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A 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.

Introduction

Cataract surgery has undergone various advances since it was evolved. It started from ancient couching then transformed to intracapsular cataract extraction and finally evolved to the modern phaco emulsification cataract surgery. The primary aim is good post-operative visual rehabilitation without correction with immediate mobilization, but the main obstacle is surgically induced astigmatism (SIA). Over time, various surgeons have strived hard and invented different incisions to reduce the SIA.

The outcome of cataract surgery depends on various factors like incision, approach, type of surgery, mode of intraocular lens (IOL) insertion and type of IOL.The introduction of self-sealing clear corneal incision has gained popularity worldwide as it offers several benefits over traditional sutured limbal incision and scleral tunnel. The two main determinants of the refractive state of the eye following phacoemulsification and intraocular lens implantation (PE+IOL) are IOL power and surgically induced astigmatism (SIA). Factors such as wound location and architecture, and IOL size are important predictors of SIA.[1,2,3,4]

According to numerous studies, temporal clear corneal incisions have been reported to produce minimal SIA.[5,6,7,8,9,10,11,12] The small size incision gives a rapid and a stable optical recovery, and thus a lesser SIA.

Many studies were done to compare the astigmatism with different types of small incisions in different locations like superior, superonasal, superotemporal, and temporal. Regarding the architecture of the

cornea, giving phacoemulsification incision on the steepest corneal axis at the time of cataract surgery can correct a small amount of astigmatism. Other options like peripheral corneal relaxing incisions and toric IOLs were also safe and effective for treating more than 1 diopter of preexisting astigmatism.

Aims And Objectives

1. To study the amount of surgically induced astigmatism after phacoemulsification with foldable intraocular lens using the superior clear corneal and temporal clear corneal incision.
2. To compare the surgically induced astigmatism in terms of better postoperative visual recovery.

Materials And Methods

1. 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.
2. Patients were divided into Group-A and Group- by simple random sampling technique who underwent superior and temporal clear corneal approach.
3. Preoperatively 52% of Group A patients had WTR, 30% of pts had ATR and 18% had no astigmatism. In Group B, 32% had WTR, 54% had ATR and 14% had no astigmatism.
4. The patients were followed upon day 1, 7, 30 and 6 weeks postoperatively. Visual acuity and keratometry readings were recorded.
5. SIA was evaluated by Vector analysis from pre and post-operative readings.

Criteria

Inclusion Criteria

1. Patients undergoing phacoemulsification with foldable posterior chamber intraocular lens implantation at Katuri medical college & hospital.
2. Patients between age group of 40 to 80 years.
3. All patients were operated by single surgeon.

Exclusion Criteria

1. Patients with corneal opacities, complicated cataracts, cataract with chronic uveitis, traumatic cataract, macular or retinal diseases, pseudo exfoliation.
2. Irregular, oblique and bioblique astigmatism.

Patients were evaluated for Blood Pressure, Random blood sugar, Urine analysis, HIV and HBsAg, RT PCR for Covid-19. Uncorrected and best corrected visual acuity were evaluated pre operatively. Keratometry and A Scan biometry were done in all cases to calculate IOL power. Keratometry was done using Bausch and Lomb Keratometer.

All surgeries were done by single surgeon under peribulbar anesthesia. Post-operative patients were evaluated at day 1, day 7, day 30, 6 weeks post operatively. Patients were evaluated for visual acuity and keratometry at each follow up visit.

Results:

Majority of patients in Group A were in range of 51-60 years (40%). In group B majority of patients were in the range of 61-70 years (42%). In Group A, most of the patients were males (54%). Equal sex distribution seen in group B. Pre-operative visual acuity ranges from Hand movements to 6/18.

Table-1

Range of SIA	Group-A		Group-B	
	No of Patient	Percentage (%)	No of 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

Volume 6, Issue 2; March-April 2023; Page No 829-832
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>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

	DAY-1		**1st WEEK**		**1- MONTH**		**6 WEEKS**	
RANGE OF VA	**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%]

Postoperatively variations seen in keratometry readings on 1st day and 1st week. There is no much significant change between 1st month and 6 weeks reading i.e. Post-operative wound related flattening showed changes at early period. i.e. 1st day and 1st week and became stable by 1 month. It is comparatively earlier in temporal group.

Discussion

The incidence of post-operative astigmatism following phacoemulsification with foldable intraocular lens implantation with temporal clear corneal incision is less than with superior clear corneal incision. The average SIA was less with temporal clear corneal incision as compared to superior clear corneal incision.

In Group A that is Superior clear corneal incision induced against the rule astigmatism is 48% and with the rule is 40% postoperatively. In Group B that is temporal clear corneal incision induced against the rule astigmatism is 30% and with the rule is 42% post operatively. In superior clear corneal incision group 12% of patients showed nil astigmatism. In temporal clear corneal incision group 28% patients showed nil astigmatism, post-operatively.

Volume 6, Issue 2; March-April 2023; Page No 829-832
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In group A with superior clear corneal incision, the average SIA was 0.99D. In group B with temporal clear corneal incision, the average SIA was 0.57D

Visual rehabilitation was earlier following temporal clear corneal phacoemulsification. In conclusion temporal clear corneal incision seem 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.

Conclusion

Present study demonstrated the effect on corneal astigmatism of two commonly used self-sealing incisions in phacoemulsification with foldable IOL. In spite of various modifications in the cataract surgery, phacoemulsification remains the fastest and best surgical procedure.

A temporal approach is more accessible than superior approach as a prominent brow and deep-set sunken eyes obstruct the maneuvering of the probe in the superior approach, which is easier and more accessible in temporal approach. A self-sealing corneal incision gives a bloodless surgical field. It is better to give incision in steeper meridian but in camp cases it is not feasible, so in those situations temporal approach is better choice.

A well-formed 2.8 mm biplanar clear corneal incision gives excellent wound stability and healing. SIA in the temporal group is less than in the superior group and gives a better visual outcome, good optical quality, and great patient satisfaction.

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Volume 6, Issue 2; March-April 2023; Page No 829-832

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