation was significant ($P = 0.022$) between 1-month and 6-month visits. With respect to the visual axis, greater KS-aquaPORT decentration was associated with lower visual acuity (X-coordinate: $P = 0.004$; radius: $P = 0.006$), and inferior decentration with longer xenon-type glare photostress recovery time ($P = 0.021$). With respect to the pupil center, lower radius was associated with better QoV scores ($P \leq 0.01$) and temporal decentration produced higher ring-shaped dysphotopsia ($P = 0.007$).

Conclusions: EVO+ ICL KS-aquaPORT location appears to be clinically stable up to 6 months postoperatively. A central location of the EVO+ ICL KS-aquaPORT hole is preferred because allows reduced perception of dysphotopic phenomena that can result in better QoV.

INTRODUCTION

Adequate intraocular lens (IOL) centration is desirable to maximize visual outcomes. This is particularly of relevance when it comes to the use of multifocal and toric IOLs. Numerous authors have showed that multifocal IOL decentration can cause visual disturbances.[1-3] In contrast, IOL decentration with a monofocal IOL is generally more forgiving, with reports of less postoperative dysphotopsia.[4] With posterior chamber phakic IOLs, they are commonly monofocal, however, the EVO and EVO+ implantable collamer lens (ICL; STAAR Surgical Co.) integrate a hole in the center of the optic (KS-aquaPORT™) to allow aqueous circulation. Visual disturbances can be induced by reflections originating from the boundary surface of the central hole,[5] which may be related to IOL decentration.

Previous studies have assessed visual, refractive and optical outcomes of ICL with and without the central hole (V4c vs V4b ICL), demonstrating that both achieve similar outcomes, even during a long-term follow-up.[6-9] These findings may suggest that there is no clinically relevant effect due to the presence of the EVO ICL central hole. However, in these studies the exact IOL decentration was not monitored. Eom et al.[10] have described a new visual disturbance reported by patients with EVO ICL implants, named ring-shaped dysphotopsia, related to the presence of the central hole.[10] However, these authors did not evaluate the degree of postoperative IOL decentration. The scarce evidence reported in the scientific literature about the influence of EVO ICL decentration on postoperative outcomes, shows that higher order aberrations and quality of life can be negatively affected.[11,12] Therefore, the central hole of the EVO and EVO+ ICL, and in particular the location of the hole, may influence visual outcomes.

The aim of the present study was, first, to determine whether there are changes in the exact location of the EVO+ ICL KS-aquaPORT central hole with respect to the pupil center and visual axis postoperatively and, second, to assess the effect of the exact location of the central hole on the visual performance, quality of vision (QoV) and quality of life (QoL).

METHODS

The present work is a prospective interventional case series study. It was prospectively approved by the East Valladolid Health Area Ethics Committee (Valladolid, Spain) and performed at Instituto de Oftalmobiología Aplicada (IOBA; University of Valladolid, Spain). The study complied with the Tenets of the Declaration of Helsinki and all participants provided a signed written informed consent.

Sample

Thirty-six volunteers who underwent bilateral myopic posterior chamber EVO+ ICL implantation were consecutively included. As previously reported,[13] sample size was calculated considering a two-tailed α error of 0.05/10, a β error of 0.20 (power 80%) and a 10% drop-out rate to find a difference in visual acuity of 0.05 logarithm of the minimum angle of resolution (logMAR) between visits using a paired t-test. Inclusion and exclusion criteria were subjects with a minimum age of 21 years that achieved a corrected distance visual acuity (CDVA) ≤0.10 logMAR. Additionally, subjects with the presence of cataract, glaucoma, retinal anomalies, amblyopia, macular diseases, previous ocular surgery or preoperative manifest cylinder above 4.50 Diopters (D) were excluded.

Given that the dominant eye leads in the visual process, data from that eye was selected for statistical purposes.[14] Three consecutive measurements using the hole-in-card test were performed to detect the dominant eye for distance.[14]

Study schedule

Surgical procedure

The EVO+ ICL was calculated using the OCOS calculator. The surgery was performed as previously reported.[13] In brief, a clear corneal incision of 2.75 mm was performed after dilatation of the pupil with tropicamide 1% under topical and intracamerular anesthesia. The anterior chamber was filled with 1% sodium hyaluronate and the EVO+ ICL was inserted. Then, the 1% sodium hyaluronate was completely removed by aspiration and irrigation, and later acetylcholine 1% was introduced. At the end of the surgery, Ofloxacin drops and Dexamethasone were topically applied. All implantations were performed by the same experienced surgeon (M.J.M.).

After surgery, topical medications included ofloxacin 3%, one drop every 2 hours for 1 week and then, one drop every 4 hours for 1 week, brimonidine and timolol and dexamethasone 1% were administrated in tapering doses over 4 and 5 weeks, respectively. Additionally, 250 mg of oral acetazolamide were prescribed twice per day during the first 72 hours.

Follow-up evaluations

Participants underwent four follow-up visits: 1 week, and 1, 3 and 6 months after surgery.

Central hole location assessment

The KS-aquaPORT central hole location was determined in the dominant eye while the contralateral eye was occluded. The calculation was performed as previously described by our research group.[12] Briefly, the location of the center of the KS-aquaPORT was determined with respect to the pupil center using a digital image obtained by slit-lamp biomicroscopy (SL- 8Z, Topcon Corp.). Then, the location of the center of the hole with respect to the visual axis was determined combining the data obtained from a Placido-disk dual Scheimpflug system (Galilei G4, Ziemer) and the data obtained from the slit-lamp digital image (Figure 1).

The EVO+ ICL image obtained by slit-lamp is magnified by the refraction of the anterior and posterior corneal surfaces. Consequently, the decentration data were corrected (Appendix; Supplemental material). Finally, the decentration data (in millimeters) were calculated in cartesian coordinates (X, Y) and polar coordinates (*radius*, polar angle) from two reference systems (pupil center and visual axis). Regardless of the eye analyzed, a positive and negative X value represents a nasal and temporal decentration, respectively.

Visual assessment

Monocular UDVA was measured (logMAR) using the Early Treatment Diabetic Retinopathy Study chart at 4m distance. Binocular contrast sensitivity (CS) was assessed using the IOBA-HAXEMCST, as previously described.[12] This set allows measuring CS using the Pelli-Robson chart at 1m distance. Mesopic CS was assessed following 10 minutes of dark adaptation. Then, glare CS was measured during 5 seconds of progressively intense glare simulating halogen and xenon lights in a random order. Photostress recovery time necessary to achieve the previous mesopic CS after halogen and xenon-type glare was measured. Later, discomfort glare under halogen and xenon illumination was evaluated using de Boer rating scale from 0 (unbearable) to 9 (unnoticeable).[15]

Patient-reported outcomes instruments

The QoV questionnaire assesses 10 visual symptoms across 3 subscales: frequency, severity and bothersome of symptoms.[16,17] The QoV scores range from 0 to 100, with higher scores indicating poorer QoV.

The frequency, severity and bothersome perception of ring-shaped dysphotopsia was also evaluated in a 0 (absence) to 3 (maximum) scale.[10]

The Quality of Life Impact of Refractive Correction (QIRC) questionnaire assess QoL related to refractive correction.[18] Scores range from 0 to 100, with higher values indicating better QoL.

Vault

Vault refers to the distance between the ICL and the anterior lens capsule. Central vault assessment was performed using a spectral domain optical coherence tomographer (OCT; Topcon 3D-2000, Topcon Corp) at the 6-month postoperative visit.

Statistical analysis

Statistical analyses were performed using the R statistical package version 4.0.0. by a professional statistician (I.F.). The effect of time on EVO+ ICL decentration parameters was analyzed using linear mixed models with random effect for subjects. Significant models were followed by multiple comparisons using the Tukey method. The assumptions of linearity, normality, homoscedasticity and lack of outliers were checked. When normality could not be assumed, a robust model was fitted.

The effect of the central hole location (considering the 6-month postoperative values) on the study parameters was analyzed using multivariate regression models. The influence of cartesian (X, Y) and polar (*radius*, polar angle) coordinates on study variables were determined using the Pillai test. When the outcome for Pillai test was significant, the multivariate models were fitted including the dependent variable with four dimensions (one per visit) and the cartesian or polar coordinates as independent variables. The required model assumptions were multivariate normality, linearity and lack of outliers, which were checked using the residuals of the fitted models. In case the model did not comply with these assumptions and data transformation was not sufficient to satisfy them, the model was not considered valid.

The effect of central vault on KS-aquaPORT decentration parameters were analyzed using simple linear regression models. When normality could not be assumed, a robust model was fitted.

Two-sided P-values ≤0.05 were considered statistically significant.

RESULTS

Study population

Thirty-six patients who underwent EVO+ ICL implantation (23 females and 13 males) with a mean (± SD) age of 31.0 ± 6.1 years finished the study. Table 1 shows the preoperative descriptive data. Table S1 (Supplemental material) shows the results of the study parameters at each follow-up visit.

KS-aquaPORT hole location during the follow-up

EVO+ KS-aquaPORT location in relation to the pupil center and visual axis during the follow-up is shown in figure 2. The mean decentration values and differences between visits are presented in table 2. There were statistically significant ($P \leq 0.03$) differences among visits in the KS-aquaPORT decentration for the X-coordinate and for the radius, using the pupil center as a reference system. In contrast, no significant ($P \geq 0.07$) differences were found among visits for the KS-aquaPORT decentration with respect to the visual axis (Table 2).

Effect of KS-aquaPORT hole location on visual parameters

The KS-aquaPORT location had a statistically significant effect on UDVA (Pillai test: X, P=0.046 and Y, P=0.99; *radius*, P=0.034; polar angle, P=0.98) using the visual axis as the reference. The multivariate models showing statistically significant results are shown in table 3.

No statistically significant effect of the KS-aquaPORT location was found on mesopic CS (Pillai test: X and Y, $P \geq 0.21$; *radius* and polar angle, $P \geq 0.39$). Similarly, KS-aquaPORT location in polar coordinates did not have a statistically significant effect on halogen CS (Pillai test: *radius* and polar angle, $P \geq 0.13$). However, with regards cartesian coordinates, it was not possible to fit a valid model for halogen CS. Likewise, it was also not possible to fit any valid model for xenon CS, using any reference system, in cartesian or polar coordinates. Statistical assumptions were not met, and data transformations did not fix the violated assumptions.

No significant effect of the KS-aquaPORT location was found on photostress recovery time after halogen glare (Pillai test: X and Y, *P*≥0.44; *radius* and polar angle, *P*≥0.18). Likewise, the KS-aquaPORT location, using the pupil center as the reference, did not have an effect on photostress recovery time after xenon glare (Pillai test: X and Y, *P*≥0.22; *radius* and polar angle, *P*≥0.10). On the contrary, using the visual axis, the KS-aquaPORT location in cartesian and polar coordinates showed a significant effect on photostress recovery time after xenon glare (Pillai test: X, *P*=0.47; Y, *P*=0.004; *radius*, *P*=0.77; polar angle, *P*=0.04); however, none of the multivariate models were significant for the polar coordinates (R^2≤0.08, *P*≥0.14). The statistically significant multivariate models are shown in table 3.

Finally, the KS-aquaPORT location did not have a significant effect on the bothersome after halogen or xenon glare (Pillai test: X and Y, *P*≥0.10; *radius* and polar angle, *P*≥0.10).

Effect of KS-aquaPORT hole location on patient-reported outcomes

The KS-aquaPORT location using the pupil center as the reference axis did not have a statistically significant effect in cartesian coordinates on any QoV questionnaire subscale (Pillai test: X and Y, *P*≥0.15). However, in polar coordinates, statistically significant effects were found on QoV frequency (Pillai test: *radius*, *P*=0.038; polar angle, *P*=0.59) and QoV severity (Pillai test: *radius*, *P*=0.019; polar angle, *P*=0.29) scales. In contrast, the QoV bothersome scale was not significantly affected by KS-aquaPORT location (Pillai test: *radius*, *P*=0.06; polar angle, *P*=0.27). Regarding to the visual axis system, neither cartesian nor polar coordinates have a statistically significant effect on any QoV scale (Pillai test: X and Y, *P*≥0.32; *radius* and polar angle, $P \geq 0.23$). The multivariate models with statistically significant results are shown in table 3.

The KS-aquaPORT location showed a significant effect using the pupil center in cartesian and polar coordinates on the ring-shaped dysphotopsia QoV severity subscale (Pillai test: X, $P=0.031$; Y, $P=0.91$; *radius*, $P=0.036$; polar angle, $P=0.99$), although it was not significant on the frequency and bothersome subscales of the QoV (Pillai test: X and Y, $P \geq 0.22$; *radius* and polar angle, $P \geq 0.12$). The KS-aquaPORT location with respect to the visual axis in cartesian coordinates, did not have a statistically significant effect on any ring-shaped dysphotopsia scale (Pillai test: X and Y, $P \geq 0.09$). Similarly, in polar coordinates, the KS-aquaPORT location did not have any effect on the QoV severity and bothersome subscales (Pillai test: *radius* and polar angle, $P \geq 0.08$). A statistically significant effect of polar coordinates was found on the ring-shaped dysphotopsia QoV frequency subscale (Pillai test: *radius*, $P=0.04$; polar angle, $P=0.44$); however, none of the multivariate models were significant ($R^2 \leq 0.14$, $P \geq 0.06$). The statistically significant multivariate models are shown in table 3.

The KS-aquaPORT location did not have a significant effect on QIRC scores (Pillai test: X and Y, $P \geq 0.51$; *radius* and polar angle, $P \geq 0.14$).

Effect of vault on decentration parameters

Central vault shown a significant effect on KS-aquaPORT location using the Y-coordinate with respect to the pupil center ($R^2=0.22$; $\beta=0.27 \times 10^{-3}$; $P=0.004$). The central vault did not show any significant effect for any other decentration parameter with respect to any reference system ($P \geq 0.10$).

DISCUSSION

In this study, EVO+ ICL decentration results obtained in terms of X-coordinate, showed mostly temporal displacements of the KS-aquaPORT for both reference systems (pupil center or visual axis) (Figure 2). It is likely that the KS-aquaPORT hole is located in the midpoint of the sulcus to sulcus distance and, consequently, the location is temporal with respect to the reference systems analyzed.[19,20] In addition, this tendency for a temporal location of the central hole might also be explained by the mydriatic pupil status when the lens is positioned intraoperatively. Under pharmacological mydriasis, there is a temporal shift of the pupil center in comparison to normal physiological conditions.[21] In addition, in our study the temporal displacement of the central hole is larger for the visual axis than for the pupil center in agreement with previous studies.[12,22] The visual axis is usually located nasal to the pupil center,[19,23] which agrees with our study outcomes.

In this study, the values of the KS-aquaPORT hole decentration were highly consistent during the four postoperative visits using the visual axis as reference system. Similarly, the Y-coordinate and polar angle with respect to the pupil center did not alter either. However, the X-coordinate and *radius* (distance) showed statistically significant differences between certain postoperative visits (Table 2). These differences could be the consequence of the transitory decrease of pupil diameter after EVO+ ICL implantation,[24] in combination with the topical administration of brimomidine during the first four postoperative weeks.

The study results showed that less negative X values (equivalent to more central values in our sample), as well as less *radius* (distance) with respect to the visual axis, increases postoperative UDVA. Thus, a centered location of the EVO+ ICL, and consequently the KS-aquaPORT, achieves good UDVA. In addition, the KS-aquaPORT location of the EVO+ ICL did not affect the CS in mesopic and glare conditions, although some parameters could not be statistically analyzed. In previous studies, neither the presence of the KS-aquaPORT hole[6] nor the intraocular lens decentration[12] were found to affect mesopic CS. Therefore, these findings suggest that the KS-aquaPORT location does not affect CS under mesopic conditions, with or without glare, similar to those during nighttime. This outcome is very important because it advocates that patients undergoing EVO+ ICL surgery will achieve not only appropriate UDVA,[13,25] but also adequate night vision to perform common daily activities.

In this study, the KS-aquaPORT hole location did not have influence on bothersome and photostress recovery time after halogen glare. Inferior EVO+ ICL decentration, with respect to the visual axis, was associated with longer xenon glare photostress recovery time at the 1-week postoperative visit. These outcomes could be related to the CS decrease after glare found at the 1-week visit (Table S1; Supplemental material). However, this finding is only related to the 1-week postoperative visit.

A lower *radius* (distance) of KS-aquaPORT decentration, using the pupil center as the reference was associated with improved QoV questionnaire scores (frequency and severity scales) at the 1-month postoperative visit. Similarly, previous studies reported that decentrated IOLs or pupil diameters greater than the IOL optical zone can create dysphotopic phenomena.[26,27] However, these findings were only significant at the 1-month postoperative visit, which could be related to the QoV decrease observed during that visit (Table S1; Supplemental material). It may suggest that dysphotopic phenomena and worse QoV at the 1-month postoperative visit in patients with successful EVO+ ICL implantation may be transient. In addition, we found that a higher *radius* (equivalent to temporal decentration in our sample) of KS-aquaPORT with respect to the pupil center produces more ring-shaped dysphotopsia (severity scale) at the 3-month postoperative visit. This outcome was only found at the 3-month visit when the ring-shaped dysphotopsia perception has been already considerable reduced in comparison with 1-week visit (Table S1; Supplemental material). Thus, it suggests that most ring-shaped dysphotopsia is found at an early postoperative time regardless to the central hole location.

In the present study, we observed different findings depending on the system used as the reference axis. When the pupil center was used as a reference, QoV and ring-shaped dysphotopsia were significantly affected. These parameters are used to evaluate dysphotopic phenomena, which might be directly related to the pupil dynamics. When visual axis was used as the reference, the parameters significantly affected were UDVA and photostress recovery time after glare, which provide information of the fixation point when using central fixation (fovea).

Higher central vaults were related to superior displacements of KS-aquaPORT in this study. Specifically, for each 100 µm increase in vault, the KS-aquaPORT was estimated to be located 0.027 mm superiorly, at the 6-months postoperative visit. Previous studies have reported that an undersized ICL can be associated with a low vault.[28,29] Thus, patients implanted with ICLs showing low vaults may be located slightly inferiorly (Y-coordinate), possibly because the lower ICL footplate may be more wedged in the lower ciliary sulcus due to gravity. Nevertheless, the study outcomes showed that KS-aquaPORT location (Y-coordinate) had no significant effect on QoV or QoL 6-months postoperatively.

One limitation of the present study is that only the 6-month decentration values were selected for statistical purposes to assess the effect of EVO+ ICL decentration in visual performance, QoV and QoL. However, EVO+ ICL decentration parameters were stable among visits and the statistically significant differences found were minimal (Table 2) and they could be considered not clinically relevant. Another limitation of the present study is that the outcomes obtained are related to the EVO+ ICL decentration values observed in our sample. Thus, these outcomes depend on the EVO+ ICL location values of the patients recruited and individual surgeon, and the decentration values observed are the ones expected in usual clinical settings after uneventful surgeries. Finally, the sample size was calculated using a statistical power of 80% and visual acuity as the main variable, thus, the power may be different for other parameters evaluated in the study.

In conclusion, the results of the present study indicate that EVO+ ICL KS-aquaPORT hole location appears to be clinically consistent throughout the short-term postoperative course. Additionally, an accurate centration of the phakic EVO+ Visian ICL allows higher QoV levels, with a low perception of dysphotopic phenomena during the first 6 postoperative months. Also, the central hole location does not appear to affect CS under mesopic and glare conditions when decentration values

are representative of the ones commonly observed after uneventful EVO+ ICL surgeries. Further, KS-aquaPORT decentration does not affect QoL during the short-term follow-up.

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FIGURE CAPTIONS.

Figure 1. Schematic representation of the KS-aquaPORT, pupil center and visual axis locations.

The figure is composed of an anterior segment image provided by a dual-Scheimpflug system (Galilei G4, Ziemer) and the representation of an EVO+ implantable collamer lens. The central area of the image has been magnified to allow easier comprehension of the relationship between the locations of KS-aquaPORT (H), visuals axis (V) and pupil center (P).

The Galilei G4 image includes: two green concentric circles showing limbus and pupil diameter (a green cross-hair has been added for ease location of pupil center), a red cross-hair showing the Galilei G4 alignment system for image acquisition (it shows the alignment performed in this image during acquisition) and a partially superposed yellow cross-hair indicating the surface alignment (which is the appropriate alignment that should be performed during the acquisition process), based on the Purkinje images (dots) reflected from the anterior corneal surface intercepting visual axis. The EVO+ ICL representation is drawn in blue and consists of ICL boundaries, optical zone and the central KS-aquaPORT.

Figure 2. Polar plot of the EVO+ KS-aquaPORT hole location (mm) in relation to the pupil center (A) and visual axis (B).

The radius (mm) and polar angle (degrees) are shown as the distance from the center of the axis (0.2 mm per ring) and the orientation, respectively. (0°: nasal; 180°: temporal).

Table 1. Descriptive data of the preoperative visual, refractive and ICL parameters.

Parameter	Mean ± SD or Median (IQR)	Range
CDVA (LogMAR; Snellen equivalent)	-0.04 ± 0.05; 20/18	-0.12, 0.08; 20/24, 20/15
Refractive sphere (D)	-7.23 ± 2.31	-12.00, -3.00
Refractive cylinder (D)	-1.00 ± 1.06	-4.50, 0
Refractive spherical equivalent (D)	-7.75 ± 2.36	-12.38, -3.50
ICL sphere (D)	-9.47 ± 2.51	-14.00, -5.00
ICL cylinder (D)	0.85 ± 1.16	0, 4.50
ICL power (spherical equivalent) (D)	-9.05 ± 2.38	-13.50, -4.50
ICL size (mm)	13.20 (12.60, 13.20)	12.10, 13.70

CDVA: corrected distance visual acuity; D: diopters; ICL: implantable collamer lens; IQR: interquartile range; LogMAR: logarithm of the minimum angle of resolution; mm: millimeters; SD: standard deviation.

Table 2. EVO+ KS-aquaPORT hole location in relation to the pupil center and visual axis. Data is provided in cartesian (X, Y) and polar coordinates (radius and polar angle) for each postoperative visit.

Reference system	Visit	Cartesian coordinates		Polar coordinates	
		X (mm)	Y (mm)	Radius (mm)	Polar angle (degrees)
Pupil center	1 week	-0.27 ± 0.17 * ‡	0.07 ± 0.14	0.32 ± 0.15 * ‡	168.11 ± 39.95
	1 month	-0.27 ± 0.16 †	0.07 ± 0.13	0.32 ± 0.15	168.73 ± 34.26
	3 months	-0.25 ± 0.16 *	0.06 ± 0.13	0.30 ± 0.14 *	168.88 ± 40.51
	6 months	-0.25 ± 0.17 ‡ †	0.07 ± 0.12	0.30 ± 0.13 ‡	165.28 ± 40.49
Visual axis	1 week	-0.37 ± 0.15	0.04 ± 0.18	0.42 ± 0.13	174.49 ± 30.18
	1 month	-0.40 ± 0.14	0.03 ± 0.18	0.44 ± 0.13	176.60 ± 23.16
	3 months	-0.36 ± 0.16	0.00 ± 0.19	0.41 ± 0.14	180.16 ± 30.47
	6 months	-0.38 ± 0.14	0.04 ± 0.17	0.42 ± 0.13	174.91 ± 27.31

Values are shown as mean ± standard deviation. *: statistically significant difference between 1-week and 3-month visits ($p<0.05$), ‡: statistically significant difference between 1-week and 6-month visits ($p\leq0.01$), †: statistically significant difference between 1-month and 6-month visits ($p=0.02$).

Table 3. Regression coefficient and P-value of Cartesian and polar coordinates for statistically significant multivariate models.

Reference system	Parameter	Visit	Model R^2 (p-value)	Coefficients Coordinate: β (p-value)
Pupil center	**QoV, Frequency**	**1 month**	0.24 (***0.004***)	r: 70.91 (***0.002***) / α: -0.08 (0.28)
	QoV, Severity	**1 month**	0.23 (***0.005***)	r: 58.13 (***0.002***) / α: -0.05 (0.39)
	RSD, Severity	**3 months**	0.17 (***0.021***)	X: -2.02 (***0.007***) / Y: -0.46 (0.66)
			0.11 (0.054)	r: 2.21 (***0.016***) / α: 0.00 (0.82)
Visual axis	**UDVA**	**3 months**	0.22 (***0.011***)	X: -0.31 (***0.004***) / Y: 0.03 (0.68)
			0.19 (***0.018***)	r: 0.32 (***0.006***) / α: 0.00 (0.65)
	PRTXG	**1 week**	0.22 (***0.022***)	X: 2.71 (0.18) / Y: -3.83 (***0.021***)

α: polar angle; r: radius; X & Y are the Cartesian coordinates. PRTXG: photostress recovery time after xenon glare; QoV: quality of vision; RSD: ring-shaped dysphotopsia.

Figure 1

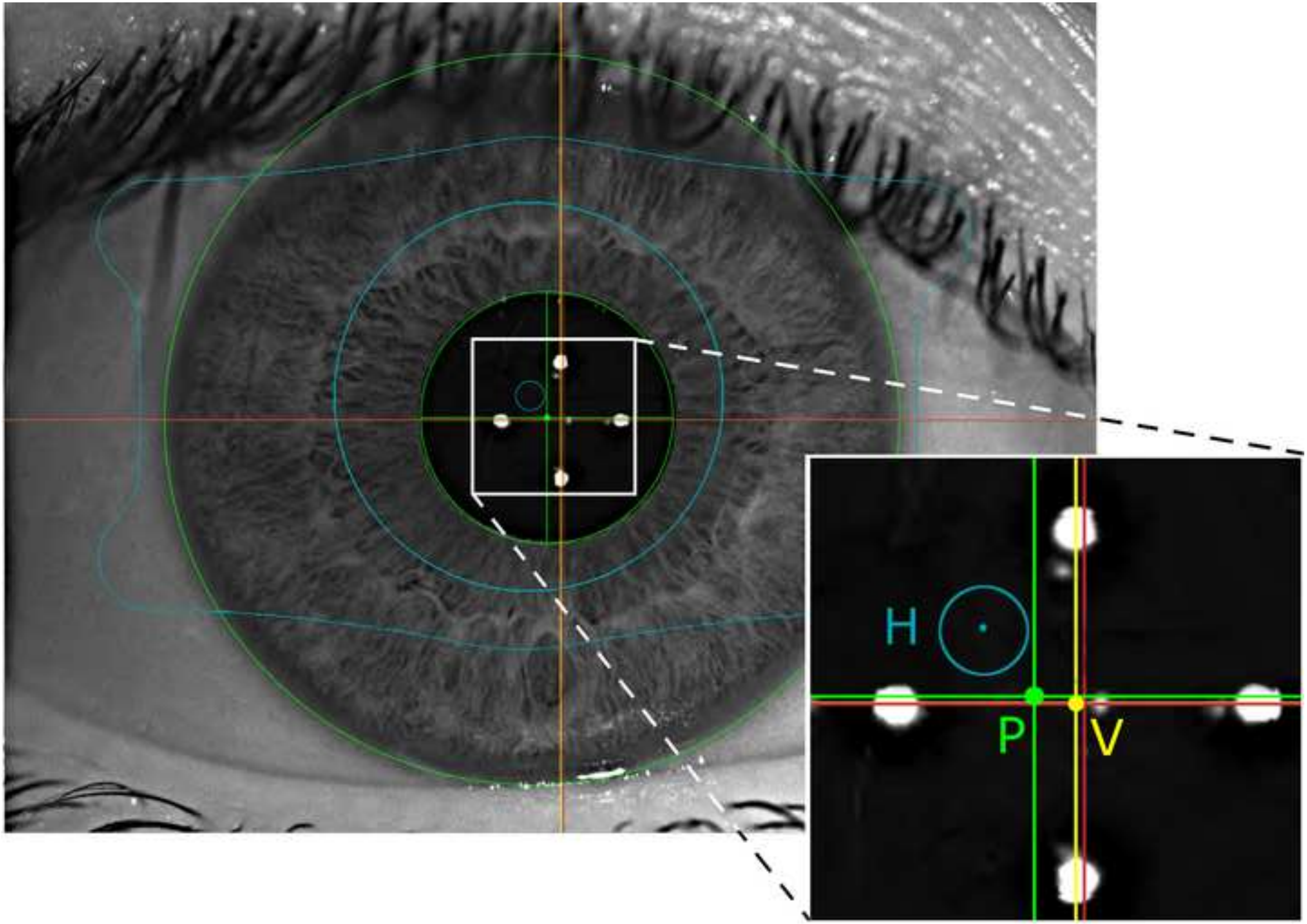

Figure 2

Click here to access/download;Figure;Figure 2.tif

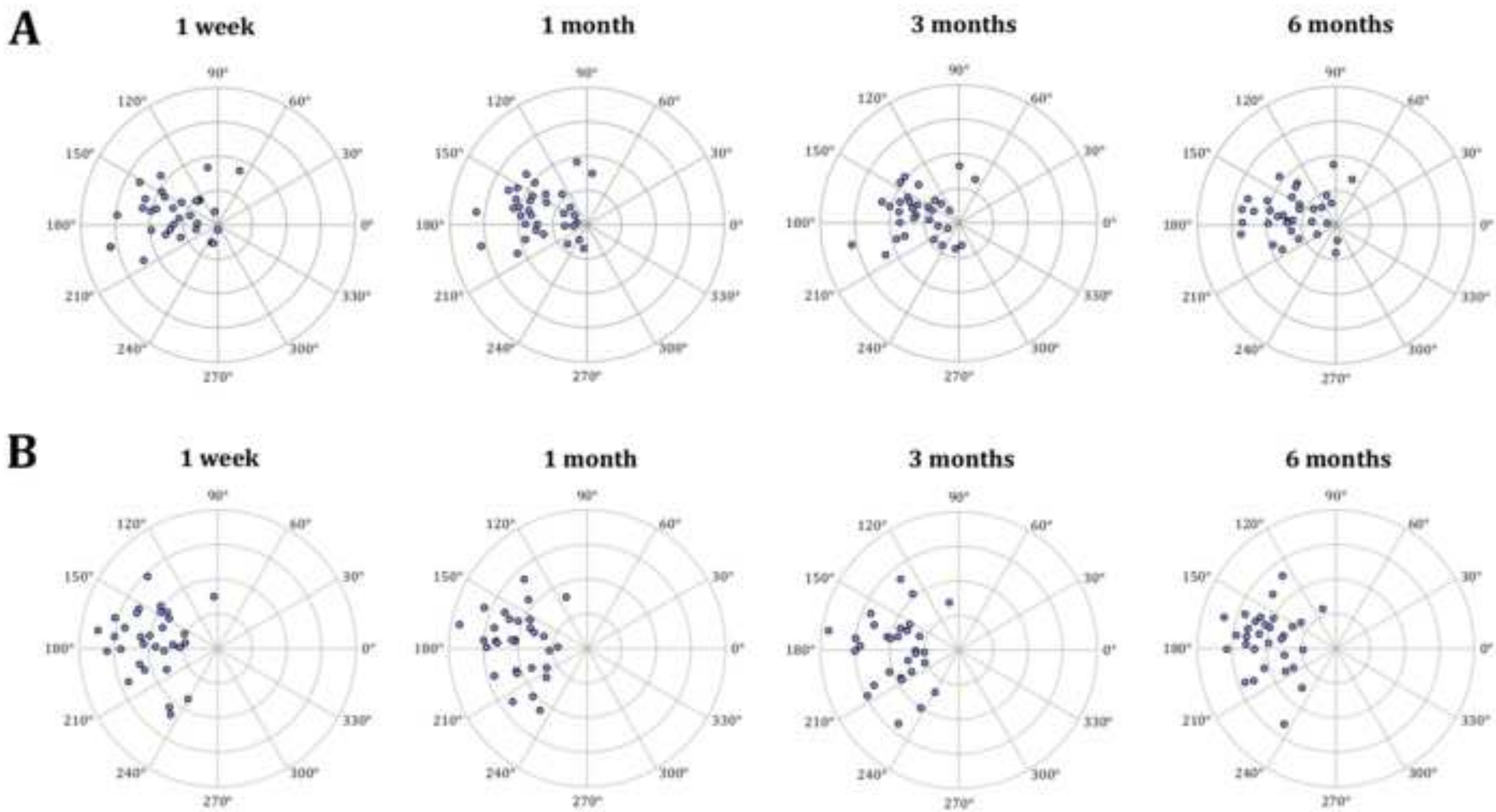

Figura1 y 2 unificadas y en color.pdf