

Comparative Study of Post Operative Astigmatism Following Small Incision Cataract Surgery-Sics in Superior, Supero-Temporal and Temporal Incision.

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Abstract

This prospective study was designed to evaluate and compare surgically induced astigmatism in small incision cataract surgery through superior, supero-temporal and temporal approach.

Astigmatism means no point focus. It is a refractive error that occurs when the optical system does not have the same refractive power at all its meridian. The location and width of incision will determine the amount of surgically induced astigmatism (SIA) in small incision cataract surgery. Temporal and superotemporal incisions are less likely to induce post operative astigmatism than the 12 o' clock incisions.

The study was carried out at Tairunnessa Memorial Medical College and Hospital, Gazipur; Faridpur Diabetic Association Medical College and Hospital, Faridpur and General Hospital, Faridpur, Bangladesh, from January 2012 to June 2013. Total number of 120 eyes of 108 patients, both male and female patients were included for the study. We excluded the patients having corneal scar, irregular astigmatism, presence of pterygium and previous intraocular surgery from our study. The mean patient age at the time of surgery was 61.9±8.1 years ranged from 40 to 70 years. The patients were divided into three groups. The three groups had 40 patients each. The patients in group-A underwent manual SICS with a superior incision, the patients in group-B underwent manual SICS with a supero-temporal incision and the patients in group-C underwent manual SICS with a temporal incision. The small incision cataract surgeries were done by applying same surgical technique. The courses of the post operative astigmatic changes were determined by using Auto Refractometer at 1st week, 6th weeks and 12th week postoperatively.

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The mean surgically induced astigmatism- SIA in group-A was found to be 1.45 ± 0.44, in group- B, it was 1.08± 0.44 and in group-C, it was 0.08 ±0.34 .

Small incision cataract surgery-SICS with a temporal and superior-temporal approach provides earlier stabilization of refraction and better visual acuity due to significantly less SIA than the superior approach.

Keywords: Astigmatism, Small incision cataract surgery, Superior incision, Temporal incision, Supero-temporal incision, Surgically induced astigmatism (SIA)

Introduction

Cataract is the leading cause of avoidable blindness specially in the developing country accounting for about three quarters of the blindness. The mainstay of the management of cataract is surgery. Cataract surgery is no more a blind rehabilitation surgery. But it gives absolutely a normal vision. Cataract surgery has undergone great great refinement in recent years. Recent progress in cataract surgical technique have heightened patient's expectation of visual outcome; good post-operative vision without spectacles is considered normal. Small incision cataract surgery-SICS, is a simple and versatile technique which unlike phacoemulsification can be universally applied nearly all type of cataract. Lack of suture tension can lead to astigmatic shift against the rule. Surgically induced Astigmatism(SIA) is one of the important factors that hampers post-operative good visual outcome. Thus control of post-operative astigmatism is a key factor in meeting these expectation.

Materials & Methods

The study was carried out at Tairunnessa Memorial Medical college and Hospital, Gazipur, Faridpur Diabetic Association Medical College and Hospital, Faridpur and General Hospital, Faridpur, Bangladesh, from January 2012 to June 2013.

Total number of 120 eyes of 108 patients, both male and female patients were included for the study. We excluded the patients having corneal scar, irregular astigmatism, presence of pterygium and previous intraocular surgery from our study. The mean patient age at the time of surgery was 61.9±8.1 years ranged from 40 to 70 years.

We measured the pre-operative corneal astigmatism by using Auto Refractometer. We carried out the measurement at least two times for each. The patients were divided into three groups. The three groups had 40 patients each. The patients in group A underwent manual SICS with a superior incision, the patients in group B underwent manual SICS with a supero-temporal incision and the patients in group C underwent manual SICS with a temporal incision.

Small incision cataract surgeries were done by applying same surgical technique in three the groups. Cataract extraction was done in these patients under peri-bulbar anesthesia using a sclero-corneal tunnel incision, which is 6.5 mm long in sclera, 8 mm inside cornea, 2 mm behind the limbus and 1 mm into the cornea.

Continuous curvilinear capsulorhexis performed followed by hydro procedures and finally nucleus was delivered by sandwich method. Intraocular lens was placed in the bag. Surgical section was closed by self-sealing method forming the anterior chamber with ringers lactate solution. The courses of the post operative astigmatic changes were determined by performing Auto Refractometer at 1st week, 6th weeks and 12yh weeks postoperatively.

Results

The results are shown in tabulated form below:

Table-I : Shows distribution of age among the study group.

Age in years	Group-A		Group – B		Group-C	
	No.	(%)	No.	(%)	N0	%
41- 50	3	7	2	5	2	5
51-60	18	45	17	42	13	32
61- 70	19	48	21	53	26	63

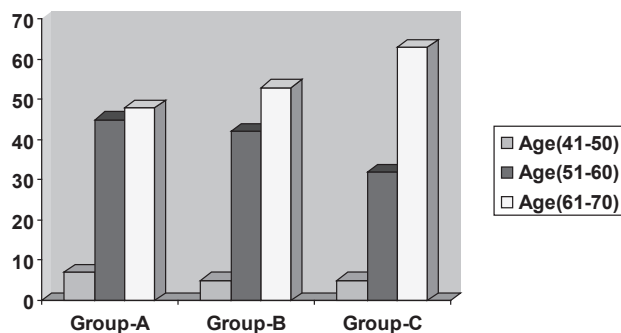


Fig-1: Bar diagram shows distribution of age among the study group.

Table-II : Shows distribution of pre-operative astigmatism among the study group. Difference of mean pre-operative astigmatism between three groups were statistically not significant.

Pre-operative astigmatism (Dioptre –D)	Group-A		Group – B		Group-C	
	No.	(%)	No.	(%)	No	%
00 – 0.5	02	42.50	05	45	03	
0.51 – 1.0	14	35	15	32.50	18	
1.1 – 1.5	18	17.50	17	20	14	
1.51 –2.0	06	4	03	2.50	05	
Mean astigmatism (Dioptre – D)	0.63D		0.59D		0.61D	

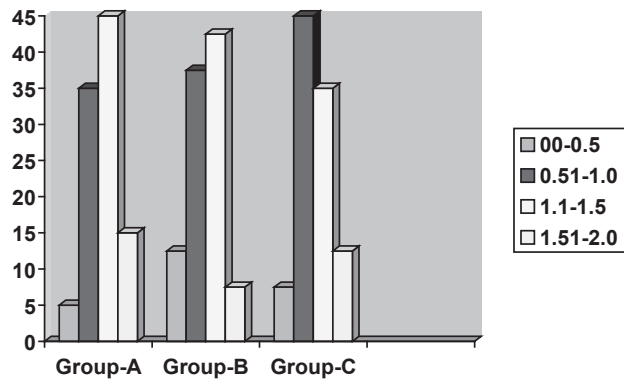


Fig-2: Bar diagram shows distribution of pre-operative astigmatism among the study group.

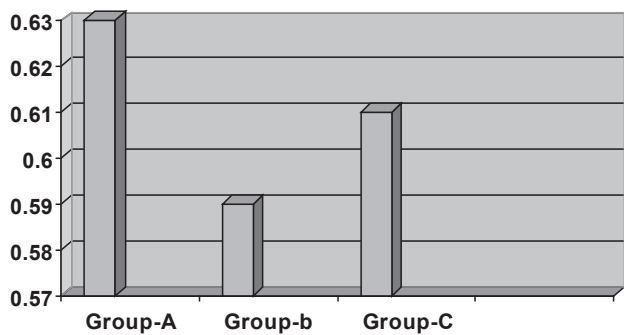


Fig-3: Bar diagram shows pre-operative mean astigmatism among the study group. The pre-operative mean astigmatism was 0.63D in Group -A, in Group- B it was 0.59D and in Group- C it was 0.61D.

Table-III: Shows the distribution of mean surgically induced post-operative astigmatism among the study group.

Post-operative period	Group-A	Group – B	Group-C
	Mean astigmatism. (± SD)	Mean astigmatism. (± SD)	Mean astigmatism. (± SD)
1 st week	1.83 (± 0.45)	1.47 (± 0.44)	1.32(± 0.37)
6 th week	1.63 (± 0.44)	1.23 (±0.43)	1.12(± 0.35)
12 th week	1.45 (±0.44)	1.08 (±0.44)	0.88(± 0.34)

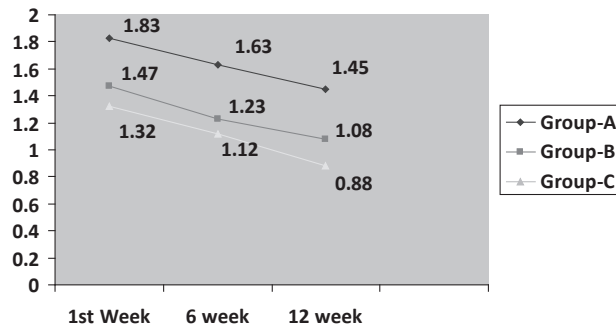


Fig-4: Line chart shows the distribution of mean surgically induced post-operative astigmatism among the study group.

Discussion

The success of cataract surgery either small incision cataract surgery or phacoemulsification is determined by quicker visual and functional recovery. Control of post-operative surgically induced astigmatism (SIA) is a key factor in meeting the expected visual outcome. The astigmatism which was induced in small incision cataract surgery- SICS which was done with superior, supero-temporal and temporal scleral tunnel incisions was compared. This study found that the surgically induced astigmatism was lower in the temporal and supero-temporal groups as compared to that in the superior group.

In our study the mean SIA in group A, was found to be 1.45 ± 0.44 , in group B, it was 1.08 ± 0.44 and in group C, it was 0.88 ± 0.34 . Vaishali Satyajeet Pawar et al¹, showed that surgically induced astigmatism (SIA) in the superior group was 1.57 ± 0.61 , it was 0.53 ± 0.31 in the superotemporal group and it was 0.43 ± 0.31 in the temporal group. Pawar VS et al² observed that the mean SIA in superior group was found to be 1.572 ± 0.651 , in supero-temporal group, it was 0.532 ± 0.317 and in temporal group, it was 0.435 ± 0.338 .

In the study of Gokhale NS et al³, found 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. Radwan AA⁴, observed in his study mean surgical-induced astigmatism (SIA) was found to be significantly lower in the temporal group compared to that in the superior group. The superior incision induced 2.1 D of "against the rule astigmatism(ATR)". While the temporal While the temporal incision induced 0.7 D of WTR astigmatism.

Kohnen et al⁵, Simsek et al⁶, Oshima et al⁷, Cillino S et al⁸ and Mendivil et al⁹ also showed that surgically induced astigmatism (SIA) is more in the eyes that received superior incisions than that of temporal incisions and this difference was statistically significant. This study found that the surgically induced astigmatism-SIA was lower in the temporal and supero-temporal groups as compared to that in the superior group.

Small Incision Cataract Surgery (SICS) is a good alternative to Phacoemulsification but the rates of astigmatism are higher due to the larger sizes of the incisions. When the incision is located superiorly, both the gravity and the blinking of eyelid tend to create a drag on the incision. These forces are neutralized better with temporally placed incisions because in such cases, the incision is parallel to the vector of the forces.

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. The "against the rule drift" is present more markedly in SICS patients with superior tunnel approach than that of temporal tunnel due to various reasons. First an "against the astigmatism" predominantly present in cataract age group and it is further increased with an incision at 12 o' clock meridian. Next, the eyelid pressure emphasizes the "against the rule shift" with a 12 o' clock incision in the elderly population. Considering all these points, SICS with temporal tunnel approach is a better option for large volume cataract surgery.

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