

Adjustment of Phaco Entrance According to Pre-Existing Astigmatism

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ABSTRACT

Background: Astigmatism is the fundamental reason of visual imperfection after successful cataract surgery and may necessitate wearing correcting glasses eventually patient nonsatisfaction. However, there are many modern sophisticated ways to treat astigmatism. Our study deal with the easiest affordable way in the same cataract surgery by manipulating the probe entry according to the pre-existing astigmatism. **Aim of the study:** This study is done to show the ability of astigmatism treatment to certain extent by phacoemulsification technique. Using same technique and available tools. Obtaining better visual outcomes by only adjusting the sites of entrances. **Methods:** 35 eyes from 28 patients with cataract and regular astigmatism more than 1 dioptre without a history of prior ocular operation or trauma or morbidity were operated and followed for a year in the period between January 2023 and January 2024. All done by the same surgeon using the same phacoemulsification technique. The patients classified into 3 groups according to the type of astigmatism. **Result:** We see that the high levels of astigmatism preoperatively, were significantly decreased in the 1st month postoperative, average of 2.25 ± 0.75 dioptres to 1.5 ± 0.75 dioptres ($P = 0.001$). Then we notice stable readings through while the next examination schedule which was programmed three, six, and twelve months. **Conclusion:** Performing the phaco scratches on the sharp meridian is simple method of correcting mild and moderate astigmatism without the need of sophisticated tools. Unlike the greater degrees of astigmatism which necessitate using more advance techniques.

Keywords: With the rule astigmatism, Against the rule astigmatism, Best corrected visual acuity, uncorrected visual acuity.

Introduction

Astigmatism is the most common cause for the need to glasses after successful cataract surgery (1,2), in which the patients undergone to be free of any aid. Since even lower degrees of astigmatism can cause blurred distorted vision, headache, eye strain, glare, difficulties in night vision (3). There are many modern ways to treat astigmatism for instance limbal relaxing incisions and toric intraocular lens insertion also excimer laser surgeries which all require skills and experience along with high expense levels which are not always available especially for our patients (4-6).

Therefore we would like to manipulate our work to have optimum results by only adjusting the sites of our incisions in concordance with already existing astigmatism without the need for any additional equipment. And this is not new technique since it was talked about 24 years ago by Lever and Dahan (7), who have opposed clear corneal incisions straddling the precipitous meridian with a lot of studies in different manoeuvres with different sizes and sizes of corneal incisions but still not standard for all surgeries which we hopefully expect to be eventually part of every phaco surgery to optimise the phacoemulsification procedure and insure patients satisfaction (8-11).

Materials and Methods

This study is done to show the ability of astigmatism treatment to certain extent by phacoemulsification technique. Using same technique and available tools. Obtaining better visual outcomes by only adjusting the sites of entrances 35 eyes from 28 patients with cataract and regular astigmatism more than 1 dioptre without a history of prior ocular operation or trauma or morbidity. Preoperatively the patients examined for finest altered visual acuity (BCVA), "uncorrected visual acuity (UCVA)", refraction, slit lamp investigation, fundus investigation tonometry. Corneal Keratometry was measured using Autokeratometer Topcon KR.800.

The study was done in the period between January 2023 and January 2024.

Written educated consensus gotten from the patients for the surgery and the following visits schedule with strict adherence to the tenets of the Statement of Helsinki.

To overact the possible cyclotorsion cornea stood noticeable using stain Gentian violet (applied at 6 o'clock and 12 o'clock). We noticeable the steep meridian in the operating room while the patients were lying down using the Mendez ring. The main incision was made by the disposable keratotomy knife 3.2 mm (Mani Ophthalmic, Tochivi, Japan) at the steep meridian according to the type of astigmatism 1mm anterior to the limbus, another stab incision was made on the opposite side of the main incision with the same knife. Usual phacoemulsification was done using the two shot wounds for doing capsulorrhexis and manipulation of the other device. Viscoelastic stayed used in all patients the similar kind of foldable IOL was inserted. The anterior hall was irrigated then designed with stable salt solution. The wounds then secured by stromal hydration. At the end of the surgery the scratches were distended by the keratotomy knife using surgical calliper to 4 mm without using sutures. The patients treated with antibiotics and steroids drops for the next 6 weeks. The patients were monitored (monitoring done after 1 month, 3 months, 6 months, and 1 year). The visits include slit lamp examination and tonometry and Keratometry and definitely visual acuity tests.

All the surgeries done by the same surgeon using the same phacoemulsification technique device and instrumentation.

The patients classified according to the type of astigmatism into groups

- 1- "With the rule astigmatism (WTA)" the sharp meridian on 90 degrees.
- 2- "Against the rule astigmatism (ATA)" the sharp meridian on 180 degrees
- 3- Oblique astigmatism in between.

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STATISTICAL INVESTIGATION: The data underwent analysis utilizing SPSS software (version 24: IBM Establishment, Chicago, USA), with every eye ($n = 35$) treated as an individual analytical unit. Descriptive statistics were employed to generate charts, while matching and autonomous t-tests, along with correlation investigation, were conducted on the variables. Statistical importance stayed concluded at $p < 0.05$.

RESULTS

A total of 35 eye from 28 patients were enrolled in the study. The cases were followed for a period of a year, but 3 patients did not commit for visits, the end results were plotted for 32 eyes of 28 patients, 4 patients with bilateral cataract were studied. Out of 28 patients, 11 (39%) were man and 17 (60%) were woman (aging mean 65.4) and age extent of 25–80 years).

The left side eyes (15 eyes; 53.5%), and the right-side eyes (13 eyes; 46.4%). The most frequent type of cataract was shown to be posterior subcapsular, with 23 eyes (71.8%). Second most probable was nuclear sclerosis, with 14 eyes (43.7%), and cortical type was the least common one with 6 eyes (18.7p%). Definitely There was overlapping between the types of cataracts in each eye. Cases were categorised into 3 groups founded on the sharp meridian:

WTR stayed most probable in the eyes throughout the study (19 eyes: 59.3%), after that the ATR group (11 eyes: 34.3%) and the least one was the slanted astigmatism group (2 eyes: 6.2%).

We found that the high levels of astigmatism preoperatively, were significantly decreased in the 1st month postoperative, average of 2.25 ± 0.75 dioptres to 1.5 ± 0.75 dioptres ($P = 0.001$). Then we notice stable readings through while the next examination schedule which was programmed three, six, and twelve months (Table 1 and Figure 1).

Table 1. Astigmatism changes according to the time of visits

Keratometry	Timing of visits				
	Pre operation	1 st	3 th	6 th	12 th
Mean± SD	2.25 ± 0.75	1.5 ± 0.75	1.25 ± 0.5	1.25 ± 0.75	1.25 ± 0.75
Range	1-5	0.25-3	0.25-3.25	0.25-3.00	0.25-2.75
SD=Standard deviation					

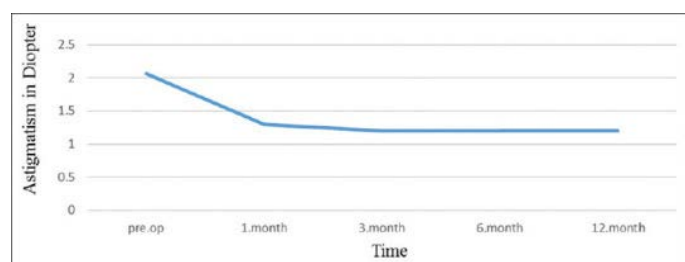


Figure 1. Astigmatism changes over time.

DISCUSSION

We think that the adjustment of phacoemulsification incision rendering to the type of pre-existing astigmatism should be part of every phaco surgery since perfect visual outcome and freedom from glasses is expected from the patients. So when we leave astigmatism uncorrected with even perfect and uneventful surgery non perfect visual outcome will result. Not to mention surgically induced astigmatism. We know the various successful methods of treating astigmatism such as corneal relaxing incisions and toric lens implantation even keratorfractive

Lasik surgery which may needs skills and expensive instrumentation and these by turn not always available especially for our patients in developing countries (4-7).

Performing the phaco scratches on the sharp meridian is simple method of correcting mild and moderate astigmatism without the need of using sophisticated tools. Unlike the greater degrees of astigmatism which necessitate using more advance techniques. In this study the astigmatism preoperatively decreased significantly from 2.25 ± 0.75 dioptres to 1.25 ± 0.75 dioptre.

When we speak about correction of astigmatism throughout cataract operation, we should mention Lever and Dahan study as they were the first who admitted alteration of astigmatism throughout cataract operation the author proposed 2 dioptre declining in astigmatism using opposite clear corneal incisions 3.5 mm knife (7). Tadros searched 103 eyes with 3.5 mm incisions results in more than 1.25 dioptre decrease in astigmatism measures (12), which were similar to a training via Simon and Desatnik on 34 patients submitted to pure corneal phacoemulsification cataract abstraction with 3.2-mm (13). Another prospective clinical study by Khokhar et al. (2006) studied the astigmatic correction via OCCIs on 40 eyes using 3.2 mm scratches. The mean gain was more than 1.5 dioptre with stability at one month similar to this study (14). Alam gives postoperative astigmatic change only as 0.58 D after 2 months with a 3.2 mm incision (15), which harmonized with results obtained by Nemeth et al. (2014) (16). Besides Bazzazi et al. (2008), study which was in the lower ranges mentioned thoroughly (17). Žemaitienė et al. (2003) reported similar results to Bazzazi pre and postoperative astigmatism, as this study divided the patients into 2 groups performing 4 mm CCI group and 3 mm incision in OCCI groups (18). Other similar study to our results obtained from Faal et al. (2021) study, the change in astigmatism was 0.85 Dioptre at one year postoperatively (19). These stigmatism outcome further affected by presence of other diseases, such as, heart failure (20), diabetes (21,22), and retinopathy (23,24).

CONCLUSION

Wholly these trainings showed that astigmatism was considerably decreased via matching OCCI. So our operate is in synchronisation with the results of these trainings reporting that matching OCCI can decline astigmatism during cataract operation.

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Competing Interest: None

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