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Acomparative Study of Surgically Induced Astigmatism in Superiorversus Superotemperal Incision in Small Incision Cataract Surgery in Govt. Siddartha Medical College, Vijayawada

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Abstract
Aim: *To determine the amount and type of surgically induced astigmatism (SIA),in superior and superotemparal sclera incisicion in small incision cataract surgery.*
Methods: *A prospective randomized comparative clinical study. Study was done on a total number of 100 patients aged 40y and above with senile cataract. 50 cases were randomly assigned superior sclera group and other 50 cases were allotted to superotemporal scleral incision. SICS with PCIOL implantation were performed through unsutured 6.5mm scleral incision in all 100 patients. Patients were examined post operatively 1st day,5th day, 2nd week,4th week after surgery.*
Results: *Post operatively after 4 weeks Superior group 80% of patients had ATR astigmatism and super temporal incision group 86% of the patients had WTR astigmatism, though majority of patients had ATR Astigmatism preopratively.The mean SIA in SUPERIOR INCISION GROUP is 1.10D ±0.600 AND IN TEMPORAL GROUP 0.65±0.370 Witch is comparatively less (p<0.005.) After 4 weeks 52%of superior group had visual activity better than 6/9 in temporal group 82% had visual acuity better than 6/9(p<0.001).*
Conclusion: *In conclusion superior sclera incision induces ATR astigmatism, super temporal incision induces lower WTR astigmatism. Which is advantageous, most elderly patients have preoperative ATR astigmatism. Visual rehabilitation is better in superotemporal incision than superior incision.*
Keywords: *Astigmatism, superior incision (SI), superiotemporalincision(STI), With The Rule Astigmatism (WTR), Against The Rule Astigmatism (ATR), Surgically induced astigmatism (SIA), small incision cataract surgery (SICS), Visual Acuity (VA),No Astigmatism (NA).*

I. Introduction

The cataract is defined as an opacity in the lens capsule or its substance. It is the commonest cause of treatable 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. Today's trend is manual Small Incision Cataract Surgery (SICS) and Phacoemulsification (Phaco) with posterior chamber intraocular lens implantation.

With the advent of phacoemulsification, cataract surgery has been reduced to a day care surgery. But due to economic reasons, phacoemulsification is limited to big cities & institutions only. Non-phaco or manual small incision cataract surgery (SICS) by virtue of its self sealing suture-less incision appears as a ray of hope for tackling the cataract burden in developing countries like India, Lower cost of instrumentation and disposables in manual SICS is an added advantage. It is also better suited for advanced and mature cataracts seen in developing countries.A variety of scleral incisions are being used in manual SICS, with the aim of keeping the post operative astigmatism to a minimum. All scleral pocket incisions share the advantages of intra & post-operative stability which include early healing, faster visual restoration & superior astigmatism control.

Astigmatism means "without a point". Miller Stephen J defined astigmatism as a condition of refraction in which a point of light cannot be made to produce a punctate image upon the retina by a correcting spherical lens [1]. Astigmatism causes blurring of the images. Even with an appropriate spectacle correction, the meridinal magnification can create distortion. In all types of cataract surgeries, the incisions which are made on the cornea or the sclera give rise to scars, thus altering the curvature of the cornea. These scars cause corneal flattening along the meridian of the incision and steepening in the meridian 90% away [2]. This Surgically Induced Astigmatism (SIA) is one of the causes of the poor quality of vision post-operatively because of the blurring of images. SIA in turn, depends on the type, length and the position of the incision and also on the method of the wound closure [3].

II. Materials And Methods

This was a prospective, hospital based, randomized, controlled clinical study which was conducted between January 2014 - December 2015 with permission from the ethical committee of the institute. All the surgeries were conducted in the Department of Ophthalmology,Govt. Siddhartha Medical College, Vijayawadaby single surgeon.The patients were randomly assigned to any of two groups. The two groups had 50 patients each. The patients in group A underwent manual SICS with superior tunnel incisions, the patients in group B underwent manual SICS with supero-temporal tunnel incisions

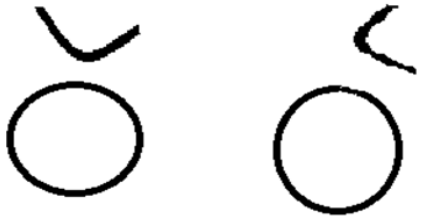
Inclusion Criteria

All the patients with Senile Cortical and Nuclear Cataract, including Posterior sub capsular cataract included.

Exclusion Criteria

Patients associated with other ocular disases like corneal,Glaucoma,Retina and Macular diseases were excluded,like wise other types of cataracts such as Tramatic Cataract, Comlicated cataract, and associated with pseuedoexfoliation Excluded. 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 or 78 D. Astigmatism was measured by using a autorefractometer and a keratometer if it was possible. 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, Local Investigations, intraocular pressuer, syring for lacrimal sac patency, were done. Patients were operated under peribulbar local Anaestesia,with mixer of Xylocaine 2%,Bupiavacaine 0.5%Hylauronidase. A conjunctival flap was made. A 6.5 mm frown shaped scleral incision which was 1.5 mm posterior to the limbus was made. In group A, the incision was made superiorly [Fig-1], in group B it was made supero-temporaly [Fig-2]

Fig-1 Fig-2



A three-plane sclero-corneal tunnel was created with a 15 No. blade and 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 using wire vectcs. 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 chamber. The visco solution was removed from the anterior chamber by irrigation with BSS by using a simcoe cannula. A corneal stromal hydration was performed at the wound edges. A sub-conjunctival injection, Tobramycine mixed with Dexamethasone was injected in the lower fornix. The eye was bandaged for 24 hours. Post-operatively, oral antibiotics (Tab.Ciprofloxacilin 500mg twice daily) and analgesics were given. The patients were examined on the post-operative days 1st day,5th day, 2nd week and 4th week . The uncorrected and the best corrected visual acuity were recorded; slit-lamp examination, fundus examination and autorefractometer and keratometry examinations were done. 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 [4]. The Surgically Induced Astigmatism was calculated from the pre and the postoperative keratometric values, as was described by Holladay et al., [5]. The comparison between the groups was done by using InStat (a statistical software program) in steps like comparing the means and performing the ordinary ANOVA test and the assuming values were sampled from the Gaussian distribution.

III. Results

This study was done on 100 patients equally divided in two groups,Each group receiving different incision inSICS , group A 50 patientssuperior incisicion group B superotemparal incision.

Table 1 Sex distribution

SEX	SI	STI	PERCENTAGE
MALE	22	29	51%
FEMALE	28	21	49%
TOTAL	50	50	100%

In the present study superior incision group 22 (44%) males and 28(50%) females, In super temporal incision 29(58%) males and 21(52%) females.Total 51(51%) males 49(49%) females.

Table 2 Pre –operative visual Acuity

Visual acuity	SI	STI	TOTAL
Pl+ ---CF-CF	12	3	15
CF1/2-CF3Mts.	11	16	27
CF3 ½--CF5Mts	13	17	30
>6/60	14	14	28
TOTAL	50	50	100

No statistical significant difference in visual acuity was found between groups.

Table 3 Pre-operative astigmatism

Type of Astigmatism	SI	STI	TOTAL
WTR	21(42%)	17(34%)	48(48%)
ATR	19(38%)	23(56%)	42(42%)
NA	10(20%)	10(20%)	20(20%)

In this study in SI group 19 (38%)cases ATR,21(42%) WTR,and 10(20%)NA.
In STI group 23(56%) ATR,17(34%)WTR,and 10(20%)NA.

Table 4 Comparison of Pre and Post operative astigmatism in Superior and superotemporal scleral incision

Type of incision	Preoperative astigmatism (no.of patents)	Postoperative changes of astigmatism	Postoperative period			
			1st day	5th day	2nd week	4thweek
SI	WTR 21	Increased	14	5	5	7
		Decreased	3	13	14	12
		Same	4	3	2	2
	ATR 19	Increased	15	13	14	12
		Decreased	1	3	3	2
		Same	3	3	4	2
	NA 10	WTR	1	0	0	2
		ATR	9	10	10	8
		Same	-	-	-	-
STI	WTR 17	Increased	8	14	14	14
		Decreased	4	2	3	3
		Same	5	1	0	0
	ATR 23	Increased	9	1	2	1
		Decreased	4	22	18	19
		Same	3	0	3	3
	NA 10	WTR	6	9	10	9
		ATR	4	1	0	1
		Same	-	-	-	-

Table 5 Postoperative Astigmatism

Type of Astigmatism	SI	STI	TOTAL
WTR	9 (18%)	43(86%)	52
ATR	40(80%)	5(10%)	45
NA	1(2%)	2(4%)	3
TOTAL	50	50	100

In present study superior incision causes ATR shift than WTR, in STI group the shift of astigmatism mire to WTR(86%).

Table 6 Comparison of Postoperative Visual Acuity in SI ANS STI

Type of incision	visual acuity	1st day	5th day	2nd week	4th week
SI	>6/9	1	2	7	21
	6/18-6/12	9	15	21	25
	6/36-6/24	14	19	20	4
	<6/60	12	2	1	1
STI	>6/9	0	3	8	39
	6/18-6/12	11	32	34	8
	6/36-6/24	24	13	7	2
	<6/60	12	2	1	1
Ch square test(x^2)		8.905	16.474	9.732	15.824
P value		P<0.05	P<0.05	P<0.05	P<0.123

The improvement in V.A.in STI group is better than SI group after 4 weeks. The difference is statistically significant(x^2=9.732,p<0.05)

After 2 weeks reduction of SIA in both the groups. In SI mean was 1.00D+0.696 and in STI the mean SIA was 0.70D±0.384 and the difference between the group was statistically significant (t-2.672,p<0.009) After 4 weeks mean SIA in group SI was 1.10+0.650 and in STI group mean SIA was 0.70D+0.387. Even after 4 weeks the difference between two groups was found to be statistically significant (t=3.69 <p0.000)

IV. Discussion

The suture less manual Small Incision Cataract Surgery (SICS) is a good alternative to Phacoemulsification and it gives visual results which are equivalent to Phacoemulsification, at lower expenses. But the rates of astigmatism are higher due to the larger sizes of the incisions. In order to achieve an excellent visual acuity, the effect of astigmatism on the postoperative vision has to minimize. Burgansky et al have reported an increase in astigmatism with an increase in the incision size [6]. A pre-existing astigmatism can be neutralized by changing the site of the incision 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 supero-temporaly placed incisions because in such cases, the incision is parallel to the vector of the forces [7]

The supero-temporal location has the advantages of both the locations. The supero-temporal incision is free from the effect of gravity and eyelid pressure and it tends to induce less astigmatism. The astigmatism which was induced in manual SICS which was done with superior, superior-temporal scleral tunnel incisions was compared. This study found that the induced astigmatism was lower in the supero-temporal groups as compared to that in the superior group.

V. Conclusion

SICS With supero-temporaly Scleral incision provides good Quality of vision as it produces less SIA than superior scleral incision.

References

[1]. Miller SJ, Parson's Diseases of Eye. Edinburgh: Butterworth Hienmann International Edition. 18th edition 1990; 63-69.
[2]. Merriam JC, Zheng L, Merriam JE, Zaider M, Lindstrom B. The effect of incisions for cataract on corneal curvature. *Ophthalmology*. 2003 Sep; 110(9): 1807-13
[3]. Koch PS. The structural analysis of cataract incision construction.*J Cataract Refract Surg*1991; 17(suppl): 661-67.[
[4]. Sawhney S, Aggarwal A, The SIA calculator Version 2.1 –Calculating Surgically Induced Astigmatism using MS Excel. [Internet]. [Cited 2012 May 10]. Available from:http://www.insighteyeclinic.in/articles/SIA_Calc_2-1_Article.pdf.
[5]. Holladay JT, Dudeja DR, Koch DD. Evaluating and reporting astigmatism for individual and aggregate data. *J Cataract Refract Surg*1998;24:57-65
[6]. Burgansky Z, Isakov I, Avizemer H, Bartov E. Minimal astigmatism after sutureless, planned, extracapsular cataract extraction. *J Cataract Refract Surg*2002; 28:499-503.
[7]. Merriam JC, Zheng L, Urbanowicz J , Zaider M. Change on the horizontal and vertical meridians of the cornea after cataract surgery. *Trans Am Ophthalmol Soc*. 2001;99:187-95.
[8]. Minnassian DC, Rosen P, Dart JK, Reidy A, Desai P, Sindhu M. Extra capsular cataract extraction compared with small incision surgery by phacoemulsification: a randomized trial. Br J Ophthalmol 2001; Jul; 85(7); 822-29.