

A COMPARATIVE STUDY OF POST OPERATIVE ASTIGMATISM IN SUPERIOR VERSUS TEMPORAL APPROACH OF MANUAL SMALL INCISION CATARACT SURGERY

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ABSTRACT: BACKGROUND: Manual small incision cataract surgery is a simple and less expensive technique of cataract surgery but gives visual result almost equivalent to Phacoemulsification. **PURPOSE:** To compare surgery induced astigmatism in manual small incision cataract surgery through superior and temporal approaches. **METHODOLOGY:** One hundred and thirty eyes were included in this study. Eyes with steeper vertical keratometric reading were subjected to superior small incision cataract surgery (SICS) and those with a steeper horizontal keratometric reading were subjected to temporal small incision cataract surgery (SICS). Eyes with no astigmatism were randomly subjected to either type of surgery. Each group had 65 eyes. All the patients were followed up on 1st, 7th, 30th and 90th postoperative days. During each follow up, UCVA and BCVA were recorded, slit lamp examination was performed; autorefractometry and keratometric examinations were also performed. **RESULTS:** Out of 65 in the temporal incision group only 55 completed follow up till 90th day. The mean surgery induced astigmatism was found to be 1.45 ± 0.4 D in superior and 0.70 ± 0.3 D in the temporal incision group. Amount of surgery induced astigmatism was found to be significantly lower among the temporal incision group ($t = 11.444$, $p = 0.000$). **CONCLUSION:** SICS through temporal approach provides a better stabilization of refraction with significantly lesser amount of SIA than superior approach.

KEYWORDS: Manual small incision cataract surgery, surgery induced astigmatism.

INTRODUCTION: Cataract is the most common cause of blindness in India and other developing countries.¹ Management for cataract is its extraction by surgery. Nowadays all techniques of cataract extraction are being modified to achieve best uncorrected visual acuity and early rehabilitation.² Hence conventional extra capsular cataract extraction was improved to manual small incision cataract surgery (SICS) and Phacoemulsification. Phacoemulsification is expensive due to high cost of foldable IOLs and high cost of machine. For developing countries like India, Manual SICS is affordable and has given encouraging results.³

Various modifications in its techniques have been tried. It has been seen that frown incision causes minimal astigmatism in SICS but UCVA was decreased to 6/60. This was mostly due to postoperative astigmatism.⁴ In normal healthy eyes stiff upper tarsal plate causes pressure on cornea i.e. plus cylinder at 90U. With increasing age this pressure gradually decreases resulting in against the rule astigmatism.⁵ Several studies were conducted for comparing astigmatism induced by the superior and temporal approaches of surgery but up on smaller group of patients.⁶ Hence, this study was designed to evaluate the results among a larger population.

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MATERIALS AND METHODS: This was a hospital based study conducted in the Department of Ophthalmology, Agartala Government Medical College between March 2013 and December 2013. One hundred and thirty eyes were included in this study. Eyes with steeper vertical keratometric reading were subjected to superior small incision cataract surgery (SICS) and those with a steeper horizontal keratometric reading were subjected to temporal small incision cataract surgery (SICS). Eyes with no astigmatism were randomly subjected to either type of surgery. Each group had 65 eyes. All the surgeries were conducted by a team of two ophthalmic surgeons.

Patients with significant cataract controlled for diabetes and hypertension and without any cardiovascular disease were included in the study. The patients were examined with slit lamp biomicroscopy and fundus examination with 90D. Astigmatism was measured by autorefractometer and keratometer. IOL power was calculated with a scan biometry. Blood glucose estimation, ECG and thorough check up to rule out any other coexisting medical conditions were performed during the preoperative period. Surgeries were operated under peribulbar anaesthesia. The superior rectus suture was given in superior approach but not given in temporal approach. Fornix based conjunctival flap was made and peritomy was performed. A frown shaped scleral incision was made 1.5 - 2mms away from the limbus with surgical blade.

A crescent blade was used to dissect 1 to 2 mms into clear cornea to form a tunnel. Side port was made and anterior chamber was filled with viscoelastic solution and capsulorhexis was performed with cystotome made from 26 gauge needle. A sharp 3.2 mm keratome was used to make entry into anterior chamber. The internal opening was made little bigger than the external opening. Hydrodissection was done with ringer lactate solution and nucleus was delivered directly by pulling it with wire vectis. The cortical matter was aspirated with two-way since irrigation and aspiration cannula. A PMMA IOL was then implanted in the capsular bag. The viscoelastic was removed from anterior chamber by irrigation with ringer lactate using since cannula.

Corneal wound edges were hydrated. Subconjunctival injection of gentamicin 20 mg mixed with dexamethasone 4 mg was injected in the lower fornix. The eye was bandaged for 24 hours. Patients were followed up on 1st, 7th, 30th and 90th postoperative days. During each follow up, UCVA, BCVA, slit lamp examination, autorefractometry and keratometry were performed. Surgery induced astigmatism was calculated based up on the pre and post operative keratometric readings.

RESULTS: In the superior incision group 35 were right eye and 30 were left eyes. In the temporal incision group 30 were right eye and 25 were left eyes. Out of 130 eyes operated all the 65 in superior incision group and only 55 in the temporal incision group completed the follow up till 90th day.

Table 1: Post operative astigmatism in the superior and temporal incision groups

Location of incision	Amount of astigmatism, mean (SD)	Significance
Superior incision group	1.45 (0.4) D	t = 11.444 p = 0.000
Temporal incision group	0.70 (0.3) D	

Table 1 shows that mean post surgical astigmatism was significantly lower among the temporal incision group eyes (t = 11.444, p = 0.000).

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DISCUSSION: Until recently Manual small incision cataract surgery was considered as poor cousin of Phacoemulsification. Several recent articles have compared Manual small cataract surgery to Phacoemulsification and demonstrated almost equivalent outcome. Small incision cataract surgery gives visual results equivalent to Phacoemulsification at lower expenses. Manual SICS is alternative to Phacoemulsification but the astigmatism is higher due to the larger incision size. Burgansky et al have observed increase in astigmatism with an increase in the incision size.⁷

They found the mean astigmatism to be 0.6 ± 0.3 D for 6mms incision, 0.75 D for 6.5 mm incision and 1.36 D for 7mms incision. Kimura et al have shown that surgically induced astigmatism is less with an oblique incision (1.02 ± 0.66 D) than with a superior incision (1.41 ± 0.72 D).⁸ 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 temporally placed incisions as the incision is parallel to the vector of forces. Temporal incision causes with the rule astigmatism which neutralizes against the rule astigmatism present in elderly cataract patients. In a study by Gokhale et al, SIA was found to be 1.28D in superior group, 0.2D in superotemporal and 0.37D in temporal group.⁹ We also found similar results in our study with superior group having SIA of 1.45D and temporal group with SIA of 0.70D. The present study has clearly demonstrated the superiority of temporal incisions in manual small incision cataract surgery.

CONCLUSION: SICS through temporal approach provides better stabilization of refraction with significantly lesser amount of SIA than the superior approach.

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