Objective Assessment of Anterior Segment Measurements With Optical Low-Coherence Reflectometry and Scheimpflug Analysis Following Intravitreal Injection of Dexamethasone Implant*

İntravitreal Deksametazon Enjeksiyonu Sonrası Yapılan Optik Düşük Koherens Reflektometri ve Scheimpflug Analizi ile Ön Segment Ölçümlerinin Objektif Değerlendirilmesi

Semra Akkaya TURHAN[1], Osman ÇEKİÇ[2]

ABSTRACT

Purpose: To compare the anterior segment measurements obtained with optical low-coherence reflectometry and Scheimpflug analysis following intravitreal injection of dexamethasone implant.

Materials and Methods: This study enrolled eleven eyes with branch retinal vein occlusion implanted with dexamethasone implant. Central corneal thickness, anterior chamber depth, pupil diameter, keratometry (K) readings at the steepest meridian (steep K) and the flattest meridian (flat K), corneal astigmatism power, and cylinder axis were measured before and after intravitreal injection using the optical low-coherence reflectometry device and Scheimpflug analyzer. The degree of agreement between parameters was assessed using Bland-Altman plot analysis.

Results: Central corneal thickness, anterior chamber depth, pupil diameter, steep K, flat K, corneal astigmatism power, and cylinder axis measurements with the optical low-coherence reflectometry device and Scheimpflug analyzer showed narrow 95% limits of agreement (LoA), which implies good agreement between two measurements.

Conclusion: Both systems can be used interchangeably for all anterior segment measurements following intravitreal injection of dexamethasone implant.

Key words: intravitreal dexamethasone implant, optical low-coherence reflectometry, Scheimpflug analysis

ÖZ

Amaç: İntravitreal deksametazon enjeksiyonu sonrası optik düşük koherens reflektometri ve Scheimpflug analizi ile alınan ön segment ölçümlerini karşılaştırmak.

Gereç ve Yöntemler: Bu çalışmaya ven dal tıkanıklığı nedeniyle deksametazon implantı uygulanan 11 göz dahil edildi. Her iki cihaz ile intravitreal enjeksiyon öncesi ve sonrası, merkezi kornea kalınlığı, ön kamara derinliği, pupil çapı, keratometri (K) değerleri (dik ve düz meridyendeki K değerleri), korneal astigmatizma gücü ve silindir gücü ölçüldü. Parametreler arasındaki uyum Bland-Altman plot analizi ile değerlendirildi.

Bulgular: Blant-Altman analizinde her iki cihazla elde edilen tüm verilerin (merkezi kornea kalınlığı, ön kamara derinliği, pupil çapı, dik K, düz K, korneal astigmatizma gücü ve silindir gücü) %95 uyum aralığı klinik olarak kabul edilebilir sınırlarda idi ve cihazlar arasında iyi bir uyum mevcuttu.

This study was presented in 19th European Society of Cataract & Refractive Surgeons (ESCRS) Winter Meeting, 2015, Istanbul, Turkey

1- Uz.Dr., Marmara Üni. Tıp Fak., Göz Hastalıkları AD, İstanbul - TÜRKİYE
TURHAN SA, semraakkaya85@hotmail.com

2- Prof.Dr., Marmara Üni. Tıp Fak., Göz Hastalıkları AD, İstanbul - TÜRKİYE
ÇEKİÇ O, ocekic@hotmail.com

Geliş Tarihi - Received: 03.03.2016
Kabul Tarihi - Accepted: 02.09.2016
Glo-Kat 2017;12:47-50

Yazışma Adresi / Correspondence Adress:
Semra Akkaya Turhan
Marmara Üniversitesi Tıp Fakültesi, Göz Hastalıkları AD
İstanbul - TÜRKİYE

Phone: +90 530 932 0980
E-mail: semraakkaya85@hotmail.com

Sonuç: Deksametazon implatının enjeksiyonu sonrası alınan bütün ön segment parametrelerinin değerlendirilmesi için her iki cihaz birbirinin yerine kullanılabilir.

Anahtar Kelimeler: İntravitreal deksametazon implant, optik düşük koherens reflektometri, Scheimpflug analizi

INTRODUCTION

Intravitreal steroids have long been practiced in the treatment of retinal edema associated with retinal vascular diseases.[1-3] The intravitreal dexamethasone implant is now widely used for macular edema secondary to branch retinal vein occlusion as this implant produced significant visual acuity gains than did a sham procedure in eyes with macular edema and branch retinal vein occlusion.[4] The implant releases dexamethasone progressively and dissolved in the vitreous cavity. Cataract development and elevated intraocular pressure are both expected side effects after the procedure. Cataract extraction is reported to increase following dexamethasone intravitreal implant injection.[5]

As the implant's size and efficacy decrease with time and re-injections are common in clinical practice, we have speculated that the intravitreal implant may cause oculometric alterations which are important in the planning of cataract and refractive surgery. Previously, we demonstrated the significant effects of intravitreal triamcinolone injection on ocular dimensions.[6] Currently, we have interested in the impact of slow-releasing dexamethasone implant on the anterior chamber.[7]

This preliminary study investigated the short-term impact of intravitreal dexamethasone implant on ocular dimensions, and assessed whether measurements taken by using the Lenstar and the Pentacam devices are interchangeable.

METHODS

Institutional Review Board approved the study and all patients gave a written informed consent before enrollment. The oculometric alterations were evaluated following dexamethasone injection in 11 phakic eyes of 9 patients (median age, 53 years) with macular edema related to branch retinal vein occlusion. Patients with a known history of glaucoma or steroid response were not included. In all eyes, a complete ophthalmic examination was performed and measurements were obtained by using the Lenstar optical biometer, based on optical low-coherence reflectometry, and the Pentacam, based on the Scheimpflug system, respectively. Central corneal thickness (CCT), anterior chamber depth (ACD), pupil diameter (PD), keratometry readings at the steepest meridian (steep K) and the flattest meridian (flat K), corneal astigmatism power, and cylinder axis were measured before and one month after the intravitreal injection. Measurements were taken around noon in order to avoid confusion with diurnal variations of the parameters.

RESULTS

Table 1 shows the values of the parameters assessed by each device as well as the results of the Mann-Whitney U and Wilcoxon test. ACD values detected by the Lenstar were deeper than those of the Pentacam both at baseline (P=0.002) and at one month (P=0.01). There were also significant difference between PD obtained by using the two devices after intravitreal injection (P=0.0002). All other measurements obtained by the two devices were similar at baseline and one month (P>0.05). Fig. 1 shows the results of the Bland-Altman plot analysis of the agreement between the Lenstar and the Pen-

Table 1. Measurement data with statistical analysis

	Baseline	**1 month**	
	Mean±SD	Mean±SD	p
CCT (µm)			
Scheimpflug	550.09±24.52	541.54±25.47	**0.01**
OLCR	542.54±25.48	538.36±27.10	**0.04**
p	0.41	0.74	
ACD (mm)			
Scheimpflug	2.53±0.27	2.65±0.24	0.44
OLCR	3.00±0.28	2.97±0.26	**0.01**
p	**0.002**	**0.01**	
Ks (D)			
Scheimpflug	44.82±2.08	44.13±1.73	0.86
OLCR	43.98±1.78	43.45±1.64	0.07
p	0.27	0.36	
Kf (D)			
Scheimpflug	43.98±1.88	44.13±1.73	0.06
OLCR	43.31±1.69	43.45±1.64	**0.03**
p	0.3	0.27	
Astigmatism (D)			
Scheimpflug	0.81±0.49	0.74±0.53	0.21
OLCR	0.67±0.43	0.65±0.44	0.84
p	0.45	0.99	
Axis (degrees)			
Scheimpflug	79.61±69.15	71.36±73.06	0.59
OLCR	94.90±31.57	92.63±36.58	0.61
p	0.37	0.30	
PD (mm)			
Scheimpflug	2.97±0.61	2.97±0.39	0.47
OLCR	3.76±0.51	4.01±0.44	0.10
p	0.058	**0.0002**	

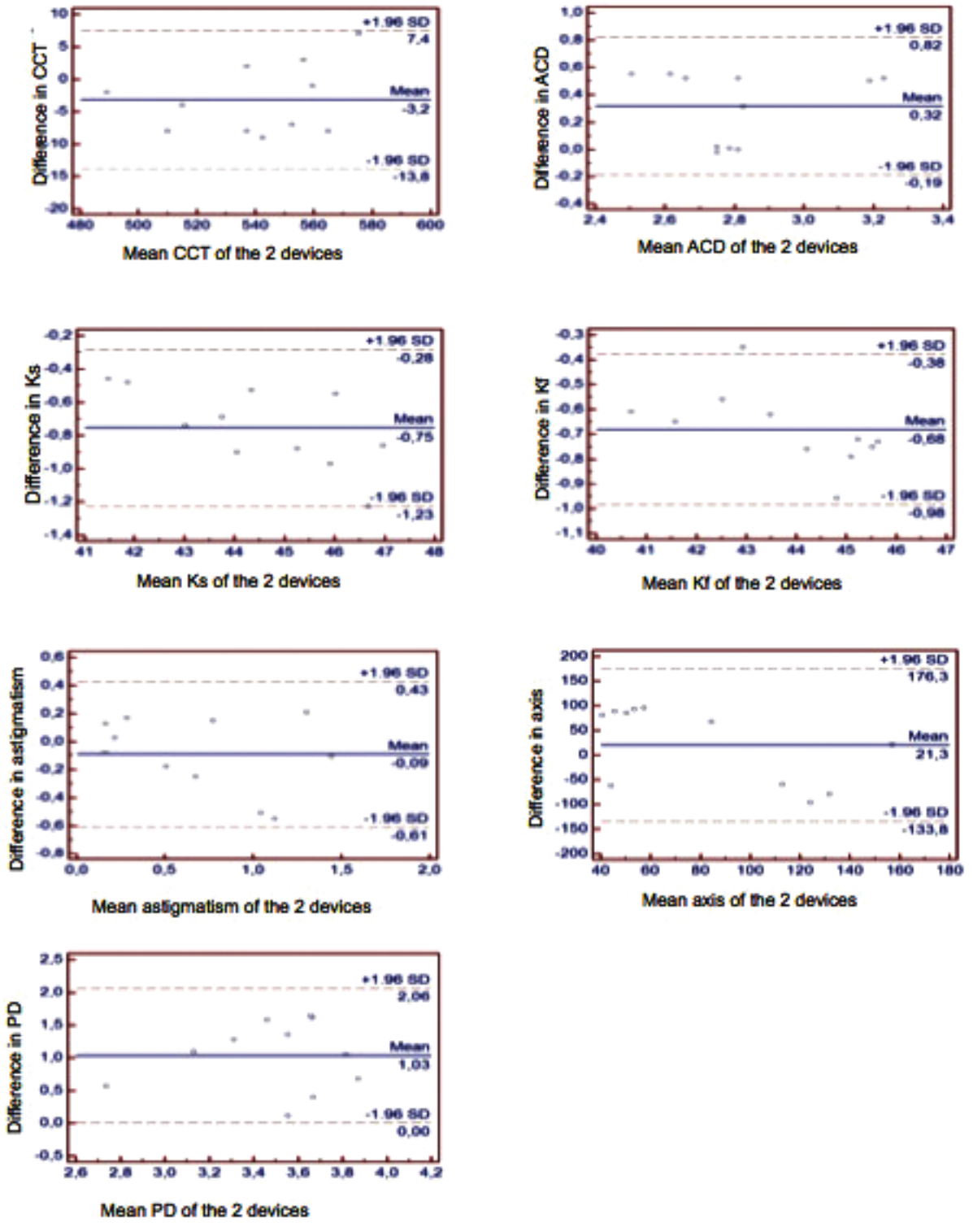

Figure 1. *Bland-Altman plots of biometry measurements with the OLCR device and the Scheimpflug device at 1 month (CCT=central corneal thickness; ACD=anterior chamber depth; Ks, keratometric readings at the steepest meridian; Kf, keratometric readings at the flattest meridian; PD=pupil diameter*

tacam. Steep K, flat K, corneal astigmatism power, cylinder axis, CCT, ACD, and PD detected by using the Lenstar and the Pentacam showed narrow 95% limits of agreement (LoA), which implies good agreement between two devices. During the study period, intravitreal dexamethasone implant induced decrease in CCT was confirmed by the two devices (P=0.01 and P=0.04, respectively). The decrease in ACD (P=0.01) and steepening of flat K (P=0.03) that were detected by the Lenstar were not confirmed by the Pentacam (P=0.44 and P=0.06, respectively).

DISCUSSION

Although the repeatability of measurements obtained with both devices has been reported before[8-10] no study has compared the two devices after the intravitreal implant injection. Our results showed the differences in the measurements of ACD and PD obtained with two devices. Similar baseline PD values detected by using the Lenstar and the Pentacam showed significant difference at one month after implant injection that may have clinical implications. Both devices agreed that intravitreal dexamethasone implant cause thinning of CCT over one month that should also be considered in the monitoring of intraocular pressure during follow-up.

In conclusion, although both systems can be used interchangeably for all anterior segment measurements following intravitreal injection of dexamethasone implant, ACD and PD measurements obtained by two devices were not equivalent.

Acknowledgements:
The authors have no financial or proprietary interest in any products or materials related to this study

REFERENCES/KAYNAKLAR

1. Çekiç O, Chang S, Tseng JJ, et al. Intravitreal triamcinolone treatment for macular edema associated with central retinal vein occlusion and hemiretinal vein occlusion. Retina 2005;846-50.
2. Çekiç O, Chang S, Tseng JJ, et al.Intravitreal triamcinolone injection for treatment of macular edema secondary to branch retinal vein occlusion. Retina 2005;25:851-5.
3. Çekiç O, Çakır M, Yazıcı AT, et al. A comparison of three different treatment modalities of macular edema due to branch retinal vein occlusion. Curr Eye Res 2010;35:925-9.
4. Haller JA, Bandello F, Belfort R Jr, (OZURDEX GENEVA Study Group) et al. Randomized, sham-controlled trial of dexamethasone intravitreal implant in patients with macular edema due to retinal vein occlusion. Ophthalmology 2010; 117: 1134-46.
5. Haller JA, Bandello F, Belfort R Jr, (OZURDEX GENEVA Study Group) et al. Dexamethasone intravitreal implant in patients with macular edema related to branch or central retinal vein occlusion twelve-month study results. Ophthalmology 2011; 118: 2453-60.
6. Çekiç O, Bardak Y. Oculometric alterations following intravitreal triamcinolone injection. Br J Ophthalmol 2010; 94**:** 1408-9.
7. Çekiç O, Turhan SA. Corneal effects of the dexamethasone-releasing biodegradable intravitreous implant. Cornea 2015;34: e33.
8. Huang J, Pesudovs K, Wen D, et al. Comparison of anterior segment measurements with rotating Scheimpflug photography and partial coherence reflectometry. J Cataract Refract Surg 2011; 37: 341-8.
9. Chen W, McAlinden C, Pesudovs K, et al. Scheimpflug-Placido topographer and optical low-coherence reflectometry biometer: repeatability and agreement. J Cataract Refract Surg 2012; 38: 1626-32.
10. Zhao J, Chen Z, Zhou Z, et al. Evaluation of the repeatability of the Lenstar and comparison with two other non-contact biometric devices in myopes. Clin Exp Optom 2013; 96: 92-9.