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Research Article

STUDY OF ASTIGMATIC PROFILE FOLLOWING SMALL INCISION CATARACT SURGERY

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ABSTRACT

Aim: To evaluate surgically induced astigmatism following cataract surgery with superior scleral incision of different sizes and shapes

Objective: To evaluate the change in astigmatism pre and post cataract surgery using keratometry values

1. With different sizes of scleral incision
2. With different shape of incision (Straight & Frown)

Material and Methods: Study was conducted in SVS Medical College Mahabubnagar. 200 patients who had senile cataract were included in the study. Patients were divided into 4 groups depending on size of superior scleral incision following small incision cataract surgery. Patients were followed up 1, 3 and 6 weeks post cataract surgery. Visual acuity and keratometry readings were recorded. Surgically induced astigmatism was evaluated by simple subtraction method from the pre and post operative keratometry readings.

Observations: Our study showed group 1 with 5.5 mm superior scleral incision showed least surgically induced astigmatism. 40 patients (80%) with 5.5 mm incision had < 1 D of SIA compared to 20 patients (40%) with 6.5 mm incision group. 18% of patients with 6.5 mm incision had SIA > 1.6 D, which was high compared to 5.5 mm group which was only 8%. Comparing straight and frown incision, 6 mm frown incision showed significantly low SIA compared to 6 mm straight incision. 46% of patients with frown incision showed < 0.5 D SIA which was significantly low compared to 6 mm straight group which had only 24% patients who had < 0.5 D SIA.

Conclusion: Smaller the size of scleral incision less is the surgically induced astigmatism. Frown incision showed less SIA compared to same size straight sclera incision.

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INTRODUCTION

Cataract is one of the major causes of visual morbidity in elderly age world wide¹. There had been many changes in the technique of cataract surgery in order to achieve best visual outcome. Though phacoemulsification is advanced method of cataract surgery, Small Incision cataract surgery (SICS) is still considered and done in developing countries, in view of its low cost, good visual outcome and less machine dependant²⁻³. With good surgical technique and knowledge over surgically induced astigmatism, best visual quality can be obtained post operatively⁴⁻⁵. In this study we have compared visual quality in terms of surgically induced astigmatism with different incisions done for SICS surgery.

MATERIALS AND METHODS

200 patients were included in the study. Patients were divided into 4 groups based on length of scleral incision
Group 1: 50 patients with 5.5mm straight incision
Group 2: 50 patients with 6mm straight incision
Group 3: 50 patients with 6.5mm straight incision
Group 4: 50 patients with 6.5mm frown incision

Inclusion criteria

1. Age > 50 yrs
2. Keratometric astigmatism < 4 D
3. Visually significant cataract

Exclusion criteria

1. Cases with corneal pathology - corneal opacities, corneal degenerations, pterygium
2. Cases with history of glaucoma

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3. Cases with retinal pathology (diabetic retinopathy, ARMD)
4. Cases with high pre- op astigmatism - > 2 D
5. Cases which had intraoperative complications- premature entry, scleral tear (button hole), posterior capsular rupture

Patients were evaluated for Blood Pressure, Random blood sugar, Urine analysis, HIV and HbsAg pre operatively. Uncorrected and Best corrected visual acuity were evaluated pre operatively. Keratometry and A Scan biometry was done in all cases to calculate IOL power. Keratometry was done using Bausch and Lomb Keratometer.

All surgeries were done under peribulbar anesthesia by single surgeon.

Post operative patients were evaluated at day 1, day 7, day 21, 6 weeks post operatively. Patients were evaluated for visual acuity and keratometry at each follow up visit.

Astigmatic analysis was restricted to keratometric cylinder, as it is an objective measure of corneal contour. For simplification of analysis astigmatic changes were studied only in horizontal and vertical axis. Surgery induced astigmatism was calculated using simple subtraction method.

Simple subtraction Method: It is one of the easiest methods to calculate SIA. Difference between postoperative and preoperative astigmatic power regardless of axis is taken as SIA.

SIA= Postoperative astigmatism- Preoperative astigmatism

Observations

Sex distribution

Table 1 showing sex distribution in the study

Sex	No of cases	Percentage %
Males	113	56.5
Females	87	43.5

Age distribution

Table 2 showing age distribution in the study group

Age	No of cases	Percentage %
50 – 55	35	17.5
56 – 60	63	31.5
61- 65	70	35
66- 70	32	16

Majority of cases were in 56- 65 years age group (66.5 %)

Pre operative visual acuity

Table 3 showing preoperative visual acuity

BCVA	No of cases	Percentage %
PL – CF 1 mt	21	10.5
CF 1 mt – CF 5 mt	57	28.5
6/ 60- 6/36	89	44.5
6/24 – 6/18	33	16.5

Pre operative visual acuity ranged from perception of light - 6/18

Table 4 Showing SIA in different lengths of incisions

Surgically induced astigmatism (in Diopters)	5.5mm straight incision. Number of cases	6mm straight incision. Number of cases	6.5mm straight incision. Number of cases
0	1 (2 %)	2(4 %)	1 (2 %)
<= 0.5	22(44 %)	12(24 %)	5(10 %)
0.6 – 1.0	18(36%)	25(50 %)	15(30 %)

1.1– 1.5	5(10 %)	8(16 %)	20(40 %)
>1.6	4(8 %)	3 (6 %)	9 (18 %)

Above table shows 44 % patients with SIA <0.5D belong to 5.5mm incision group which was significantly better compared to 6mm (24%) and 6.5mm (10%) group.

18 % of patients in 6.5mm incision group had SIA > 1.6 D which was significantly higher compared to 6mm (6%) and 5.5 mm (8%)

Indicating increase in SIA with increase in size of incision

Table 5 showing SIA in 6mm straight and frown incision groups

SIA (diopters)	6mm straight incision		6mm frown incision	
	No of cases	%	No of cases	%
0	2	4	2	4
< / = 0.5	12	24	23	46
0.6-1.0	25	50	18	36
1.1-1.5	8	16	5	10
>1.6	3	6	2	4

Above table shows nearly half (46 %) of patients with frown incision had SIA < 0.5 D which was significantly better than 6mm straight group in which only 24 % patients had SIA < 0.5D

BCVA was 6/6 in > 85% of patients in all four groups. There was no significant difference in postoperative best corrected visual acuity in all four groups.

DISCUSSION

With the advent of microsurgical procedures, cataract surgery is mainly aiming at improving refractive outcome. Astigmatic component of refractive error following cataract surgery remains greatest obstacle for achieving best refractive outcome. Our study mainly focused on comparing surgically induced astigmatism with different lengths and shape of superior sclera incision post cataract surgery Our study showed, 44% of patients in group 1 (5.5 mm incision) showed SIA < 0.5 D, which was significantly low (P – 0.004) compared to 6mm (24%) and 6.5 mm (10 %)

SIA was significantly high (> 1.6 D) in 6.5 mm group in 18 % patients, where as only 8% patients showed in 5mm group Indicating – Bigger the length of sclera, more will be post operative surgically induced astigmatism

Cornea flattens along the meridian of incision. Koch’s study⁶ and Gill and Sanders analysis⁷ of Koch’s study has concluded that corneal astigmatism is directly proportional to cube of the length of the incision

Burgansky *et al*⁸ conducted a study comparing 5 mm incision with 6mm, 6.5mm and 7mm incision. There was no significant difference between 6, 6.5, 7mm groups, but SIA was significantly higher in 7 mm group compared to 5mm group Kullenberg *et al*⁹ study, comparing 5.5mm incision with 6.5mm incision didn’t show any significant difference in SIA after 1 year follow up

Comparing straight and frown incisions of equal size (6 mm), 46% of patients with frown incision showed SIA (< 0.5D) which was only 24% in straight incision, which was statistically significant (p- 0.34)

Indicating SIA is much lower in frown incision compared to straight incision of same length. Similar results were observed in following studies Chourasia P¹⁰ *et al* study, comparing straight and frown incision showed significantly lower SIA ($P < 0.05$) in frown at 3 months follow up

Amedo¹¹ *et al* study, comparing straight and frown incision showed significantly lower SIA in frown group ($P < 0.05$) at 12 weeks follow up.

Whole length of frown incision lies within the incision funnel compared to straight incision in which ends of incision lies outside the funnel and are closer to limbus which may account for more SIA.

CONCLUSION

In conclusion, in manual small incision cataract surgery, the surgical induced astigmatism can be considerably reduced by shortening the size of the incision and changing the shape incision from straight to frown.

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