



THE EFFECT OF INCISION SITE ON SURGICALLY INDUCED ASTIGMATISM IN CATARACT SURGERY

Anand Kumar
Kularia*

MS., Associate Professor, Ophthalmology. JNU medical college, Jaipur.
*Corresponding Author

Pooja Choudhary

MS, Assistant Professor, SNMC Jodhpur.

ABSTRACT

Aims: In this interventional prospective study we compare the surgically induced astigmatism (SIA) in superior incision with superotemporal incision in small incision cataract surgery (SICS). The duration of surgery, surgeon's convenience, operative and visual outcome in each type were studied.

Materials and Methods: Two groups of patients with cataract were randomly selected for SICS. Scleral frown shaped incision 6mm was given in all cases. There were hundred patients in each group of superotemporal and superior incision. Patients with vertical and horizontal keratometry differences not more than 0.50D were selected for study. SIA was measured at 6 weeks postoperatively. Surgeons' convenience was assessed in tunnel making, capsulorhexis, nucleus delivery, cortical matter aspiration and IOL implantation in both groups and graded as easy, satisfactory and difficult. Surgical duration in both types of incisions was noted. Final result of surgery, corrected vision and patients symptoms in postoperative period were recorded.

Statistical Analysis: Chi square test and independent t test was used for calculating p value.

Results: Mean SIA in suprotemporal incision group was -0.5 D and in superior incision it was -1.25 D ($p < 0.08$). Final Visual acuity with refraction was comparable in both the groups at 6 weeks ($p > 0.05$). Mean surgical duration in superotemporal incision group was 10 ± 2 minutes and 14 ± 2 minutes in the superior group. Surgeons were more at ease in superotemporal incision surgery compared to superior incision approaches.

Conclusion: Superotemporal incision is associated with less surgical time and surgical induced astigmatism compared to Superior incision. The surgeon observed easy access at superotemporal incision site. The difference in visual outcome, operative difficulty and postoperative recovery were not significant.

KEYWORDS : Astigmatism SICS Incision

INTRODUCTION:

The SICS perfectly fills the gap between phacoemulsification and conventional ECCE. Phacoemulsification has advantage 2.5mm incision with minimal astigmatism but it cause endothelial cell loss in hard cataract.

SICS has evolved as a low cost method with small learning time and good vision. It can be done by two approaches, by superior incision at 90 and superotemporal at 45 or 135 right or left eye. The astigmatism seen after SICS is between -0.5 to -3D at the vertical axis Attempts are made to reduce astigmatism by modification as superotemporal incision, frown shaped incision, distance from limbus, steep meridian incision etc. We studied the role of the incision site in postoperative astigmatism.

Materials and Methods:

Two hundred cataract patients were studied after SICS by two incision methods. They were divided in two groups of 100 cases each Superotemporal and superior groups. Patients with horizontal and vertical keratometry differences not more than 0.50D were selected. High myopic and hypermetropic patients were excluded. Both groups had right and left eyes in equal proportion. Surgically induced astigmatism was measured at 6 weeks postoperative. Surgeons' comfort was accessed in tunnel making, capsulorhexis, nucleus delivery, cortical matter aspiration and IOL implantation, duration and graded as easy, satisfactory and difficult. Any complication and Visual outcome at 6 weeks recorded.

RESULTS

Most common postoperative complication among 2 groups was postoperative corneal edema, which was 15% in oblique and 17% in the superior group. Post operative striate keratopathy was treated with topical 5% hypertonic saline eye drops. Flat Anterior chamber at postoperative day 1 was observed in 2% cases in oblique incision group and 1% cases in superior incision group, treated by air injection in anterior chamber. Posterior capsular rent (PCR) was seen in 2% of cases in Superotemporal groups compared to 3% cases in

superior groups. Most PCR happened during sub incisional cortical matter aspiration. The Best Corrected Visual Acuity (BCVA) was tested at 6 weeks after surgery and it was observed that there is a difference in astigmatism between two groups. Although the visual acuity after 6 weeks was comparable in both groups. But there was no spectacle dependency for distance in the Superotemporal group. At 6 weeks postoperative 92% in superior and 94% patients in the Superotemporal group had VA better than or equal to 6/9. During the course of postoperative follow up VA remained comparable between two groups, no statistically significant difference seen (P value > 0.05). Mean postoperative astigmatism at 6 weeks using refraction in case of the superior group was 1.44 D and 0.9D in the Superotemporal group. (P value < 0.05) (Table 1)

Table 1- Visual acuity after 6weeks (BCVA)

	6/6	6/9	6/12	6/18	Chi Square Test	P-Value
Superotemporal incision group	82	12	5	1	2.0	$P > 0.5$
Superior incision group	74	18	7	1	2.0	$P > 0.5$

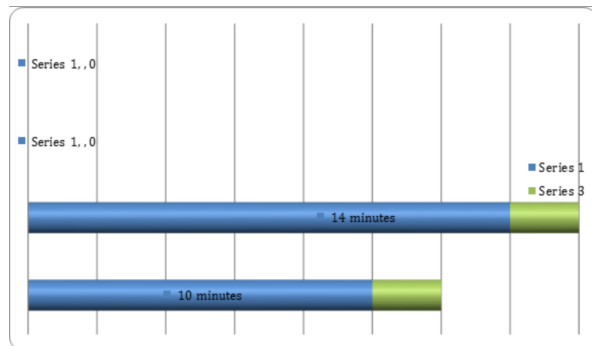
Due to gravitation and lid movement over incision on superior site cause more flattening at 90° with the rule astigmatism (WTR) compared with the Superotemporal group. Most patients had postoperative astigmatism within -0.25D to -2.25 D. It was less in Superotemporal incision group with no difference between left or right eye. (Table 2)

Table 2- Distribution of surgically induced astigmatism (SIA) in patients after 6weeks

SIA	Suprotemporal incision group	Superior incision group
< 0.25	7	0
0.50	39	3
0.75	35	10
1	8	20
1.25	4	24

1.50	3	18
1.75	2	12
2	1	9
>2.25	1	4
Mean \pm SD	0.50 \pm 0.514	1.25 \pm 0.418
Total	100	100

Mean surgical time in the Superotemporal group was 10 \pm 2 minutes (category 1) and 14 \pm 2 minutes (category 2) in the superior group. (Chart 1)



In superotemporal SICS as easy access to incision site available, supraorbital rim is avoided and superior rectus suture was not required, (subconjunctival hemorrhage caused by this is avoided). The Scleral tunnel making was easier than the superior approach and capsulorhexis, nucleus delivery, cortical matter aspiration and intraocular lens implant was easier.

DISCUSSION

Different locations of incision in different types of astigmatism will also affect SIA.[1] Superior incision will result in an astigmatism shift toward against the rule (ATR), while the temporal incision will cause an astigmatism shift toward with the rule (WTR).[2],[3],[4] Thus, other researchers said that superior incisions should be performed on astigmatism WTR, whereas temporal incisions should be carried out on ATR astigmatism.[5] This is because incision can decrease corneal curvature.[6] The incision is made on the site with more convex curvature, intended to balance the corneal curvature meridian and in turn reduce the SIA.[7] The uncorrected vision in 94% in superotemporal group was 6/9 or better vision and 92% in superior group was 6/9 or better vision. Study by Kongsap P Best corrected visual acuity (BCVA) was 20/40 or better in 83 eyes (87.37%) at one week postoperatively, in 86 eyes (90.53%) at one month, in 87 eyes (91.58%) at 3 months, and in 85 eyes (89.48%) at 6 months.[8] Rashid et al in his MSICS study reported that at 8th week postoperatively best-corrected V/A was achieved as 6/9 or better in 81.05% patients and as 6/12 or better in 94.68% patients in Group-A (superior), whereas in Group-B (temporal) best-corrected V/A was achieved as 6/9 or better in 87.36% patients and as 6/12 or better in 96.83% patients Without preexisting ocular pathology the common cause of reduced vision at 6 weeks is cystoids macular edema, it could be dealt with oral Acetazolamide. Pre-existing astigmatism can be neutralized by changing the site of incision.

The temporal location is farthest from the visual axis and any flattening due to wound is less likely to affect the corneal curvature at the visual axis. When the incision is made superiorly both gravity and eye blink tend to create a drag on the incision line. These forces are neutralized better in oblique placed incisions. Surgically induced astigmatism was calculated at 6 weeks postoperatively by subtraction method between postoperative and preoperative astigmatic value. Mean postoperative astigmatism in the superotemporal incision group was 0.9 D \pm 0.514 Diopters and in the superior incision it was 1.44 \pm 0.418 Diopters.[9] Similar study by Mandeep Tomar et al shows Mean postoperative astigmatism

in the case of the superior group was 1.35 \pm 0.62 D and 0.97 \pm 0.51 D in the oblique group. It was done with straight incision, whereas present study was done with frown shaped incision.[10]

It was comparable to the previous study done by Gokhle et al which reported the amplitude of postoperative astigmatism higher in superior group (1.45 + 0.94) than in temporal group (0.43+0.27) and in superotemporal group (0.67+0.65) D. here we hadn't done temporal incision case study. As the authors considered, temporal SICS incision will be exposed to an environment unprotected by an upper lid that is prone to infection.[11] Burgansky et al in their study found that with superior group had SIA of 1.45D and temporal group had SIA of 0.70D.[12] Kimura et al have shown that SIA is less with a Superotemporal incision.[13]

CONCLUSION

In this study it was observed that statistically the superotemporal incision in SICS is associated with less surgically induced astigmatism and less surgical time when compared to Superior incision. The high postoperative corneal astigmatism creates blurred images through a bigger circle of the least confusion on the retina.

The visual outcome after 6 weeks was not different statistically in both types of incisions.

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Conflicts Of Interest:- There are no conflicts of interest.

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