Original Article

SURGICALLY INDUCED ASTIGMATISM AFTER PHACOEMULSIFICATION WITH CLEAR CORNEAL 3.2 MM INCISION WHILE USING SUPERIOR VERSUS TEMPORAL APPROACH

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ABSTRACT

OBJECTIVE: The aim and objective of this study was to assess surgically induced astigmatism followed by phacoemulsification with clear corneal 3.2mm incision while using superior versus temporal approach.

MATERIAL AND METHODS: This study was carried out at the department of Ophthalmology Ghazi Medical College and Teaching Hospital Dera Ghazi Khan. The sample size was 200 eyes of 180 patients. In all the patients, clear corneal incision was used. The patients were divided into two groups. Group-I included 100 eyes of 94 patients who underwent surgery via temporal approach. Group- II included 100 eyes of 86 patients in whom superior approach was used. Keratometry was performed preoperatively, on first post operative day, after 2 weeks and 8 weeks. Surgically induced astigmatism was calculated by comparing preoperative and post operative keratometric readings at 8 weeks.

RESULTS: 200 eyes of 180 patients were the sample size of this study. 79 were male with Mean 59.76±0.5) and 101 were females with Mean 60.61±0.2. Mean age ranged 45-70 years was 60.24±0.3. The surgically induced astigmatism in group I ranged from 0.25D to 0.85D with Mean 0.48D and in Group II ranged from 0.75D to 1.50 D with Mean 0.99D.

CONCLUSION: For a suture less clear corneal incision temporal approach results in considerably less degree of surgically induced astigmatism.

KEY WORDS: Ocular residual astigmatism (ORA), surgically induced astigmatism (SIA), Intraocular Lens (IOL), temporal clear corneal incision (TCCI), superior clear corneal incision (SCCI),outpatient department(OPD),intraocular pressure(IOP)

INTRODUCTION:

Astigmatism is an optical condition in which visual acuity is reduced due to the lack of ability of the optics of the eye to focus a point object into a sharp focused image on the retina. An irregular curvature of the cornea and/or lens may be the cause of this problem. Astigmatism is divided into two types, regular and irregular. Irregular astigmatism is often caused by a corneal scar or dispersion in the lens that cannot be corrected by standard spectacle lenses. The more common regular astigmatism arising from either the cornea or crystalline lens can be corrected by spectacles or toric lenses[1]

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Ocular symptoms such as blurry vision, eye strain, fatigue, headaches or squint in eyes may be caused by higher degrees of astigmatism. There is research showing the link between astigmatism and higher prevalence of migraine headaches[2].Ocular residual astigmatism (ORA) is the minimal amount of astigmatism that can remain in the optical system of the eye.[6]

The modern technique for the surgery of cataract is phacoemulsification with a foldable intraocular lens insertion. Due to small size (just about 3.00mm) of incision, this procedure is modestly invasive and induces very less astigmatism [7]. An incision in the cornea leads to flattening in that meridian and relative steepening in the opposite meridian (90^0 away from the incision) [8].

Ideally, incision in the steeper meridian or as close as possible to steeper meridian should be the aim always [9]. But most of the surgeons do not feel easy to sit on the temporal side while doing phacoemulsification irrespective of the preoperative keratometric results. They have a tendency to use superior approach for all the patients. It further increases the flattening if the incision is given in an already flatter meridian. Thus it may result in high degree induced astigmatism postoperatively [10]. This problem is increased as most of the surgeons like to leave the wound unsutured. This definitely affects the visual outcome postoperatively and increase in demand of spectacles to improve postoperative visual acuity.

Apart from the size of incision, the amount of SIA also depends upon its distance from the centre of cornea [11]. If the distance is less from the centre of cornea then more would be the amount of SIA. In other words a clear corneal incision will lead to more astigmatism as compared to a sclera incision [12]. In spite of this fact many surgeons prefer clear corneal incision in phacoemulsification during cataract surgery. This is because a clear corneal incision allows comfortable surgery under topical anesthesia without the need of doing any cautery [13]. Moreover the operated eye is less congested on the first post operative day. The aim of this study was to have a comparision of surgically induced astigmatism in diopters by a suture less clear corneal incision of 3.2 mm while using a superior and temporal approach.

MATERIAL AND METHODS:

This interventional and quesi, experimental study was carried out at the department of ophthalmology Ghazi Medical College and Teaching Hospital Dera Ghazi Khan from 1st march 2013 to 30th December 2014. The sample size was 180 eyes of 200 patients. All patients were operated by a single experienced Ophthalmic Surgeon. Patients having astigmatism of more than 0.5 D were excluded from the study. The patients were randomly divided in two groups. The patients were admitted from eye OPD a day before surgery. Every patients had preoperative assessment including a complete ocular examination i.e. testing of visual acuity, slit lamp examination, IOP measurement and fundus examination. Calculation of iol was done by using Javel Schiortz Keratometer and A scan ultrasound.

All patients had cataract surgery under local anesthesia using peribulbar injection of a mixture of 2% Lignocaine and 0.5 % Bupivacaine. Clear corneal incision was used in all the patients. All apart from 3 patients (who had posterior capsular rent) had uneventful surgery. In these patients anterior vitrectomy was done.As the size of rent was small, foldable IOL through 3.2 mm incision was implanted. Postoperative complications included IOP rise in two patients and mild striate keratopathy in 09 patients.

On first operative day, apart from slit lamp examination the patients had auto refraction and keratometery. The same routine was followed at subsequent follow up visits at 2 weeks and 8 weeks. In addition, subjective refraction of every patient was done at 8 weeks.

Statistical analysis was done using computer program SPSS version 16.00. Mean and standard deviations have been calculated for numerical data while frequencies and percentages were tabulated for categorical study variable.

RESULTS:

This study was conducted in ophthalmology department, teaching hospital, Dera Ghazi Khan from 1st March, 2013 to 30st December, 2014. 200 eyes of 180 patients were the sample size of this study. 79 were male patients with

Mean 59.76±0.5) and 101 were femalepatients with Mean 60.61±0.2 as shown in Table 1. Age ranged from 45 to 70 years. Mean age was 60.24±0.3 as shown in Table 2.

Clear corneal incision was used in all the patients. The patients were divided into two groups. Group-I included 100 eyes of 94 patients who undergo surgery via temporal approach. The surgically induced astigmatism in this group ranged from 0.25D to 0.85D with Mean 0.48D. Group- II included 100 eyes of 86 patients in whom superior approach was used. The surgically induced astigmatism in this group ranged from 0.75D to 1.50 D with Mean 0.99D as shown in Table 3. As expected, it was with the rule astigmatism in group-I and against the rule astigmatism in group-II.

DISCUSSION:

In the present era, cataract surgery with implantation of intraocular lens is regarded as a refractive surgery aiming postoperative emmetropia.l [14, 15]. Generally it is observed that a clear corneal incision when given temporally results in less postoperative astigmatism by flattening the horizontal corneal meridian [16].

In our study, although foldable IOL's had been used in all the patients yet there was a significant difference of 0.50D in the sum of surgically induced astigmatism between the two groups; less astigmatism with Mean 0.48 D in Group I as compared to Group II in which more astigmatism with mean 0.99D was observed. Lesser amount of surgically induced

TABLE 1. GENDER DISTRIBUTION (N= 180)

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Age	Male	79	59.76	5.326	.599
	Female	101	60.61	2.771	.276

TABLE 2. AGE ALLOCATION

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Age	180	45	70	60.24	.306	4.103
Valid N (listwise)	180					

TABLE 3. SIA IN TWO GROUPS

PATIENTS	Range of Astigmatism	Mean Astigmatism
Group I (TCCI)	0.25D-0.85D	0.48D
Group II (SCCI)	0.75D- 1.50D	0.99D

TCCI= Temporal clear corneal incision
SCCI= Superior clear corneal incision

TABLE 4. INDUCED ASTIGMATISM

1 eye group of patients chi square = 0.000; df= 9
2 eyes group of patients chi square = 0.003; df= 6

No. of eyes of patients (1or 2)			Induced Astigmatism										Total
			0.25 D	0.56 D	0.85 D	0.75 D	0.45 D	0.35 D	0.55 D	1.00 D	1.50 D	1.25 D	
1	Surgical Approach	Temporal	6	6	12	9	17	9	16	0	0	0	75
		Superior	0	0	0	27	0	0	0	17	7	34	85
	Total		6	6	12	36	17	9	16	17	7	34	160
2	Surgical Approach	Temporal	4	3	6	0				0	0	0	13
		Superior	0	0	0	1				2	3	1	7
	Total		4	3	6	1				2	3	1	20

astigmatism obviously results in greater patient satisfaction because of better unaided post operative visual acuity. In Our study the difference in the amount of SIA between the two groups was significant.

This study shows that a temporal 3.2 mm incision hardly causes any astigmatism or induces any significant change in the existing preoperative astigmatism, i.e. less than 0.50 diopters. This correlates with a similar study carried out by S C Moon et al [17]. Similarly our results are certainly comparable to the other studies carried out with clear corneal incision [11, 18]. During cataract surgery, preferably incision in the steeper meridian should be the aim of a phaco surgeon to limit the SIA. Surgeons who are using superior approach may argue that the SIA via this approach can be reduced by giving a relatively posterior (scleral) incision. But as mentioned above clear corneal incision has many advantages which will not be gained if one gives a scleral incision. One may find temporal approach to be a bit difficult in the beginning. This is because of lack of support from the patient's forehead for surgeon's hands but with experience a surgeon can operate with equal ease using either approach.

CONCLUSION:

For a suture less clear corneal incision during cataract surgery, temporal approach results in considerably less amount of surgically induced astigmatism. Surgeons should use it in patients with no pre existing corneal astigmatism or patients with against the rule astigmatism (horizontal meridian more steeper). Superior clear corneal incision should only be used in those patients who have significant (1.5 D or more) with the rule astigmatism (vertical meridian more steeper).

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If I cut a faithful Muslim into pieces to make him hate me, he will not turn into my enemy and if I give all the wealth of this world to a hypocrite to make him my friend he will not befriend me. It is so because the Holy Prophet has said: " O Ali! No faithful Muslim will ever be your enemy and no hypocrite will ever be your friend."

Hazrat Ali (Karmulha Wajhay)