

Study of Postoperative Astigmatism Between Superior and Temporal Clear Corneal Incision in Phacoemulsification

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Abstract:

Introduction: Comparison of amount of surgically induced astigmatism after phacoemulsification with foldable intraocular lens using the superior clear corneal and temporal clear corneal incision.

Materials and Methods: It was hospital based prospective study of 100 patients conducted in Katuri medical college and hospital during the period of December-2020 to July-2021. Patients were divided into Group-A and Group-B randomly who underwent superior and temporal clear corneal approach respectively.

Results: In group A with superior clear corneal incision, the average SIA was 0.99D. and in group B with temporal clear corneal incision, the average SIA was 0.57D

Conclusion: In conclusion temporal clear corneal incision seems to achieve the goal of minimizing surgically induced astigmatism. Temporal clear corneal incision is evidently better than superior clear corneal incision in minimizing surgically induced astigmatism. It is the incision which is more popularly used today as compared to a superior clear corneal incision.

Keywords: phacoemulsification, surgically induced astigmatism, superior, temporal.

1. Introduction

Since it was first created, cataract surgery has undergone a number of advancements. Since its early iterations in the days of ancient couching, intracapsular extraction, and finally phaco emulsification, cataract surgery has come a long way. Although surgically induced astigmatism (SIA) is the most barrier, the main objective is adequate visual rehabilitation without correction and quick deployment following surgery. In order to reduce the SIA over time, surgeons have put a lot of effort on developing novel incisions.

The incision created, the method utilized to install the intraocular lens (IOL), and the type of IOL all play important roles in determining the success of cataract surgery. Self-sealing transparent corneal incision has swiftly grown in favor around the world due to its many advantages over the more common sutured limbal incision and scleral tunnel. The power of the intraocular lens (IOL) and any surgically induced astigmatism (SIA) together determine the eye's refractive state following phacoemulsification and intraocular lens implantation (PE+IOL). The wound's



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location, wound morphology, and intraocular lens (IOL) size are all significant predictors of SIA [1- 4].

According to numerous studies, temporal clear corneal incisions have been reported to produce minimal SIA [5-12]. The small size incision gives a rapid and a stable optical recovery, and thus a lesser SIA.

Numerous studies have compared how astigmatism is affected by small incisions made in different anatomical areas, including the superior, supranasal, supratemporal, and temporal regions. When doing cataract surgery, the phacoemulsification incision should be made on the steepest corneal axis in order to correct a small bit of astigmatism. Other therapies, like peripheral corneal relaxing incisions and toric IOLs, were safe and effective for astigmatism higher than 1 diopter.

Aims and Objectives

1. By using a foldable intraocular lens during phacoemulsification through a superior clear corneal incision and a temporal clear corneal incision, one purpose was to assess how much astigmatism was introduced during surgery.
2. with the intention of contrasting naturally occurring astigmatism with improved post-operative vision.

Materials And Methods

1. It was a prospective hospital-based trial with 100 participants that ran from December 2020 to July 2021 at Katuri Medical College and Hospital.
2. Patients with a superior and temporal clear corneal approach were divided into Group-A and Group- utilizing a straightforward random selection technique.
3. Before surgery, 52% of patients in Group A had WTR, 30% had ATR, and 18% had no astigmatism. 32% of Group B participants had WA, 54% had ATR, and 14% had no astigmatism.
4. On the first and seventh postoperative days, as well as at 30, and six weeks, patients were examined. A visual acuity chart and keratometer results were recorded.
5. To compare pre- and post-operative SIA values, vector analysis was employed.

Criteria

Inclusion Criteria

1. Patients at the Katuri Medical College and Hospital undergoing phacoemulsification with implanted foldable posterior chamber intraocular lenses.
2. patients between the ages of 40 and 80.
3. All of the surgeries were done by a single surgeon.

Exclusion Criteria

1. Traumatic cataracts, corneal opacities, complex cataracts, persistent uveitis, pseudo-exfoliation, macular or retinal diseases, and cataracts.
2. irregular, oblique, or bio-oblique astigmatism.

Patients underwent a battery of diagnostic tests, including a BP read, a BG sample, a urinalysis, an HIV/HBsAg test, and an RT PCR for Covid-19. Before surgery, patients had their uncorrected and best-corrected vision tested. In every case, the power of the intraocular lens was determined by keratometry and an A Scan biometry. The Bausch and Lomb Keratometer was used for the keratometry.

Under peribulbar anesthesia, all procedures were performed by a single surgeon. Patients who underwent surgery were assessed on Day 1, Day 7, Day 30, and at 6 weeks post operatively. At each checkup, patients had their eyes examined using keratometry and a visual acuity chart.

2. Results:

Patients in Group A made up 40% of those between the ages of 51 and 60. 42 percent of the patients in group B were aged 61 to 70 or older. More than half of the patients in Group A were male. There was a 50/50 gender split in subgroup B. Preoperative eyesight ranges from hand motions to 6/18.

Table 1.

Range of SIA	Group-A		Group-B	
	Noof Patient	Percentage (%)	Noof Patient	Percentage (%)
0	6	12	14	28
<0.5D	15	30	16	32
0.75-1.0	9	18	12	28
1.25-1.5	10	20	5	10
1.75-2.0	6	12	1	2
>2D	4	8	2	4

Above table shows, In Group A 15 patients had astigmatism of <0.5D, 9 patients had astigmatism in the range of 0.75-1.0D, 10 patients had astigmatism in range of 1.25-1.5D, 6 patients had astigmatism in range of 1.75- 2.0D, 4 patients had astigmatism of >2D and 6 patients had nil astigmatism.

In Group B 16 patients had astigmatism of <0.5D, 12 patients had astigmatism in the range of 0.75-1.0D, 5 patients had astigmatism in range of 1.25-1.5D, 1 patient had astigmatism in range of 1.75-2.0D, 2 patients had astigmatism of >2D and 14 patients had nil astigmatism.

Table 2. Amount of SIA in Group A and B

SIA	Group-A	Group-B
Average SIA	0.99D	0.55D

Table 2 shows, in group A i.e, superior clear corneal incision, the average SIA was 0.99D. In group B i.e, temporal clear corneal incision, the average SIA was 0.57D

Table 3. Comparison of post-operative visual acuity between Group A and Group B

RANGE OF VA	DAY-1		1 st WEEK		1-MONTH		6 WEEKS	
	GROUP-A	GROUP-B	GROUP-A	GROUP-B	GROUP-A	GROUP-B	GROUP-A	GROUP-B
>6/60 to CF 3mt	2[4%]	1[2%]	2[4%]	1[2%]	2[4%]	-	2[4%]	-
6/60 to 6/24	18[36%]	7[14%]	8[16%]	2[4%]	1[2%]	2[4%]	-	2[4%]
<6/24 to 6/12	19[38%]	29[58%]	21[42%]	25[50%]	3[6%]	2[4%]	-	-
<6/12 to 6/6	11[22%]	13[26%]	19[38%]	22[44%]	44[88%]	46[92%]	48[96%]	48[96%]

The keratometry measurements made on the first day and the first week following surgery differ from one another. The first month's readings and the first six weeks' readings don't differ all that much from one another. Early on, postoperative flattening showed wound-related changes. Specifically, the first day and week were followed by a steady month. It belonged to a time before this one.

3. Discussion

When the incision is performed in the temporal clear cornea rather than the superior clear cornea, astigmatism is less likely after phacoemulsification and the implantation of a foldable intraocular lens. The average SIA was lower with the temporal clear corneal incisions when compared to the superior ones.

In Group A, which received a better clear corneal incision, the postoperative astigmatism was 48% against the rule, compared to 40% in Group B, which received a normal incision. Postoperative astigmatism was 40% with the rule and 30% against it in Group B, which had a temporal clean corneal incision. In the patients who underwent a superior clear corneal incision, 13% did not have astigmatism. In the group of patients who had temporal clean corneal incisions after surgery, 28% had no astigmatism.

The superior clean corneal incisions in group A resulted in an average SIA of 0.99D. For group B, who received temporal clean corneal incision, the average SIA was 0.57D.

A faster visual recovery was made possible by phacoemulsification of the cornea temporarily clear. The findings imply that the amount of astigmatism introduced during surgery can be minimized by temporal clean corneal incision. It seems that temporal clear corneal incision is better to superior clear corneal incision in order to decrease the likelihood of postoperative astigmatism. The incision is currently the preferable course of treatment when compared to a superior clear corneal incision.

4. Conclusion

In this study, the effects of two commonly used self-sealing incisions for phacoemulsification with a foldable IOL on corneal astigmatism were compared. Despite numerous improvements in cataract surgery, phacoemulsification remains the fastest and most efficient technique.

The temporal approach is more practical and less invasive since a high brow and profoundly sunken eyes make it harder to operate the probe in the superior approach. A self-sealing corneal incision creates a hygienic working environment. Although it is ideal to make an incision on a more acute meridian, in the field this is frequently not achievable, making the temporal approach the better choice.

A well-formed 2.8 mm biplanar clear corneal incision should be predicted to have excellent wound stability and healing. In comparison to the superior group, the visual outcome, optical quality, and patient satisfaction are all enhanced with SIA in the temporal group.

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