

Comparison Of Visual Outcome And Surgically Induced Astigmatism After Manual Small Incision Cataract Surgery With Different Sites Of Incision From The Limbus.

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Abstract

Aims:

To compare surgically induced astigmatism after manual small incision cataract surgery (MSICS) with different distance of superior corneo-scleral incision (CSI) posterior to the limbus .

Material & Method:

A prospective case study of 75 patients who had undergone MSICS were divided in three groups according to the distance of superior corneo-scleral incision, 1mm, 2mm and 3 mm away from limbus in group A ,B and C respectively. The visual acuity, refraction and surgically induced astigmatism (SIA) were evaluated.

Results:

Mean astigmatism induced in Group A was 1.11D ,Group B was 1.04 D and in group C it was 0.62D with the difference being statistically significant. Group B and C showed significant improvement in post operative visual acuity ($P < 0.05$) with minimum surgically induced astigmatism. The MSICS with CSI distance 2 and 3 mm is an effective measure to reduce SIA and better visual outcome.

Conclusion:

In MSICS surgically induced astigmatism is less with superior corneo -sclera incision more than 2mm away from limbus.

Keywords: Manual small incision cataract surgery, Surgically induced astigmatism

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I. Introduction

Phacoemulsification and Manual small incision cataract surgery techniques are widely used now a days, although phacoemulsification is gold standard but cost of equipment ,long learning curve and high proportion of hypermature cataract with hard nucleus limits its use in developing countries 1. So MSICS is more preferable over phacoemulsification in countries like India to reduce the backlog of cataract 2,3.

MSICS does not require costly instrument and long learning curve. It is easy to master, safe, less postoperative astigmatism and without suture related complications, still we observe significant amount of surgically induced astigmatism in MSICS 4. Scleral incision is commonly performed superiorly as it is easy and has the forehead support of the patient but is said to cause maximum SIA 5.

To reduce SIA in MSICS some of the standard recommendation are-

1. To reduce the size and alter shape of incision (frown shape).
2. To place incision according to preoperative keratometric readings.
3. To increase the distance of incision from the limbus.

Standard recommendation to make MSICS astigmatism free, is to place the external scleral tunnel incision 4 to 5 mm away from the limbus but this makes the surgeon difficult to operate in the region of pars plana. Hence we propose to study the amount of astigmatism induced by placing the external scleral tunnel incision at 1,2&3 mm away from limbus with an aim to minimize post operative astigmatism 6-8.

II. Material & Methods

A prospective study of 75 patients undergoing manual small incision cataract surgery was conducted at Upgraded Department of Ophthalmology, J L N Medical College and Hospital, Ajmer, Rajasthan (India).

Patients were divided in three groups of 25 cases each. MSICS was done by superior, straight scleral-corneal incision of 6.5mm length with distance of incision 1mm, 2mm & 3mm away from limbus in Group A, B & C respectively.

*We preferred straight sclerocorneal tunnel because in higher incision it is difficult to make frown incision and faces surgical difficulties.

Inclusion Criteria :

Senile cataract with grade 1,2,3 nuclear sclerosis,with intact zonules.
Good corneal clarity

Exclusion criteria :

Corneal disorders,
Ocular surface disorders
Pterygium,
History of eye trauma,
Previous ocular surgery
Glaucoma, uveitis, retinal pathology
Intraoperative complication and/or needed suture, enlarging incisions

An informed and written consent was obtained from the patient. A detailed history was taken regarding any systemic pathology and allergy to the drugs. Visual acuity was checked unaided for both far and near vision and with pinhole. Best-corrected visual acuity was recorded. Thorough slit-lamp examination was done and under dilated pupil grading of cataractous lens was done(Lens Opacities Classification System III). Direct and indirect ophthalmoscopic examination to rule out fundus pathology and B-scan was done in mature and hypermature cataract.

Preoperative investigations like lacrimal sac syringing ,IOP, keratometry and A-scan was done.

Patients were started on moxifloxacin 0.3% and flurbiprofen 0.03% eye drops from the previous day. On the day of surgery, the eye to be operated was dilated with tropicamide 0.8% + phenylephrine 5% eye drops.

All 75 patients were operated by single experienced surgeon under peribulbar anesthesia .After painting and draping wire speculum and superior rectus bridle suture was applied. Conjunctival flap was raised and cauterization was done. CSI of 6.5 mm was made on superior sclera 1 mm, 2mm and 3mm away from limbus in group A,B,C respectively.

Side-port incision was made at 8 o'clock position with 2.8 mm keratome blade.Through side port anterior capsule stained with trypan blue.After injecting viscoelastic,around 5.5 to 6 mm diameter continuous curvilinear capsulorhexis (CCC) was made with cystitome and hydrodissection was performed.Main port entry made with 2.8 mm keratome and tunnel extended both nasally and temporally.Nucleus flipped in anterior chamber with help ofinsky's hook and nucleus delivery done with Wire Vectis, cortical matter aspirated with simcoe's irrigation aspiration cannula, after which a foldable IOL was implanted in capsular bag. Anterior chamber formed with balanced salt solution. Side port was hydrated.Subconjunctival Gentamycin and Dexamethasone injected.

Postoperatively Tab.Ofloxacin 200mg bd , Tab Diclofenac 50 mg bd given for 3 days.Topical antibiotic + steroid eye drops given for 4 weeks in tapering dosage. Topical mydriatics given for 1 week.

On 1st postoperative day visual acuity with and without pinhole and corneal curvature recorded . Follow up done on 7th, 15th,30th and 45th day.

The preoperative keratometer readings were compared with the postoperative keratometer readings and SIA was calculated. Paired *t* test was used to make an analysis of preoperative data and postoperative data. P value < 0.05 was considered statistically significant.

III. Result

In our study, there were 75 patients, of whom 46 were male and 29 were female.

The age of the patients ranged between 35 and 80 years.

Among these, 32 patients underwent surgery in the right eye and 43 patients in left eye.

In our study we observed that majority of patient had visual acuity 6/60 to 6/24 preoperatively and 6/9 to 6/24 postoperatively as shown in Table 1.

Table 1: PRE- OPERATIVE &POST- OPERATIVE VISUAL ACUITY

VISUAL ACUITY	PRE-OPERATIVE	POSTOPERATIVE
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	GROUP A	GROUP B	GROUP C	GROUP A	GROUP B	GROUP C
6/6 -6/9	0	0	0	3	12	17
6/12-6/18	1	2	3	8	9	6
6/24 -6/36	15	13	9	13	4	2
6/60-1/60	5	9	10	0	0	0
<1/60	4	1	3	0	0	0

Preoperative and postoperative astigmatism measurements in all three groups are shown in Table 2.

TABLE 2: COMPARISON OF PREOPERATIVE AND POSTOPERATIVE ASTIGMATISM

ASTIGMATIC ERROR		NUMBER OF PATIENTS (PREOPERATIVE)			NUMBER OF PATIENTS (POSTOPERATIVE 45 TH DAY)		
FLATTER K AXIS	DIOPTERS	GROUP A	GROUP B	GROUP C	GROUP A	GROUP B	GROUP C
ATR	0.25 -0.5	3	3	1	4	9	14
	0.75-1.0	3	5	3	7	7	9
	1.25-1.5	0	2	0	8	2	1
	1.75-2.0	0	0	0	4	2	0
	>2.0	0	0	0	0	2	0
WTR	0.25 -0.5	10	3	10	2	1	0
	0.75-1.0	5	8	10	0	0	0
	1.25-1.5	0	0	0	0	0	0
	1.75-2.0	0	0	0	0	0	0
	>2.0	0	1	0	0	0	0
NO ASTIGMATISM		4	3	1	0	2	1

ATR- Against the rule, WTR-With the rule

Postoperative mean SIA on 1st , 30th and 45th day are shown in table 3.

TABLE 3: MEAN SURGICALLY INDUCED ASTIGMATISM

MEAN SIA DIOPTER	1 ST POD			30 TH POD			45 TH POD		
	GROUP A	GROUP B	GROUP C	GROUP A	GROUP B	GROUP C	GROUP A	GROUP B	GROUP C
ATR	1.4	1.3	1.1	1.31	1.02	0.70	1.1	1.04	0.62
WTR	0.62	0.06	0.56	0.50	0.25	0.50	0.73	0.25	0.00

IV. Discussion:

Still today age related cataract represents the most common cause of curable blindness in the world. Despite 10 to12 million cataract operations performed globally, cataract blindness is still increasing by 1-2 million every year.

Ophthalmic surgeons have witnessed a significant evolution in surgical techniques for cataract extraction in 20th century like small incision cataract surgery and phacoemulsification. . Developing countries like india are still having large backlog of cataract, so to overcome this problem MSICS is cost effective and best modality with advantage of minimum post operative astigmatism and no suture related complications.

In our study preoperative astigmatism in Group –A ranged between 1.0 D with the rule to1.0D against the rule. 15 cases had with the rule astigmatism and mean was 0.60D ; 6 cases had against the rule astigmatism and mean was 0.66D.

In group B it ranged between1.0D with the rule to1.25D against the rule except 1case. 12cases had with the rule astigmatism and mean was 1.4D ; 10 cases had against the rule astigmatism and mean was 0.85D .

In Group –C it ranged between 1.0D with the rule to 1.0D against the rule. 20 cases had with the rule astigmatism and mean was 0.75D; 4 cases had against the rule astigmatism and mean was 0.86D.

Ninn Pedirson et al (1997) observed that rapid changes in astigmatism after cataract surgery due to large preoperative astigmatism, young age, low intra ocular pressure and the surgeon . Anders et al (1997)

observed that age, intraocular pressure, axial length, preoperative astigmatism had significant influence on post operative astigmatism .

Neumann et al. (1990) in his study on small incision to control SIA concluded that surgically induced astigmatism is dependent on incision size.

Rij G.V and Warning (1997) studied changes in corneal curvature induced by incision and concluded that surgically induced astigmatism depends on the location of incision.

Number of studies have demonstrated that smaller incision induces less initial with the rule astigmatism and achieve stability faster than do larger incision.

Singer JA (1992)- using frown incision ,78% of cases had no astigmatism or less than 1.5D at the end of 4th post operative week compared to only 22% cases with astigmatism greater than 1.5D.

In our study on 1st post operative day surgically induced astigmatism -

In Group A SIA in 19 cases was against the rule with 15 cases having SIA between 0.25-2.0D ,4 cases had SIA>2.25D, 4 cases had no SIA and 2 cases had with the rule SIA .

In Group B SIA in 18 cases was against the rule with 12 cases having SIA between 0.25-1.5D , 2 cases had no SIA and 5 cases had with the rule SIA between 0.25-1.0D.

In Group C SIA in 19 cases was against the rule with 15 cases having SIA between 0.25-1.5D ; 2 cases had no SIA, 4 cases had with the rule SIA between 0.25-1.25 D.

On 15th post operative day-

In Group A 21 cases had against the rule SIA maximum ranging between 0.25-1.5D except 6 cases and 4 cases had no SIA.

In group B , 22 cases had against the rule SIA with maximum cases between 0.25-1.0D except 6 cases ; 1 case had no SIA ; 2 cases had with the rule SIA between 0.25-0.5D.

In group C , 20 cases had against the rule SIA , out of which 17 cases had SIA between 0.25-1.0D , 3 cases had no SIA , 2 cases had with the rule between 0.25-0.5D.

Surgically induced astigmatism on 45th post operative day -

In Group A, 23 cases had against the rule SIA with majority ranging between 0.25-1.5D.

In group B, 22 had against the rule SIA with majority ranging between 0.25-1.0D .

In Group C , 24 cases had against the rule SIA with majority ranging between 0.25-1.0D.

Steinert et al. evaluated induced astigmatism and post operative wound stability and concluded that the mean post operative induced keratometric astigmatism for the small incision cataract surgery was 1.54D at day, 1,1.0D at 2 weeks , 0.98D at 1 month and 0.82 D at 3 months.

Guirao et al (2004) studied the effect of small incision on the optical aberrations of the cornea. The mean induced astigmatism was-1.09D at the orientations of surgical meridians.It was concluded that small incision does not significantly degrade the optical quality of cornea and the incision site plays the key role in the corneal changes after surgery.

In our study mean surgically induced astigmatism on 1st postoperative day-

In GroupA mean against the rule was 1.4D and mean with the rule SIA was 0.62D.

In group B, mean against the rule SIA was 1.30D and mean with the rule was 0.06D.

In GroupC, mean against the rule SIA was 1.10D and mean with the rule was 0.56D.

On 30th postoperative day-

In Group A,mean against the rule SIA was 1.31D and mean with the rule SIA 0.5D.

In Group B, mean against the rule SIA was 1.02D and mean with the rule was0.25D.

In Group C,mean against the rule SIA was0.70D and mean with rule SIA was 0.5D.

On 45th post operative day-

In Group A mean against the rule SIA was 1.1D and mean with the rule SIAwas0.73D

In Group B mean against the rule SIA was 1.04D and mean with the rule SIA was 0.25D

In group C mean against the rule SIA was 0.62D and mean with the rule SIA was nil.

In our study it was noted that the farther the incision site from limbus the lesser will be the induced astigmatism ,which gets stabilized by 6th week.

V. Conclusion

This study concludes that manual small incision cataract surgery with scleral incision 2-3mm away from limbus had less post operative astigmatism in comparison to incision 1mm away from limbus. Till today manual small incision cataract surgery is a safe, low cost technique which can be easily adopted by developing countries for mass scale surgery to combat social burden of cataract blindness.

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