Int Ophthalmol (2019) 39:2807–2813
https://doi.org/10.1007/s10792-019-01127-3

ORIGINAL PAPER

Evaluation of biometry and corneal astigmatism in cataract surgery patients in Northern United Arab Emirates

Eui Seok Han · Moonjung Kim

Received: 10 November 2018 / Accepted: 22 May 2019 / Published online: 27 May 2019

Abstract
Purpose To analyze biometric parameters and patterns of corneal astigmatism in cataract surgery patients using optical low-coherence interferometry in Northern United Arab Emirates (UAE).
Methods Axial length (AL), anterior chamber depth (ACD), horizontal corneal diameter (white to white, WTW) and flat and steep keratometry (K1 and K2, respectively) were optically measured using optical low-coherence interferometry (Aladdin). Ocular datasets acquired between 2015 and 2018 were collected and analyzed.
Results This study evaluated 238 eyes of 123 cataract patients with a mean age of 67.1 ± 9.4 years. Mean AL, ACD, WTW, K1, and K2 were 23.22 ± 0.99 mm, 3.05 ± 0.36 mm, 11.19 ± 0.46 mm, 43.72 ± 1.80 diopter (D), and 45.04 ± 1.71 D, respectively. Mean corneal astigmatism was 1.32 ± 0.97 D. Corneal astigmatism of 1.5 D or greater was found in 32.4%. With the rule, against the rule, and oblique astigmatism were found in 29.8%, 57.1%, and 13.0% of eyes, respectively.
Conclusions Results of this study provide normative data for cataract surgery as an informative reference in Northern UAE, the Middle East. This study showed higher corneal astigmatism in Northern UAE than those in other countries.

Keywords Corneal astigmatism · Cataract surgery · Middle East · Biometric parameters · Optical low-coherence interferometry

Presented as a E-poster at the 120th annual meeting of the Korean Ophthalmological Society, Seoul, Korea, November 2018.

E. S. Han · M. Kim (✉)
Department of Ophthalmology, Sheikh Khalifa Specialty Hospital, PO Box 6365, Ras al-Khaimah, United Arab Emirates
e-mail: anseld@naver.com

E. S. Han · M. Kim
Department of Ophthalmology, Seoul National University Hospital, Seoul, Korea

Introduction

Cataract surgery is one of the most frequently performed surgeries in ophthalmology. Ocular biometric parameters such as keratometry and axial length are known as very important variables for minimizing postoperative refractive error. Due to advances in biometric devices and intraocular lens (IOL) calculation formulas, we can obtain postoperative refractive error within 0.5 diopter (D) of targeted spherical correction [1, 2].

Toric IOLs are widely used in modern cataract surgeries to reduce astigmatism because they can provide stable and reliable results that are equal or superior to limbal-relaxing incision results [3–5]. In the Middle East, toric IOLs are widely used. To reduce astigmatism after cataract surgery, it is very important to measure corneal astigmatism correctly.

Corneal astigmatism can be measured by different keratometry systems. Conventional, automated refractokeratometer is still used widely. This instrument based on partial coherence interferometry (PCI) was introduced and used popularly with advantage of noncontact evaluation and provision of additional data allowing IOL calculations to be performed. The machine, based on optical low-coherence interferometry (OLCI), was introduced to provide additional information regarding white to white distance, pupil size, and pupil and visual axis decentration by image analysis.

Most of previous studies regarding corneal astigmatism and biometric parameters using PCI or OLCI have shown results of Western, American, and Far East countries [6–10]. To the best of our knowledge, few studies have reported corneal astigmatism and biometric parameters for cataract surgery using OLCI from the Middle East. Thus, the purpose of this study was to analyze biometric parameters and the patterns of corneal astigmatism using OLCI in Northern United Arab Emirates (UAE), the Middle East.

Methods

This retrospective study analyzed cataract patient data acquired between December 2015 and December 2018 in Sheikh Khalifa Specialty Hospital, Ras Al Khaimah, United Arab Emirates (UAE). This study protocol was approved by the Ministry of Health and Prevention Research Ethics Committee (MOHAP/DXB/REC-23/2018). It followed the tenets of the Declaration of Helsinki. Inclusion criteria were UAE citizens, Middle Easterner with local last name living in northern part of UAE with comprehensive preoperative evaluation with OLCI (Aladdin software version 1.4.0, VISIA imaging and Topcon, Italy). Exclusion criteria were those who aged under 20 years or over 100 years, expatriates, a history of previous ocular surgery or ocular trauma, corneal opacity or disease such as keratoconus, presence of ocular surface, and intraocular disease that could affect the measurement. Microcornea (white to white, WTW 10 mm or less) and megalocornea (WTW 13 mm or more) were also excluded. Warning sign by OLCI software was indicated in case of bad focus, closed palpebral, tear film insufficiency, high standard deviation on repetition, movement, or measurement not in range. If warning sign was shown in OLCI device, patients' data were also excluded. All patients underwent the same comprehensive ophthalmic evaluation for both eyes before cataract surgery, including visual acuity, tonometry, refraction, slit-lamp examination, and fundus examination through dilated pupils.

All patients underwent a full ophthalmologic examination including pupil dilation with 1.0% tropicamide (Bausche&Lomb, France). Two experienced optometrists routinely checked vision and intraocular pressure and performed OLCI examination before pupil dilation. Patients were positioned with a chin and forehead rest. They were instructed to fixate on the internal fixation target. Axial length (AL), flat (K1) and steep (K2) keratometry, anterior chamber depth (ACD) and horizontal corneal diameter (WTW) were optically measured with the OLCI. AL was defined as the distance between the cornea and the inner limiting membrane. For acquisition of AL measurements, an interference signal was produced if the measuring light was reflected by the retinal pigment epithelium of the eye. Because the Aladdin system can automatically adjust for the distance difference between the inner limiting membrane and the retinal pigmented epithelium, Aladdin displays adjusted values that can be compared directly to those obtained by immersion ultrasound. Keratometry acquisition was based on the reflection of 24 rings of the Placido disk on the eye at a distance of 80 mm from the patient's eye. WTW, the value of the horizontal corneal diameter, was obtained automatically with information of corneal diameter and decentralization. ACD was the distance between corneal epithelium and the anterior surface of the crystalline lens. It was measured along the optical axis where the distance was the biggest with slit light projection measuring method. Corneal astigmatism was defined as the difference between K1 and K2. Corneal astigmatism pattern was categorized into three types: with-the-rule astigmatism, if the steepest meridian of the cornea was within $90° \pm 30°$; against-the-rule astigmatism, if the steepest meridian of the cornea was within $180° \pm 30°$; and oblique astigmatism, if the steepest meridian of the cornea was between 30° and 60° or between 120° and 150°.

All collected data were recorded in a spreadsheet and analyzed using SPSS for Windows software version 17.0 (SPSS Inc., Chicago, IL, USA). Distributions of involved eyes and patients were described. An age of patients, AL, ACD, WTW, corneal astigmatism, flat keratometry, and steep keratometry were expressed as mean ± standard deviation (SD) with range. *P* value of less than 0.05 was considered significant. This study's results regarding corneal astigmatism were compared with those reported previously in other countries [11–13].

Results

This study comprised 238 eyes of 123 UAE citizen patients (Middle Easterner with local last name). Of these 120 patients, 65 (53%) were men. The mean age of patients at the time of surgery was 67.1 ± 9.4 (mean ± SD) years (range 20–89 years). Demographics and biometric parameters of patients are shown in Table 1. The difference in mean AL between men and women was 0.81 mm (23.60 ± 0.94 mm in men and 22.79 ± 0.86 mm in women, $p < 0.001$). Male eyes had significantly deeper ACD (3.10 ± 0.37 mm in men and 3.00 ± 0.35 mm in women, $p = 0.049$) and larger corneal astigmatism (1.44 ± 0.98 D in men and 1.18 ± 0.93 D in women, $p = 0.035$) compared with female eyes. Significant differences were also found in K1 (43.10 ± 1.56 D in men and 44.43 ± 1.80 D in women, $p < 0.001$), K2 (44.54 ± 1.79 D in men and 45.60 ± 1.43 D in women, $p < 0.001$), and WTW (11.26 ± 0.48 mm in men and 11.09 ± 0.41 mm in women, $p = 0.003$).

The distribution of corneal astigmatism in all eyes is shown in Fig. 1. Mean corneal astigmatism was 1.32 ± 0.97 D (range 0–5.48 D). Corneal astigmatism was 1.5 D or less in 161(67.6%) eyes, 0.5 D or less in 42 (17.6%) eyes, between 0.51 and 1.00 D in 61 (25.6%) eyes, and between 1.01 and 1.50 D in 58 (24.4%) eyes. Corneal astigmatism pattern was with-

Table 1 Demographic characteristics of patients and biometric parameters

	Male	Female	Total	*p* value
Eyes	127 (53%)	111 (47%)	238	–
Patients	65	58	123	–
Age				
Mean ± SD	68.58 ± 6.79	65.34 ± 11.52	67.06 ± 9.42	0.057
Range	57, 84	20, 89	20, 89	
Axial length				
Mean ± SD	23.60 ± 0.94	22.79 ± 0.86	23.22 ± 0.99	< 0.001
Range	21.75, 27.92	20.90, 25.44	20.90, 27.92	
Anterior chamber depth				
Mean ± SD	3.10 ± 0.37	3.00 ± 0.35	3.05 ± 0.36	0.049
Range	1.21, 4.33	1.86, 3.90	1.21, 4.33	
Horizontal corneal diameter				
Mean ± SD	11.26 ± 0.48	11.09 ± 0.41	11.19 ± 0.46	0.003
Range	10.11, 12.37	10.16, 12.25	10.11, 12.37	
Corneal astigmatism				
Mean ± SD	1.44 ± 0.98	1.18 ± 0.93	1.32 ± 0.97	0.035
Range	0, 5.44	0, 5.48	0, 5.48	
Flat keratometry (K1)				
Mean ± SD	43.10 ± 1.56	44.43 ± 1.80	43.72 ± 1.80	< 0.001
Range	40.08, 47.39	38.91, 49.65	38.91, 49.65	
Steep keratometry (K2)				
Mean ± SD	44.54 ± 1.79	45.60 ± 1.43	45.04 ± 1.71	< 0.001
Range	40.41, 49.00	42.28, 50.14	40.41, 50.14	

SD standard deviation

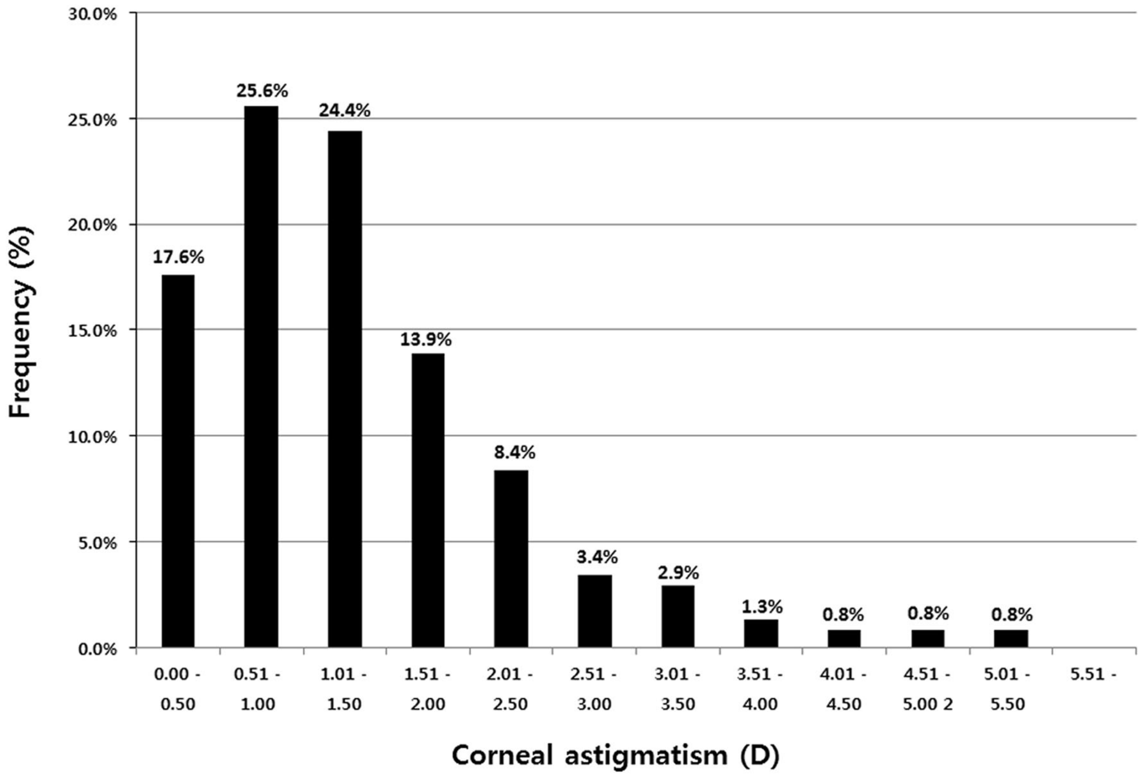

Fig. 1 Distribution of corneal astigmatism. Corneal astigmatism of more than 1.5 diopters was found in 32.4% of eyes in this study

the-rule in 29.8%, against-the-rule in 57.1%, and oblique in 13.0% of eyes.

Discussion

This study evaluated the distribution of ocular biometric parameters and characteristics of corneal astigmatism measured by OLCI in cataract patients living in northern part of UAE, the Middle East. Some studies regarding corneal astigmatism in cataract patients have been published from several countries but relatively rare in the Middle East [6, 7, 9–17]. Our data could be used to represent local cataract patients in Northern UAE because we checked all patients' nationality, residence area, and ethics.

In the present study, OLCI was used for cataract surgery evaluation. OLCI is quick and easy to use. It can measure the axial length in eyes with central posterior subcapsular cataract for which PCI is not possible [18, 19]. Many studies have reported corneal astigmatism using PCI [6, 9–11, 14, 15, 17]. There are two studies showing excellent agreement and repeatability between OLCI and PCI [20, 21]. However, Hoffer et al. [22] have reported that keratometry measured by OLCI is 0.14 D flatter than that measured by PCI. They explained the reason for the difference by suggesting that PCI could analyze smaller corneal diameter than OLCI and most corneas were steeper in the center. This should be considered when comparing keratometry between OLCI and PCI results. According to their previous study, the magnitude of corneal astigmatism measured by OLCI was 0.06 D smaller than or the same as that evaluated by PCI [22]. Hence, it should be considered when comparing corneal astigmatism reports from different countries as shown in Table 2.

The mean AL using OLCI in our study was 23.22 mm. It was shorter than that (23.43 mm) in Germany measured by PCI [9]. Because a previous study has shown excellent agreement and correlation of AL between OLCI and PCI [22], data could be compared without adjustment. It has been suggested that the reason for AL difference is that AL is highly associated with genetic and environmental factors [23, 24]. Usually, people with smaller body height and

Table 2 Comparison of corneal astigmatism in cataract patients between this study and other published studies

	This study	Spain [13]	Germany [9]	United Kingdom [10]	China [17]	Nigeria [16]	China [14]	China [6]	Iran[15]	Korea [12]	China [11]
Publication year	2019	2009	2010	2011	2013	2014	2014	2014	2014	2015	2017
Eyes/patients (n)	238/123	4540/2415	23,239/ 15,448	1230/746	4831/2849	3286/3169	12,449/6908	6750/4561	2156/1317	2847/2847	3209/2821
Male (%)	53.4	31.8	ND	46.0	38.3	57.6	46.3	44.4	46.2	35.8	38.0
Age (years)											
Mean ± SD	67.1 ± 9.4	60.5 ± 9.8	74[a]	75.5 ± 0.7	70.5 ± 9.5	60.8 ± 12.7	69.8 ± 11.1	70.4 ± 10.5	64.9 ± 11.4	66.6 ± 12.1	70.5 ± 9.8
Range	20, 89	32, 87	ND	30, 104	40, 95	16, 110	39, 97	40, 101	30, 88	20, 100	32, 95
Measurement instrument	OLCI	ARK	PCI	PCI	PCI	MK	PCI	PCI	PCI	MK	PCI
Corneal astigmatism (D)											
Mean ± SD	1.32 ± 0.97	0.90 ± 0.93	0.98 ± 0.78	1.03 ± 0.72	1.01 ± 0.69	1.16 ± ND	1.15 ± 0.84	0.9[a]	1.12 ± 1.10	0.79 ± 0.64	1.09 ± 0.77
Range	0, 5.48	0.25, 6.75	ND	0, 6.20	0.05, 6.59	0.25, 6.00	0, 6.63	ND	0, 7.00	0, 4.00	0, 6.21
Mean keratometry (D)											
Flat	43.72 ± 1.80	43.48 ± 1.61	ND	43.43 ± 1.48	43.76 ± 1.53	43.80 ± ND	43.93 ± 1.67	43.57 ± 1.69	43.70 ± 1.70	43.77 ± 1.53	43.75 ± 1.59
Steep	45.04 ± 1.71	44.08 ± 1.59	ND	44.46 ± 1.56	44.76 ± 1.56	43.99 ± ND	45.08 ± 1.73	44.69 ± 1.69	44.83 ± 1.79	44.56 ± 1.57	44.84 ± 1.65
Corneal astigmatism (D)											
≤ 0.5 D	17.6	58.8	26.3	24.5	23.4	ND	20.8	ND	23.3	50.1	21.2
≤ 1.0 D	43.2	70.9	63.9	59.6	58.7	33.1[b]	52.8[b]	56.1[b]	51.9	77.3	56.2
≤ 1.5 D	67.6	83.5	83.4	79.5	81.5	ND	ND	77.0[c]	73.7	89.6	77.9
≥ 2.0 D	18.5	9.2[d]	8.0	9.7[d]	8.2	21.0	13.2	11.6	14.9[d]	7.2	10.6[d]
≥ 2.5 D	10.1	5.6[e]	ND	4.6[e]	3.5	ND	ND	ND	10.1[e]	3.1	5.5
≥ 3.0 D	6.7	3.3[f]	2.7	1.9	1.7	6.1	3.8	3.4	7.4	1.1	2.8

ND no data, *SD* standard deviation, *D* diopter, *OLCI* optical low-coherence interferometry, *PCI* partial coherence interferometry, *ARK* auto-kerato-refractometer, *MK* manual keratometer

[a]Median

[b]1.0 D was not included

[c]1.5 D was not included

[d]2.0 D was not included

[e]2.5 D was not included

[f]3.0 D was not included

weight have shorter axial length. Considering that the average body height of our study subjects was 161.9 cm for men and 149.9 cm for women, genetic factor is thought to be an important factor. Hoffer et al. [22] have reported that mean ACDs measured by OLCI are 0.16 mm and 0.05 mm deeper than those measured by PCI in China and US groups, respectively. ACD values measured by OLCI in our study were smaller than those measured by PCI in other countries [6, 11, 22]. Similar to findings in other studies [6, 9, 12, 25], our study also revealed that men had a longer AL, flatter K1 and K2, deeper ACD, and larger WTW than women.

In our study, the mean corneal astigmatism (1.32 D) was much higher than that reported by others. It has reported to be between 0.90 and 1.03 D in Europe [9, 10, 13]. In Asia, various studies have reported corneal astigmatism from 0.79 to 1.15 D [6, 11, 12, 14, 15, 17]. Isyaku et al. [16] have reported a mean corneal astigmatism of 1.16 D in Africa. The magnitude of corneal astigmatism can be affected by ethnic and environmental factors. High incidence and severity of keratoconus in Arabic peninsula have been reported [26]. This provides a clue for the high corneal astigmatism found in our study, suggesting that ethnic factor and environmental factor such as chronic corneal trauma might play a role.

It is widely proven that corneal astigmatism 0.5 D or less can be controlled by placing a clear cornea incision on the steep axis of the cornea [27]. In the present study, the percentage of the corneal astigmatism of 0.5 D or less was 17.6%, the lowest among all other countries as shown in Table 2. Corneal astigmatism of between 0.5 and 1.5 D before intervention of cataract surgery can be corrected by single on-axis clear corneal incision or with an opposite clear corneal incision [27, 28]. In our study, 67.6% of eyes had corneal astigmatism of 1.5 D or less. This percentage was much smaller than those from other countries [6, 9–13, 15, 17]. It has been widely accepted that moderate-to-severe corneal astigmatism in cataract patients can be corrected by toric IOL implantation. In our study, 32.4% of eyes had corneal astigmatism of more than 1.5 D. This percentage was larger than those from other countries [6, 9–11, 13, 15, 17].

This study has some limitations. First, the number of cataract surgery patients in our hospital was not large enough to represent the whole population in Northern UAE. The cataract surgery in our hospital was started in December 2015, and this area has a small UAE citizen population. Many patients were excluded from our study because of the high presence of ocular surface and intraocular disease. Some patients' data were excluded due to warning sign of OLCI. There is also a possibility of selection bias regarding corneal astigmatism from a referral hospital. Second, we could not provide characteristics of biometric parameters by dividing several groups on the basis of age because some patients did not know exactly their year of birth. Record of birth was unavailable several decades ago. Third, we could not compare our data with those from other countries directly because of different measurement instruments.

In conclusion, this study revealed the variation of ocular biometric parameters of cataract surgery patients using OLCI in Northern UAE, the Middle East. Corneal astigmatism of more than 1.5 D was found in 32.4% of eyes. This percentage was much higher than those reported in other countries. Despite the small number of study samples, results of this study provide valuable and practical information to physicians and government regarding service plan in Northern UAE, the Middle East.

Compliance with ethical standards

Conflict of interest The author declares that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Informed consent was waived by approval of the Ministry of Health and Prevention Research Ethics Committee (MOHAP/DXB/REC-23/2018).

References

1. Olsen T (2007) Improved accuracy of intraocular lens power calculation with the Zeiss IOL Master. Acta Ophthalmol Scand 85:84–87
2. Narvaez J, Zimmerman G, Stulting RD, Chang DH (2006) Accuracy of intraocular lens power prediction using the Hoffer Q, Holladay 1, Holladay 2, and SRK/T formulas. J Cataract Refract Surg 32:2050–2053
3. Holland E, Lane S, Horn JD, Ernest P, Arleo R, Miller KM (2010) The AcrySof Toric intraocular lens in subjects with cataracts and corneal astigmatism: a randomized, subject-

masked, parallel-group, 1-year study. Ophthalmology 117:2104–2111

4. Saragoussi JJ (2012) Preexisting astigmatism correction combined with cataract surgery: corneal relaxing incisions or toric intraocular lenses? J Fr Ophtalmol 35:539–545
5. Leon P, Pastore MR, Zanei A, Umari I, Messai M, Negro C, Tognetto D (2015) Correction of low corneal astigmatism in cataract surgery. Int J Ophthalmol 8:719–724
6. Cui Y, Meng Q, Guo H, Zeng J, Zhang H, Zhang G, Huang Y, Lan J (2014) Biometry and corneal astigmatism in cataract surgery candidates from Southern China. J Cataract Refract Surg 40:1661–1669
7. De Bernardo M, Zeppa L, Cennamo M, Iaccarino S, Zeppa L, Rosa N (2014) Prevalence of corneal astigmatism before cataract surgery in Caucasian patients. Eur J Ophthalmol 24:494–500
8. Fotedar R, Wang JJ, Burlutsky G, Morgan IG, Rose K, Wong TY, Mitchell P (2010) Distribution of axial length and ocular biometry measured using partial coherence laser interferometry (IOL Master) in an older white population. Ophthalmology 117:417–423
9. Hoffmann PC, Hutz WW (2010) Analysis of biometry and prevalence data for corneal astigmatism in 23,239 eyes. J Cataract Refract Surg 36:1479–1485
10. Khan MI, Muhtaseb M (2011) Prevalence of corneal astigmatism in patients having routine cataract surgery at a teaching hospital in the United Kingdom. J Cataract Refract Surg 37:1751–1755
11. Yu JG, Zhong J, Mei ZM, Zhao F, Tao N, Xiang Y (2017) Evaluation of biometry and corneal astigmatism in cataract surgery patients from Central China. BMC Ophthalmol 17:56
12. Oh EH, Kim H, Lee HS, Hwang KY, Joo CK (2015) Analysis of anterior corneal astigmatism before cataract surgery using power vector analysis in eyes of Korean patients. J Cataract Refract Surg 41:1256–1263
13. Ferrer-Blasco T, Montes-Mico R, Peixoto-de-Matos SC, Gonzalez-Meijome JM, Cervino A (2009) Prevalence of corneal astigmatism before cataract surgery. J Cataract Refract Surg 35:70–75
14. Yuan X, Song H, Peng G, Hua X, Tang X (2014) Prevalence of corneal astigmatism in patients before cataract surgery in Northern China. J Ophthalmol 2014:536412
15. Mohammadi M, Naderan M, Pahlevani R, Jahanrad A (2016) Prevalence of corneal astigmatism before cataract surgery. Int Ophthalmol 36:807–817
16. Isyaku M, Ali SA, Hassan S (2014) Preoperative corneal astigmatism among adult patients with cataract in Northern Nigeria. Indian J Ophthalmol 62:1094–1095
17. Chen W, Zuo C, Chen C, Su J, Luo L, Congdon N, Liu Y (2013) Prevalence of corneal astigmatism before cataract surgery in Chinese patients. J Cataract Refract Surg 39:188–192
18. Einan-Lifshitz A, Rozenberg A, Wang L, Koch DD, Shoshany N, Zadok D, Avni I, Abulafia A (2017) Accuracy and feasibility of axial length measurements by a new optical low-coherence reflectometry-based device in eyes with posterior subcapsular cataract. J Cataract Refract Surg 43:898–901
19. Shammas HJ, Wetterwald N, Potvin R (2015) New mode for measuring axial length with an optical low-coherence reflectometer in eyes with dense cataract. J Cataract Refract Surg 41:1365–1369
20. Sabatino F, Findl O, Maurino V (2016) Comparative analysis of optical biometers. J Cataract Refract Surg 42:685–693
21. Mandal P, Berrow EJ, Naroo SA, Wolffsohn JS, Uthoff D, Holland D, Shah S (2014) Validity and repeatability of the Aladdin ocular biometer. Br J Ophthalmol 98:256–258
22. Hoffer KJ, Shammas HJ, Savini G, Huang J (2016) Multicenter study of optical low-coherence interferometry and partial-coherence interferometry optical biometers with patients from the United States and China. J Cataract Refract Surg 42:62–67
23. Meng W, Butterworth J, Malecaze F, Calvas P (2011) Axial length of myopia: a review of current research. Ophthalmologica 225:127–134
24. Wang D, Zhao C, Huang S, Huang W, He M (2015) Longitudinal relationship between axial length and height in Chinese children: Guangzhou Twin Eye study. Eye Sci 30(1–6):12
25. Yoon JJ, Misra SL, McGhee C, Patel DV (2016) Demographics and ocular biometric characteristics of patients undergoing cataract surgery in Auckland, New Zealand. Clin Exp Ophthalmol 44:106–113
26. Assiri AA, Yousuf BI, Quantock AJ, Murphy PJ (2005) Incidence and severity of keratoconus in Asir province, Saudi Arabia. Br J Ophthalmol 89:1403–1406
27. Amigo A, Giebel AW, Muinos JA (1998) Astigmatic keratotomy effect of single-hinge, clear corneal incisions using various preincision lengths. J Cataract Refract Surg 24:765–771
28. Khokhar S, Lohiya P, Murugiesan V, Panda A (2006) Corneal astigmatism correction with opposite clear corneal incisions or single clear corneal incision: comparative analysis. J Cataract Refract Surg 32:1432–1437