

## Comparison of post operative astigmatism from superiotemporal vs temporal incision in small incision cataract surgery

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### Abstract

**Introduction:** Cataract surgery has become one of the most common and successful procedures in ophthalmology. In addition to improving visual acuity (VA), one of the goals of modern cataract surgery is to reduce pre-existing astigmatism (PEA), a factor that may reduce VA and affect the quality of vision.

**Materials and Methods:** It was a prospective, interventional study conducted at a tertiary care center. The study population consisted of 142 cataract patients admitted in hospital and underwent manual small incision cataract surgery. Patients were randomized and divided into two groups (group A –superiotemporal, Group B –temporal) Patients were examined on post-operative Day 1, 1week, 40days Uncorrected and best corrected visual acuity was recorded. Slit-lamp examination, auto refractometer and keratometry examination were done.

**Results:** The mean SIA in Group1 was found to be  $0.532 \pm 0.317$  and in Group 2 it was  $0.435 \pm 0.338$ . The p value accordingly was less than 0.05, which is statistically non significant. T-test was applied to compare the two groups.

**Conclusion:** SICS with the temporal approach provides a better stabilization of the refraction with a significantly less SIA than superior approach.

**Keywords:** Astigmatism, Small incision cataract surgery, Surgically induced astigmatism, Superiotemporal incision, Temporal section

### Introduction

Astigmatism is very common after Cataract surgery which is due to the fibrosis of the incision given during the cataract surgery. In most of the cases cornea is at fault. Normally some degree of with the rule astigmatism is present i.e. vertical meridian is more steep as that of horizontal meridian. This is usually increased with superior incision. Against the rule astigmatism has horizontal meridian steeper than vertical meridian.

Many studies have quoted that astigmatism either with or without the rule depend upon the type of incisions.<sup>(1,2,3)</sup> This study was done to assess the effect of incision on the surgical induced astigmatism.

### Materials and Methods

1. In this study total 150 patients planned for the cataract surgery was enrolled. The study was conducted in out patient department of ophthalmology at Sri Guru Ram Dass Medical College, Vallah, Amritsar from June to December 2016. After randomization, patients were divided into two study groups (Group A- superiotemporal, Group B- temporal). Informed written consent was obtained from the patient or the attendant prior to the surgery.

Patients were then examined on a day prior to the surgery (-1day) & on days (1, 7, 15, 30 & 40) post operatively. The day of surgery is taken as 0 day.

**Surgical technique-** All the patients were pre-operatively assessed with visual acuity recording, slit-lamp bio-microscopy, tonometry and fundus

examination by using a direct and indirect ophthalmoscope and 90 D. Astigmatism was measured by using a autorefractometer and a keratometer. The IOL power was calculated by contact A-scan biometry by using the SRK II formula. Pre-operative investigations like a complete haemogram, random blood sugar, routine urine and microscopy were done.

The institutional ethics committee approval was taken and the informed written consent was obtained from the patients or the attendants.

Patients were included if they were older than 40 years & having non Complicated cataract as cortical /nuclear /posterior sub capsular cataract.

Exclusion criteria consisted of history of intraocular inflammation or uveitis, trauma & myopia, significant posterior chamber disease involving macular region, previous macular surgery, previous history of raised intraocular pressure, prolonged steroid therapy, ocular surface epithelial defect, h/o any type of steroid intake, any type of immunocompromised patients, in addition subjects with known hypersensitivity to ketorolac, any ingredients of the study medication were excluded.

**Surgical technique-** Preoperatively (Day-1) patients were examined with slit lamp to rule out any ocular surface defect. All operations were performed in a standard way and by the same experienced surgeon. Briefly, mydriasis was achieved by instillation of Tropac p (tropicamide 0.8% with phenylephrine 5%) eye drops on the day of surgery. Surgery was performed under peribulbar anesthesia with lignocaine 2% with adrenaline 1:20000 & bupivacaine 0.5% in 3:2 mixture

with 150 IU of hyaluronidase. Small incision cataract surgery was carried out via a temporal/sclerotemporal scleral tunnel based incision, and same ophthalmic viscoelastic device were used in all cases. The irrigating solution zysure (zydus) used in all the surgeries.

After making 6 mm frown incision 1.5mm behind the limbus with 15 no. blade three-plane sclero-corneal tunnel was created with a crescent blade. Through a side port, the anterior chamber was filled with Trypan blue. After 30 seconds, the anterior chamber was washed and filled with a viscoelastic solution (Hydroxy Propyl Methyl Cellulose 2%). Capsulorrhexis was performed by using a 26 gauge needle. An entry into the anterior chamber was made with a sharp 3.2mm keratome to create a self sealing corneal valve and the internal opening was extended with the same keratome up to 7 mm, which was slightly larger than the external one. Hydro-dissection and delineation were performed. The upper pole of the nucleus was prolapsed out of the capsular bag. Through the scleral tunnel, the nucleus was delivered directly by visco-expression. The cortical matter was aspirated with simcoe two way irrigation and aspiration cannula. In the presence of a viscoelastic solution, a rigid posterior chamber 6×12.5 mm PMMA intraocular lens was implanted in the posterior capsular bag. The viscoelastic was removed from the anterior chamber by irrigation with BSS. A corneal stromal hydration was performed at the wound edges. A sub-conjunctival injection, Gentamicin 20 mg mixed with Dexamethasone 2mg was injected in the lower fornix. At the end of the surgery difluprednate emulsion was applied and the eye was bandaged for 24 hours. Post-operatively, oral antibiotics (Tab.Ofloxacin 200 mg twice daily) and analgesics were given. The patients were examined on the post-operative days 1,7,15 21 and 40. The uncorrected and the best corrected visual acuity were recorded; slit-lamp examination, fundus examination and autorefractometer and keratometry examinations were done. A topical antibiotic – steroid combination eye drop (Ofloxacin 0.3% - Dexamethasone 0.1%) was instilled every 2 hourly for the first 7 days in the operated eye and then in tapering doses over a period of 40 days. Proper eye care was advised to the patients to prevent eye infections, like hand washing, proper instillation of the eye drops and avoidance of coughing and lifting heavy weights. The patients were asked to come for regular follow ups.

All the calculations were performed by using the surgically induced astigmatism (SIA) calculator version 2.1, a free software program for the pre and the postoperative keratometric values, as was described by Holladay et al.<sup>(4)</sup> The comparison between the groups was done by using In Stat (a statistical free software program) in steps like comparing the means and performing the ordinary ANOVA test and the assuming values were sampled from the Gaussian distribution.

## Results

In group A 72 and 70 patients in group B completed the 41days follow up. The mean SIA in Group1 was found to be  $0.532\pm 0.317$  and in Group 2 it was  $0.435\pm 0.338$ . The z score applied was found to be 1.7143. This value was less than the standard value, i.e.2.58. The p value accordingly was less than 0.05, which is statistically non significant.

**Table 1: Age distribution of patients in different age group**

Patients' age (in years)	Superiotemporal	Temporal
41-50	2	0
51-60	29	32
61-70	38	36
71-80	6	7
Total	75	75

**Table 2: Comparison between the groups**

	Mean difference	Q	P
Superiotemporal vs temporal	0.0975	2.112	NS p>0.05

**Table 3: Surgically induced astigmatism (SIA)**

Incision location	No of patients	Surgically induced astigmatism
Superiotemporal	75	$0.532\pm 0.317$
Temporal	70	$0.435\pm 0.338$

## Discussion

The small incision cataract surgery is a good alternative to phacoemulsification, as being cheap only drawback is the incision is bigger which can cause astigmatism. The temporal location is the farthest from the visual axis and any flattening which is caused by the wound is less likely to affect the corneal curvature at the visual axis. A temporal incision is advantageous because it can be made easily in deep sockets and small eyes. Also, the superior site is still there if a trabeculectomy surgery has to be done for glaucoma in the future. But it is difficult to learn and the upper lid does not cover the incision and so the foreign body sensation due to the exposure is more and it is exposed to infection.

The supero-temporal location has the advantages of both the locations i.e. superior and temporal. The supero-temporal incision is free from the effect of gravity, eyelid pressure and also added advantage of lid cover it tends to induce less astigmatism.<sup>(1,2)</sup> This study found that the induced astigmatism was lower in supero-temporal groups as compared to that in the temporal group. The astigmatism in the supero-temporal and the temporal groups was comparable. In the study of Gokhale et al,<sup>(5)</sup> the SIA in the superior group was 1.28D, it was 0.2D in the superotemporal group and it was 0.37D in the temporal group. Another study by vaishali et al<sup>(6)</sup> showed

similar results, with the superior group having an SIA of 1.57D, an SIA of 0.53D in the superotemporal group and that of 0.435D in the temporal group.

### Conclusion

SICS with the superior-temporal and the temporal approaches provides a better quality of vision due to the significantly less SIA than the superior approach. But the superotemporal incision has the advantages of both the locations and so it is better than the temporal incision.

### References

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