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A RETROSPECTIVE COMPARATIVE STUDY OF VISUAL OUTCOME OF SUPERIOR AND SUPEROTEMPORAL MANUAL SMALL INCISION CATARACT SURGERY

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Abstract

Background: Manual small incision cataract surgery (MSICS) is considered a more cost-effective alternative to phacoemulsification, but it often results in higher rates of postoperative astigmatism (Surgically induced astigmatism) due to the incision size which negatively impacts visual outcomes. High astigmatism is an important cause of poor uncorrected visual acuity after cataract surgery. Control of post-operative astigmatism is key to good post-operative vision without spectacles. **Methodology:** The study was conducted in patients presenting with senile cataract and with normal range of random blood sugar levels and blood pressure in OPD of the tertiary care hospital for a period of 3 months. 50 patients selected for manual small incision cataract surgery were included in the study. Patients were divided into 2 groups consisting of 25 patients each. Group 1 and group 2 included the patients who underwent superior incision and superotemporal incision MSICS respectively. Patient's visual acuity and keratometry readings were noted on postoperative day 1 and 6th week. Type of astigmatism was analysed. **Results:** Patients who underwent superotemporal incision MSICS gave better visual outcome as compared to superior incision MSICS. Most of the patients who underwent superior and superotemporal incisions achieved Against the rule (ATR) and With the rule (WTR) astigmatism. **Conclusion:** Manual SICS through superotemporal incision has a better visual outcome and has a relatively mild influence on the incidence of surgically induced corneal astigmatism postoperatively.

Keywords: MSICS, Surgically induced astigmatism, superior, superotemporal.

Introduction

Manual small incision cataract surgery(MSICS) is considered a more cost-effective alternative to phacoemulsification, but it often results in higher rates of postoperative astigmatism (Surgically induced astigmatism) due to the incision size which negatively impacts visual outcomes.[1] Astigmatism is a condition in which a point of light is not formed

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on the retina which occurs when toricity of any of the refractive surfaces of the optical system produces two principal foci delimiting an area of intermediate focus called “conoid of sturm”.[2]

Astigmatism can arise from issues with curvature, centering or refractive index. Specifically, Corneal astigmatism, a type of curvature astigmatism, involves the vertical curvature being greater than the horizontal curvature, V>H (approximately 0.25 D). This condition, known as Direct or "With-the-rule astigmatism" is typically seen as physiological and is thought to be caused by the persistent pressure of the upper eyelid.[1] While it may slightly increase with age, it often decreases or even reverses to "Inverse astigmatism" or "Against-the-rule astigmatism" in older age, where the horizontal curvature becomes greater than the vertical, H>V.[1]

High astigmatism is an important cause of poor uncorrected visual acuity after cataract surgery.[2] Corneal astigmatism is commonly associated with manual small incision cataract surgery postoperatively, planning out the modifications of the surgical intervention especially the incision according to the state of astigmatism present preoperatively is necessary to reduce or correct existing refractive error or astigmatism. So, control of post-operative astigmatism is key to good post-operative vision without spectacles.[3]

Superotemporal incision also provides other advantages like better wound strength due to minimal separational force of lid pressure and gravity, and preservation of functioning filter bleb in previous glaucoma surgery. It is preferred in deeply seated eyes and eyes with coloboma of the iris. This incision site also causes less central endothelial loss.[1]

Materials and methods

Study place- The study was conducted in patients presenting with senile cataract and with normal range of random blood sugar levels and blood pressure in OPD of the tertiary care hospital for a period of 3 months.

Study design- A Retrospective cohort study

Inclusion criteria- Patient with senile cataract(>50 years)

Exclusion criteria- Cases with pterygium, associated ocular disorders like co-existing glaucoma, previous ocular surgeries, uveitis, corneal surface irregularities, combined surgical procedures at the time of surgery like pterygium excision, trabeculectomy, subluxated lens, aphakia, hypertension and diabetes mellitus.

Sample size- 50 patients selected for manual small incision cataract surgery were included in the study. Patients were divided into 2 groups consisting of 25 patients each. Group 1 and group 2 included the patients who underwent superior incision and superotemporal incision MSICS respectively

Data analysis- Data was gathered, analyzed and entered in MS Excel.

Ethical consideration- The Institutional Ethical Committee permission was taken before beginning of study.

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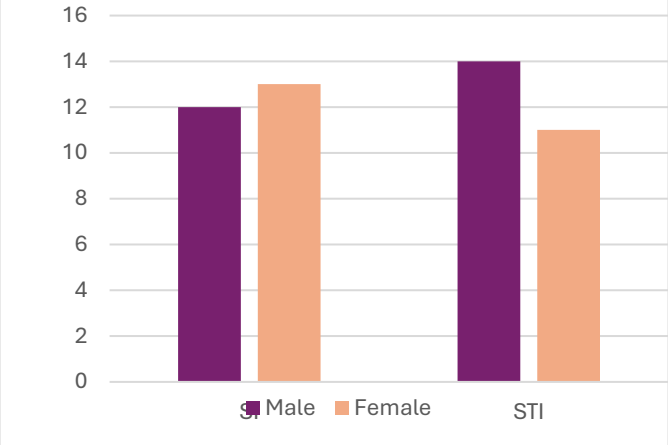
Result- 50 patients were randomly distributed into two equal groups for MSICS with PCIOL by superior and superotemporal incisions.

Table 1: Sex distribution

SEX	SI	STI	%
Male	12	14	52%
Female	13	11	48%
Total	25	25	100%

Figure 1: Sex distribution

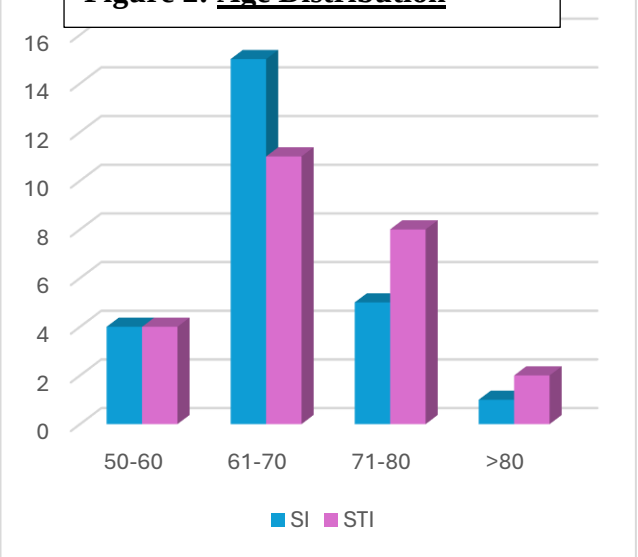


Above table and graph shows that out of the total samples, 52% and 48% were male and female respectively.

Table 2: Age Distribution

AGE	SI	STI	TOTAL
50-60	4	4	8
61-70	15	11	26
71-80	5	8	13
>80	1	2	3
Total	25	25	50

Figure 2: Age Distribution



Above table and graph shows that most of the samples were belonging to the age group of 61-70 years.

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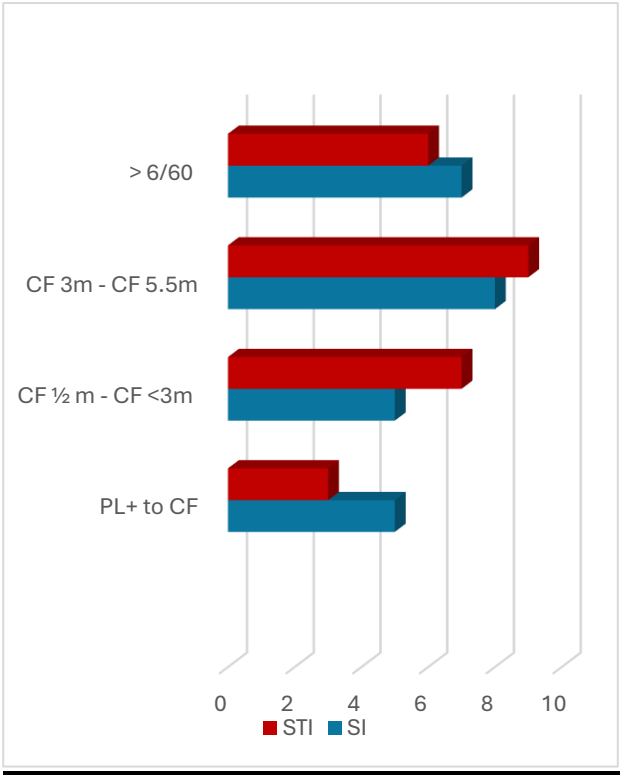
Table 3: Pre-operative visual acuity

Visual Acuity	Patients Undergoing Superior Incision	Patients Undergoing Supero Temporal Incision
Perception of light(PL) + to counting fingers (CF)	5	3
CF ½ metre to CF <3m	5	7
CF 3m to CF 5.5m	8	9
> 6/60	7	6
Total	25	25

Figure 3: Pre-operative visual acuity

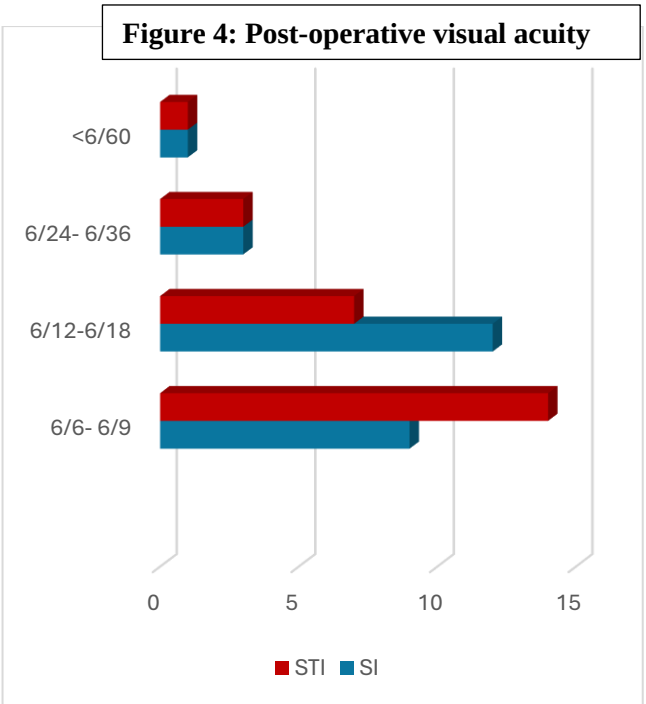


Above table and graph shows that most of the patients in both the groups i.e. superior and superotemporal incision were having pre-operative visual acuity between counting fingers 3 m to counting fingers 5.5 m.

Table 4: Post-operative visual acuity

Visual acuity	Patients undergoing superior incision	Patients undergoing superotemporal incision
6/6-6/9	9	14
6/12-6/18	12	7
6/24-6/36	3	3
<6/60	1	1

Figure 4: Post-operative visual acuity



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Above table and graph shows that most of the patients in both the groups i.e. superior and superotemporal incision were having pre-operative visual acuity between 6/12 to 6/18 and 6/6 to 6/9 respectively.

Table 4: PREOPERATIVE ASTIGMATISM

TYPE OF ASTIGMATISM	SUPERIOR INCISION	SUPERO TEMPORAL INCISION	TOTAL
WTR	9	12	21
ATR	10	8	18
NA	6	5	11
Total	25	25	50

Figure 5: Preoperative astigmatism in superior incision

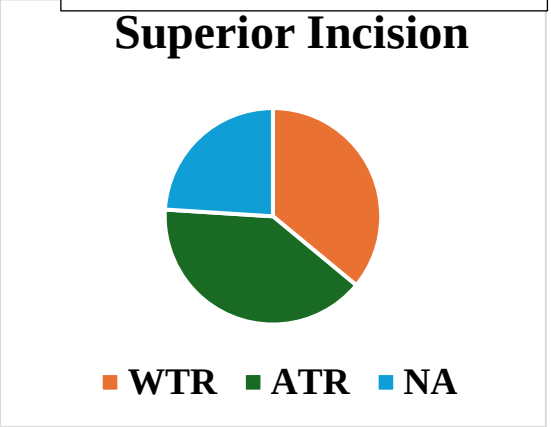
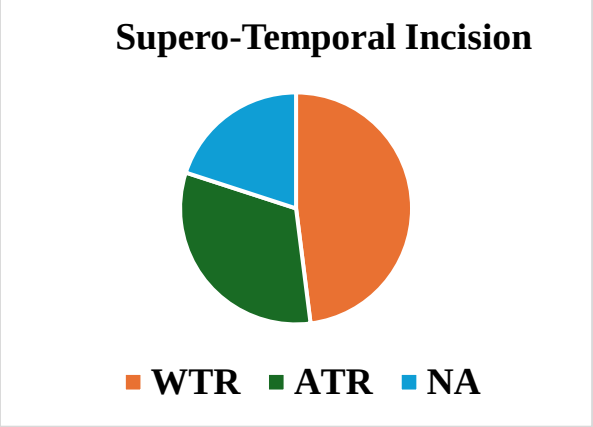


Figure 6: Preoperative astigmatism in superotemporal incision



Above table and graph concludes that most of the patients in superior incision and superotemporal incision group were having ATR and WTR astigmatism preoperatively.

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Table 5: POST OPERATIVE ASTIGMATISM

In superior incision

TYPES OF ASTIGMATISM [PRE-OPERATIVE] (N)	POST OPERATIVE CHANGE	POST OPERATIVE ON 6TH WEEK
WTR (9)	Increase	3
	Decrease	5
	Same	1
ATR (10)	Increase	7
	Decrease	1
	Same	2
NEUTRAL (6)	WTR	1
	ATR	5
	Same	0

In superotemporal incision

TYPES OF ASTIGMATISM [POST-OPERATIVE](N)	POST OPERATIVE CHANGE	POST OPERATIVE ON 6TH WEEK
WTR(12)	Increase	6
	Decrease	2
	Same	4
ATR(8)	Increase	1
	Decrease	5
	Same	2
NEUTRAL(5)	WTR	4
	ATR	1
	Same	0

Above table concludes that most of the patients in superior incision and superotemporal incision group achieved ATR and WTR astigmatism respectively.

Discussion-

Superior incision- It caused more ATR shift than the WTR. It is because the incision on the superior meridian causes flattening of the vertical meridian and steepening of the horizontal meridian, leading to more ATR shift post-operatively.[4]

Superotemporal incision- Shift of astigmatism was more towards WTR. This is because the superotemporal incision causes flattening of the horizontal meridian and steepening of vertical meridian leading to more WTR shift.[4]

Temporal incision- Location is farthest from the visual axis. Any flattening due to the wound is less likely to affect the corneal curvature at the visual axis.

When the incision is located superiorly, both gravity and eyelid blink tend to create a drag on the incision. These forces are neutralized better with temporally placed incisions because the incision is parallel to the vector of the forces.[2] This may be advantageous as most elderly patients will have ATR astigmatism preoperatively.[4]

Conclusion- Post-operative astigmatism being a common complication of cataract surgery, can be reduced or avoided with modification of the location of the incision.To sum up, the results in this clinical study reveal that manual SICS through superotemporal incision has a better visual outcome and has a relatively mild influence on the incidence of surgically

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induced corneal astigmatism postoperatively. Most patients present with with-the-rule astigmatism. Such a surgical approach brings benefits to blindness prevention for the population, which deserves widespread application in the basic level hospitals of India.

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