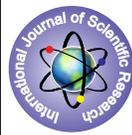


Study of Postoperative Change in Corneal Curvature Following Straight and Frown Scleral Incision in Small Incision Cataract Surgery



Medical Science

KEYWORDS : Cataract surgery, Corneal astigmatism, Straight and Frown scleral tunnel.

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ABSTRACT

A prospective randomized comparative study was carried out in 100 cases of senile cataract. All the patients underwent MSICS under peribulbar anesthesia. 50 cases received straight scleral incision and 50 cases received frown scleral incision. Postoperative astigmatism was studied in both groups using Bausch & Lomb keratometer on day 1,5,15,30 and 90. After 3 months of surgery, out of 50 patients in straight scleral incision group 86% patients had ATR astigmatism, 10% had WTR astigmatism and 4% had OA whereas in frown incision group 82% of the patients had ATR astigmatism, 14% had WTR astigmatism and 6% had OA. Mean surgically induced astigmatism in frown incision group(0.90 D) was significantly less than the straight incision group(1.09D) after 3 months postoperatively. This study reveals that there is reduction in magnitude of postoperative astigmatism as well as surgically induced astigmatism in frown incision than straight incision in MSICS resulting in better postoperative visual acuity.

INTRODUCTION:

Cataract is most common cause of visual incapacity and blindness. As per NPCB survey¹ (2001-02) cataract is by far the major cause of blindness in India accounting up to 62.6% cases of blindness. In the absence of effective medical treatment or preventive measures surgery remains sole solution. Surgical treatment for cataract has been practiced for centuries and has evolved tremendously from early days of couching² with only aim of clearing visual axis to modern era of small incision technique that could correct even the refractive error that patient had before development of cataract. Manual Small Incision Cataract Surgery (MSICS) was a later addition much after phacoemulsification, which retains the most of the advantages of phacoemulsification but can be delivered at low cost and more readily applied in high volume programs hence a popular technique in developing countries like India³.

Wound construction plays a major role in MSICS. The properties of reliable self sealing incision are⁴: 1) square incisional geometry which means length of the tunnel must be equal to or exceed the width of the tunnel. 2) Relatively short external incision with a tunnel that flares to a larger internal incision 3) Geometric external incision shape that lends itself to stretching.

Several variables exist in creation of the wound for cataract, such as location (corneal versus scleral), shape (smile/curvilinear, straight, frown, Blumenthal sidecuts, chevron 'v'), direction (superior, temporal, superotemporal), width and depth of incision.

Concept of astigmatic funnel was introduced by Paul Koch who concluded that corneal astigmatism is directly proportional to the cube of length of incision and inversely proportional to the distance of the incision from the limbus. The incisional funnel (figure 1) is an imaginary pair of curved lines representing relationship between astigmatism and incision lengths. The lines diverge from limbus, separating as the distance from the limbus increases. Incisions made within the funnel are free of astigmatism (astigmatically neutral)⁵.

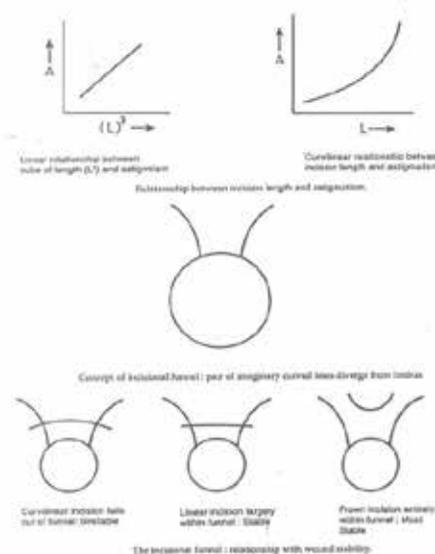


FIGURE 1

AIMS AND OBJECTIVES:

- To compare magnitude of surgically induced astigmatism following straight and frown scleral incision in manual small incision cataract surgery.
- To compare type of astigmatism following straight and frown scleral incision in manual small incision cataract surgery.
- To study postoperative visual acuity (uncorrected and corrected) following straight and frown scleral incision in manual small incision cataract surgery.

MATERIALS AND METHODOLOGY:

100 eyes of 100 patients that underwent manual small incision cataract surgery (MSICS) with implantation of posterior chamber intraocular lens in eye department of our institute were included in this study. All the patients were provided patient information sheet and after explaining it, informed consent was taken and were included in the study.

The exclusion criteria applied were

Patients with past history of ocular surgery, Patients with corneal abnormalities such as keratoconus, corneal dystrophy, pterygium, Patients with fundus pathology and Patients with intraoperative complications were excluded from study.

All the patients were preoperatively examined with slit lamp biomicroscopy, fundus examination with direct and indirect ophthalmoscopy, tonometry.

Preoperative corneal curvature was assessed by keratometry with Bausch & Lomb keratometer.

All the patients underwent MSICS with posterior chamber intraocular lens implantation under peribulbar anesthesia. After preparing eye for surgery including painting & drapping fornix based conjunctival peritomy was done superiorly and gentle cautery was done. After that scleral incision (50 patients straight and 50 patients frown) of 6-6.5 mm was placed 2 mm behind limbus superiorly and scleral tunnel was made with crescent blade upto 1.5 mm inside cornea. Sideport was made at 10 O'clock position, viscoelastic was injected into the anterior chamber and continuous curvilinear capsulorhexis of around 5 mm was made with cystotome. Then sclerocorneal tunnel was completed using 3.2mm kertome and extended to 6-6.5 mm. Thorough hydrodissection was done and nucleus was prolapsed into the anterior chamber following it nucleus was delivered out with help of viscoelastic and thorough lens matter wash was done. 6mm optic PMMA single piece posterior chamber lens was inserted into the capsular bag and remaining viscoelastic was aspirated. Main wound was checked for any leakage and conjunctiva was closed using cautery.

Postoperatively all the patients were examined on day 1,5,15,45,90. Postoperative treatment included topical steroid and antibiotic combination in tapering dose for 4-6 weeks. On every followup visual acuity, keratometry, retinoscopy were done to assess change in corneal curvature (astigmatism).

At the end of 3 months all the patients' refraction was checked and spectacles were prescribed.

OBSERVATIONS & RESULTS

- In our study maximum no. of patients were in the range of 60 to 69 years with mean age of 61.83 years.
- Out of 100 patients 44 were male whereas 56 were female.
- In our study Preoperative astigmatism was of ATR in 55% of patients followed by WTR type in 30% of patients followed by neutral in 15% patients.(table 1)

TABLE - 1

PRE OPERATIVE ASTIGMATISM (TOTAL NO. OF PATIENTS=100)		
TYPE OF ASTIGMATISM	NO.OF PATIENT	PERCENTAGE (%)
ATR	55	55%
WTR	30	30
NEUTRAL	15	15
TOTAL	100	100

-In our study in straight scleral incision group postoperatively the most common astigmatism was of ATR type (86%) followed by WTR (10%) and OA (4%), whereas in frown group it was ATR type (82%) followed by WTR (14%) and OA (4%) (table 2)

TABLE - 2

POST OPERATIVE ASTIGMATISM PROFILE AT THE END OF 3 MONTHS (TOTAL NO.OF PATIENTS=100)				
TYPE OF ASTIGMATISM	STRAIGHT GROUP		FROWN GROUP	
	NO. OF PATIENT	PERCENTAGE (%)	NO.OF PATIENT	PERCENTAGE (%)
ATR	43	86	41	82
WTR	5	10	7	14

POST OPERATIVE ASTIGMATISM PROFILE AT THE END OF 3 MONTHS (TOTAL NO.OF PATIENTS=100)				
TYPE OF ASTIGMATISM	STRAIGHT GROUP		FROWN GROUP	
	NO. OF PATIENT	PERCENTAGE (%)	NO.OF PATIENT	PERCENTAGE (%)
OA	2	4	2	6
TOTAL	50	100	50	100

-In our study at the end of three months mean surgically induced astigmatism was 1.09D in straight scleral incision group and 0.90D in frown scleral incision group that was much lesser than straight group (table 3).

TABLE - 3

MEAN SURGICALLY INDUCED ASTIGMATISM (TOTAL NO. OF PATIENT 100)	
TYPE OF INCISION	MEAN VALUE OF SIA AT THE END OF 3 MONTHS
STRAIGHT	1.09 D
FROWN	0.90 D

-In our study magnitude of postoperative astigmatism was on higher side (More diopters) in straight scleral incision group while in frown scleral incision group it was on lower side (less diopters) in more patients, which indicates that magnitude of postoperative astigmatism is more in straight group than frown group (Table 4)

TABLE - 4

MAGNITUDE OF POST OPERATIVE ASTIGMATISM AT THE END OF 3 MONTHS (TOTAL NO OF PATIENTS=100)				
ASTIGMATISM IN DIOPTR	STRAIGHT GROUP		FROWN GROUP	
	NO.OF PATIENTS	PERCENTAGE	NO.OF PATIENTS	PERCENTAGE
0-0.5	5	10	7	14
0.6-1.0	9	18	21	42
1.1-1.5	15	30	10	20
1.6-2.0	15	30	10	20
2.1-2.5	6	12	2	4
TOTAL	50	100	50	100

-In our study At the end of three months, only about 26% patients of straight group had unaided visual acuity of 6/12 whereas 50% patients of frown incision group had unaided visual acuity of 6/12.

DISCUSSION & SUMMARY

Manual Small Incision Cataract Surgery (MSICS) is the first choice alternative to phacoemulsification- retains most of the advantages of "phacoemulsification" giving visual results equivalent to phacoemulsification at a lower cost and it is the surgery for masses and appropriate for developing country. The surgery is cheap, fast, safe, and easy to learn and needs fewer resources. However, the larger incision used induces greater astigmatism than phacoemulsification⁶. In view of these findings, this study was done with aim to compare Surgically Induced Astigmatism (SIA) between MSICS by straight and frown scleral incision.

The following is the summary drawn from this study of postop-

erative change in corneal curvature following straight and frown scleral incision in manual small incision cataract surgery in our institute.

Common age of presentation of senile cataract is in the range of 60 to 69 years with mean age of 61.83 years.

There is female preponderance for cataract in present study.

Preoperative astigmatism was of against the rule type in 55% of patients followed by with the rule type in 30% of patients followed by neutral in 15% patients.

In straight group postoperatively the most common astigmatism was of ATR type (86%) followed by WTR (10%) and OA (4%), whereas in frown group it was ATR type (82%) followed by WTR (14%) and OA (4%).

Magnitude of surgically induced astigmatism was 1.09 D in straight group and 0.90 D in frown group.

At the end of three months, only about 26% patients of straight group had unaided visual acuity of 6/12 whereas 50% patients of frown incision group had unaided visual acuity of 6/12.

Best corrected visual acuity at the end of three months was 6/6 in 30% patients in straight group as compared to 42% patients in frown group.

Magnitude of postoperative astigmatism at the end of three months was less in frown group as compared to straight group.

Results of this study is consistent with previous reports that frown scleral incision induces less astigmatism than straight scleral incision and gives early visual rehabilitation^{7,8}.

CONCLUSION

From the above study we have concluded that there is reduction in magnitude of postoperative astigmatism as well as surgically induced astigmatism in frown incision than straight incision in manual small incision surgery resulting in better postoperative visual acuity with frown incision than straight incision in manual small incision cataract surgery.

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