Original Article

Occurrence of Corneal Astigmatism in Cataract Patients before Cataract Removal

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Abstract

Introduction: Cataract extraction is a common surgery in the world; associated compiling conditions are common and impact the surgery outcome, including corneal astigmatism. This research deals with estimating how prevalent the occurrence of astigmatism is in Iraqi patients, since obtaining good visual outcomes is our goal with minimising visual imperfections which may occur primarily because of astigmatism, which really cannot be defeated during cataract surgery, since usual non-toric lenses don't treat it, and there are other simple ways to manipulate minor degrees of astigmatism, like achieving the most suitable entrance of phaco. Probe in concordance with preexisting astigmatism. **Methods:** A total of 328 eyes (320 patients, aged 30-90 years) were enrolled in cataract surgery. Every patient had a keratometry test as part of routine preoperative evaluation for corneal astigmatism. **Results:** Astigmatism stayed with the rule in 136 eyes (41.4%), and it was against the rule in 187 eyes (57.01%). When 5 patients were without astigmatism (1.5%). The ATR astigmatism percentage elevated beside increasing age, while the WTR astigmatism presentation declined with age. **Conclusion:** This study provided insight into the assessment of the prevalence of corneal astigmatism tailored to patients specific populations in Iraq.

Keywords: Astigmatism, Cornea, Phacoemulsification, Cataract.

Introduction

The assessment of cataract patients for preparation for surgery includes the check for corneal astigmatism (CA) in order to provide a better type of surgery and confirm the diagnosis and prognosis, and the CA could be done postoperatively or intraoperatively to address visual accuracy.[1,2] Estimation of CA before cataract operation helps in treating it by the time of operation, since lenticular astigmatism could become red by intraocular lens implantation, but corneal astigmatism is not related. This in turn will necessitate a toric intraocular lens or other manoeuvres to treat astigmatism.[3] The rate of CA distribution in cataracts is not fully conclusive, and studies confirming numbers exactly are lacking.[4] This variation could have a link to variation in racial/ethnic differences of the studied population.[5-7]

Knowing the type and amplitude of astigmatism helps in managing it, since lower degrees can be obliterated at the time of operation by many ways, for example,[8] limbal relaxing incisions or combined opposed clear corneal incisions, while larger degrees require more advanced techniques such as toric intraocular lens implantation or laser surgery, especially when we take into consideration the perfect visual expectation of the patients for cataract phacoemulsification technique.[9,10] The aim of this study is to provide sufficient evidence of information relating to the type and strictness of pre-operative astigmatism in Iraqi adult sick admitted for cataract operation.

Materials and Methods

Retrospective data analysis of 328 eyes from 320 patients who underwent phacoemulsification cataract surgery aged from 30 years to 90 years. From July 2022 to January 2024. The data collected in Al-Diwanya Teaching Hospital (Iraq), with informed consent obtained from all

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the patients, with strict adherence to the Declaration of Helsinki criteria. The study was approved and registered by the Ethics Committee Approval and Informed Consent Statement (ECAICS) (Approval letter number 30/1179 on 20.03.2025). Every patient had a keratometry test as part of routine preoperative evaluation for corneal astigmatism and 2 keratometric readings on the principal meridian, all the tests done by the same professional examiner. Other collected data include age and gender. Excluded from the study are patients using contact lenses, patients with past medical, surgical or traumatic ocular history and patients with mature cataracts, which prevents accurate measurements. All the patients had been examined with slit lamp biomicroscopy, tonometry, dilated fundus examination, and visual acuity. Statistical investigation stayed via the use of SPSS, and bivariate correlation was estimated using the Pearson coefficient.

Results

This study enrolled 328 eyes from 320 patients, out of which 184 (56.09%) were male and 136 (41.4%) were female. Astigmatic ranges from 0.25 to 5 dioptres with a mean of 1.25D and a mode of 1D.

Astigmatism stayed with the rule in 136 eyes (41.4%), and it was against the rule in 187 eyes (57.01%). When 5 patients were without astigmatism (1.5%). The ATR astigmatism percentage elevated beside increasing age, while the WTR astigmatism presentation declined with age.

The study divided the patients into 3 groups according to the severity of astigmatism

1. Mild astigmatism, less than 1D. was founded in 141cases (42.9%).
2. Moderate astigmatism 1-2D appeared in 103 eyes (31.4%)
3. High astigmatism more than 2 D seen in 84 eyes (25.6%)

Although astigmatism higher than 3D only seen in 17 eyes (5%)

Table 1 represents the description of flat keratometry (K1) and steep keratometry (K2) in all age groups. An increase in keratometry average is noticed with age, especially K2. The eyes in this observation stayed between 71 and 80 years old, which occupied nearly one-third (35.97%) of all cases. Sick among those 61 and 70 years old were found to be single in a quarter (26.82%) of all cases.

Table 1: Distribution of Astigmatism with Statistics Via Age Grouping.

Age Grouping (y)	Astigmatism (D)	K1 (D)	K2 (D)	Eyes (%)
30–40	1.23±0.83	42.8±2.18	44.21±2.35	5 (1.52)
41–50	1.28±1.1	43.57±1.76	44.75±1.87	13(3.96)
51–60	1±0.81	43.85±1.65	44.86±1.77	49 (14.93)
61–70	1.25±0.7	44.15±1.75	45.23±1.81	88 (26.82)
71–80	1.32±0.83	43.89±1.78	45.25±1.74	118 (35.97)
81–90	1.38±0.92	43.94±1.84	45.19±1.68	52(15.85)
≥91	1.39±0.85	43.86±1.76	45.17±1.83	3 (0.91)
p value	<0.001	<0.001	<0.001	<0.001

K1 = flat keratometry, D=diopter, and K2 = steep keratometry.

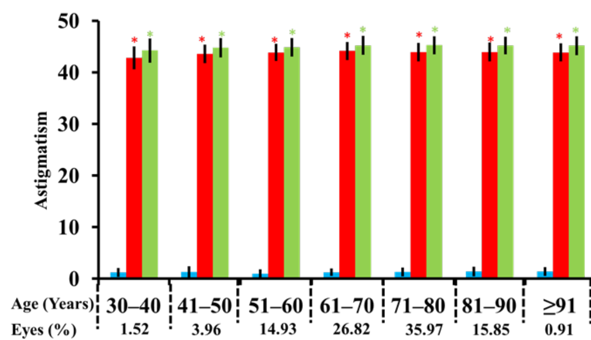

Figure 1: Distribution of Astigmatism with Statistics Via Age Grouping, K1 = flat keratometry, D=diopter, and K2 = Steep Keratometry. Data expressed as mean±SD. * Indicates Significant Differences as Compared to Astigmatism Group.

Discussion

The type and extent of corneal astigmatism in cataract operations are not highly estimated in Iraq. This study is done to guide this issue, as it will address the phaco surgeons to assume the better corrective technique for corneal astigmatism to optimise the postoperative visual results that satisfy the patient and surgeon. Corneal astigmatism exists in more than 90% of adult eyes. Therefore, good preoperative astigmatism quantification should be done. Since adjustment of final refraction is the great challenge facing the surgeon, because even perfect biometrical analysis preoperatively for non-toric intraocular lens implantation corneal astigmatism is not discriminated, this will result in a non-perfect visual outcome and the need for glasses. So, the evaluation of corneal astigmatism before cataract surgery is vitally significant.

ATR was more dominant in the older age group than the younger age group, and this is well known and shown in many studies.[11-13] The wider distribution of ATR in phacoemulsification surgery patients guides the surgeon for temporal incision more than superior incision in the absence of astigmatism refinement techniques. In this study, we find that corneal astigmatism between 0.25 and 1.25 D is the most common. This result is in coincidence with Chen *et al.*[14], who have also reported a higher ATR prevalence in elder individuals (70s years old), before surgery with a predominance of women compared to men.[15,16] Prasher and Sandhu[17] have shown higher prevalence in middle-aged adults, and the increment spikes at ages in their 40s.[17-20]

The age of our participants was middle-aged and is closely similar to the study of Ferrer-Blasco *et al.*[21]; however, this is dissimilar to many other studies, whose participants were over 70,[4,13-15,22-24] and most were over 60 years old. Consistent with a study conducted by Isyaku *et al.*[12], but unlike the literature,[4,13,14,22,24,25] the rate of males is more prevalent than females.

Our oldest age group (70-90 years) were the more prevalent groups and had the highest astigmatism value (>1.3D); this is in line with previous studies,[4,14] which have reported higher astigmatism values in their elderly. In contrast to Mohammadi *et al.*[18], it has shown the highest astigmatism values in the youngest age group. In the present study, the values of flat and steep keratometry were similar to other European studies[13,21,22] and lower than those studies conducted in Asian countries.[4,24,25] Moreover, participants of the present study confirmed increased flat keratometry until age 70s and declines thereafter in older age ranges; this finding harmonised with that reported by Mohammadi *et al.*[18]. However, steep keratometry increased until age 70s and plateaued thereafter in older age ranges; this finding harmonised with that reported by previous studies.[4,25] However, this steep keratometry result disagrees with other studies that have reported that steep keratometry declines after the 70s.[14,21]

Limitations of our training are the small sample size, since a larger number, maybe thousands, is required to estimate a population. Although our study is still conclusive, the absence of posterior corneal astigmatism measures is a weakness. Though the frontal corneal astigmatism is important, undervalue the entire corneal astigmatism to approximately 0.25–0.5 diopter. In spite of the fact that manual keratometry has accuracy and reliability as a way of measurement of corneal astigmatism, computer corneal topography is the gold standard.

Conclusion

Assessment of corneal astigmatism in cataract patients undergoing surgery and evaluation of the degree of astigmatism optimise the surgery outcome tailored to the individual population, and according to the outcome, the surgery was based on and the decision to be taken for individual patients.

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