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"A Study On The Influence Of Incision At Steeper Meridian On Corneal Astigmatism In Manual Small Incision Cataract Surgery"

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Abstract
INTRODUCTION:
Cataract is the leading cause of blindness in India & worldwide. Surgically induced astigmatism (SIA) has added an entirely unique dimension to cataract surgery. Incision during surgery is considered the most important determinant of postoperative astigmatism deciding the prognosis.
MATERIAL AND METHODS: *A prospective interventional study was conducted among 350 patients attending ophthalmology OPD at Govt Medical College, Latur, and posted for Manual small incision cataract surgery (MSICS) during the study duration after obtaining consent and IEC approval. Based on the incision, patients were divided into three groups.*
RESULTS:
Most of the study participants were of the age group of 61-70 years. There was a statistically significant difference between the three groups with respect to the preoperative type of astigmatism at baseline (p<0.0001), BCVA postoperatively (p=0.0438), UCVA postoperatively (p=0.0257) with the visual acuity restored in almost all the cases postoperatively. There was a statistically significant reduction in astigmatism in the range of 0.75-1.0 D and 1.0-3.0 D in the Temporal incision group as compared to the other two groups (p=0.00394). There was a statistically significant difference in the ATR as well as WTR in the temporal incision group as compared to the other two incision groups (p=0.00000). There was no significant difference in the age distribution (p=0.508), gender distribution (p=0.1015), with respect to the diagnosis (p = 0.969), preoperative UCVA at baseline (p=0.667), preoperative BCVA at baseline (p=0.942) in between the three groups. There was no statistically significant difference in the keratometry reading at the horizontal or the vertical meridian between the groups on postoperative days 1, 7, and 40 (p=0.0732).
CONCLUSION:
The temporal group had the least amount of postoperative astigmatism as compared to the other two incision groups. Incision at a steeper meridian is a simple, safe, effective procedure to correct mild to moderate preoperative astigmatism at the time of cataract surgery. The temporal approach was better than the superior and supero-temporal types. Postoperative astigmatism also depends on preoperative astigmatism. Patients with pre-operative WTR astigmatism benefit from superior incision cataract surgery and preoperative ATR astigmatism may benefit from supero-temporal and temporal incisions.

Keywords: *Cataract, SIA, Temporal, Steeper Meridian, Supero-temporal.*

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I. INTRODUCTION:

Cataract is a global public health concern as the leading cause of blindness worldwide and poses significant socioeconomic burden .(1) At present, the main treatment modality for cataract is surgery and phacoemulsification is consideredas the advanced and technically superior method of cataract surgery.(2,3) Recently, manual small incision cataract surgery (MSICS) is the most popular surgical management option for cataracts in developing countries mainly due to its lower costs, short operative time, reduced dependence on technology, and equivalent visual outcome to phacoemulsification.(4–7)

However, with the advent of this modern cataract and intraocular implant surgery, the surgeon faces a

single most important challenge of being able to achievepredictable and accurate refractive outcomes.(8) The patient expectations have heightened with the recent progress in cataract surgery and having a good postoperative uncorrected visual acuity is considered normal.(9)

Within these expectations the main key is the control of postoperative astigmatism for meeting these patient expectations. Surgically induced astigmatism (SIA) has added an entirely unique dimension to cataract surgery with special emphasis on refractive aspect of surgery in present era.(9,10)

Over the years, a better understanding of preoperative and intraoperative determinants of SIA has made it possible to plan surgical intervention or modify it according to preoperative astigmatism in order to achieve minimal degree of SIA. Additionally, the present-day cataract surgeries aim at reducing or correcting the existing astigmatism along with cataract removal and IOL implantation.(11–13)

Naturally occurring astigmatism ranges from 7.5% to 75%. Pre-operative astigmatism is observed among more than 60% of the patients undergoing cataract surgery.(14) The magnitude of astigmatism ranges from 2 or more diopters (D) in 3% to15% cases and approximately more than 1.5 (D) in 15 % to 25% of cataract patients undergoing surgery.(15) Therefore, for preventing and reducing postoperative outcomes constant refinement of operative procedures and surgical techniques is needed.(16) With the advent of suture less small incision cataract surgery (SICS) the occurrence of SIA has significantly reduced and there is stabilization of postoperative refraction .(17)

Several methods to correct astigmatism during cataract surgery include 1) Astigmatic keratotomy 2) Incision at steeper meridian during surgery 3) Limbal relaxing incision 4) Corneal relaxing incision 5) Toric intraocular lenses. Incision during the surgery is being considered the most important determinant of postoperative astigmatismwhich can be modified in terms of size, shape, axis, location and direction in order to reduce the degree of postoperative astigmatism.(18)

Therefore, the type, location and configuration of the type of incision used for the cataract surgery determine the extent of postoperative astigmatism that also depends on the amount of pre-existing astigmatism.(19) In this context, the present study was designed to determine the effect of various types of incision like superior, temporal and supero- temporal incision depending on steeper axis and its effect on pre-existing astigmatism.

II. MATERIAL AND METHODS:

This is prospective study which was conducted among 350 patients attending ophthalmology OPD during January 2020 to June 2021 and posted forManual small incision cataract surgery (MSICS) at GMC Latur. Patients were selected through simple random sampling. After approval from the Ethics Committee and with written informed consent, the participants fulfilling the inclusion criteria and willing to give a written informed consent were included in the study. (Ref:151/2019)

INCLUSION CRITERIA:

1. Pre-existing corneal astigmatism.
2. Patients with uneventful cataract surgery.

EXCLUSION CRITERIA:

1. Patients without preexisting corneal astigmatism.
2. Patients with preexisting corneal pathology.
3. Patients with eventful surgery.
4. Patients who will not give consent for inclusion in study.

Cases were studied in reference to detail history and clinical examination, case proforma sheet was completed. Additionally, data on socio-demographic variables, disease symptoms and duration of disease pre-existing astigmatism and refractive errors was also obtained. This was followed by a careful and detailed ocular examination as well as clinical examination. All patients were subjected to detailed general and physical examination and preoperative fitness from anesthetist before the cataract surgery. Cataracts was classified based on Morphological classification.(20,21)Pre-operative examination included the following check-ups, investigations and preparations were done:

- Ocular examination including Visual Acuity,
- Slit lamp examination.
- Fundus examination
- Intra-ocular pressure measurement by tonometry
- Sac syringing
- Keratometry
- A- Scan biometry and IOL power calculation with immersion technique.

The following Investigations were done:

- Complete hemogram
- Blood sugar level
- Urine examination
- ECG

On the previous day of surgery patient's eyes were instilled with antibiotic drops. Dilatation of the pupil was done with Tropicamide and Phenylephrine drops every 10 minutes for 2 hours before surgery. Peribulbar block was given. During the surgical procedure, the eye to be operated was painted with 5% povidone iodine solution under all aseptic precautions and draped. Adequate anesthesia and akinesia by using local anesthesia was ensured. Then a wire speculumwas applied for exposing the eyeball. Superior rectus bridle sutures were applied for fixation of the eye. A fornix-based flap was mobilized and the underlying tenons were dissected. Light cautery was applied to the bleeders. A 6-6.5mm sclera tunnel incision was given. The incisions were centered at 12 o' clock, 1:30 o' clock and 3 o' clock for superior, superotemporal and temporal incisions respectively. The sclero-corneal tunnel made with crescent blade 0.5 mm - 1 mm into the clear cornea. Then a side port paracentesis was done to facilitate intraocular manipulations at 10 o' clock position in manual SICS. A 6-6.5 mm can opener or continuous curvilinear capsulorrhexis with a bent 26G needle was done after filling the anterior chamber with viscoelastic substance. Entry was made with 2.8 mm keratome. Hydro procedures were applied to delineate the nucleus from the capsule and cortex. Thereafter, the viscoelastic liquid was injected; the nucleus dialed and bought in the anterior chamber. It is then delivered using Vectis. This is followed by the aspiration of residual matter using simcoe cannula. A 6 mm PMMA PC-IOL was implanted in the bag using Mc Pherson IOL holding forceps and dialed in position. Conjunctiva was dragged to cover the wound with cautery. Post-operatively the operated eye was patched after giving subconjunctival injection of Gentamicin and Dexamethasone.

During the postoperative evaluation on Day 1, Day 7 and Day 40 the following was done:

- Uncorrected and Best corrected visual acuity
- Refraction
- Keratometry
- Slit lamp bio-microscopy to assess the wound site.
- Any complications in the course were noted and treated accordingly.

Data regarding preoperative and postoperative astigmatism was collected and compared in patients undergoing MSICS using the temporal and the superior incisions.

STATISTICAL METHOD:

Data was collected and compiled using Microsoft Excel 2013 and then analyzed using SPSS 23.0 version and Open Epi Software Version 2.3 by calculating frequency, percentage and for cross-tabulations between various parameters. The means and standard deviations (SD) were calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Pearson`s Chi-square test was used for statistical analysis.

Microsoft Word and Excel were used to generate graphs, figures and tables. Difference of proportions between the qualitative variables were tested using chi-squaretest or Fisher exact test as applicable. Percentage, odds ratio and 95% confidence interval were estimated, wherever necessary. The individual data sets were compared using an independent sample t-test. A brief interpretation was included in the results below every table and summarized at the end. Frequency (n) and percentage (%) of various responses in each group will be compared using chi squaretest. For numerical continuous data (following a normal curve) t test for inter group comparison will be used. Keeping alpha error at 5% and beta error at 20%, power at 80%, $p<0.05$ will be considered statistically significant. The mean difference of SIA between the 1^{st}, 7^{th} and 40^{th} day was statistically evaluated using paired *t*- test, and all the analyses were performed using SPSS 18.0 (SPSS Inc.) software.

III. RESULTS:

The present study was conducted at the Ophthalmology department of a tertiary care center among 350 cases of cataract who underwent MSICS usingincision at a steeper meridian at three different sites namely the superior, temporal and the supero-temporal, in order to study the postoperative induced astigmatism with the three types of incisions.

Majority of the study participants >30.0% belonged to the age group of 61-70years and >20.0% belonged to the age group of 71-80 years. The mean age for the **Superior Incision Group (Group A)** was 64.4 years with a standard deviation of 11.5 years, for the **Temporal Incision Group (Group B)** was 65.02 years ± 12.06 years and for the **Supero-temporal Group (Group C)** was 63.8 years ± 10.9 years. There was no significant difference in the age distribution of the three groups (p=0.508). The Group A had more males as compared to Group B; the distribution was equal in Group C. There was no significant difference in the gender distribution of the study participants across the groups (p=0.1015). There was no difference in the age and gender distribution (p=0.492), the diagnosis of the study participants (p = 0.969) across the groups. (Graph-1 & 2)

There was no statistically significant difference in between the three groups with respect to the preoperative - uncorrected visual acuity (UCVA) at baseline (p=0.667) and best corrected visual acuity (BCVA) at baseline (p=0.942). There was a statistically significant difference in between the three groups with respect to the preoperative type of astigmatism at baseline (p<0.0001). (Table-1) No statistically significant difference was seen in the keratometry readings inbetween the three groups at the K1 (p=0.0890) and the K2 (p=0.5311) meridians.

There was a statistically significant difference in the BCVA postoperatively (p=0.0438) and UCVA postoperatively (p=0.0257) with the visual acuity restored in almost all the cases postoperatively. (Table-2 & 3) There was no statistically significant difference in the Keratometry reading at the horizontal or the vertical meridian in between the groups at postoperative day 1, 7 and 40 (p=0.0732).

A statistically significant reduction in astigmatism in the range of 0.75-1.0 D and 1.0-3.0 D in the temporal incision group as compared to the other two groups (p=0.00394). (Table-4) There was a statistically significant difference in astigmatism against the rule (ATR) as well as with the rule (WTR) in thetemporal incision group as compared to the other two incision groups (p=0.00000). (Table-5)

IV. DISCUSSION:

The present study was conducted at the Ophthalmology department of a tertiary care center among 350 cases of cataract who underwent MSICS using incision at a steeper meridian at three different sites namely the superior, temporal and the supero-temporal, in order to study the post-operative induced astigmatism with the three types of incisions. Surgical induced Astigmatism after cataract surgery is a known complication since the advent of cataract surgery. Several factors like the size of the incision, its location, techniques and the suture materials used influence the amount of post-operative astigmatism.

The most popularly utilized method of cataract surgery is phacoemulsification. Though, it is an advanced and technically superior method of cataract surgery, it lacks cost effectiveness and may not always be a not conveniencechoice. MSICS is an alternative to phacoemulsification as it provides equivalent visual results to small incision cataract surgery albeit at a lower cost. It can be performed efficiently for larger number of cases with minimal equipment and is easier to perform even by novice surgeons. However, the larger incision in MSICS as against incision in phacoemulsification increases the risk of greater post-operative astigmatism in MSICS as compared to phacoemulsification. This may lead to restricted improvement in the postoperative visual acuity. In this context this comparative study was conducted to study the comparative effect of scleral incision at a steeper meridian depending upon the preoperative astigmatism at three different sites namely the superior, temporal and supero-temporal scleral incisions on existing and post-surgical astigmatism.

Minor degrees of astigmatism exist in the normal population. In our study out of the total 350 patients undergoing MSICS, 156 patients had ATR, 122 patients had WTR, and 72 patients had oblique astigmatism. Thus, the pre-operative astigmatic state shows that ATR astigmatism was the commonest type of astigmatism in the patients undergoing cataract surgery. This was also reported by studies conducted by Gokhale et al (22) and Yadav et al .(23) This may be a result of the reduction in the stiffness of the upper tarsal plate in aged population that is affected by cataract causing ATR. In younger people with healthy eyes the stiff upper tarsal plate causes pressure on cornea resulting in WTR but with increasing age this pressure gradually decreases resulting in against the rule astigmatism.

The location, shape and size of incision in MSICS influences the magnitude of postoperative Surgically Induced Astigmatism (SIA) as reported by the previously conducted studies.(24,25) In our study, majority of the cases >60.0% belonged to the age group of >60 years as also seen in the study by Sumathi et al(26) in which about 82.4% of the study group was above 50 years of age and preoperative ATR astigmatism was observed in 53.86%.

In our study, the magnitude of preoperative astigmatism was highest in the moderate (1.5-2 D) and the severe (> 2.0 D) group. This was comparable to other studies by Sumathi et al where it can be observed that 113

patients (86.7%) had mildastigmatism (<1.5 D) and 17 patients (13.3%) had moderate (1.5-2 D) to severe astigmatism (more than 2D) (26).

In our study there was a statistically significant improvement in the preoperative UCVA and BCVA in all the groups. This was similarly reported in the study by Gogate et al (27) in which the postoperative BCVA at 6 weeks was better than 6/18 in 98.5 % of eyes in the phacoemulsification group and 97.3% in the MSICS group . Kapoor et al (28) also showed a similar improvement in the postoperative BCVA which was more than or equal to 6/18 in 96 %. Post-operatively the number of patients having BCVA >6/12was similar in both the superior and temporal groups (84.3% versus 88%).

In the present study, here was a statistically significant reduction in Astigmatism in the range of 0.75-1.0 D and 1.0-3.0 D in the Temporal incision group as compared to the other two groups (p=0.00394). There was a statistically significant difference in the ATR as well as WTR in the temporal incision group as compared to the other two incision groups (p=0.00000). The reduction in ATR was significant in the temporal incision group (p=0.00000). Similar finding was there from the study by Gokhale and Sawhney , (2005), in which the SIA was minimal in the in the supero-temporal group (0.2 D) as compared to 0.37 D in the temporal group and1.28 D in the superior group.(22) Another study by Hashemi et al also reported a SIA of 1.57 D in the superior group, 0.53 D in the supero-temporal group and 0.435 D in the temporal group.(24)The incision site is of paramount importance as selection of the suitable site would lead to a reduction in the postoperative astigmatism.(29) The superior incision lies closer to the corneal apex as compared to a temporal incision and thus may havea greater effect on central corneal curvature. This along with the effect of gravity as well as the pressure exerted by the upper eyelids on the superior and supero-temporal incision may be a reason for greater surgically induced astigmatism. The SIA reported in our study was akin to that reported by Thomas et al and Mallik et al (28,29).

The superior approach in MSICS induces higher SIA than a temporal approachSICS. However, in the long term follow up studies, it has been observed to bestabilized by 4-6 weeks. It has also been noted that ATR astigmatism was commonly associated with superior group postoperatively and WTR astigmatism wascommon in the supero-temporal and temporal group.(30,31)Therefore, a pre-operatively WTR astigmatism of about -0.75 D may be beneficial for opting the superior approach and preoperative ATR astigmatism of around 0.5 D may be benefited by the supero-temporal and temporal approaches as also reported by other studies (22,32,33).

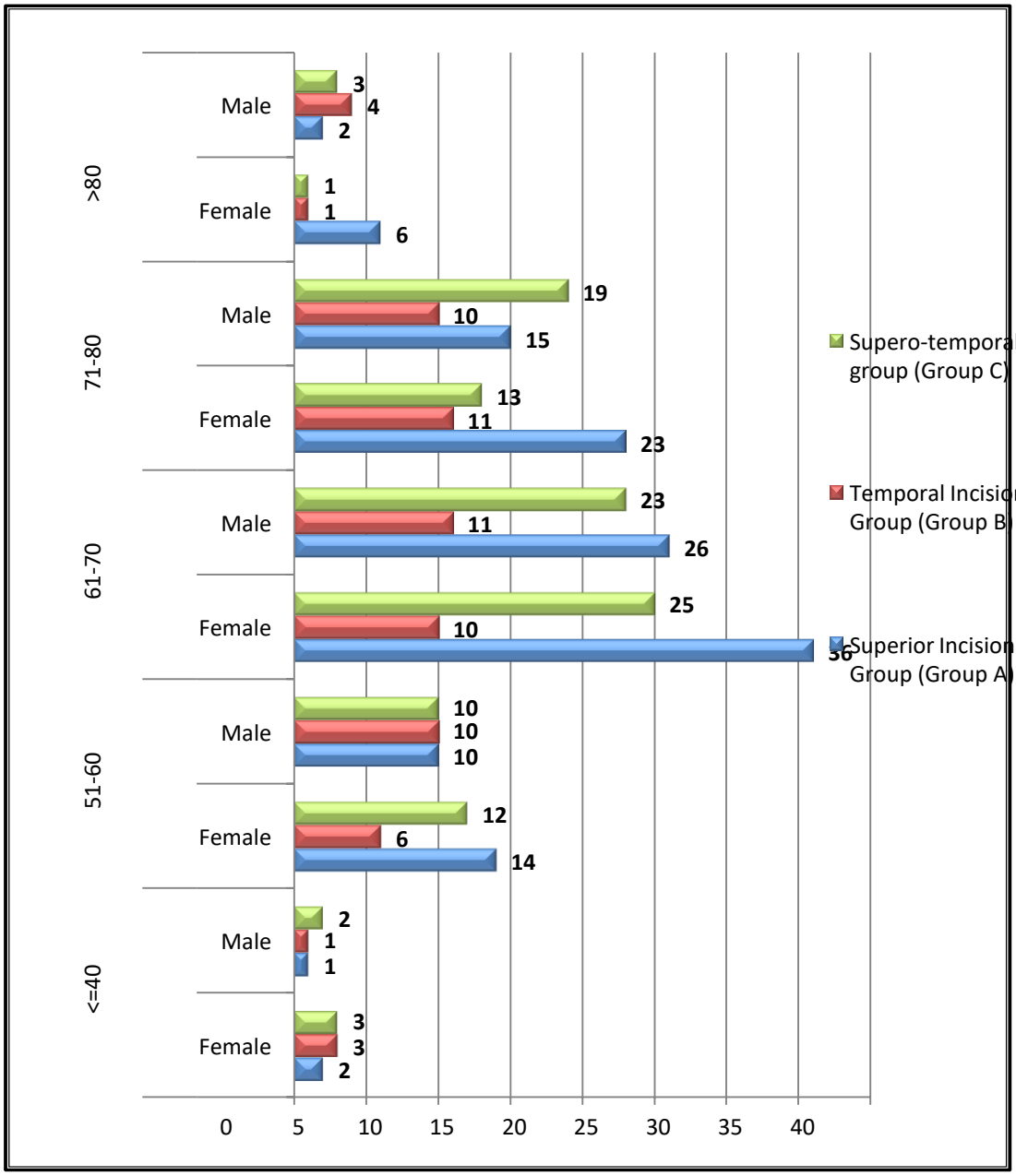
As observed in our study, the study by Sekharreddy et al, (32)also found that the supero-temporal incisions had a mean SIA of 0.8032 D ± 0.322, while the temporal incisions had a mean SIA of 0.3826 D± 0.142. There was a statistically significant reduction in SIA in temporal scleral incision group as compared to supero-temporal scleral incision group (P< 0.001). Similarly, the study done by Gokhale and Sawhneythat compared superior, supero-temporal, and temporal incisions, the highest SIA was observed in the superior incision group, whereas there is no statistically significant difference between supero-temporal and temporal incision groups with respect to postoperative SIA.(22) Similarly, the study by Pawar and Sindal et al concluded that temporal incision induces less astigmatism as compared to the supero-temporal incision; however, this difference was not statistically significant.(33)

Therefore, the temporal approach for MSICS yields better results with respect to the SIA in that there is a less degree of induced astigmatism. This may be because the temporal incision reduces preoperative ATR astigmatism, which is commonly observed in the elderly, who are more prone for developing cataract and thereby leads to a better uncorrected postoperative vision .(34) In our study, though SIA was significantly less in the temporal incision group, all the groups showed significant improvement in final uncorrected visual acuity. Therefore, we advocate the use of temporal scleral incision as it is easy to perform and is more cosmetically acceptable as it is covered by upper eyelid. This study has shown that the temporal MSICS induces lesser astigmatism as compared to the superior and supero-temporal approach.

V. CONCLUSION:

The temporal group had the least amount of postoperative astigmatism ascompared to the other two incision groups. Incision at steeper meridian is a simple, safe, effective procedure to correctmild to moderate preoperative astigmatism at the time of cataract surgery. The temporal approach was better than superior and supero-temporal types. The postoperative astigmatism also depends on preoperative astigmatism. Patients with pre-operative WTR astigmatism are benefited from superior incision cataract surgery and preoperative ATR astigmatism may benefit fromsupero-temporal and temporal incisions.

Graph 1: Age and Gender wise distribution of patients (n=350)



Graph 2: Distribution of cases according to the diagnosis (n=350)

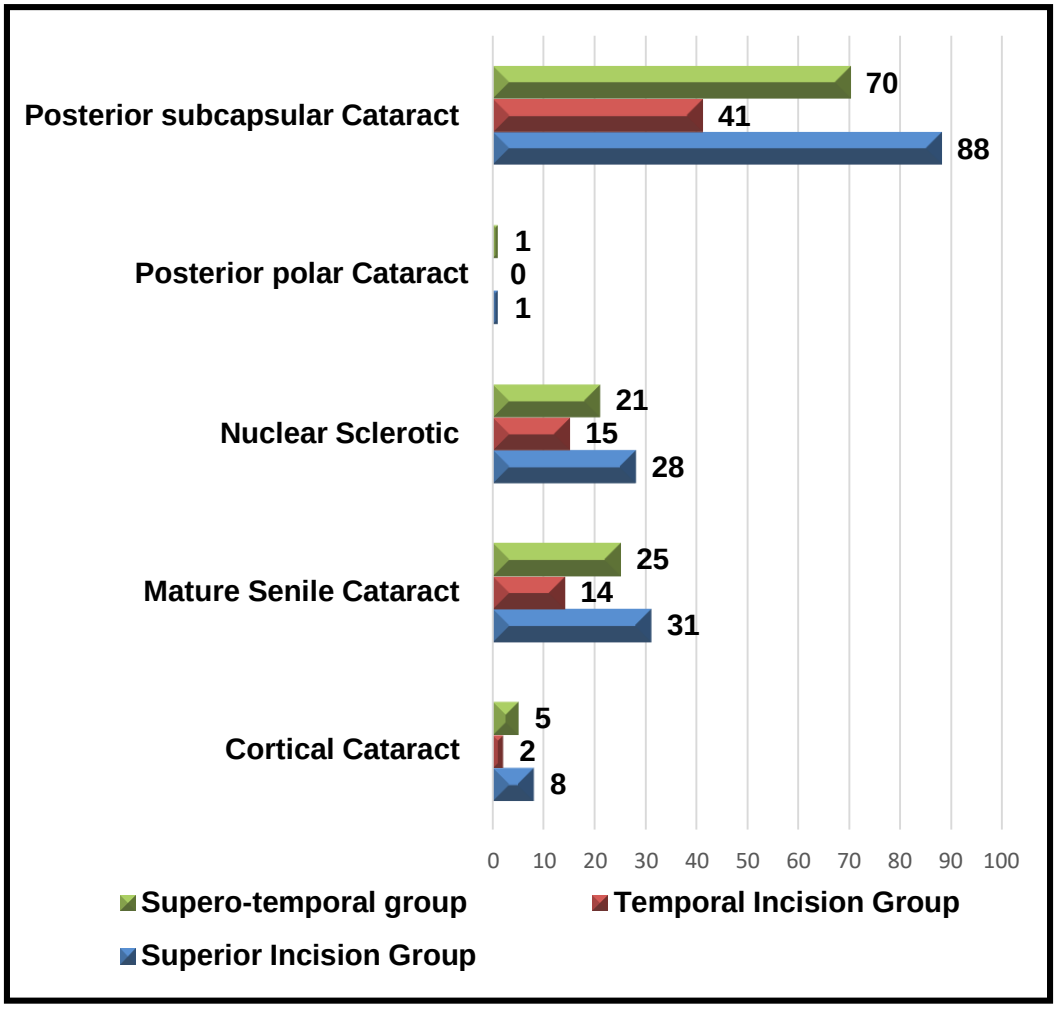


Table 1: Distribution of cases according to the type of preoperative Astigmatism(n=350)

Type of Astigmatism (D)	No of Eyes N (%)	Group A N (%)	Group B N (%)	Group C N (%)
ATR	156	156 (100)	0	0
Oblique	72	0	72 (100)	0
WTR	122	0	0	122 (100)

Pearson Chi^2 = 700.0000; Fisher's exact p < 0.0001

Table 2: Comparison of pre-operative UCVA with that on postoperative Day 1, 7 and 40 UCVA across the groups (n=350)

UCVA	Superior Incision Group(Group A) N (%)				Temporal Incision Group(Group B) N (%)				Supero-temporal Group(Group C) N (%)			
	Pre - op	Day 1	Day 7	Day 40	Pre - op	Day1	Day 7	Day 40	Pre -op	Day 1	Day 7	Day 40
Normal	0 (0)	122 (78.2)	156 (100)	156 (100)	0 (0)	54 (75)	72 (100)	72 (100)	0 (0)	81 (66.4)	121 (99.2)	122 (100)
Visual Impairment	29 (18.6)	34 (21.8)	0 (0)	0 (0)	15 (20.8)	18 (25)	0 (0)	0 (0)	26 (21.3)	41 (33.6)	1 (0.8)	0 (0)
SevereVisual Impairment	31 (19.9)	0 (0)	0 (0)	0 (0)	13 (18.1)	0 (0)	0 (0)	0 (0)	16 (13.1)	0 (0)	0 (0)	0 (0)

Blind	**96 (61.5)**	**0 (0)**	**0 (0)**	**0 (0)**	**44 (61.1)**	**0 (0)**	**0 (0)**	**0 (0)**	**80 (65.6)**	**0 (0)**	**0 (0)**	**0 (0)**

Table 3: Comparison of pre-operative BCVA with that on postoperative Day 1, 7and 40 BCVA across the groups (n=350)

	Superior Incision Group(Group A) N (%)				**Temporal Incision Group(Group B) N (%)**				**Supero-temporal Group(Group C) N (%)**			
BCVA	**Pre - op**	**Day 1**	**Day 7**	**Day 40**	**Pre - op**	**Day 1**	**Day 7**	**Day 40**	**Pre - op**	**Day 1**	**Day 7**	**Day 40**
Normal	**0 (0)**	**156 (100)**	**156 (100)**	**156 (100)**	**0 (0)**	**72 (100)**	**72 (100)**	**72 (100)**	**0 (0)**	**122 (100)**	**122 (100)**	**122 (100)**
Visual Impairment	**46 (29.5)**	**0 (0)**	**0 (0)**	**0 (0)**	**24 (33.3)**	**0 (0)**	**0 (0)**	**0 (0)**	**34 (27.9)**	**0 (0)**	**0 (0)**	**0 (0)**
SevereVisual Impairment	**37 (23.7)**	**0 (0)**	**0 (0)**	**0 (0)**	**15 (20.8)**	**0 (0)**	**0 (0)**	**0 (0)**	**28 (23)**	**0 (0)**	**0 (0)**	**0 (0)**
Blind	**73 (46.8)**	**0 (0)**	**0 (0)**	**0 (0)**	**33 (45.8)**	**0 (0)**	**0 (0)**	**0 (0)**	**60 (49.2)**	**0 (0)**	**0 (0)**	**0 (0)**
Total	**156 (100)**	**156 (100)**	**156 (100)**	**156 (100)**	**72 (100)**	**72 (100)**	**72 (100)**	**72 (100)**	**122 (100)**	**122 (100)**	**122 (100)**	**122 (100)**

Table 4: Comparison of amount of Pre- and Post-operative Astigmatismacross the groups (n=350)

Amount of Astigmatism (D)	**Superior Incision Group (GroupA) N (%)**				**Temporal Incision Group (GroupB) N (%)**				**Supero-temporal Group(Group C) N (%)**			
	Pre - op	**Day 1**	**Day 7**	**Day 40**	**Pre - op**	**Day 1**	**Day 7**	**Day 40**	**Pre - op**	**Day 1**	**Day 7**	**Day 40**
0.25-0.50	**0 (0)**	**14 (9)**	**71 (45.5)**	**65 (41.7)**	**0 (0)**	**5 (6.9)**	**35 (48.6)**	**27 (37.5)**	**0 (0)**	**10 (8.2)**	**40 (32.8)**	**61 (50)**
0.50-0.75	**0 (0)**	**41 (26.3)**	**45 (28.9)**	**52 (33.3)**	**0 (0)**	**29 (40.3)**	**27 (37.5)**	**33 (45.8)**	**0 (0)**	**20 (16.4)**	**34 (27.9)**	**29 (23.8)**
0.75-1.0	**1 (0.6)**	**35 (22.4)**	**19 (12.2)**	**24 (15.4)**	**0 (0)**	**24 (33.3)**	**7 (9.7)**	**8 (11.1)**	**3 (2.5)**	**31 (25.4)**	**25 (20.5)**	**14 (11.5)**
1.0-3.0	**155 (99.4)**	**66 (42.3)**	**21 (13.5)**	**15 (9.6)**	**72 (100)**	**14 (19.4)**	**3 (4.2)**	**4 (5.6)**	**119 (97.5)**	**61 (50)**	**23 (18.9)**	**18 (14.8)**

$X^2 = 15.562$; p =0.00394

Table 5: Comparison of Types of Pre and Post-operative Astigmatism acrosthe groups (n=350)

Type of Astigmatism (D)	**Superior Incision Group (Group A)N (%)**				**Temporal Incision Group (Group B)N (%)**				**Supero-temporal Group(Group C) N (%)**			
	Pre -op	**Day 1**	**Day 7**	**Day 40**	**Pre - op**	**Day 1**	**Day 7**	**Day 40**	**Pre -op**	**Day 1**	**Day 7**	**Day 40**
ATR	**156 (100)**	**152 (97.4)**	**146 (93.6)**	**143 (91.7)**	**0 (0)**	**0 (0)**	**1 (1.4)**	**0 (0)**	**0 (0)**	**4 (3.3)**	**4 (3.3)**	**2 (1.6)**
Oblique	**0 (0)**	**4 (2.6)**	**2 (0.6)**	**0 (0)**	**72 (100)**	**66 (91.7)**	**58 (79.2)**	**59 (81.9)**	**0 (0)**	**8 (6.6)**	**8 (6.6)**	**2 (1.6)**
WTR	**0 (0)**	**0 (0)**	**0 (0)**	**1 (0.6)**	**0 (0)**	**6 (8.3)**	**12 (16.7)**	**9 (12.5)**	**122 (100)**	**110 (90.2)**	**108 (88.5)**	**110 (90.2)**
NA	**0 (0)**	**0 (0)**	**8 (5.1)**	**12 (7.7)**	**0 (0)**	**0 (0)**	**1 (1.4)**	**4 (5.6)**	**0 (0)**	**0 (0)**	**2 (1.6)**	**8 (6.6)**

$X^2 = 1.642$; p =0.00000

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