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Original Research Article

Comparison of postoperative astigmatism in small incision cataract surgery based on size and shape of the incision

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ABSTRACT

Aim of the study: Study of comparison of postoperative astigmatism in small incision cataract surgery depending on size and shape of incision

Materials and Methods: A prospective study of 50 eyes of 50 patients who underwent manual SICS under local anaesthesia between December 2020 and May 2021 conducted by single surgeon and followed up on post op day 1 day 7 and 6 weeks. Patients selected were having grade 1 to 2 nuclear sclerosis the size and shape of incision was decided depending upon the grade of cataract. On follow ups thorough ocular examination was done especially looking for corrected visual acuity and correction needed for that. Keratometry was done in each follow up visits. At the end surgically induced astigmatism (SIA) was calculated.

Results: Surgically Induced Astigmatism (SIA) calculated by SIA calculator SIA was 0.5 - 1 D in 38 patients with frown incision of 4 to 5mm,1.0 - 1.5 D in 10 patients with frown incision size of 5 to 6mm 2D in patients with straight incision size of 6mm and more In all cases.

Conclusion: The less average SIA was noted in group with smaller incision of about 4 to 5mm. Frown superior incision has got added advantage of early wound stabilization than straight incision. It is possible to reduce the amount of post-operative astigmatism significantly by choosing the incision shape and size.

1. Introduction

Cataract surgery and intraocular lens implantation restores near normal visual acuity in otherwise healthy eyes. Tremendous changes are taking place in wound construction in cataract surgery mainly to minimise the amount of astigmatism and to the post operative refractive status in patient without compromising on wound stability.[1]

Post operative astigmatism is the main obstacle to the achievement of good uncorrected visual acuity after cataract surgery.[2] Incision length, shape, location, relationship to the limbus and cross sectional profile, all contribute to wound healing and the final amount postoperative astigmatism.

SICS through a sclera-corneal tunnel has come as a boon as it has been demonstrated that smaller the incision, lesser the number of sutures and valvular construction of wound would induce minimal astigmatism.[3]

Thus our study was conducted with the objective to study the effect of size of incision on postoperative astigmatism

2. Materials and Methods

This study included 50 eyes of 50 consecutive patients with white cataracts who had routine MSICS operated at navodaya medical hospital and research centre richer from December 2020-May 2021.

Exclusion criteria were patients with oblique astigmatism, corneal degeneration and dystrophies,

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corneal opacity, cataract with pterygium, traumatic cataract, complicated cataract, previous intraocular surgeries

Institutional ethical committee clearance was obtained before the start of the study.

All patients underwent detailed preoperative ocular examination, including clinical history and systemic examination, measurement of visual acuity, intraocular pressure (IOP) by Goldmann applanation tonometry.

Detailed slit lamp biomicroscopy under maximum mydriasis was performed.

Preoperative keratometry was done with Bausch and Lomb keratometer

IOL power and axial length were calculated using A-scan.

B-scan for posterior segment evaluation.

All observations and demographic data were carefully recorded using a protocol sheet.

Prophylactic antibiotics drops moxifloxacin 0.5% eye drops started one day before surgery. Patients were dilated with tropicamide and phenylephrine 0.5% eye drop and non-steroidal anti-inflammatory drops flurbiprofen sodium 0.03% was used 3 times every 15 minutes to maintain the dilatation.

2.1. Surgical Technique

All patients underwent small incision cataract surgery by experienced surgeon.

After peri-bulbar block with 5 ml of 2% lignocaine with adrenaline (1:20,0000) with 150 units/ml of hyaluronidase. Povidone-iodine 5% was instilled into the conjunctival sac. For SICS a fornix base conjunctival flap was made, scleral incision was made with bard parker knife with 15 no. blade temporally or supero-temporally and sclera-corneal tunnel was constructed with crescent.

The size of scleral incision was decided depending upon the grade of cataract.

The anterior chamber was deepened using a viscoelastic and a CCC of 5 – 6 mm was initiated and completed using a bent 26-gauge needle mounted on a viscoelastic syringe.

Thorough hydro-dissection was done and nucleus was prolapsed into anterior chamber and viscoelastic was injected in front and behind lens nucleus. A sinskey hook was used to hook out one pole of the nucleus outside the capsular bag and the rest of the nucleus was wheeled out into the anterior chamber.

After a good cover of viscoelastic, the prolapsed nucleus was extracted from the eye using an wire vectis technique.

Rigid, single piece, biconvex, polymethyl meth acrylate posterior chamber intraocular lens (IOLs) was implanted.

Post-operatively, patients were put on topical antibiotics and steroids tapered over 4-6 weeks depending upon the post operative inflammation. Patients were followed on the post-operative day 1, day 7 and after 6 weeks. At each visit visual acuity and keratometry was done.

The patients were finally examined at 6 weeks for residual surgically induced keratometric astigmatism and final prescription of corrective spectacles given at that time

3. Results

Of the 50 eyes operated, there were 28 males and 22 females in the study.

Patients with WTR was 32 and patients with ATR was 15 and 2 had no astigmatism.

Table 1: Sex distribution

Sex	Number of patients
Male	28
Female	22
Total	50

Table 2: The preoperative astigmatic profile.

T ype of astigmatism	Number of patients
WTR	32
ATR	15
No astigmatism	03
Total	50

WTR: With the rule astigmatism; ATR: Against the rule astigmatism

The size of scleral incision was decided depending upon the grade of cataract.

Table 3: Size of scleral incision

Incision size (MM)	Number of patients
4-5	38
5-6	10
6 and more	2
Total	50

Table 4: Postoperative astigmatism after 1 week

Size of incision (mm)	Astigmatism (D)
4-5	1.5-2.0
5-6	2.0-3.0
6 and more	3.0

Table 5: Postoperative astigmatism after 6 weeks

Size of incision (mm)	Astigmatism (D)
4-5	0.5-1
5-6	1-2
6 and more	2

4. Discussion

Surgically induced astigmatism after cataract surgery is a complex problem because the final refractive result

is influenced by various factors such as incision size, preoperative astigmatism, and the amount of manipulation during surgery.[4]

Modern small incision clear corneal cataract surgery causes less surgically induced astigmatism and less change to corneal shape than older methods.[5]

When an incision is placed superiorly there is flattening of vertical meridian. When this wound is closed with suture it may induce steepening of vertical meridian, if sutures are tight and causes flattening when it is too loose.

With time as the wound healing progresses there is flattening of the vertical meridian due to stretching of the incision scar.[6] So as a rule, in early postoperative period with the rule astigmatism was seen and in the late postoperative period against the rule astigmatism was seen.

More incision length was associated with more astigmatism. There is more astigmatism in patients with >6mm incision, than in patients with 4-5mm incision. As incision size is reduced SIA is reduced.

Pavan chavan et al concluded that decreasing the size of incision induces less astigmatism.

Karad H T et al reported that lower the size of incision induces low astigmatism. Induced astigmatism was lower in 5.5mm size of incision as compared to 6.5mm size.

Frown incision has got added advantage of early wound stabilisation than straight incision.

5. Conclusion

In developing countries like India, where phacoemulsification is not affordable by all patients, SICS is better option. As it is cheap, safe, fast and easy to learn and needs fewer resources.

However larger incision used induces greater astigmatism than phacoemulsification.

High astigmatism is an important cause of poor uncorrected visual acuity after cataract surgery.[7]

In view of these findings, this study was done with the aim that lowering the size of incision induces low astigmatism.

6. Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

7. Source of Funding

None.

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