



COMPARISON OF CHANGES IN ASTIGMATISM AFTER CATARACT SURGERY IN TEMPORAL VERSUS SUPERIOR INCISIONS

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ABSTRACT

Introduction- Patients undergoing cataract surgery develop astigmatism based on location of incision. This retrospective study investigated the “Pre & post operative astigmatism after cataract surgery based on incision”. Purpose of this study was to compare astigmatism obtained in temporal & superior incision.

Material and Methods- Out of 50 cataract patients collected, 25 patients were in the temporal incision PHACO group and 25 were in the superior incision PHACO group. Corneal astigmatism and corrected visual acuity were assessed 30 and 90 days after cataract surgery.

Results- against the rule astigmatism is more common after superior incision cataract surgery and with the rule astigmatism is more common after temporal incision cataract surgery.

Conclusion: The study reveals temporal incision, increase with the rule & superior incision increase against the rule and also concluded astigmatism is least in temporal incision.

Key words: Phacoemulsification, temporal and superior incision, surgically induced astigmatism.

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INTRODUCTION

Astigmatism is one of the commonest refractive errors encountered during clinical practice. Corneal astigmatism has been a by-product of cataract surgery since the first corneal incision was made. Post corneal astigmatism remains a problem, often delaying visual rehabilitation & limiting visual outcome & reducing the effectiveness of the procedure. Symptoms such as glare, monocular diplopia, asthenopia and distortion are accompaniments. Even when corrected with glasses, astigmatism may cause off-axis blur, eyestrain and visual field restriction. Hence the need for the study of surgically induced astigmatism and comparisons of various techniques that will offer the best corrected visual acuity post surgically. Cataract surgery is the removal of the natural lens of the eye (also called

“crystalline lens”) that has developed an opacification, which is referred to as a cataract. Metabolic changes of the crystalline lens fibers over time lead to the development of the cataract and loss of transparency, causing impairment or loss of vision. During cataract surgery, a patient’s cloudy natural lens is removed and replaced with a synthetic lens to restore the lens’s transparency. Following surgical removal of the natural lens, an artificial intraocular lens implant is inserted. 3 basic techniques for cataracts surgery include Phacoemulsification wherein which the eyes internal lens is emulsified with an ultrasonic hand piece and aspirated from the eye. Extracapsular cataract surgery used mainly for every advanced cataract where the lens is too dense to dissolve into fragments (phaco emulsify). This technique requires a larger incision so that

the cataract can be removed in one piece without being fragmented inside the eye. Intracapsular cataract surgical technique requires an even larger wound than extracapsular surgery, and the surgeon removes the entire lens and the surrounding capsule together. This technique requires the intraocular lens to be placed in a different location, in front of the iris. This method is rarely used today but can still be useful in cases of significant trauma. The aim of this study was, to compare pre & post operative astigmatism after cataract surgery based on incision.

MATERIAL AND METHODS

This was retrospective hospital based study consisting of 50 patients (50 eyes) who underwent cataract surgery conducted in Al Salama Eye Hospital, Perinthalmanna. Study was performed between January 2014 to September 2014. Since the study involves a surgical procedure, we could not enroll more patients. This study was in accordance with ethical standards of responsible committee on Human experimentation and with the Helsinki Declaration of 1975 which was revised in 2000 and it was reviewed and cleared by Institutional ethics committee. The cases were included after an informed written consent was taken from patients. A complete ocular evaluation including Snellen visual acuity testing, Slit lamp biomicroscopy, IOP using Applanation Tonometer, and Biometry- A scan, Keratometry were performed at baseline. Cataract patients were randomized into two groups, 25 eyes in the temporal incision group and 25 in the superior incision group. Astigmatism was measured by keratometry readings and by refraction before and 1 week, 1 month, and 3 months after surgery. Phacoemulsification was followed by intra ocular lens implantation. Corneal astigmatism and corrected visual acuity were assessed 30 and 90 days after cataract surgery. Those with grossly altered corneal topography, Postoperative vitreous loss, uveitis, corneal oedema, Aphakic and pseudophakic bullous keratopathy, preceding eye diseases other than cataract were excluded. Statistical analysis was done using SPSS 15.0 SAS 9.2, and R environment ver.2.11.1 and Microsoft word and Excel have been used to generate graphs, tables etc. Student t test (two

tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. A p value < 0.05 was considered statistically significant.

Statistical Methods¹⁻⁴:

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean \pm SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data are made, Assumptions: 1. Dependent variables should be normally distributed, 2. Samples drawn from the population should be random, and Cases of the samples should be independent. Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters.

Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

Significant figures

+ Suggestive significance (P value: $0.05 < P < 0.10$)

* Moderately significant (P value: $0.01 < P \leq 0.05$)

** Strongly significant (P value: $P \leq 0.01$)

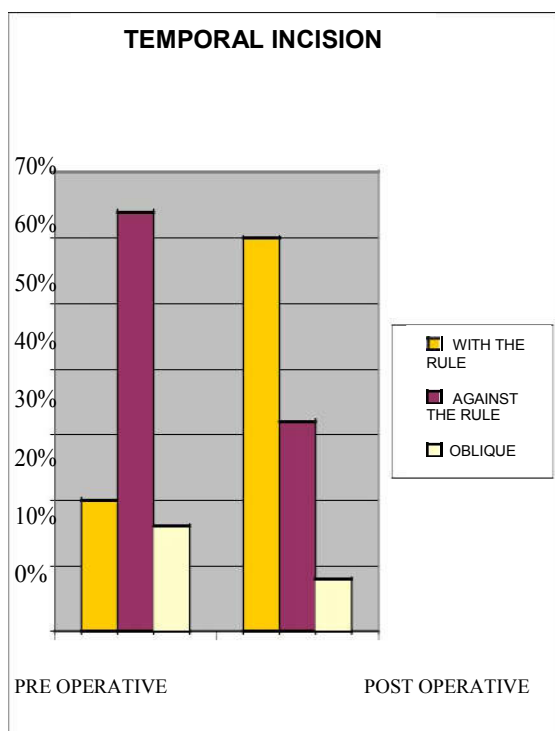
Statistical software: The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS

This study shows a statistically significant positive correlation between astigmatism, after cataract surgery and incision of cataract surgery. The result suggests that magnitude and the variability of surgically induced astigmatism with temporal incision surgery is significantly lower than that of superior incision surgery. Study reveals that against the rule astigmatism is more common after superior incision cataract surgery (Graph2) and with the rule astigmatism is more common after

temporal incision cataract surgery (Graph 1). Surgeons interested in reducing the magnitude and variability of induced astigmatism at the time of cataract surgery may want to consider the use of temporal incision. Results were statistically analyzed (Table1-3) and found to be not significant.

GRAPH 1- shows; with the rule astigmatism is more in post operative refraction after temporal incision.



GRAPH 2- This graph shows, against the rule astigmatism is more in post-operative refraction after superior incision.

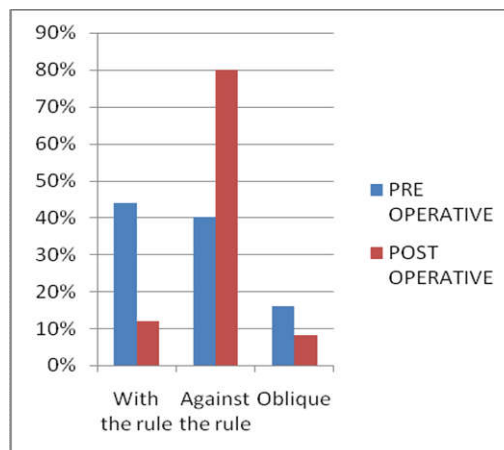


Table 1- Assessment of Refraction of patients in two groups studied

Refraction	Pre operative	Post operative	% change
Temporal incision (n=25)			
• <-2.5	3(12%)	0(0%)	-12.0%
• -2.5 to -1.25	7(28%)	2(8%)	-20.0%
• -1.25 to 0	3(12%)	11(44%)	32.0%
• 0	0(0%)	0(0%)	0.0%
• 0-1.25	6(24%)	10(40%)	16.0%
• 1.25-2.5	5(20%)	2(8%)	-12.0%
• >2.5	1(4%)	0(0%)	-4.0%
Superior incision (n=25)			
• <-2.5	3(12%)	0(0%)	-12.0%
• -2.5 to -1.25	8(32%)	4(16%)	-16.0%
• -1.25 to 0	1(4%)	12(48%)	44.0%
• 0	0(0%)	0(0%)	0.0%
• 0-1.25	6(24%)	8(32%)	8.0%
• 1.25-2.5	5(20%)	1(4%)	-16.0%
• >2.5	2(8%)	0(0%)	-8.0

Table 2- Assessment of Axis of patients in two groups studied

Axis	Pre op	Post op	% change
Temporal incision (n=25)			
• <50	5(20%)	4(16%)	-4.0%
• 50-150	16(64%)	13(52%)	-12.0%
• >150	4(16%)	8(32%)	16.0%
Superior incision (n=25)			
• <50	1(4%)	1(4%)	0.0%
• 50-150	19(76%)	22(88%)	12.0%
• >150	5(20%)	2(8%)	-12.0%

Table 3- Comparison of mean Axis of patients in two groups studied

Axis	Temporal incision	Superior incision	P value
Pre Operative	92.00±49.33	98.80±40.06	0.595
Post Operative	102.20±56.61	96.20±31.66	0.646

DISCUSSION

There are several reports on astigmatism before and after cataract surgery based on incision. In a study conducted by Pallavi Patil et al, Surgically induced astigmatism clinical outcome of both surgeries was same, as there was no significant difference in the uncorrected postoperative visual acuity in between the groups⁵ In another study conducted by Jaime Tajedor et al, it was found that temporal incisions are recommended for negligible astigmatism, whereas nasal and superior incisions are preferable when the steep axis is located at approximately 180° and 90°, respectively⁶ In a study conducted by Sitki Samet et al, showed that there was no statistically significant difference in astigmatism between superotemporal incisions in the right eyes and superonasal incisions in the left eyes 1 year after surgery for a surgeon who sits at the 12 o'clock⁷. Studies conducted by Stephan Kohlen et al, found that there was a highly statistically significant difference in surgically induced corneal astigmatism after temporal and nasal unsutured

limbal tunnel incisions⁸. In another study conducted by Stan J. Roman et al, shows that the superior corneal incision produced significant surgical induced astigmatism (SIA), leading to high postoperative astigmatism and poor UCVA. The scleral- and temporal incisions produced minimal SIA and good UCVA⁹. The result suggests that magnitude and the variability of surgically induced astigmatism with temporal incision surgery is significantly lower than that of superior incision surgery. Our study reveals that against the rule astigmatism is more common after superior incision cataract surgery and with the rule astigmatism is more common after temporal incision cataract surgery.

CONCLUSION

This study concludes that after temporal incision cataract surgery, with the rule astigmatism is more common than against the rule astigmatism and after superior incision cataract surgery, against the rule astigmatism is more common than with the rule astigmatism. Astigmatism is least in temporal incision cataract surgery.

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