COMPARISON OF POSTOP SIA IN MSICS WITH STRAIGHT INCISION VERSUS FROWN INCISION

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ABSTRACT

BACKGROUND

Surgically-Induced Astigmatism (SIA) is one of the commonest causes of poor postoperative vision even after uneventful cataract surgery. Recent advances have led to a newer concept of "refractive cataract surgery."

The aim of the study is to study the comparison of postop SIA in Manual Small Incision Cataract Surgery (MSICS) with straight versus frown incision.

MATERIALS AND METHODS

50 patients of cataract were divided into 2 groups (25 each) - group A underwent MSICS with 6 mm straight incision, group B underwent MSICS with 6 mm frown incision. BCVA, keratometry readings were recorded with auto kerato-refractometer preop, at 1 week, 1 month, 3 months and SIA was calculated with SIA calculator version 2.1, a free software program.

RESULTS

Mean SIA in group A and B were - 1.14D versus 0.92D at 1 week; 1.26D versus 0.97D at 1 month; 1.29D versus 0.95D at 3 months. The difference was statistically significant at each follow up visit ($p<0.05$).

CONCLUSION

Frown incision gives lesser SIA than straight incision in MSICS.

KEYWORDS

Surgically-Induced Astigmatism, Frown Incision.

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BACKGROUND

Cataract surgery, today is seen as a refractive surgery. So, we should be concerned not only to correct the spherical ametropia, but also the cylindrical.[1] Although, phaco has become the biggest surgical achievement of the present decade, it is still not being practiced by the majority of surgeons in developing countries including India.[2] Lower cost of instrumentation and disposables in manual SICS is an added advantage.[3,4] It is also better suited for advanced and mature cataracts seen in developing countries.[5] High astigmatism is an important cause of poor uncorrected visual acuity after cataract surgery.[6] Koch (1991)[7] described the incisional funnel where the incisions made should be astigmatically neutral and Singer (1991)[8] developed the frown incision showing minimal-induced astigmatism. Singer gave two theories for the better stability of frown incision- one, the structural similarity between the frown incision and a suspension bridge; second, incision's broad surface area available for healing and its relationship to the Koch's funnel. Singer (1991),[8] Nielsen et al (1995),[9] Vass C et al (1997)[10] and Jauhari et al (2014)[11] compared straight versus frown incision in MSICS. Our study was designed to compare SIA in MSICS by frown versus straight incision.

A prospective hospital-based study was conducted on 50 eyes of 50 patients undergoing routine uncomplicated senile cataract surgery. Patients were randomly divided into 2 groups (25 each) - Group A- MSICS with straight incision, Group B- MSICS with frown incision. The study was done in accordance to the tenets of the Declaration of Helsinki. The study was approved by the Institutional Ethics Committee. Informed written consent was obtained from all the study participants. Patients with any other concurrent eye disease, history of trauma, dropouts were not included in the study. The standard clinical examination was carried out including visual acuity testing with Snellen chart, lacrimal sac patency, applanation tonometry, slit lamp examination and fundoscopy. Keratometry was performed with Topcon Automated keratometer KR8800 Version 1.25 (Topcon, Tokyo, Japan) before surgery and at 1 week, 1 month and 3 months after surgery. Intraocular Lens (IOL) power was calculated using SRK II formula. On the day of surgery, pupil was dilated with 0.8% tropicamide and 5% phenylephrine drops. Flurbiprofen 0.03% eye drops were instilled twice to

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maintain intraoperative mydriasis. All the surgeries were performed under peribulbar anaesthesia by one surgeon. After making a fornix-based conjunctival flap in group A, a 6-mm straight incision of 1/3-1/2 thickness of the sclera, 1 mm posterior to the limbus with 1 mm backward radial extension at each end was made while in group B, a frown-shaped incision 6 mm in length, 1 mm posterior to the limbus with 1 mm backward radial extensions was made. A sterile disposable crescent blade was used to create a self-sealing sclerocorneal tunnel extending into the clear cornea for 1 mm. A 3.2 mm keratome was used to enter the anterior chamber through the tunnel incision. Continuous curvilinear capsulorhexis was done using a 26 G cystitome through the main tunnel under viscoelastic cover. The internal wound was then enlarged to 8-10 mm length approximately sufficient to accommodate larger nucleus as well. None of the incisions were enlarged peroperatively. Hydrodissection and delineation was performed. The nucleus was prolapsed in the anterior chamber and was delivered by viscoexpression.[12] After irrigation and aspiration, single piece PMMA IOL was implanted in the capsular bag and dialled. Self-sealing wound was left sutureless after checking for any wound leakage. Conjunctival flap was cauterised.

Patients were examined on 1st day, 1st week, 1st month and 3rd month postoperatively. Prednisolone acetate 1% eye drops were instilled 8 times a day and gatifloxacin eye drops 0.3% were instilled four times daily postoperatively. Mydriatic and antiglaucoma medications were also given as and when required. Prednisolone was tapered over 6 weeks. Best Corrected Visual Acuity (BCVA) and slit lamp findings were recorded at each visit. Keratometry was repeated at each follow up visit postoperatively. Data was analysed statistically using SPSS version 19.0 statistical analysis software. The study was analysed using the SIA calculator version 2.1, a free software program. Unpaired 't' test was used to compare the mean-induced astigmatism in the two groups.

RESULTS

A total of 50 eyes were operated. Table 1, 2 show the age and sex distribution in both the groups. Maximum patients (50%) were in the age group of 51-60 yrs. Slight male (56%) preponderance was seen.

Age (yrs.)	Group A		Group B		Total	
	Freq.	%	Freq.	%	Freq.	%
41-50	2	8.0	4	16.0	6	12.0
51-60	14	56.0	11	44.0	25	50.0
61-70	9	36.0	10	40.0	19	38.0
Total	**25**	**100.0**	**25**	**100.0**	**50**	**100.0**

Table 1. Age Distribution of Patients

Gender	Group A		Group B		Total	
	Freq.	%	Freq.	%	Freq.	%
Male	13	52.0	15	60.0	28	56.0
Female	12	48.0	10	40.0	22	44.0
Total	**25**	**100.0**	**25**	**100.0**	**50**	**100.0**

Table 2. Sex Distribution of Patients

Maximum patients (64%) had preop visual acuity in the range of 6/60-3/60 as shown in Table 3.

Visual Acuity	Group A		Group B		Total	
	No.	%	No.	%	No.	%
>6/60	4	8	5	10	9	18
6/60 to 3/60	15	30	17	34	32	64
<3/60	6	12	3	6	9	18
Total	**25**		**25**		**50**	**100.0**

Table 3. Preop BCVA of Patients

Maximum patients (43%) achieved visual acuity in the range of 6/12-6/6 after 3 months (Table 4).

	1 Week				1 Month				3 Months			
	Group A		Group B		Group A		Group B		Group A		Group B	
	No.	%	No	%	No	%	No	%	No	%	No.	%
6/60-6/36	11	44	7	28	3	12	1	4	0	0	0	0
6/24-6/18	9	36	12	48	9	36	9	36	4	16	3	12
6/12-6/6	5	20	6	24	13	52	15	60	21	84	22	88
Total	**25**	**100**	**25**	**100**	**25**	**100**	**25**	**100**	**25**	**100**	**25**	**100**

Table 4. Postop BCVA of Patients

Maximum (60%) patient's preoperatively had ATR astigmatism. Amount of SIA in both groups at different follow up visits was recorded (Table 5).

SIA	1 Week				1 Month				3 Months			
	Group A		Group B		Group A		Group B		Group A		Group B	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0.00-0.50	2	8	4	16	2	8	3	12	1	4	4	16
0.75-1.00	8	32	13	52	8	32	13	52	8	32	12	48
1.25-1.50	14	56	8	32	11	44	9	36	12	48	8	32
1.75-2.00	1	4	0	0	3	12	0	0	4	16	1	4
2.25-2.50	0	0	0	0	1	4	0	0	0	0	0	0
Total	**25**	**100**	**25**	**100**	**25**	**100**	**25**	**100**	**25**	**100**	**25**	**100**

Table 5. Amount of SIA

Mean SIA in Group A (straight incision) was 1.14 ± 0.33 D at 1 week, 1.26 ± 0.44 D at 1 month, 1.29 ± 0.36 D at 3 months while in group B (frown incision), SIA was 0.94 ± 0.33 D at 1 week, 0.97 ± 0.333 at 1 month, 0.95 ± 0.41 D at 3 months (table 6, figure 1). The difference was statistically significant on each follow up (P<0.05).

	1 Week	1 Month	3 Months
Group A	1.14 ± 0.331	1.26 ± 0.442	1.29 ± 0.366
Group B	0.94 ± 0.334	0.97 ± 0.333	0.95 ± 0.415
	P=0.0257	P=0.0117	P=0.0035

Tale 6. Progress of SIA Over 3 Months

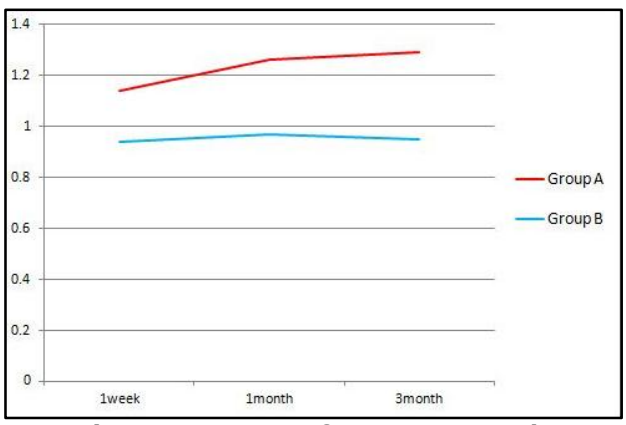

Figure 1. Progress of SIA over 3 Months

DISCUSSION

Gogate PM (2009)[13] has reported that patients undergoing MSICS have an early visual rehabilitation, quick visual restoration and less SIA. He found MSICS to be more effective and economical than ECCE and almost as effective as and more economical than phacoemulsification. Postoperative astigmatism affects the quality of life of the patient. So, this study was designed to minimise the SIA with an aim to render the patient spectacle free.

In our study, maximum patients in both the groups achieved visual acuity in the range of 6/12-6/6 after 3 months. Rohtagi et al (2008),[14] Zawar and Gogate (2011)[15] and Jauhari et al (2014)[11] had similar findings. Maximum patients preoperatively had ATR, which is probably due to the fact that with age there is flattening of the superior meridian.

As shown in table 5 in group A (straight incision) at the end of 3 months, maximum number of patients, i.e. 12 had SIA in the range of 1.25-1.50 D followed by 8 patients in the range of 0.75-1.00 D. No (0) patient had SIA in the higher range of 2.25-2.50 D. Our findings were similar to those of Jauhari et al (2014)[11] who also had maximum patients (straight incision) having SIA in the range of 1.25-2D and Jha and Vats (2006)[16] had maximum patients with SIA upto 1D. In group B (frown incision) at the end of 3 months, maximum number of patients, i.e. 12 had SIA in the range of 0.75-1.00 D followed by 8 patients in the range of 1.25-1.50 D. No (0) patient had SIA in the higher range of 2.25-2.50. D. Jauhari et al (2014)[11] also reported maximum patients (frown incision) had SIA <1D while Randeri et al (2008)[17] reported that maximum patients (frown incision) had SIA in the higher range of 1.25-2 D.

In group A (straight incision), SIA was 1.14 ± 0.33 D at 1 week, 1.26 ± 0.44 D at 1 month, 1.29 ± 0.36 D at 3 months as compared to a lesser SIA of 0.94 ± 0.33 D at 1 week, 0.97 ± 0.333 at 1 month, 0.95 ± 0.41 D at 3 months in group B (frown incision). The difference in SIA of the two groups was statistically significant on each follow up visit (P<0.05).

In table 6, the increase in astigmatism in group A is due to the fact that flattening or ATR astigmatism increases postoperatively till the scleral incision area has healed completely (approximately 3 months). The sagging down of the wound is more with straight incision as compared to frown incision causing more flattening with straight incision.

Singer et al (1991),[8] Nielsen et al (1995),[9] Vass C et al (1997)[10] and Jauhari et al (2014)[11] compared straight versus frown incision in MSICS. Similar to our study, Singer (1991)[8] reported that frown incision induced lesser SIA as compared to straight incision. But, unlike our study in Singer's study, both the incisions were sutured. Contrary to our study, Nielsen et al (1995)[9] found that frown incisions created more initial induced astigmatism than the straight corneoscleral incisions. As opposed to our study, both Vass C et al (1997)[10] and Jauhari N et al (2014)[11] concluded that both straight and frown incision did not have any significant difference in terms of SIA.

CONCLUSION

Scleral frown incision is easy to perform, achieves a remarkable degree of corneal topographic stability and lower SIA as compared to straight incision providing instant visual restoration.

Limitations of the Study

- The sample size is small consisting of only 50 patients.
- The period of follow up was only 3 months. Other studies observed changes in SIA till 1 year after surgery.
- Automated keratometer was used to record keratometric values. Videokeratoscope or Bausch and Lomb keratometer could've given more accurate values.
- Findings were recorded only in two meridians - 90°, 180°.

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