A COMPARATIVE STUDY OF POSTOPERATIVE ASTIGMATISM BETWEEN SUPERIOR AND TEMPORAL CLEAR CORNEAL INCISION IN PHACOEMULSIFICATION

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INTRODUCTION

- Cataract surgery has undergone various advances since it was evolved.
- It started from ancient couching then transformed to intracapsular cataract extraction and finally evolved to the modern phaco-emulsification cataract surgery.
- The primary aim is good post operative visual rehabilitation without correction with immediate mobilization, but the main obstacle is surgically induced astigmatism[SIA].
- Over time, various surgeons have strived hard and invented different incisions to reduce the SIA.

- The outcome of cataract surgery depends on various factors like incision, approach, type of surgery, mode of intraocular lens[IOL] insertion and type of IOL.
- The introduction of self-sealing clear corneal incision has gained popularity worldwide as it offers several benefits over traditional sutured limbal incision and scleral tunnel.
- Post operative SIA depends on location, size, architecture of wound.
- The small size incision gives a rapid and a stable optical recovery, and thus a lesser SIA.

- Many studies were done to compare the astigmatism with different types of small incisions in different locations like superior, supero-nasal, supero-temporal, and temporal.
- Regarding the architecture of the cornea, giving phacoemulsification incision on the steepest corneal axis at the time of cataract surgery can correct a small amount of astigmatism.
- Other options like peripheral corneal relaxing incisions and toric IOLs were also safe and effective for treating more than 1 diopter of preexisting astigmatism.

AIMS AND OBJECTIVES

- To evaluate the amount of surgically induced astigmatism after phacoemulsification with foldable intraocular lens using the superior clear corneal and temporal clear corneal incision.
- To compare the surgically induced astigmatism in terms of better postoperative visual recovery.

MATERIALS AND METHODS

- It was hospital based prospective study of 100 patients conducted in katuri medical college and hospital during the period of December-2020 to July-2021.
- Patients were divided into Group-A and Group-B who underwent superior and temporal clear corneal approach respectively based on steeper meridian on the cornea.
- The patients were followed upon day 1, 7, 30 and 6 weeks postoperatively. Visual acuity and keratometry readings were recorded.
- SIA was evaluated by simple subtraction method from pre and post operative keratometry readings.

CRITERIA

INCLUSION CRITERIA

- Patients undergoing phacoemulsification with foldable posterior chamber intraocular lens implantation at Katuri hospital.
- Patients between age group of 40 to 80 years.
- All patients were operated by single surgeon.
- Nucleus Grade II and III.

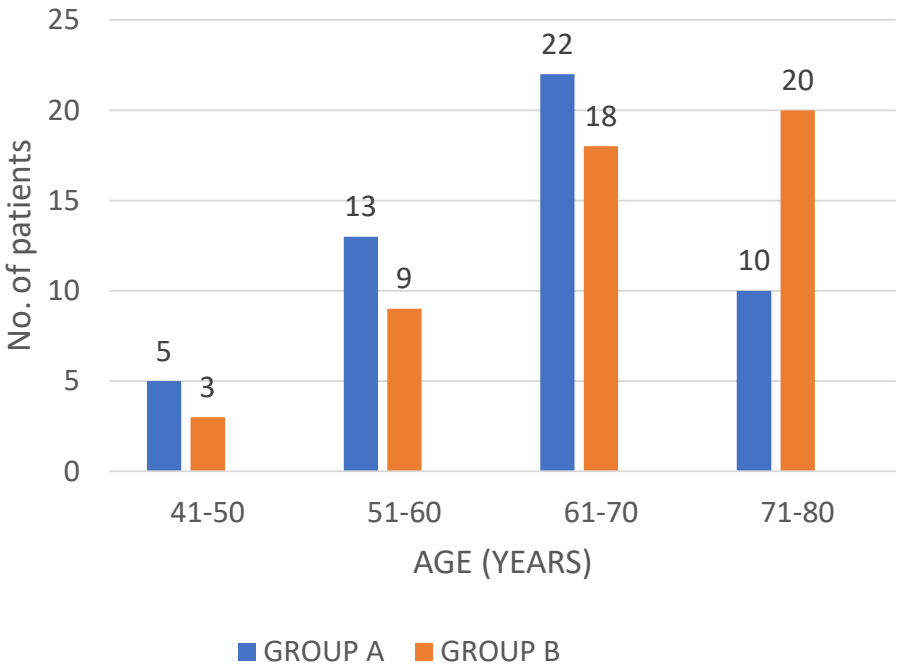
EXCLUSION CRITERIA

- Nucleus Grade IV.
- Patients with corneal opacities, complicated cataracts, cataract with chronic uveitis, traumatic cataract, macular or retinal diseases, pseudo-exfoliation.
- Irregular, oblique and bi-oblique astigmatism.

- Patients were evaluated for Blood Pressure, Random blood sugar, Urine analysis, HIV and HbsAg ,RT PCR for Covid 19.
- Uncorrected and Best corrected visual acuity were evaluated pre-operatively. Keratometry and A Scan biometry were done in all cases to calculate IOL power. Keratometry was done using Bausch and Lomb Keratometer.
- All surgeries were done by single surgeon under peribulbar anesthesia.
- Post operative patients were evaluated at day 1, day 7, day 30 , 6 weeks post operatively.
- Patients were evaluated for visual acuity and keratometry at each follow up visit.

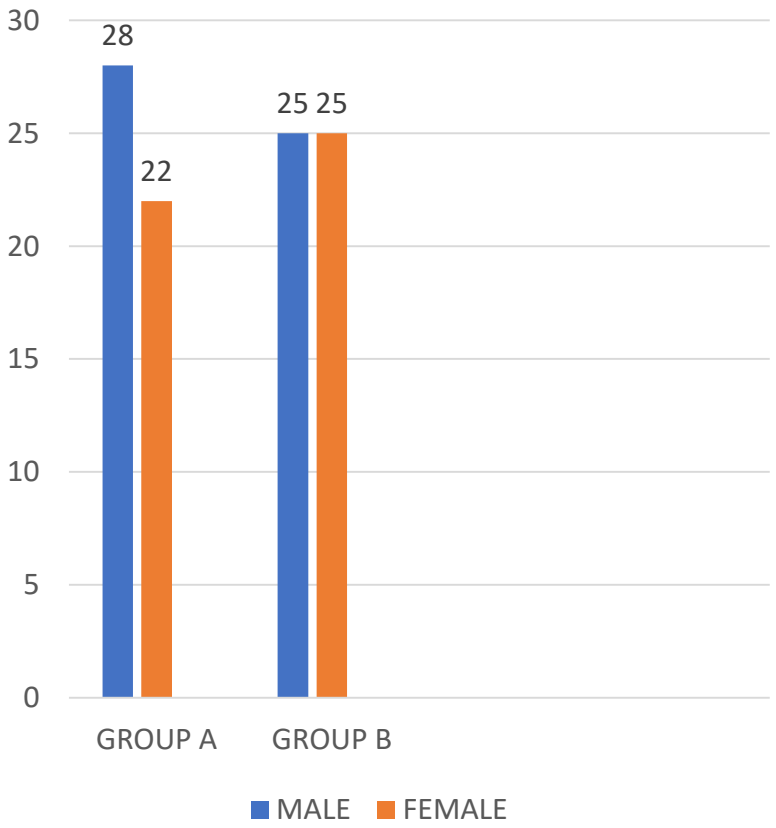
OBSERVATIONS

AGE DISTRIBUTION



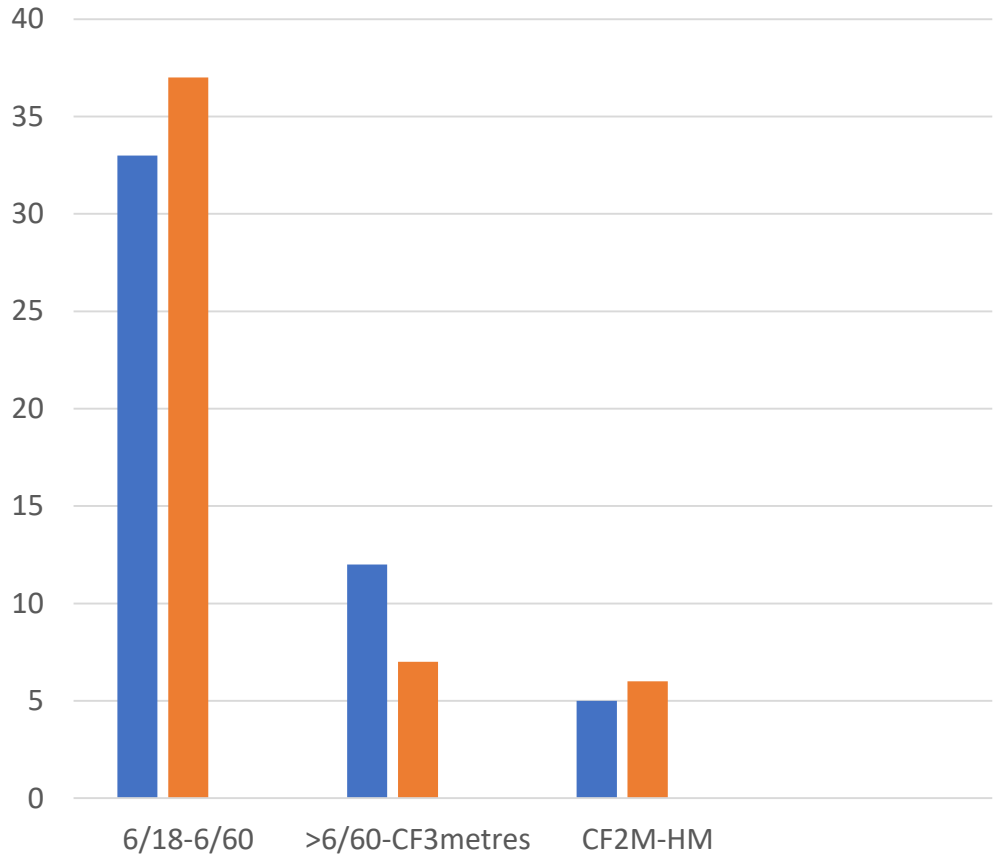
	GROUP A		GROUP B	
AGE	NO OF PATIENTS	PERCENTAGE	NO OF PATIENTS	PERCENTAGE
41-50	5	10.00	3	6.00
51-60	13	26.00	9	18.00
61-70	22	44.00	18	36.00
71-80	10	20.00	20	40.00
TOTAL	50	100.00	50	100.00

SEX DISTRIBUTION



	GROUP A		GROUP B	
SEX	NO.OF PATIENTS	PERCENTAGE	NO.OF PATIENTS	PERCENTAGE
Male	28	56.00	25	50.00
Female	22	44.00	25	50.00
Total	50		50	

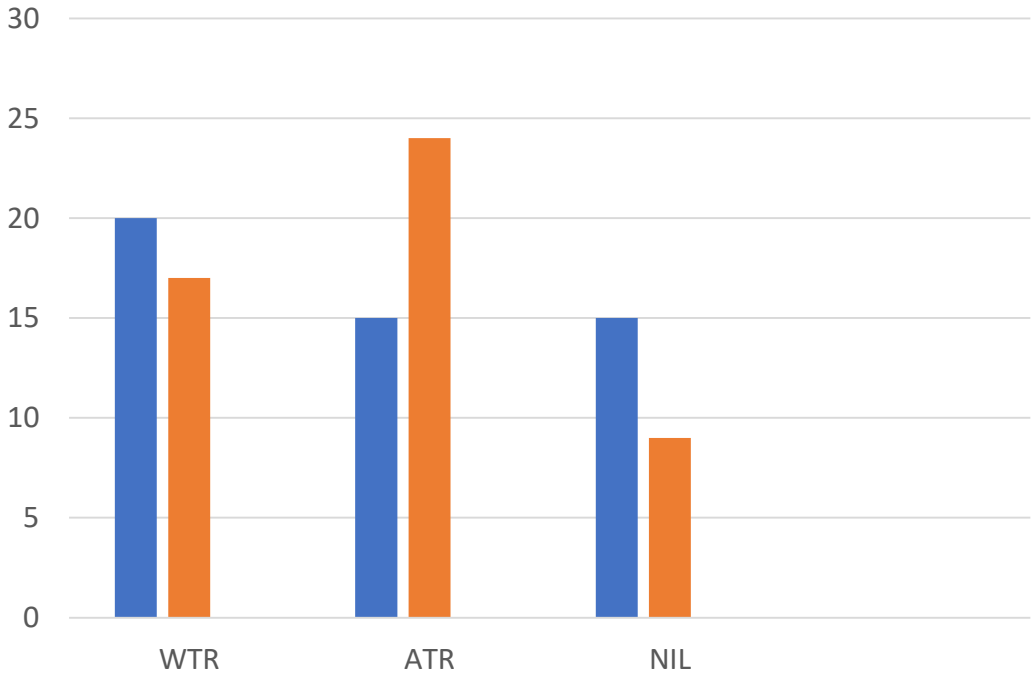
Pre-operative Visual acuity



Group A(Superior)			Group B(Temporal)	
Visual acuity	No of Patients	%	No of Patients	%
6/18 - 6/60	33	66.0	37	74.00
>6/60 - CF 3 meters	12	24.00	7	14.00
CF 2 m-HM	5	10.00	6	12.00
Total	50	100	50	100

Pre-operative visual acuity ranged from Hand movements to 6/18.

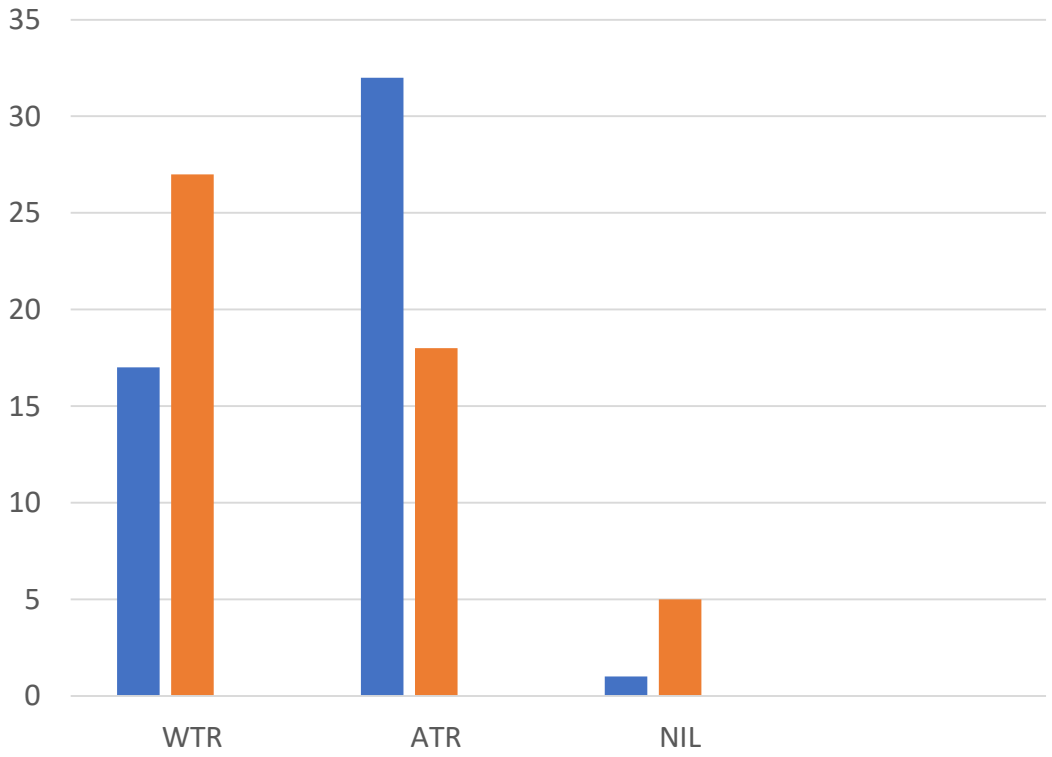
Pre-Operative Astigmatism



40% of Group A Pts have WTR and 48% of pts had ATR astigmatism preoperatively.

Group A (Superior)			Group B (Temporal)	
Type	No of Patients	%	No of Patients	%
WTR	20	40.00	17	34.00
ATR	15	30.00	24	48.00
Nil	15	30.00	9	18.00
Total	50	100	50	100

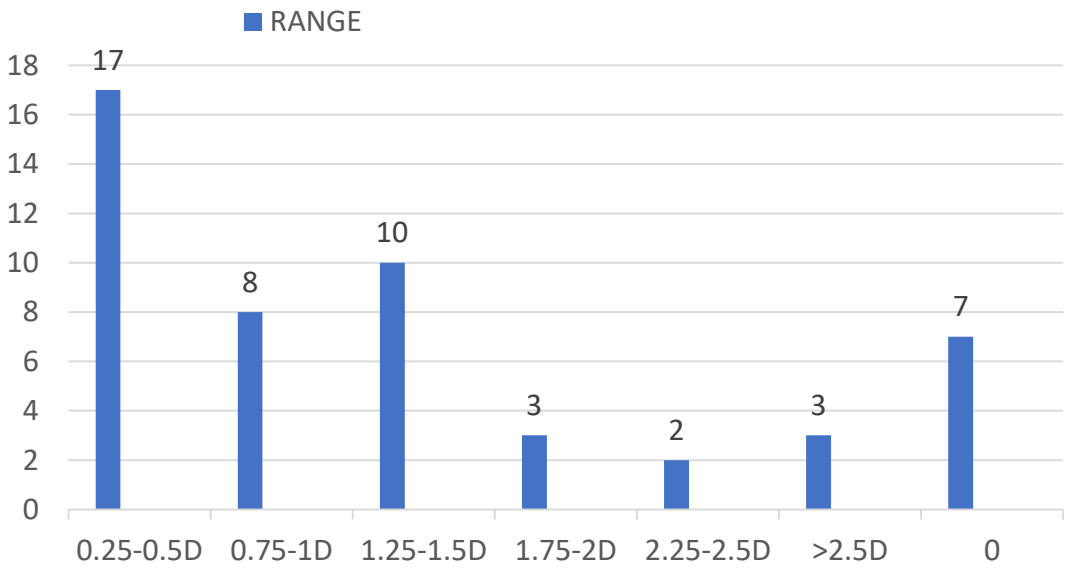
Post-Operative Astigmatism



Group A (Superior)			Group B (Temporal)	
Type	No of Patients	%	No of Patients	%
WTR	17	34.00	27	54.00
ATR	32	64.00	18	36.00
Nil	1	2.00	5	10.00
Total	50	100	50	100

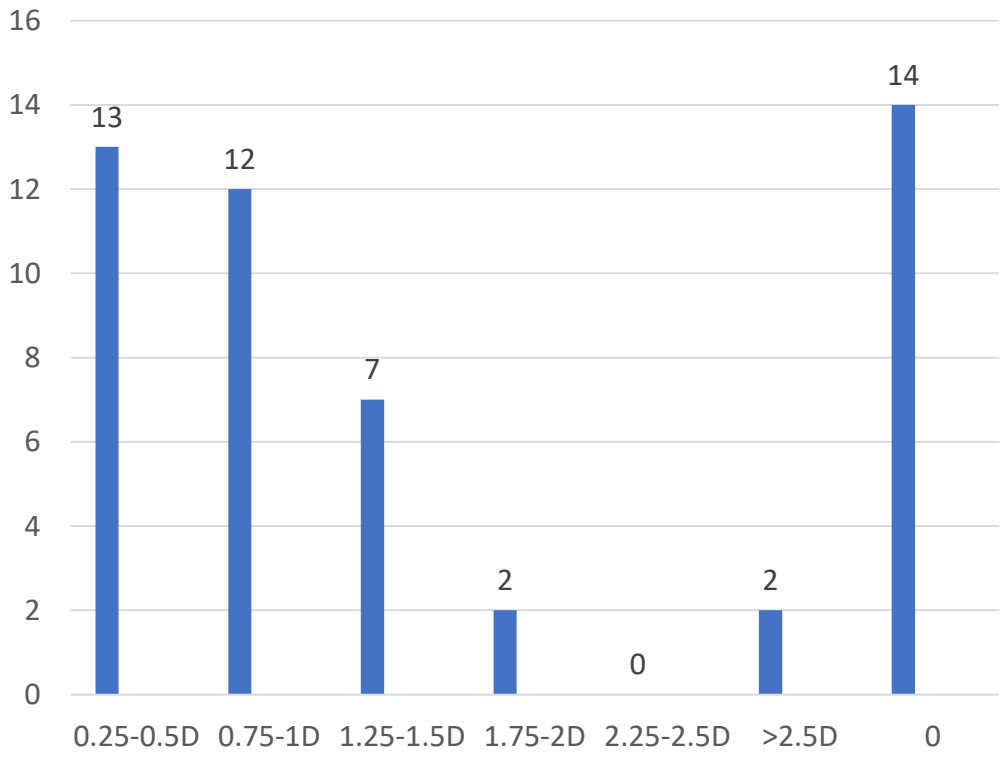
Superior clear corneal incision induced against the rule astigmatism (64%)and temporal clear corneal incision induced against the rule astigmatism (54%) post operatively.

Range of SIA in Group A



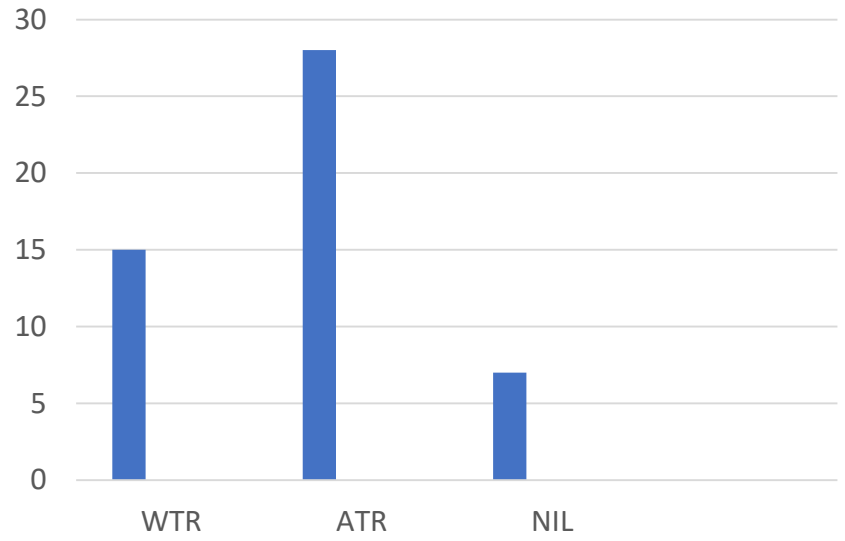
Range	No.of pts	Percentage
0.25-0.5D	17	34.00
0.75-1D	8	16.00
1.25-1.5D	10	20.00
1.75-2D	3	6.00
2.25-2.5D	2	4.00
>2.5D	3	6.00
0	7	14.00
TOTAL	50	100

Range of SIA in Group B

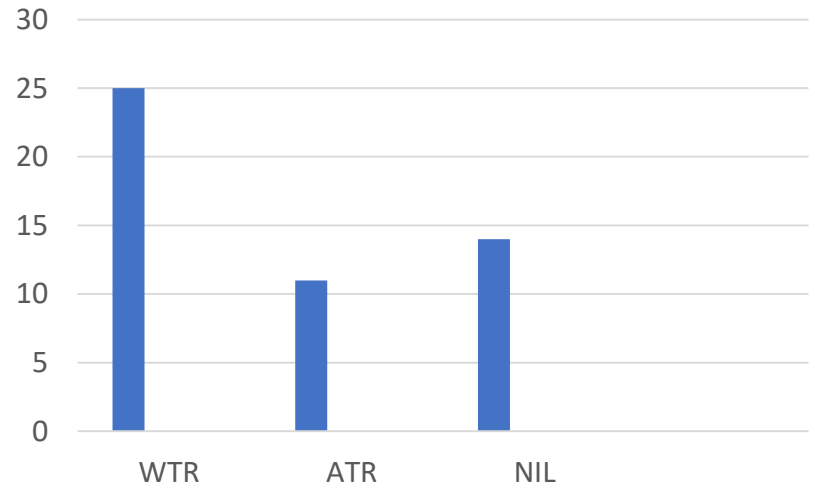


Range	No. of pts	Percentage
0.25-0.5D	13	26.00
0.75-1D	12	24.00
1.25-1.5D	7	14.00
1.75-2D	2	4.00
2.25-2.5D	0	0
>2.5	2	2.00
0	14	28.00
TOTAL	50	100

Type of SIA in Group A



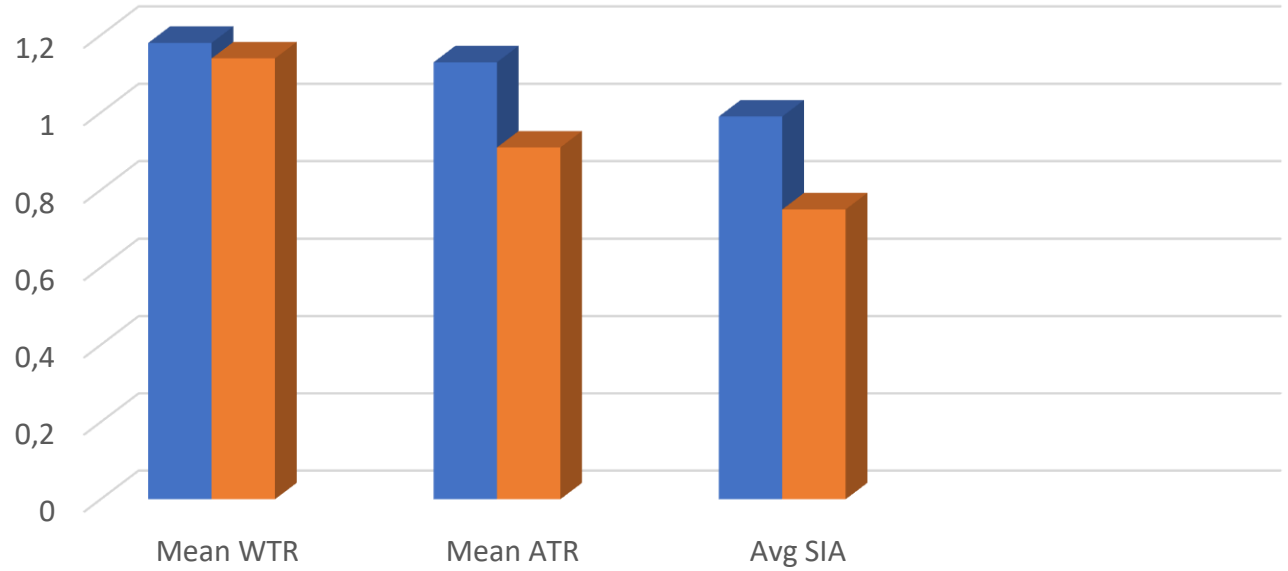
Type of SIA in Group B



TYPE	NO.of pts	%	mean
WTR	15	30.00	1.18D[SD0.64]
ATR	28	56.00	1.13D[SD0.96]
NIL	7	14.00	-
TOTAL	50	100	-

TYPE	No. of pts	%	mean
WTR	25	50.00	1.14D[SD0.81
ATR	11	22.00	0.91D[SD0.38
NIL	14	28.00	-
TOTAL	50	100	-

Comparison of amount of SIA between Group A and B



TYPE OF SIA	GROUP A	GROUP B
Mean WTR	1.18D[SD 0.64]	1.14D[SD 0.81]
Mean ATR	1.13D[SD 0.96]	0.91D[SD 0.38]
Average SIA	0.99D[SD 0.86]	0.75D[SD 0.79]

Comparison of post operative visual acuity between Group A and Group B

	DAY 1		1 Week		1 Month		6 Weeks	
RANGE OF VA	GROUP A	GROUP B	GROUP A	GROUP B	GROUP A	GROUP B	GROUP A	GROUP B
>6/60 to CF 3mt	2[4%]	1[2%]	2[4%]	1[2%]	2[4%]	-	2[4%]	-
6/60 to 6/24	18[36%]	7[14%]	8[16%]	2[4%]	1[2%]	2[4%]	-	2[4%]
<6/24 to 6/12	19[38%]	29[58%]	21[42%]	25[50%]	3[6%]	2[4%]	-	-
<6/12 to 6/6	11[22%]	13[26%]	19[38%]	22[44%]	44[88%]	46[92%]	48[96%]	48[96%]

- Postoperatively variations seen in keratometry readings on 1st day and 1st week.
- There is no much significant change between 1st month and 6 weeks reading i.e. postoperative wound related flattening showed changes at early period .i.e. 1st day and 1st week and became stable by 1 month.
- It is comparatively earlier in temporal group.

DISCUSSION

- The incidence of post operative astigmatism following phacoemulsification with foldable intraocular lens implantation with temporal clear corneal incision is less than with superior clear corneal incision.
- The average SIA was less with temporal clear corneal incision as compared to superior clear corneal incision.
- In group A with superior clear corneal incision, the average SIA was 0.99D with standard deviation of 0.861.
- In group B with temporal clear corneal incision ,the average SIA was 0.75D with standard deviation of 0.790.

- Superior clear corneal incision induced against the rule astigmatism (64%)and temporal clear corneal incision induced against the rule astigmatism (54%) post operatively.
- Visual rehabilitation was earlier following temporal clear corneal phacoemulsification.
- In conclusion temporal clear corneal incision seem to achieve the goal of minimizing surgically induced astigmatism.
- Temporal clear corneal incision is evidently better than superior clear corneal incision in minimizing surgically induced astigmatism.it is the incision which is more popularly used today as compared to a superior clear corneal incision.

CONCLUSION

- This study demonstrated the effect on corneal astigmatism of two commonly used self-sealing incisions in phacoemulsification with foldable IOL.
- In spite of various modifications in the cataract surgery, phacoemulsification remains the fastest and best surgical procedure.
- A temporal approach is more accessible than superior approach as a prominent brow and deep-set sunken eyes obstruct the maneuvering of the probe in the superior approach, which is easier and more accessible in temporal approach.
- A self-sealing corneal incision gives a bloodless surgical field.
- A well-formed 2.8 mm biplanar clear corneal incision gives excellent wound stability and healing. SIA in the temporal group is less than in the superior group and gives a better visual outcome, good optical quality, and great patient satisfaction.

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