



OUTCOME OF PRE-EXISTING CORNEAL ASTIGMATISM BY INCISION AT STEEPER AXIS IN MANUAL SMALL INCISION CATARACT SURGERY - AN OBSERVATIONAL PROSPECTIVE STUDY

Ophthalmology

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ABSTRACT

Background and Aims: Cataract is one of the top three causes of blindness in the world, which is easily treated with simple and effective surgeries. Manual Small Incision Cataract Surgery (MSICS) is the favored surgical approach in poor nations due to its cost effectiveness, wider applicability, short surgical time, less reliance on technology, and visual results equivalent to phacoemulsification. So this study was conducted at our institution to study the post-operative changes in pre-existing corneal astigmatism and the visual outcome in these patient. **Material and Method:** This study was an observational prospective study and was done at a tertiary care teaching hospital, over a period of 1 and ½ years. During this period data collection was done for 1st year and the data analysis done in next 6 months. During this study, sampling was be done by total consecutive sampling. **Results:** The study on 87 patients with 45 (51.72%) males and 42 (48.28%) females. Male to female ratio was 1.07:1. In The mean post operative astigmatism at day 1 was 0.70 D with reduction of 0.72D (50.70%), at 6 weeks it was 0.64D with reduction of 0.78D (54.92%), at 6 month it was 0.54D with a reduction of 0.88D (61.97%). When compared the preoperative astigmatism, between WTR (60.50%), oblique (52.30%) and ATR (65.00%) at 6months Against the rule showed maximum amount of reduction. Post-op astigmatism in Superior incision it reduced 0.87 D (63.50%) of the pre-existing astigmatism. In Temporal incision it showed the maximum reduction of about 1.04 d (65.05%) while In supero-temporal incision it was 0.75 D(57.69%) Post operatively at 6 month UCVA of 6/6 to 6/18 in 86(98.85%) patients, 6/24 to 6/60 in 1(1.15%) patients, <6/60 in 00 patients& all 87 (100%) of patients had 6/6 to 6/18 as BCVA **Conclusions:** Regardless of the pre-existing astigmatism, post operative surgically induced astigmatism shifts towards against the rule astigmatism. Incision at steeper meridian is a simple, safe, effective procedure to correct mild to moderate preoperative astigmatism. A simple modification in incision placement produces comparable surgical outcome to other sophisticated procedures with limited resources available.

KEYWORDS

Pre-existing corneal astigmatism, Steeper axis, Visual Acuity.

INTRODUCTION:

One of the top three causes of blindness in the world is cataract, which can be easily treated with a simple and effective operation^[1]. Cataract is thought to be responsible for the blindness of 12.6 million people globally, as well as the moderate to severe visual impairment of 52.6 million others.^[2] According to the most recent estimates, cataract causes 39 percent of global blindness^[3] and 33 percent of visual impairment.^[4]

Recent progress in cataract surgery has heightened patient expectations and having a good post-operative uncorrected visual acuity is considered a norm.

Cataract surgery has been conducted for millennia and has progressed enormously with the reduction in the size of the incision and the insertion of intraocular lenses. It is one of the most effective surgical procedures available.^[5,6] Manual Small Incision Cataract Surgery (MSICS)^[7,8,9] is the favored surgery approach in poor nations due to its cost effectiveness^[10], wider applicability, short surgical time, less reliance on technology, and visual results equivalent to phacoemulsification.^[11,12]

The purpose of modern cataract surgery is not only cataract extraction followed by IOL implantation but also to reduce or correct existing astigmatism.

The corneal curvature is affected by cataract surgery. Surgically induced astigmatism (SIA) is the result of this change in the cornea's astigmatic condition Even in the case of a successful cataract surgery, surgically induced astigmatism is unavoidable. This allows for the correction of pre-existing astigmatism. The type of pre-existing astigmatism in patients, the incision site, and the ensuing SIA all contribute to the improvement of the eye's astigmatic state. In cataract procedures, SIA caused by cataract incision can be employed as a therapeutic approach to address astigmatism.^[14] The current study is thus aimed to analyse the effect of incision at steeper axis in cataract surgery on pre-existing corneal astigmatism and compare the resultant astigmatism and visual outcomes of performing SICS with pre-operative astigmatism and visual outcomes. This study was an

observational prospective study done at a government medical college& hospital, over a period of 1 and ½ years. During this period, data collection was done for 1st year and the data analysis done in next 6 months. Sampling method was by total consecutive sampling of patients who fulfill the inclusion criteria and willing to participate in the study with written informed consent.

AIM:

To study the post-operative changes in pre-existing corneal astigmatism and the visual outcome in these patient.

Settings and Design

Study design: An Observational prospective study.

Place of study: Department of Ophthalmology, Government medical college & Hospital Miraj.

Duration of study: One and half years.

Sampling method and sample size: Total consecutive sampling of the patients satisfying the inclusion criteria, Duration based (Jan 2020 to May 2021)

Sample size: 87

MATERIAL& METHOD

This study includes 87cases of visually significant senile cataract with pre-existing 0.5D-3D astigmatism who attended the OPD of Department Of Ophthalmology or referred from other departments of our institution who were posted for a MSICS during a period of one year, who were willing to participate in the study were included. All patients underwent a thorough ocular examination with detailed ophthalmic history & other essential pre-op & Post-Op ophthalmic evaluation. All the cases were examined properly & followed at regular intervals after MSICS for visual outcome.

Inclusion criteria:

1. All patients with Immature senile cataract with pre-existing 0.5 D-3 D astigmatism who are willing to participate in research.

- Adults (>18 years) of both sexes will be included who have undergone manual small incision cataract surgery

Exclusion criteria

- Pre-existing pathology other than cataract causing diminution of vision (such as corneal opacities, scar/degenerations, uveitis, glaucoma, macular and optic nerve disorders ocular trauma.)
- Any patient who had undergone previous ocular surgery (trabeculectomy, refractive or retinal detachment surgery).
- Patient with follow up less than 3 months.
- Pregnant & lactating women.
- Critically ill patients.
- Traumatic cataract.

Detailed procedure of study conduct:

This was an observational prospective study to see the outcome of pre-existing corneal astigmatism by incision at steeper axis in manual small incision cataract surgery. The study was done at Department of ophthalmology, at government medical college & hospital. The cases included patients with visually significant senile cataract with pre-existing corneal astigmatism by non-randomised consecutive sampling in patients who will be attending the outpatient department of Ophthalmology or referred from other departments in the hospital and who were posted for cataract surgery by manual small incision cataract surgery fulfilling the inclusion criteria during one year of this study (January 2020 - December 2020). Written and informed consents of all patients included in the study were taken. In cases where patient is incompetent, consent of guardian or authorised representatives were taken. A detailed proforma devised containing all essential details for each individual. The patients were asked about their age, sex, occupation and address, complaints and other co morbid conditions like Hypertension, Diabetes Mellitus, etc will be taken for medical records.

A complete ophthalmic history was taken & a comprehensive clinical examination was done.

- Pre operatively, in all patients, following examination was done:
 - Snellen Visual Acuity measurement
 - External Examination under torch light
 - Examination of anterior segment by slit lamp biomicroscopy
 - Evaluation of pre-operative astigmatism by keratometry
 - Intra ocular pressure measurement by Schiotz or applanation tonometer.
 - Examination of patency of nasolacrimal duct
 - Examination of the posterior segment by ophthalmoscopy (direct and indirect) and +90D biomicroscopy.
 - Ascan biometry
 - Ultrasound (B-scan)
 - Fundus Photography (whenever required according to clinical status)
 - Routine systemic investigation
 - Fitness from a physician
 - The location of the tunnel i.e., the main incision is decided and marked on the case paper preoperatively according to their pre-op astigmatism.
- Total 87 patients were studied in the study plan. Main surgical Incisions were decided according to their pre-op astigmatism & divided into following 3 groups:
 - 31 patients with eyes having vertical steeper axis i.e., with the rule astigmatism in which superior scleral tunnel incision was taken.
 - 38 patients with eyes having horizontal steeper axis i.e., against the rule astigmatism in which temporal scleral tunnel incision was taken.
 - 18 patients with eyes having oblique astigmatism in which superior-temporal scleral tunnel incision was taken.

On Bausch and Lomb Keratometer, vertical keratometry readings are noted as k1 and horizontal keratometry readings are noted as k2. So, in group 1, patients have with the rule astigmatism i.e., $k1 > k2$ and in group 2, patients have against the rule astigmatism i.e., $k1 < k2$. After the detailed pre-op evaluation, patients were posted for MSICS.

Surgical procedure:

Type of Anaesthesia: Peribulbar block.

Procedure:

- Standard guidelines for the procedure for MSICS were followed.

- Straight incision was placed 2 mm posterior to the limbus & the length of incision being 6.5 mm. The incision was centered at 12 o'clock, 1:30 o'clock & 3 o'clock for superior, supero-temporal & temporal incision respectively.
- The IOL implanted was rigid PMMA IOL of optimum power according to individual patients.
- After the surgery Post operative evaluation of all the patients were done on post op day 1, at 6 weeks, at 6 months & following examination was done:
 - Snellen visual acuity measurement.
 - External Examination under torch light
 - Examination of anterior segment by slit lamp biomicroscopy
 - Evaluation of post-operative astigmatism by keratometry
- All Data was collected in regard to pre operative and post operative astigmatism.

Simple subtraction method is used for analysis of astigmatism.

Colour Plates:



Plate1: superior rectus bridle suture

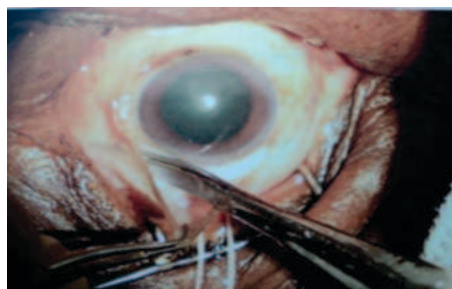


Plate2: Fornix based conjunctival flap

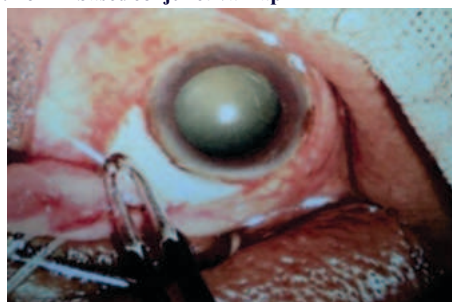


Plate3: cauterisation

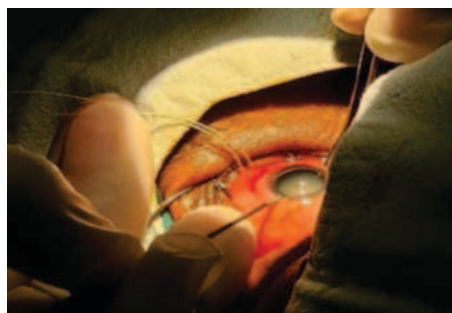


Plate4: superior incision for sclero- corneal tunnel with crescent blade



Plate5: sideport entry into anterior chamber

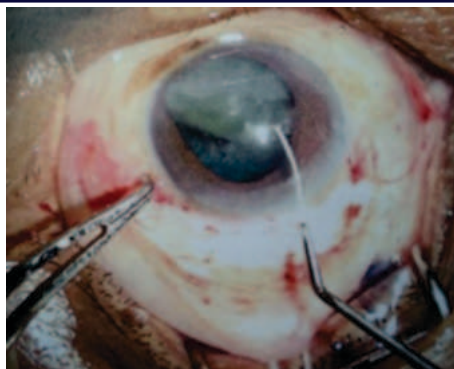


Plate10: Rotation of nucleus

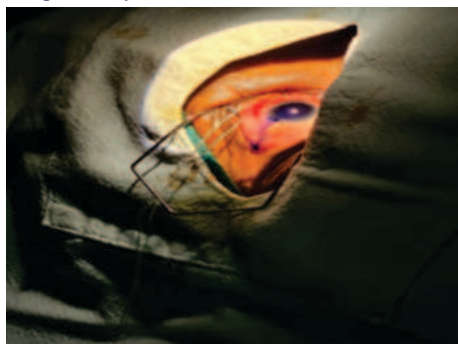


Plate6: staining of anterior capsule with methylene blue dye

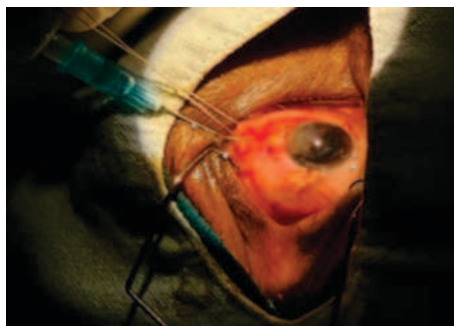


Plate11: nucleus delivery by visco-expulsion

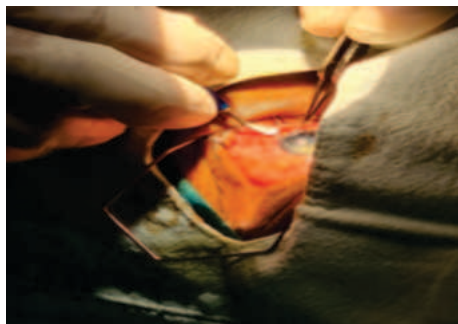


Plate7: anterior chamber entry with



Plate12: anterior chamber wash method with Simcoe canula

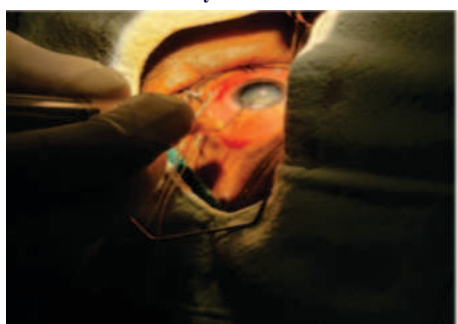


Plate8: continuous curvilinear Keratome capsulorrhexis



Plate13: IOL implantation in capsular bag



Plate9: Hydrodissection of nucleus

RESULTS:

Total patients, Sex Wise Distribution of Patients [Table 1]:

TOTAL PATIENTS		
Sex	Count	Percentage
Male	45	51.72%
Female	42	48.28%
Total	87	100%

Pre operative visual Acuity [Table 2]:

PRE-OP UCVA					
RANGE	NO OF PATIENTS			TOTAL	PERCENT AGE
	Temporal	Supero-Temporal	Superior		
≤ 6/60	29	14	24	67	77.01%
6/36 - 6/24	9	4	7	20	22.99%
6/18-6/6	0	0	0	0	0.00%
Total	38	18	31	87	100%

[UCVA- Uncorrected visual acuity]

Pre operative astigmatism [Table 3]:

PRE-OP TYPE OF ASTIGMATISM			
TYPE OF ASTIGMATISM	MEAN ASTIGMATISM	NO OF PATIENTS	PERCENTAGE
ATR	1.49D	38	43.68%
OBLIQUE	1.30D	18	20.69%
WTR	1.24D	31	35.63%
TOTAL	1.36D	87	100 %

[ATR-against the rule, WTR- with the rule]

Post operative uncorrected visual acuity [Table 4]:

POST-OP UCVA AT DIFFERENT POINTS OF TIME												
UCVA	Temporal			Supero-Temporal			Superior			All cases		
	D1	6 W	6 M	D1	6 W	6 M	D1	6 W	6 M	D1	6 W	6 M
6/18-6/6	19	23	38	9	14	18	15	19	31	43	56	87
6/60-6/24	19	15	0	8	4	0	11	12	0	38	31	0
<6/60	0	0	0	1	0	0	5	0	0	6	0	0

[UCVA- uncorrected visual acuity, D-day, W- week, — Month]

Post operative best corrected visual acuity [Table 4]:

POST-OP BCVA AT DIFFERENT POINTS OF TIME												
BCVA	Temporal			Supero-temporal			Superior			All Cases		
	D1	6 W	6 M	D1	6 W	6 M	D1	6 W	6 M	D1	6 W	6 M
6/18-6/6	31	38	38	16	18	18	31	30	22	78	86	87
6/60-6/24	7	0	0	1	0	0	0	1	9	8	1	0
<6/60	0	0	0	1	0	0	0	0	0	1	0	0

[BCVA- best corrected visual acuity, D-day, W- week, M- Month]

Post-Op Astigmatism [Table 5]:

POST-OP ASTIGMATISM AT DAY 1, 6 WEEKS AND AT 6 MONTHS AS COMPARED TO PRE-OP				
ASTIGMATISM	PRE-OP MEAN	POST-OP DAY1 MEAN	POST-OP 6 WEEK MEAN	POST-OP 6 MONTHS MEAN
ATR	1.49D	0.62D	0.60D	0.56D
OBLIQUE	1.30D	0.60D	0.57D	0.55D
WTR	1.24D	0.90D	0.78D	0.50D
TOTAL	1.36D	0.72D	0.66D	0.54D

[ATR-against the rule, WTR- with the rule]

Post-op reduction of astigmatism at day 1, 6 weeks and at 6 months as compared to pre-op [Table 6]:

POST-OP REDUCTION OF ASTIGMATISM AT DAY 1, 6 WEEKS AND AT 6 MONTHS AS COMPARED TO PRE-OP									
ASTIGMATISM	PRE-OP		POST OP DAY 1		6 WEEKS POST OP		6 MONTHS POST OP		
	Mean (in diopters)	Mean (in diopters)	Reduction in AST	% of Reduction In AST	Mean (in diopters)	Reduction In AST	% of Reduction In AS.	Mean (in diopters)	Reduction In AST
ATR	1.49D	0.62D	0.87D	58.38%	0.60D	0.89D	59.73%	0.56D	0.93D

Oblique	1.30D	0.60D	0.70D	53.84%	0.57D	0.73D	56.15%	0.55D	0.75D	57.69%
WTR	1.24D	0.90D	0.34D	27.42%	0.78D	0.46D	37.09%	0.50D	0.74D	59.67%
Total	1.36D	0.72D	0.64D	47.05%	0.66D	0.70D	51.47%	0.54D	0.82D	60.29%

[ATR-against the rule, WTR- with the rule]

Shift of astigmatism [Table 7]:

SHIFT OF ASTIGMATISM				
TYPE	PRE-OP COUNT	POST-OP COUNT		
		Day 1	6 Week	6 Months
ATR	38	37	37	36
OBLIQUE	18	21	19	14
WTR	31	29	27	31
NIL ASTIGMATISM	0	0	4	6

[ATR-against the rule, WTR- with the rule]

Post op astigmatism at the end of 6 months [Table 8]:

POST OP ASTIGMATISM AT THE END OF 6 MONTHS		
ASTIGMATISM	COUNT	PERCENTAGE
≤ 0.25D	21	24.14%
0.26- 0.50D	37	42.53%
0.51D - 0.75 D	16	18.39%
0.76-1.00D	12	13.79%
> 1.00 D	1	1.15%
TOTAL	87	100%
Minimum Ast. -0.00D Maximum Ast. -1.25D Mean Ast.-0.54D		

Paired t- test for astigmatism [Table 9]:

		MEAN	STANDARD DEVIATION	CORRELATION	PAIRED T-TEST	P-VALUE
PAIR 1	PRE-OP AST	1.40	0.43399	0.317	13.084	P<0.0001
	DAY1 AST	0.70	0.46904			
PAIR 2	PRE-OP AST	1.40	0.43399	0.387	16.533	P<0.0001
	6 WEEK AST	0.57	0.37714			
PAIR 3	PRE-OP AST	1.40	0.43399	0.591	24.413	P<0.0001
	6 MONTH AST	0.50	0.28336			

In above table paired T test is applied for pre and Post -operative astigmatism which shows significant p value of <0.0001 which shows strong correlation between pre-operative astigmatism & Post-operative astigmatism.

DISCUSSION:

Age & sex distribution

Of the total 87 patients included in the study, 45 (51.72%) were males and 42(48.28%) were females. Male to female ratio is 1.07:1.

Selected patients age ranged from 18 years to 90 years majority of the patients belonged to the age group 61-75 mean age being 68.77 years. The youngest patient was 32 years old and the eldest 90 years old (range 32years - 90 years).

Pre operative visual acuity [Table]:

Total Pre operatively 67(77.01%) patients had UCVA of 6/60 or less & 20(22.99%) patients had UCVA of ≥6/60.

[Table 10: comparison of Preoperative UCVA]

PREOPERATIVE UCVA						
STUDIES	SUPERIOR INCISION		TEMPORAL INCISION		SUPEROTEMPORAL INCISION	
	<6/60	≥ 6/60	<6/60	≥ 6/60	<6/60	≥ 6/60
Our Study	7	24	9	29	4	14

Madhumita Prasad[15]	53	47	70	30	63	37
Soumyadeep Hazra[16]	15	35	-	-	16	34

Pre operative astigmatism:

The existence of minor degrees of physiological astigmatism in the general population, occurring equally in males and females, is well known. Although WTR astigmatism is the commonest type of astigmatism in adults, the present study revealed a preponderance of ATR astigmatism in this study population with 38(43.68%) patients having pre-existing of ATR astigmatism, 18 (20.69%) patients having oblique and 31(35.63%) patients having pre-existing WTR astigmatism. The mean preoperative astigmatism was 1.36D.

According to these preoperative astigmatism patients were marked for tunnel incisions at their steeper axis respectively, for e.g Superior incisions were taken in patients with WTR astigmatism similarly Supero-temporal incisions for oblique astigmatism & Temporal incisions for ATR astigmatism. Following table gives information of pre-op astigmatism in other similar studies.

[Table 11: comparison of Magnitude of preoperative astigmatism]

MAGNITUDE OF PREOPERATIVE ASTIGMATISM	
Study	Preoperative Astigmatism
Our study	1.36 D
Madhumita Prasad[15]	0.95 D
Dodiya et al [17]	0.94 D
Rohit Saxena[18]	0.96 D

The mean postoperative astigmatism in our study is 0.54D, which is comparable to other studies.

[Table 12: comparison of Magnitude of postoperative astigmatism]

MAGNITUDE OF POSTOPERATIVE ASTIGMATISM	
Study	Mean Postoperative Astigmatism
Our study	0.56 D
Alpins et al [19]	0.85 D
Madhumita Prasad[15]	0.82 D

Post operative visual acuity:

On post operative day1, 43(49.43%) patients had UCVA of 6/18 to 6/6, 6/60 to 6/24 in 38(43.67%) patients, <6/60 in 6(6.90%) patients & out of which 78 (89.66%) had BCVA of 6/18 to 6/6 & 8 (9.20%) had BCVA of 6/60 to 6/24, only 1 (1.15%) patient had BCVA of <6/60.

At 6 weeks, UCVA of 6/18 to 6/6 in 56(64.37%) patients, 6/60 to 6/24 in 31(35.63%) patients, no patient had UCVA of <6/60. Out of which 86(98.85%) patients had BCVA of 6/18 to 6/6 & only 1(1.15%) patient had BCVA of 6/60 to 6/24.

Post operatively at 6 month all patients i.e 87 (100%) patients had UCVA & BCVA of 6/18 to 6/6.

[Table 13: comparison of Post-operative UCVA at different points of time]

POST-OP UCVA AT DIFFERENT POINTS OF TIME									
STUDY UCVA (PERCENTAGE)									
	Postoperative Day 1			Postoperative 6 Weeks			By The End Of Study		
	<6/60	6/60-6/24	6/18-6/6	<6/60	6/60-6/24	6/18-6/6	<6/60	6/60-6/24	6/18-6/6
Our Study	0%	55.17%	44.83%	0%	16.10%	83.90%	0%	0%	100%
Madhumita Prasad[15]	10%	49%	41%	2%	40%	58%	-	-	-
Rohit Saxena[18]	-	-	-	-	-	-	0%	0%	100%
Soumya deep Hazra[16]	38%	38%	24%	-	-	-	1%	6%	93%

Post operative astigmatism:

In all patients the mean post operative astigmatism at day1 was 0.72D, at 6 weeks 0.66D. at 6 months it was 0.54D. In all patients the mean post operative astigmatism at day 1 was 0.72D with decrease of 0.64D (47.05%), at 6 weeks it was 0.66D with reduction of 0.70D (51.47%) of astigmatism, at 6 months mean post operative astigmatism was 0.54D with a reduction of 0.82D (60.29%) when compared to preoperative astigmatism.

In patients with WTR astigmatism the mean post operative astigmatism at day1 was 0.90D, at 6 weeks 0.78D, at 6 months 0.50D in patients with WTR astigmatism the mean post operative astigmatism at day 1 was 0.90D with decrease of 0.34D (27.42%), at 6 weeks it was 0.78D with reduction of 0.46D (37.09%) of astigmatism, at 6 months mean post operative astigmatism was 0.50D with a reduction of 0.74D(59.67%). 3 patients showed ATR shift out of which 1 patient had no residual astigmatism at 6 weeks & 5 patients showed shift to oblique astigmatism at post op Day 1& at 6 weeks 2 more patients showed shift to oblique astigmatism, at the end of 6 months all patients with oblique astigmatism shifted back to WTR.

In patients with oblique astigmatism the mean post operative astigmatism at day1 was 0.60 D, at 6 weeks 0.57D, at 6 months 0.55 D in patients with oblique astigmatism the mean post operative astigmatism at day 1 was 0.60D with decrease of 0.70D (53.84%), at 6 weeks it was 0.57D with reduction of 0.73D (56.15%) of astigmatism, at 6 months mean post operative astigmatism was 0.55D with a reduction of 0.75D (57.69%). 6 patients showed shift to WTR astigmatism at post op Day 1& 6 weeks out of which only 3 had residual WTR at the end of 6 months, 1 patient showed shift to ATR at 6 weeks& 6 Months, out of which only 1 patient showed ATR astigmatism at 6 weeks, 3 showed no residual astigmatism. At the end of 6 months no patient showed any astigmatic shift.

In patients With ATR astigmatism the mean post operative astigmatism at day1 was 0.62D, at 6 weeks 0.60D, at 6 months 0.56D in patients with ATR astigmatism the mean post operative astigmatism at day 1 was 0.62D with decrease of 0.87D(58.38%), at 6 weeks it was 0.60D with reduction of 0.89D (59.73%) of astigmatism, at 6 months mean post operative astigmatism was 0.56D with a reduction of 0.93D (62.41%). 4 patients showed shift to oblique astigmatism at post op Day 1 out of which 3 showed no residual astigmatism at the end of 6 weeks & remaining 1 patient by the end of 6 months.

Between the With The rule (59.67%), oblique(57.69%) and ATR (62.41%) at 6months ATR showed maximum amount of reduction.

In our study 21 of 87 (24.14%) had astigmatism less than 0.25D out of which 6 had no post op astigmatism at the end of 6 months, 37(42.53%) patients had 0.26 D to 0.50 D, & 16(18.39%) patients had 0.51D-0.75D, 12(13.79%) patients had 0.76D-1.00D, while only 1(1.15%) patient had astigmatism of >1.00D post-operatively at 6 months. Minimum value of astigmatism being 0.00D & maximum value being 1.25D, mean value being 0.54D. Which is comparable with other studies.

[Table 14: comparison of Post op astigmatism at the end of the study]

POST OP ASTIGMATISM AT THE END OF THE STUDY					
Study	Astigmatism (Percentage)				
	≤0.50D	0.51-1.00D	1.01-1.50D	1.51-2.00D	>2.00D
Our study	66.67%	32.18%	1.15%	0.00%	0.00%
Madhumita Prasad[15]	32%	31%	12.33%	13.33%	11.33%
Dodiya et al [17]	18.70%	36.08%	28.26%	8.70%	8.26%

In Superior incision it reduced 0.74D (59.67%) of the pre-existing astigmatism which showed wide range of fluctuation from day 1 to 6 week which got stabilized over a period of 6 months. visual recovery showed fluctuation depending on the fluctuation in the amount of astigmatism.

In Temporal incision it showed the maximum reduction of all the three which was about 0.93D (62.41%) of the pre-existing astigmatism. Which remained stable over a period of 6 months without much fluctuation with good visual recovery.

In Supero-temporal incision it reduced 0.75D (57.69%) of the pre-existing astigmatism which remained stable over a period of 6 months without much fluctuation with good visual recovery.

This effect on astigmatism is may be because the Temporal incision is farther from the visual axis than the Superior incision, any wound flattening is less likely to affect the corneal curvature at the visual axis, early vision rehabilitation may be possible. Gravity and the blinking of the eyelids tend to tug on the incision when it is located superiorly. Because the incision is parallel to the vector of forces, these influences are effectively negated. The Supero-temporal incision is also likely free of gravity and eyelid pressure, resulting in less astigmatism. The goal of cataract surgery is to leave the patient with astigmatism of 0.5D or less in order to achieve the best visual results. Low simple myopic astigmatism is associated with higher uncorrected near visual acuity in pseudophakes, according to Trinadade et al. Mild residual astigmatism allows for pseudo accommodation, which improves both near and far vision. following table gives post-op astigmatism at the end of other similar studies.

[Table 15: comparison of Mean Post-op astigmatism at the end of study]

MEAN POST-OP ASTIGMATISM AT THE END OF STUDY			
STUDY	SUPERIOR INCISION	SUPEROTE MPORAL	TEMPORAL INCISION
Our Study	0.50D	0.55D	0.56D
Lyhne N (1998) [20]	0.61D	--	0.41D
Irina S B (2004) [21]	1.65D	--	0.71D
Haldipurkar (2009) [22]	1.2D	0.8D	0.95D
Madhumita Prasad[15]	1.32±0.97	1.03±0.75	1.00±0.60
Gokhale (2005) [23]	1.36D±1.03D	0.51D±0.49 D	0.67D±0.4D
Malik VK et al[24]	1.45±0.7D	0.805±1.25D	0.75±0.4D
Satyajeet V[25]	1.52±0.6D	0.6±1.25D	0.43±0.33D

CONCLUSION:

- Regardless of pre-existing astigmatism, surgically induced astigmatism shifts to an ATR astigmatism after surgery.
- To correct mild to moderate preoperative astigmatism during cataract surgery, an incision at a steeper meridian is a straightforward, safe, and successful choice.
- Visual outcome in post operative period was comparable in all the cases with incisions being taken at a steeper axis.
- In the Supero-temporal and Temporal groups, postoperative vision and astigmatism remained steady throughout a 6-month follow-up period, whereas the Superior incision group experienced astigmatism fluctuation in the first 6 weeks after surgery, which stabilised over a 6-month period.
- A simple modification in incision placement produces comparable results to other sophisticated procedures & hence offers a way to attain better surgical outcome with limited resources available in most of the set ups

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Conflicts of interest

There are no conflicts of interest

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