

Evaluation of Various Incisions on the Post-Operative Astigmatism in Cataract Surgery

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Abstract

Background and Aim: Instrumentation and surgical methods have been improved in order to reduce postoperative astigmatism. The most recent one is cataract surgery without sutures. The current study sought to ascertain whether a steeper meridian incision would be more effective in lowering preoperative astigmatism during manual small incision cataract surgery with IOL implantation.

Material and Methods: The current study took two years to complete. The ophthalmology department of the medical college and hospital conducted the study. The study involved 50 eyeballs from 50 participants in total. The thorough history was noted during the preoperative assessment. Slit lamp examination was used to examine the eyes, record the intraocular pressure, and perform a thorough fundus examination. Following surgery, a follow-up was performed on day one and at regular intervals every week for the following six months. Each follow-up included refraction, keratometry, and Slit lamp biomicroscopy to evaluate the wound site.

Results: In the current study, preoperative astigmatism was present in 22 patients who were against the rule, 10 patients who were oblique, and 18 patients who were with the rule. In the case of the superior incision, it decreased the pre by 0.78 D, which had a wide range of fluctuations from one week to six weeks before stabilising after six months. Because the temporal incision is farther from the visual axis than the superior incision, any flattening brought on by the wound is less likely to alter the corneal curvature at the visual axis during early rehabilitation of vision.

Conclusion: To correct mild to moderate preoperative astigmatism at the time of cataract surgery, an incision at a steeper meridian is a straightforward, safe, and efficient treatment. In the superotemporal and temporal groups, postoperative eyesight and astigmatism remained stable throughout a period of six months of follow-up, whereas in the superior incision group, astigmatism fluctuated in the first six weeks after surgery before stabilising over the course of six months.

Keywords: Astigmatism, Cataract Surgery, Keratometry, Temporal incision.

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Introduction

The need to obtain predictable and accurate refractive outcomes is the single most important difficulty facing surgeons today when evaluating recent advancements in contemporary cataract and intraocular implant surgery. A strong postoperative uncorrected visual acuity is now expected of patients and has raised patient expectations as a result of recent advancements in cataract surgery.[1-3]

In an effort to lessen astigmatism while maintaining the safety and affordability of the procedure, a variety of incisions and phacofracture procedures have been reported in literature and are in use. The 3 mm arc incision of Sahu *et al.*, which has been practised using phacofracture, is one such incision that has been used in practise. Using the viscoelastic cannula, this was improved upon and reduced to a 2 mm incision manual small incision cataract surgery (MSICS).[4,5]

Instrumentation and surgical methods have been improved in order to reduce postoperative astigmatism. The most recent one is cataract surgery without sutures. The quantity of surgically generated astigmatism has considerably decreased with the development of suture-less small incision cataract surgery, and postoperative refraction has stabilized. The position, nature, and configuration of the cataract incision, which has its own astigmatic consequences, together with the patient's age and the condition of the other eye, should all be taken into account while planning the procedure for refractive cataract surgery.[6-8]

The cataract incision has several other purposes in addition to providing access to the anterior chamber. In cataract surgery, it is a crucial structural variable. In this regard, a study was conducted to ascertain the relevance of impacts of different incision kinds, such as superior, temporal, and

superotemporal incision depending on steeper axis and its impact on pre-existing astigmatism.[9,10] Therefore, the purpose of the current investigation was to ascertain whether preoperative astigmatism might be reduced by manual small incision cataract surgery with IOL implantation by making an incision at a steeper meridian.

Material and Methods

The current study took two years to complete. The ophthalmology department of the medical college and hospital conducted the study. The study involved 50 eyeballs from 50 participants in total. Preoperative astigmatism in all of the included patients who underwent cataract surgery was greater than 0.7 to 2.5 diopters. Before being included in the trial, the included patients were given information about it in the local language and asked to sign an informed consent form. Prior to the study's launch, the institute's ethics committee was made aware of it and an ethical clearance certificate was obtained.

In the current investigation, a straight incision at a steeper meridian was used in a prospective interventional case study with manual small incision cataract surgery and IOL implantation. The following inclusion and exclusion standards were used:

Patients with a pre-existing corneal astigmatism of 0.75 to 2.5 dioptres, a primary cataract, and an age range of 25 to 75 years were included.

Exclusion factors include irregular astigmatism, any prior history of eye surgery, vascular disorders of the collagen, failure to insert the IOL into the capsular bag, and others. The study omitted any complication that required expanding the first incision and second surgeries throughout the follow-up period.

The thorough history was noted during the preoperative assessment. Slit lamp examination was used to examine the eyes, record the intraocular pressure, and perform a thorough fundus examination. Using 0.5% tropicamide, 5% phenylephrine, 1% cyclopentolate, and NSAID eye drops, preoperative mydriasis was obtained.

The surgical treatment was performed in accordance with industry standards. Following surgery, a follow-up was performed on day one and at regular intervals every week for the following six months. Each follow-up included refraction, keratometry, and Slit lamp biomicroscopy to evaluate the wound site. Any problems during the course were observed and handled appropriately. Data on preoperative and postoperative astigmatism were gathered and compared. Utilising the χ^2 test, student t test, and probability tests, statistical analysis was carried out.

Results

50 eyes of 50 patients who had manual small incision cataract surgery had their preoperative and postoperative astigmatism assessed, as indicated in the materials and methods section. All of the patients finished their six-month follow-up. The excel spreadsheet was filled out with data.

All of the patients who had surgery had various types and grades of cataract. Nuclear cataract was the second most common kind of cataract among patients, after posterior subcapsular cataract. The posterior polar cataract was present in the least number of

individuals. The study's carefully chosen patients ranged in age from 25 to 75 years old, with a mean age of about 62 years. In account of sex distribution in the study it was found that there were 28 males and 22 females. The male to female ratio was found to be 1.5:1.

In the current study, preoperative astigmatism was present in 22 patients who were against the rule, 10 patients who were oblique, and 18 patients who were with the rule. The average astigmatism prior to surgery was 1.35D + 0.59D. The average post-operative astigmatism in patients is 0.96D 0.28D after 1 week, with a decrease of 0.48D, and 0.86D 0.29D at 6 weeks, with a drop of 0.51D. When compared to preoperative astigmatism, the mean postoperative astigmatism at 6 months was 0.48D 0.28D, a reduction of 0.75D (60.74%).

With a successful visual recovery, the superotemporal incision lowered the pre by 0.64 D and kept it there for the full six months.

In the case of the superior incision, it decreased the pre by 0.78 D, which had a wide range of fluctuations from one week to six weeks before stabilising after six months. Variations in visual recovery were correlated with variations in astigmatism levels.

Because the temporal incision is farther from the visual axis than the superior incision, any flattening brought on by the wound is less likely to alter the corneal curvature at the visual axis during early rehabilitation of vision.

Table 1: Type of astigmatism pre operative

Type of astigmatism	No. of patients
Against the rule	22
Oblique	10
With the rule	18

Discussion

The most frequent cause of reversible blindness is a cataract, and up until recently, surgery has been the sole treatment option. The most often performed procedures are phacoemulsification and manual small-incision cataract surgery (MSICS).

There is a significant backlog in cataract surgeries in our nation, primarily among people who live in rural and suburban areas.[11,12] The best method for treating cataracts is phacoemulsification.

However, because MSICS is less expensive and just as successful as phacoemulsification, it has become a preferred method for treating cataracts surgically. It might be viewed as a more effective method for performing numerous procedures.[13]

Several studies have described changes throughout the first six weeks. The patient's characteristics, however, might have an impact on how well the surgical incision heals. Beginning in the second week, the wound remodels. Early postoperative measurements of astigmatism and corneal curvature change are most likely to reflect the results of surgery alone.[14,15]

To have the best possible visual recovery after cataract surgery, the patient should have an astigmatism of 0.5D or less. Trinadade *et al.* contend that pseudophakes with modest simple myopic astigmatism have improved uncorrected near visual acuity. Pseudo accommodation is made possible by mild residual astigmatism and assists with both close-up and far-off vision. According to a number of studies, Richard P. Kraft was the first surgeon to shift from the limbus posteriorly towards the sclera in 1983, improving wound healing and minimising medically caused astigmatism.[16,17]

Following surgery, axis changes of 15 to 30 degrees were seen in 13%, 15%, and 23% of patients in the temporal, superotemporal, and

superior groups, respectively. Axis shifts of less than 15 degrees were seen in 87%, 85%, and 66% of patients in each of these groups, respectively.

Conclusion

To correct mild to moderate preoperative astigmatism at the time of cataract surgery, an incision at a steeper meridian is a straightforward, safe, and efficient treatment.

In the superotemporal and temporal groups, postoperative eyesight and astigmatism remained stable throughout a period of six months of follow-up, whereas in the superior incision group, astigmatism fluctuated in the first six weeks after surgery before stabilising over the course of six months.

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