

# Post-operative effect of temporal and superior approach in Manual small incision cataract surgeries

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## Abstract

**Aim:** to compare the temporal approach and superior approach in minimal invasive cataract surgery for postoperative astigmatism, Though there are various techniques of surgeries, the manual small incision cataract surgery (SICS) technique was used predominantly in India, due to its cost effectiveness and its less dependency in technology **Materials and methods:** a prospective, randomized control, hospital-based study done on 83 patients by dividing the group randomly based on surgical technique, There were 29 patients who underwent surgery in temporal technique and 54 patients who underwent surgery in superior technique **Results:** P- Value[0.018] suggests the difference between the lateral technique and superior technique is significant, superior technique is having more number of surgically induced astigmatism compared to temporal technique

**Key Word:** temporal incision, lateral incision, MICS, SIA

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## INTRODUCTION

The number one cause of preventable blindness all over the world is cataract, the American association of ophthalmology defines cataract as a clouding of the natural intraocular crystalline lens that focuses the light entering the eye onto the retina, as cataract develops it diminishes the vision of the normal elderly persons slowly, later it may cause complete blindness to the patient if left untreated, as of up to now there is no medical treatment for the cataracts, replacing the cloudy

lens with a normal lens is the only surgical treatment. Conventional extracapsular cataract surgery (ECCE), manual small incision cataract surgery (MSICS) and phacoemulsification are the three most popular forms of cataract surgery in India and rest of the world<sup>1</sup>, Though there are various techniques of surgeries, the manual small incision cataract surgery (SICS) technique was used predominantly in India, due to its cost effectiveness<sup>2</sup> and its less dependency in technology<sup>3</sup>, as per alcon's phaco development program, "India has among the world's highest proportion of blind people (numbering nearly 12 million) against 36 million globally which makes India home to one-third of the world's blind population". Astigmatism following cataract surgery consists of two components: preoperative astigmatism, which is intrinsic to the patient, and surgically induced astigmatism (SIA), which is a result of the procedure Astigmatism following cataract surgery consists of two components: preoperative astigmatism, which is intrinsic to the patient, and surgically induced astigmatism (SIA), which is a result of the procedure Difficulty in normal vision due to the alteration in the normal curvature of cornea or lens is called

astigmatism, when the normal curvature of cornea is deranged then it is corneal astigmatism, when lens normal curvature is altered then it is lens astigmatism. There are two components in surgically induced astigmatism: preoperative astigmatism, which is present already in the patient due to physiological errors, and surgically induced astigmatism (SIA), because of the procedure<sup>4</sup>. The scars are the result of incisions in the cornea and lens, these scars cause corneal flattening along the meridian of the incision and steepening in the meridian 90° away<sup>5</sup>. The commonest causes of post-operative blurring of vision complained by the patients are the surgically induced astigmatism, Postoperative astigmatism is a very complex clinical problem. The main influence on its appearance has preoperative astigmatism as well as shape and length of anterior chamber opening, suturing technique and wound healing<sup>6</sup>. Nidhi Jauhari *et al* compared the SIA in three different groups of patients, in which each group got a different type of incision<sup>7</sup>, similarly Nikhil S Gokhale *et al* compared and came to conclusion SIA was lower in the temporal and supratemporal groups compared to that in the superior group<sup>8</sup>, we designed our study by comparing two groups of patients, who were operated randomly by the surgeons by anyone of the technique, either by superior incision and temporal incision in the population of north arcot district.

## MATERIALS AND METHODS

This study is designed as a prospective, randomized control, hospital-based study between February 2018 and September 2018, the study was done in department of ophthalmology of melmaruvahtur dhiparasakthi institute of medical sciences and research, Kanchipuram. The patients were selected after screening them for associated medical conditions. After screening, patients with cortical and nuclear cataracts ranging from grade 1 to hyper mature were selected, patients with traumatic cataract, associated glaucoma, corneal scarring and degeneration and are those with complications intra operatively and postoperatively were excluded. The selected 83 patients were operated by two surgeons by dividing into two groups, group 1 was operated with temporal technique and group 2 was operated by superior technique. Preoperative assessments like recording the visual acuity, slit lamp examination and measuring the intraocular pressure were done for all the patients, fundus was examined by using direct and indirect ophthalmoscope by 90 D or 78 D, by using autorefractometer preoperative astigmatism was recorded, by using the contact A scan biometry and applying the SRK II formula intraocular lens power was calculated. Regular preoperative investigations like random blood sugar, urine routine and complete hemogram were done. Three days before the

surgery topical ofloxacin 0.3 % eyedrops were administered 4 times a day, 1 hour before the surgery Topical tropicamide 0.8% with phenylephrine 5% and flurbiprofen (non-steroidal anti-inflammatory) eye drops were instilled every 15 minutes The patients were operated under peribulbar anaesthesia with 5 cc of a 3:2 mixture of injection Xylocaine 2% and Injection bupivacaine 0.5 % with 150 I.U. of Hyaluronidase. After making a conjunctival flap, 1.5 mm posterior to limbus a 6MM frown shaped scleral incision was made, superior incision was made for group 1 and lateral incision was made for group 2 A three-planar sclero-corneal tunnel was constructed using a 15 No. blade followed by a crescent blade. A side port was made and the anterior chamber was filled with Trypan blue after introducing an air bubble to prevent corneal endothelial staining. The anterior chamber was washed after 30 seconds and then filled with a viscoelastic solution (Hydroxy Propyl Methyl Cellulose 2%). Capsulorrhexis was done using a 26-gauge needle. An entry into the anterior chamber was made with a sharp 3.2mm keratome to make a self sealing corneal valve. The internal opening was then extended with the same keratome up to 7 mm such that the inner opening was slightly larger than the external one. Hydrodissection was done, followed by hydrodelineation. Using a dialer, the upper pole of the nucleus was carefully prolapsed out of the capsular bag. Through the scleral tunnel, the nucleus was delivered with pressure over the posterior lip of tunnel directly by means of visco-expression. Cortical cleaning was done with simcoe two-way irrigation and aspiration cannula. After filling the capsular bag with viscoelastic solution, a rigid posterior chamber 6×12.5 mm PMMA intraocular lens was implanted in the posterior chamber. The visco solution was washed out from the anterior chamber by irrigation with ringer lactate by using a simcoe cannula. A corneal stromal hydration was performed at the wound edges. A sub-conjunctival injection, Gentamicin 20 mg along with Dexamethasone 2mg was injected in the lower fornix. The eye was bandaged for twenty-four hours. Post-operatively, oral antibiotics (Tab. Ofloxacin 200 mg twice daily) and analgesics were prescribed. The patients were examined on the first, seventh, twenty first and forty fifth days postoperatively, and the findings noted methodically. The uncorrected and the best corrected visual acuity were documented during each visit slit-lamp examination, fundus examination and autorefractometer and keratometry were performed. 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 followed by tapering doses over a period of 45 days. Proper eye care, like hand washing, was explained to the patients to prevent eye

infection. Most importantly, patients were taught to instill the eye drops properly. They were also suggested avoidance of coughing and lifting heavy weights. The patients were advised to come for regular follow ups We used SIA calculator version 2.1 (surgically induced astigmatism), a free software program to perform all the calculations. As Holladay *et al*<sup>9</sup> mentioned in his article the surgically Induced Astigmatism of the patients were calculated from keratometric values taken preoperatively and postoperatively, by using ibm SPSS version 20, The comparison between the groups was calculated, in steps like comparing the means and performing the ordinary independent t test and chi square test was used for categorical variables

**RESULT**

A total of 83 eyes were operated on. There were 29 patients who underwent surgery in temporal technique and 54 patients who underwent surgery in superior technique, the group gender cross tabulation of the patients in the different groups has been shown in [Table-1]. The sex distribution of the patients in the different groups was as has been shown in [Table - 2]. The mean SIA in temporal group was found to be  $0.53294 \pm 0.6207$ , in superior group, it was  $0.81505 \pm 1.0278$  [Table- 3].The P value was 0.018.P- Value suggests the difference between the lateral technique and superior technique is significant, superior technique is having more number of surgically induced astigmatism compared to temporal technique. Comparing the surgical induced astigmatism after the superior and temporal technique in two groups of patients revealed temporal technique have to be preferred over superior technique which is significant in statistical analysis.

**Table 1: Group \* Gender Cross tabulation**

		gender		Total	
		Male	Female		
Group	Temporal	Count	16	13	29
		% within gender	38.1%	31.7%	34.9%
Superior		Count	26	28	54
		% within gender	61.9%	68.3%	65.1%
Total		Count	42	41	83
		% within gender	100.0%	100.0%	100.0%

**Table 2: Age Group \* Group Crosstabulation**

		group		Total	
		Temporal	Superior		
Age Group	40-50	Count	3	1	4
		% within group	10.3%	1.9%	4.8%
51-60		Count	15	17	32
		% within group	51.7%	31.5%	38.6%
61-70		Count	11	28	39
		% within group	37.9%	51.9%	47.0%
Above 70		Count	0	8	8
		% within group	.0%	14.8%	9.6%
Total		Count	29	54	83
		% within group	100.0%	100.0%	100.0%

**Table 3:**

	Group	N	Mean	Std. Deviation	Std. Error Mean	t	P value
Post op astigmat	Temporal	29	.6207	.53294	.09896	2.422**	0.018
	Superior	54	1.0278	.81505	.11091		

**DISCUSSION**

When we consider a lower cost alternative to phacoemulsification, SICS have to be considered, but due to the size of the incision which is much larger causes surgically induced astigmatism very often, according to Vaishali *et al*<sup>10</sup> - A pre-existing astigmatism can be neutralized by changing the site of the incision, incision

in the superior aspect can be learned easily compared to any other technique, due to the protection given by upper eyelid, the incision site will get protected but at the same time because of the geographical location and blinking causes a drag in the incision site and makes the temporal incision a more advantageous by causing less number of surgically induced astigmatism in the patients. The site of

incision in temporal technique is far away from the visual axis and causes less flattening due to the wound which affect the corneal curvature. The temporal incision is also can be done easily in small eyes and deep sockets. In 2012 Malik *et al* mentioned SIA induced by superior incision was 48.28 % more than temporal incision in his study, which resembles the value with our study, he also mentioned SICS with temporal approach provides better stabilization of refraction with significantly less SIA than superior approach<sup>10</sup>, then in December 2012 Renu M *et al* stated that temporal approach MSICS produces less postoperative astigmatism and has manifold advantages over superior incision MSICS with excellent visual outcome<sup>11</sup>, in 2014 Hemlata Yadav compared the astigmatism induced by a superior (onaxis) incision versus temporal incision in manual SICS in eyes with preoperative "with the rule" corneal astigmatism, she found SIA was significantly lower in the temporal group compared to that in the superior group<sup>12</sup>, later in 2016 Srinivas M *et al* reported temporal straight incision is recommended in patients with lower preoperative astigmatism as it provides less surgically induced astigmatism as compared to superior straight incision<sup>13</sup>, later in 2017 Rohit Saxena *et al.* evaluated induced astigmatism and visual outcome after manual SICS using two different incision sites "Superior vs. Temporal" and found out temporal incision will be preferred over superior incision, all these studies confirms the findings of our studies.

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