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To evaluate surgically induced astigmatism after Phacoemulsification surgery by temporal clear corneal incision v/s superior clear corneal incision

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ABSTRACT

Aim: To evaluate surgically induced astigmatism after Phacoemulsification surgery by temporal clear corneal incision v/s superior clear corneal incision.

Material and Methods: The present randomised control trial was conducted in Department of Ophthalmology Mahatma Gandhi Medical College & Hospital, Jaipur from March 2021 to June 2022. Ethical approval was obtained from institutional research ethics committee before the start of study. All Opd patients diagnosed with cataract who underwent phacoemulsification surgery; age group of more than 40 years were randomly divided into 2 groups i.e. Group 1 (who underwent temporal clear corneal incision) and Group 2 (who underwent superior clear corneal incision). A comprehensive ophthalmic examination, including best corrected visual acuity, slit-lamp examination, IOP measurement, fundus examination, pre-operative astigmatism was measured by auto refractokeratometer on all participants. Patients of immature senile cataract were graded according to LOCS II system.The phacoemulsification surgery is performed by Zeiss Visalis 100 phacoemulsification system.A detailed post-operative examination of patients is done on 1st day, 3 weeks and 6 weeks. Examination including checking visual acuity, keratometry, ophthalmoscopy (direct, indirect and slit lamp biomicroscopy) was done.

Results: Mean AST was found to be more in group A (superior incision) as compared to group B (temporal incision) with statistically significant difference. ATR was revealed more in group A as compared to group and it was found to be statistically significant after 3 and 6 weeks of operation.

Conclusion: To conclude, temporal corneal incision after Phacoemulsification produces lesser surgically inducedastigmatism as compared to superior corneal incision.

Keywords: SIA, Phacoemulsification, Temporal Clear Corneal Incision, Superior Clear Corneal Incision

I. INTRODUCTION:

Cataract is the most important and significant cause of blindness in senile age group, both in India as well as in the world[1,2].Surgery is the only definitive treatment for cataract. Cataractsurgery has evolved from couching to present day microincision phacoemulsification. Alltechniques of cataract extraction are meant for giving the best unaided visual acuity and early post-operative rehabilitation[3].

In the evolution of cataract surgery, Manual small incision cataract surgery(MSICS) was alater addition, much after phacoemulsification. It is neither a hi-tech procedure, nor is it practiced in western countries. For that matter, MSICS remains a foreign technique to a large section of the ophthalmic fraternity in the modern world. MSICS was developed mainly as the cost-effective alternative to phacoemulsification cataract surgery. Average cost of phacoemulsification surgery per case is Rs. 1978.89 and that of MSICS is Rs 720.99[4]. TheWestern world graduated from extracapsular cataract extraction to phaoemulsification. In developing countries where cost is a major issue, MSICS was developed after the advent ofphacoemulsification, and hence it is relatively younger technique than the latter. It is a safe,simple, consistent, stable, and cost effective way of cataract removal and lens implantion[5].

Small incision cataract surgery technique (SICS), is the first choice and alternative to phacoemulsification, as it does not require the high tech phaco machine neither conventional large incision of ECCE and is cost effective[6]. Hence it is ideal for mass surgery in camps, allgrades of cataract including grade IV-V hard cataracts and the technique is easyto learn.Self-sealing cataract incisions were mentioned by Kratz et al[7] in 1980 and by Girard in 1984[8], 1995[9]. Kratz thought of corneal tunnel as an astigmatic neutral way of entering the anterior chamber.

Location of incision preoperatively is decided by the keratometric readings of the patient,temporal location is farthest from the visual axis, and any flattening due to wound is less likely

International Journal Dental and Medical Sciences Research
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to affect the corneal curvature at the visual axis. When incision is located superiorly, both gravity and eyelid blink tend to create a drag on the incision. These forces are better neutralizedwith temporal incision because it is parallel to the vector of the forces. With-the-rule astigmatism induced by a temporal incision is advantageous because most elderly patients havepreoperative against-the-rule astigmatism[10].

Supero- temporal incision is also free from the effect of gravity and eye lid pressure and tends to induce less astigmatism.[10]A number of studies have shown that surgically induced astigmatism, particularly against the rule(ATR) astigmatism is the commonest cause of unsatisfactory UCVA after cataract surgery[11]. Astigmatism is a condition of refraction wherein a point focus of light cannot be formed upon the retina, due to unequal refraction of light in different meridian[12,13].

In our study, we compared the SIA in clear corneal phacoemulsification by temporal approach, with superior approach. Comparisons between SIA of the two incisions were done using keratometric and autorefractor readings of preoperative and postoperative refractive changes.

II. MATERIAL AND METHODS:

The present randomised control trial was conducted in Department of Ophthalmology Mahatma Gandhi Medical College & Hospital, Jaipur from March 2021 to June 2022. Ethical approval was obtained from institutional research ethics committee before the start of study. All Opd patients diagnosed with cataract who underwent phacoemulsification surgery; age group of more than 40 years were randomly divided into 2 groups:
Group 1 included all cases who underwent temporal clear corneal incision.
Group 2 included all cases who underwent superior clear corneal incision.

Inclusion Criteria

1) All cataract cases undergoing phacoemulsification surgery in ophthalmology department at Mahatama Gandhi Medical College and Hospital
2)Age more than 40 years.
3) The inclusion criteria was diagnosis of cataract with regular corneal astigmatism ranging from 0.50–3.50 D (as determined via an auto-keratometer).

Exclusion Criteria:

1) Ocular Surface Disease
2) Patient with any other ocular disorder- pterygium, glaucoma, uveitis, disorders of the lids, disorders of nasolacrimal pathways, ocular allergies.
3) Contact lens wearers
4) Patients with a history of previous ocular surgery, surgical complications, or any corneal or macular pathology, and poor fixation.
5) Cases involving severe dry eye were also excluded.
6) Patient with ocular viral or bacterial infection.
7) Patients who did not give the consent for study.
8) Patients with systemic diseases
9) Pregnant female.
10) Amblyopic patients.

Procedure:

- Patients were selected based on the inclusion and exclusion criteria.
- Informed consent was obtained from all subjects after the nature of the study was explained to them.
- A comprehensive ophthalmic examination, including best corrected visual acuity, slit-lamp examination, IOP measurement, fundus examination, pre- operative astigmatism was measured by auto refractokeratometer on all participants. Patients of immature senile cataract were graded according to LOCS II system.
- The patients were divided into group A and group B. Group A consist of temporal clear corneal incision and group B consist of superior clear corneal incision.
- Correlation of all data was done.

Ocular Examination:

Patients were admitted one day prior to the surgery. Detailed history was taken of each patients and thorough anterior segment examination was performed using slit lamp. VA was checked with Snellen's visual acuity chart and pinhole improvement was noted. After pupillary dilatation, detailed fundus examination by direct ophthalmoscopy and indirect ophthalmoscopy and slit lamp bimicroscopy was done, lenticular opacity was assessed and graded according to LOCS II system. Intra ocular pressure was measured with Schiotz tonometer/Non-Contact Tonometer (Topcon computerised tonometer CT-80) and patency of lacrimal system was checked. Keratometry was carried out using the Topcon Auto- kerato refractometer KR-8900. Axial length is measured by A-scan unit (PacScan plus, digital biometric ruler) and intra ocular lens power was

International Journal Dental and Medical Sciences Research
Volume 5, Issue 3, May - June 2023 pp 159-167 www.ijdmsrjournal.com ISSN: 2582-6018

calculated using SRK II formula. Routine investigations was done to rule out diabetes, hypertension.

All patients received antibiotic eye drops hourly one day before the surgery. All patients received oral antibiotic, ciprofloxacin 500 mg twice daily or ofloxacin 200 mg twice daily for three days starting from the day of surgery. Preoperative adequate mydriasis is achieved with instillation of Tropicamide 0.8% with phenylephrine 5% and flurbiprofen 0.03% eye drops one hour prior to surgery for every 15 minutes. All cases were done under local peribulbar anaesthesia. Under aseptic precautions eye was draped, a wire speculum is placed and superior rectus bridle suture passed and clamped to the towel.

Procedure of phacoemulsification by different incision:-

The phacoemulsification surgery is performed by Zeiss Visalis 100 phacoemulsification system.

Steps of superior clear corneal phacoemulsification: The eye is cleaned externally by 5 to 10% povidine iodine lotion applied to skin of the eyelids and allowed to dry. A spirit swab can additionally be used to clean the area again. One drop of 0.5% povidine iodine is instilled in conjuctival culd sac and left for sometime to remove local saprophytical flora. A self adhesive sterile surgical eye drape is applied on skin and around the eyelids, cut transversely over the palpebral aperture and folded over the edges making sure that eyelashes are tucked underneath before inserting the eye speculum. Initial superior clear corneal biplaner incision(2.8 mm) given just anterior to the limbus is given.

Main valvular incision is made using keratome, one or two side ports are made for bimanual control or manipulations using lancetip (15 degree blade). Then anterior chamber is filled with viscoelastic, after this anterior chamber opening is made in anterior capsule of the lens known as Capsulotomy. A continuous curvilinear capsulorrhexis using 26 guage needle is made.

Tryphan blue dye (Rhex ID) is used to stain the anterior lens capsule for better visibility. A bubble of air injected in the anterior chamber and underneath that bubble of air,tryphan blue dye is injected over the anterior lens capsule and spread evenly on the surface of it.The bubble and dye is then irrigated and then filled with viscoelastic preparing for capsulorrhexis.

After completing capsulotomy, a fine 27 gauge blunt tipped canula is used to inject BSS in anterior chamber to separate capsule from cortex termed as hydrodissection.

The nucleus is emulsified using phaco machine (zeiss model) which provides energy to emulsify nucleus and generates vaccuum to aspirate the cortical matter. Residual cortical matter is aspirated manually by simcoe irrigation aspiration canula or automated irrigation – aspiration probe.Before the implanting rigid PCIOL the initial 2.8mm incision is enlarged to 5.2mm incision.Finally the rigid PCIOL is implanted in the bag.

Steps of Temporal clear corneal phacoemulsification:All the steps are similar to superior clear corneal phacoemulsification apart from the following steps:

a. Initial temporal clear corneal biplaner incision(2.8 mm) given just anterior to the limbus is given.
b. Main valvular incision is made using keratome, one or two side ports are made for bimanual control or manipulations using lancetip (15 degree blade).
c. Then anterior chamber is filled with viscoelastic, after this anterior chamber opening is made in anterior capsule of the lens known as Capsulotomy. A continuous curvilinear capsulorrhexis using 26 guage needle is made.

Before the implanting rigid PCIOL the initial 2.8mm incision is enlarged to 5.2mm incision.Finally the rigid PCIOL is implanted in the bag.

Post-Operative Examination:A detailed post-operative examination of patients is done on 1st day, 3 weeks and 6 weeks. Examination including checking visual acuity, keratometry, ophthalmoscopy (direct, indirect and slit lamp biomicroscopy) was done.

With the help of auto refracto-keratometer pre-operative with the rule and against the rule astigmatism and; post-operative with the rule and against the rule astigmatism will be measured.

At the end of 6 weeks a final best corrected subjective refraction is to be performed and the spectacles are prescribed. All changes in keratometry readings are recorded and tabulated for each corresponding follow up period.

Data was collected and subjected to statistical analysis.

III. STATISTICAL ANALYSIS:

Data so collected was tabulated in an excelsheet, under the guidance of statistician.The means and standard deviations of the measurementsper group were used for statistical analysis (SPSS 22.00 for

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windows; SPSS inc, Chicago, USA).For each assessment point, data were statisticallyanalyzed using one way ANOVA. Difference between two groups was determined using student t-test as well as chi square test and the levelof significance was set at $p < 0.05$.

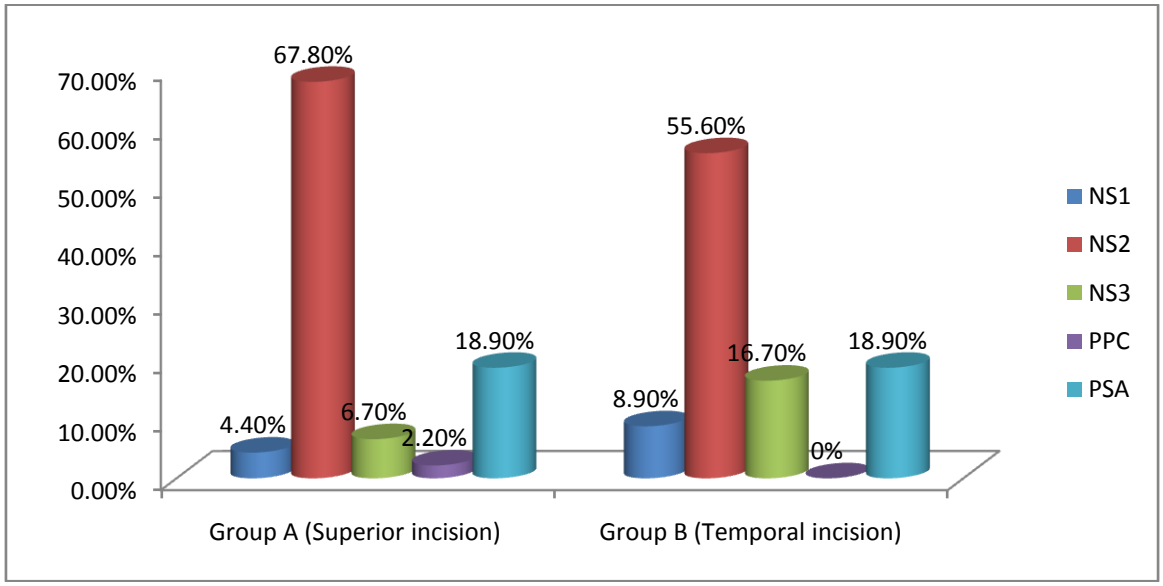
IV. RESULTS:

The subjects were randomly divided into two groups i.e. group A (Superior incision) and group B (Temporal incision). Approximate equal number of males and females were taken in both the groups to rule out any bias in relation to gender. Mean age in group A and B was 64.38±7.79 and 65.33±7.53 years respectively (table 1).In group A and B, equal number of right and left eye was operated among both the groups with statistically insignificant difference.

Table 1: Demographic data among the study groups

Variables	Group A (Superior incision)		Group B (Temporal incision)		p value
	N	%	N	%	
Gender					
Male	57	63.3	54	60	0.87
Female	33	36.7	36	40	
Age (in years)					
41-50	6	6.67	5	5.56	0.52
51-60	28	31.11	23	25.56	
61-70	40	44.44	48	53.33	
>70	16	17.78	14	15.56	
Mean±SD	64.38±7.79		65.33±7.53		0.40

In our study, most common type of cataract was NS2 followed by PSA in both the groups (graph 1).



Graph 1: Type of cataract among the study groups

Mean K1 at preop, postop day 1, 3 weeks and 6 weeks was 45.13±1.75, 45.52±1.90, 45.34±1.81, 45.22±1.77 and 45.19±1.89, 45.279±1.18, 45.21±1.44, 45.16±1.58 in group A and B respectively. When inter and intra-comparison was done among group A and B in relation to K1 and K2 at different intervals using Anova test, it was found to be statistically insignificant as $p>0.05$ (table 2).

International Journal Dental and Medical Sciences Research
Volume 5, Issue 3, May - June 2023 pp 159-167 www.ijdmsrjournal.com ISSN: 2582-6018

Table 2: K1 and K2 at different intervals among the study groups

K1: Intervals	Group A (Superior incision)		Group B (Temporal incision)		p value (t Test)
	Mean	SD	Mean	SD	
Preop	45.13	1.75	45.19	1.89	0.81
Postop Day 1	45.52	1.90	45.27	1.18	0.34
3 Weeks	45.34	1.81	45.21	1.44	0.62
6 Weeks	45.22	1.77	45.16	1.58	0.85
p value (Anova Test)	0.11		0.28		
K2: Intervals					
Preop	44.45	1.74	44.94	1.69	0.54
Postop Day 1	44.47	1.71	44.84	1.54	0.32
3 Weeks	44.62	1.65	44.50	4.62	0.82
6 Weeks	44.76	1.63	45.04	1.63	0.24
p value (Anova Test)	0.08		0.17		

Mean AST was found to be more in group A (superior incision) as compared to group B (temporal incision). Mean AST at preop, postop day 1, 3 weeks and 6 weeks was 1.06±0.76, 1.45±0.65, 0.98±0.42, 0.64±0.27 and 1.04±0.64, 1.16±0.61, 0.69±0.46, 0.42±0.29 in group A and B respectively. When inter was done among group A and B in relation to K1 at different intervals using t test, it was found to be statistically significant at all the intervals viz.postop day 1, 3 weeks and 6 weeks as $p<0.05$ (table 3).

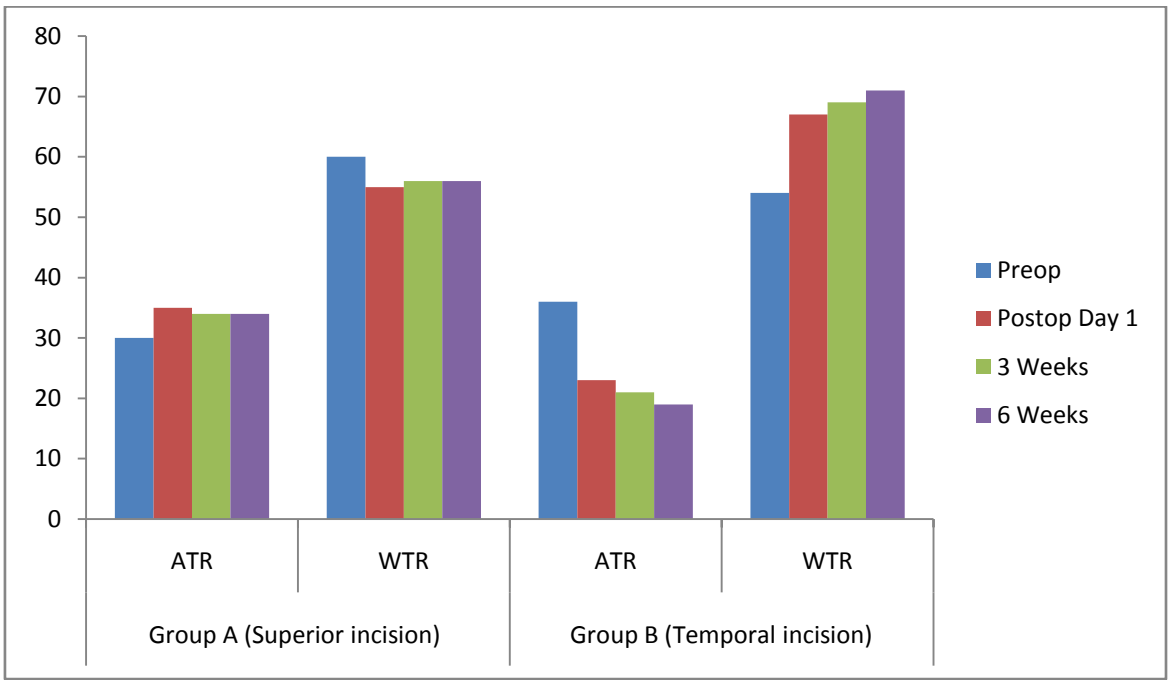
Table 3: AST at different intervals among the study groups

AST: Intervals	Group A (Superior incision)		Group B (Temporal incision)		p value (t Test)
	Mean	SD	Mean	SD	
Preop	1.06	0.76	1.04	0.64	0.81
Postop Day 1	1.45	0.65	1.16	0.61	0.002*
3 Weeks	0.98	0.42	0.69	0.46	<0.01*
6 Weeks	0.64	0.27	0.42	0.29	<0.01*
p value (Anova Test)	0.007*		0.04*		

*: statistically significant

AST viz. ATR (against the rule) and WTR (with the rule) was found in 30, 35, 34, 34 and 60, 55, 56, 56 subjects of group A respectively. AST viz. ATR (against the rule) and WTR (with the rule) was found in 36, 23, 21, 19 and 54, 67, 69, 71 subjects of group B respectively. Hence ATR was revealed more in group A as compared to group and it was found to be statistically significant after 3 and 6 weeks of operation (graph 2).

International Journal Dental and Medical Sciences Research
Volume 5, Issue 3, May - June 2023 pp 159-167 www.ijdmsrjournal.com ISSN: 2582-6018



Graph 2: Type of AST among the study subjects

Mean UCVA at preop, postop day 1, 3 weeks and 6 weeks was 0.88±0.47, 0.87±0.46, 0.74±0.44, 0.49±0.31 and 0.86±0.47, 0.80±0.45, 0.67±0.42, 0.43±0.27 in group A and B respectively. Mean BCVA at preop, postop day 1, 3 weeks and 6 weeks was 0.88±0.47, 0.87±0.46, 0.74±0.44, 0.49±0.31 and 0.86±0.47, 0.80±0.45, 0.67±0.42, 0.43±0.27 in group A and B respectively. When intra-comparison was done among group A and B in relation to UCVA and BCVA at different intervals using Anova test, it was found to be statistically significant as $p<0.05$. Statistically significant difference was found among group A and B after one day and 3 weeks of operation as $p<0.05$ w.r.t. BCVA (table 4).

Table 4: UCVA and BCVA at different intervals among the study groups

UCVA	**Group A (Superior incision)**		**Group B (Temporal incision)**		**p value (t Test)**
	Mean	**SD**	**Mean**	**SD**	
Preop	.88	.47	.86	.47	0.78
Postop Day 1	.87	.46	.80	.45	0.35
3 Weeks	.74	.44	.67	.42	0.22
6 Weeks	.49	.31	.43	.27	0.11
p value (Anova Test)	0.04*		0.03*		
BCVA					
Preop	1.09	.61	.86	.24	0.19
Postop Day 1	.91	.38	.80	.45	<0.01*
3 Weeks	.81	.38	.67	.39	<0.01*
6 Weeks	.57	.42	.44	.19	0.09
p value (Anova Test)	0.02*		0.04*		

*: statistically significant

Intra-op complications was comparable in both the groups as $p>0.05$. Intra-op complications viz. Grade 1 reaction, oedema and SKS was reported in 2.22%, 6.67%, 7.78% and 2.22%, 8.89%, 5.56% of the subjects in group A and group B respectively.

International Journal Dental and Medical Sciences Research
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V. DISCUSSION:

Conventional extracapsular cataract surgery (ECCE),manual small incision cataract surgery (MSICS) andphacoemulsification are the three most popular forms ofcataract surgery in India and rest of the world[14]. Thoughthere are various techniques of surgeries, the manualsmall incision cataract surgery (SICS) technique was usedpredominantly in India, due to its cost effectiveness[15] andits less dependency in technology[16], as per alcon's phacodevelopment program, "India has among the world'shighest proportion of blind people (numbering nearly 12million) against 36 million globally which makes Indiahome to one-third of the world's blind population[17]. Astigmatism following cataract surgery consists of two components: preoperative astigmatism, which is intrinsic to the patient, and surgically induced astigmatism (SIA), which is a result of the procedure[17].In order to achieve an excellent visual acuity, the effect of astigmatism on the postoperative vision has to minimize.The aim of the study was to evaluate surgically induced astigmatism after Phacoemulsification surgery by temporal clear corneal incision v/s superior clear corneal incision.

Approximate equal number of males and females were taken in both the groups to rule out any bias in relation to gender. Maximum number of subjects from the age group of 61-70 years followed by 50-60 years among both the groups. Mean age in group A and B was 64.38±7.79 and 65.33±7.53 years respectively in this study. Similar distribution of age was reported by Malik VK et al in their study[18]. Machireddy R. Sekharreddy et al[19] in their study found that there was a near equal distribution with slightmale preponderance among the patients getting admitted.This is easily explained by the fact that senile cataract doesnot show any gender predisposition.Most of the cases in thisstudy fall in the age group of 51–60 years. This could be dueto increasing awareness among the patients regarding thebenefits of cataract surgery[20,21].

Mean K1 at preop, postop day 1, 3 weeks and 6 weeks was 45.13±1.75, 45.52±1.90, 45.34±1.81, 45.22±1.77 and 45.19±1.89, 45.279±1.18, 45.21±1.44, 45.16±1.58 in group A and B respectively. When inter and intra-comparison was done among group A and B in relation to K1 at different intervals using Anova test, it was found to be statistically insignificant as p>0.05. Mean K2 at preop, postop day 1, 3 weeks and 6 weeks was 44.45±1.74, 44.47±1.71, 44.62±1.65, 44.76±1.63 and 44.94±1.69, 44.84±1.54, 44.5±4.62, 45.04±1.63 in group A and B respectively. When inter and intra-comparison was done among group A and B in relation to K2 at different intervals using Anova test, it was found to be statistically insignificant as p>0.05. Mean AST was found to be more in group A (superior incision) as compared to group B (temporal incision). Mean AST at preop, postop day 1, 3 weeks and 6 weeks was 1.06±0.76, 1.45±0.65, 0.98±0.42, 0.64±0.27 and 1.04±0.64, 1.16±0.61, 0.69±0.46, 0.42±0.29 in group A and B respectively. When inter was done among group A and B in relation to K1 at different intervals using t test, it was found to be statistically significant at all the intervals viz.postop day 1, 3 weeks and 6 weeks as p<0.05 in this study.

Similar results were reported by Malik VK et al[18] in their study. They revealed that the mean SIA in superior incision group was found to be 1.45 ±0.7387 and in temporal incision was 0.75± 0.4067 with statistically significant difference. It can be explained by the fact that temporal location is farthest from the visual axisand any flattening due to the wound is less likely toaffect the corneal curvature at the visual axis. Whenthe incision is located superiorly, both gravity andeyelid blink tend to create a drag on the incision these forces are neutralized better with temporallyplaced incisions because the incision is parallel tothe vector of the forces. With the rule astigmatisminduced by a temporal incision is advantageousbecause most elderly cataract patients have preoperativeagainst the rule astigmatism.R Santhanalakshmi et al[17] revealed similar results too i.e. the meanSIA in temporal group was found to be 0.53294 ± 0.6207,in superior group, it was 0.81505± 1.0278. p value suggests the differencebetween the lateral technique and superior technique issignificant, superior technique is having more number ofsurgically induced astigmatism compared to temporal technique.

In2014 Hemlata Yadav[22] compared theastigmatism induced by a superior (onaxis) incisionversus temporal incision in manual SICS in eyes withpreoperative "with the rule" corneal astigmatism, shefound SIA was significantly lower in the temporal groupcompared to that in the superior group, later in 2016Srinivas M et al[16] reported temporal straight incision isrecommended in patients with lower preoperativeastigmatism as it provides less surgically induced astigmatism as compared to superior straight incision. Laterin 2017 Rohit Saxena et al[20] evaluated inducedastigmatism and visual outcome after manual SICS usingtwo different incision sites "Superior vs. Temporal" andfound out temporal

incision will be preferred oversuperior incision, all these studies confirms the findingsof our studies.

In study by Gokhale et al[10], SIA vector insuperior group was 1.28D, 0.2D in superotemporaland 0.37D in temporal group.Our study alsoshowed similar results.A study by Satyajeet Pawar and Sindal[23]concluded that temporal incision induces less astigmatismcompared to superotemporal incision, but the difference was notstatistically significant. The temporal approach for SICS has yielded excellentresults in some studies and has the advantage that it induces lesser astigmatism. As mentioned earlier, this is mainlybecause it reduces the preoperative ATR astigmatism whichis more common in the elderly, who are more cataract proneand thereby provides a better uncorrected postoperativevision. However, certain points work against the temporalapproach, the major disadvantage being a higher risk ofbacterial endophthalmitis associated with the temporal approach.

Mean UCVA at preop, postop day 1, 3 weeks and 6 weeks was 0.88±0.47, 0.87±0.46, 0.74±0.44, 0.49±0.31 and 0.86±0.47, 0.80±0.45, 0.67±0.42, 0.43±0.27 in group A and B respectively. Mean BCVA at preop, postop day 1, 3 weeks and 6 weeks was 0.88±0.47, 0.87±0.46, 0.74±0.44, 0.49±0.31 and 0.86±0.47, 0.80±0.45, 0.67±0.42, 0.43±0.27 in group A and B respectively. When intra-comparison was done among group A and B in relation to UCVA and BCVA at different intervals using Anova test, it was found to be statistically significant as $p<0.05$. Statistically significant difference was found among group A and B after one day and 3 weeks of operation as $p<0.05$ w.r.t. BCVA. Our results were in accordance with study done by Harshavardhan Reddy et al[24]. They found that post-operative unaided visual acuity in the temporal incision group was 0.20±0.15 as compared to the superior incision group which wasfound to be 0.46±0.15. The difference in the unaidedvisual acuity in both groups was found to besignificantly different at POD1 and at 6 weeks.Another study by Srinivas M Ganagi et al[16] foundlesser post-operative astigmatism and better visualacuity was seen in those with temporal straight incision as compared to those who underwent manualSICS with superior corneal straight incision. In a study by Kavita Bhatnagar et al[25], both groups had comparable UCVA and BCVA postoperatively. Thus, choosing a proper site of incision preoperatively can lead to significant improvement in both UCVA and BCVA after cataract surgery.

Limitations of this study include the small sample size andlack of long term follow up. It can be said from the results of the present study that temporal incision is free from the effect of gravity and eyelid pressure and it tends to induce less astigmatism. This study found that the induced astigmatism was lower in the temporal groups as compared to that in the superior group.

VI. CONCLUSION:

To conclude, temporal corneal incision after Phacoemulsification produces lesser surgically inducedastigmatism as compared to superior corneal incision and the pre-existing against the rule astigmatismwhich iscommonly seen in elderly patients getsnullified through a temporal incision while the samegets worsened with a superior incision leading tobetter post-operative unaided visual acuity with atemporal incision.However, these findings can befurther cemented by conducting a study at a largerscale with a bigger sample size.

REFERENCES

[1]. Pascolini D, Mariotti SP. Global estimates of visual impairment: 2010. British Journal of Ophthalmology. 2012;96(5):614-8.

[2]. Rao GN, Raman U, Marg LP, Hills B. The Goals of VISION 2020: The Right to Sight.

[3]. Beltrame G, Salvetat M, Chizzolini M, Driussi G. Corneal topographic changes induced by different oblique cataract incisions. J Cataract Refract Surgery 2001;27:720-727.

[4]. Gogate PM, Deshpande M, Wormald RP. Is manual small incision cataract surgery affordable in developing countries? A cost comparison with extra-capsular cataract extraction, Br. Journal of Ophth.2003; 87:843-6

[5]. Haldipurkar SS, Shikari HT, Gokhale V. Wound construction in manual small incision cataract surgery. Indian Journal of Ophthalmology. 2009;57(1):9-13.

[6]. Kratz RP,Colvard DM, Mazzocco TR. Clinical evaluation of the terry keratometer. Am Intraocular Implant Soc J 1980;6:249-51

[7]. Girard LJ, Hofmann RF. Scleral tunnel to prevent induced astigmatism. In: Emery JM, Jacobson AC, editors. Current concepts in cataract surgery: Proceedings of the eight biennial cataract surgical

congress, Norwalk. Appleton-Century-Crofts; 1984. pp. 101–2.
[8]. Girard LJ. Origin of the Scleral tunnel incision. J Cataract Refract Surg. 1995;21:7.
[9]. Thrasher BH, Boerner CF. Control of astigmatism by wound placement. J Am Intraocul Implant Soc. 1984;10:176–9.
[10]. Gokhale NS, Sawhney S. Reduction in astigmatism in manual small incision cataract surgery through change of incision site. Indian J Ophthalmol. 2005;53:201–3.
[11]. Minnassian DC, Rossen P, Dart JK, Reidy A, Desai P, Sindhu M. Extracapsular cataract extraction compared with small incision cataract surgery by phacoemulsification a randomized trial Br J ophthalmol 2001;85(7):822-9
[12]. Elders D. Practice of refraction 10th edition new Delhi: Elsevier India (p) Ltd: 1983.p65
[13]. Ascaso FJ, Huerva V, Grzybowski A. Epidemiology, etiology, and prevention of late IOL-capsular bag complex dislocation: review of the literature. Journal of ophthalmology. 2015;2015.
[14]. Singh S, Pardhan S, Kulothungan V, Swaminathan G, Ravichandran JS, Ganesan S, Sharma T, Raman R. The prevalence and risk factors for cataract in rural and urban India. Indian journal of ophthalmology. 2019;67(4):477.
[15]. Basti S, Vasavada AR, Thomas R, Padhmanabhan P. Extracapsular cataract extraction: Surgical techniques. Indian J Ophthalmol. 1993; 41:19–21.
[16]. Srinivas M Ganagi, Bhaskar A,Gonsalves S. Comparison of Post Operative Astigmatism in Superior Versus Temporal Incision in Manual Small Incision Cataract Surgery IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 2016;15(12):32-34.
[17]. Santhanalakshmi R, Srividya S. Post-operative effect of temporal and superior approach in Manual small incisioncataract surgeries. MedPulse International Journal of Ophthalmology. 2019; 11(2): 25-28.
[18]. Mallik VK, Kumar S, Kamboj R, Jain C, Jain K, Kumar S, et al. Comparison of astigmatism following manual small incision cataract surgery: Superior versus temporal approach. Nepal J Ophthalmol 2012;4:54-8.
[19]. Sekharreddy MR, Sugantharaj V, Hegde SP. Surgically induced astigmatism in manual small-incision cataract surgery: A comparative study between superotemporal and temporal scleral incisions. TNOA Journal of Ophthalmic Science and Research. 2019;57(2):105.
[20]. Saxena R, Kishore P, Saxena S. To compare surgically induced astigmatism in SICS using two different incision sites–"superior vs. temporal". Indian Journal of Clinical and Experimental Ophthalmology. 2017;3(4):470-5.
[21]. Lundström M, Wejde G, Stenevi U, Thorburn W, Montan P. Endophthalmitis after cataract surgery: A nationwide prospective study evaluating incidence in relation to incision type and location.Ophthalmology 2007;114:866‑70.
[22]. Yadav H, Rai V. A study of comparison astigmatism following manual small incision cataract surgery: Superior versus temporal approach.J Evol Med Dent Sci 2014;3:6430‑4.
[23]. Pawar SVA, Sindal DK. A comparative study on the superior, supero‑temporal and the temporal incisions in small incision cataractsurgeries for postoperative Astigmatism. J Clin Diagn Res 2012;6:16.
[24]. Reddy H, Nigwekar S, Bangal SV. Post-operative Corneal Astigmatism in Superior vs Temporal straight scleral incisions after Manual Small Incision Cataract Surgery (MSICS). International J. of Healthcare and Biomedical Research. 2017;6(01):43-8.
[25]. Bhatnagar K, Khanna A, Pujari S. Superior Sclera Versus Temporal Corneal on Steep Axis Incision to Correct Pre-Existing Corneal Astigmatism Less Than 1.5 D. Journal of Opthalmic Science;1;1-8.