

Evaluation of Surgically Induced Astigmatism (SIA) at 10'O Clock Limbal Incision 2.8mm After Phacoemulsification

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ABSTRACT

Objective: To evaluate surgically induced astigmatism (SIA) at 10'o clock Limbal incision 2.8mm after phacoemulsification procedure.

Study Design: Experimental study

Place and Duration of Study: This study was conducted at the Khairpur Medical College Teaching Hospital from the duration of July 2018 to December 2018.

Materials and Methods: 100 patients who had astigmatism of less than 1.5D were selected on the basis of convenience sampling technique, and were divided into groups based on eye involvement, with one group having 50 patients in which the incisions site was Superotemporal, and the other 50 had incision site at Superonasal. The incision was given at 10'o clock 2.8mm with the wound being close with corneal hydration without using sutures. Pre and post-operative K1 and K2 measurements were recorded Data was analyzed using SPSS, with the paired t-test being applied to determine the statistical significance which was kept at ≤ 0.05 .

Results: In a study of 100 people, 64 were male and 36 were female with the mean age of male patients being 52.31 and female being 54.35. No significant difference was observed in the pre and post-operative K1 and K2 value in Superotemporal incision (K1:0.986, K2:0.384). Similarly, no significant difference was seen in the pre and post-operative K1 and K2 value in Superonasal incision (K1:0.352, K2:0.512).

Conclusion: Limbal Incision can be used after phacoemulsification surgery as it doesn't enhance SIA post-operatively.

Key Words: Evaluate Surgically Induced Astigmatism (SIA), Limbal Incision, Phacoemulsification

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INTRODUCTION

Cataract surgery and refractive surgical procedures are very common in the population, with the amount of procedures basking in several millions worldwide¹.

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A study carried out in Denmark alone showed the wide amount of cataract procedures of approximately being 46,000 each year². Cataract surgery has undergone various modernization and advancement in the field ever since its inception. It has finally reached new heights through the development of phacoemulsification cataract surgery³. Pakistan a third world country faces cataract the same way as other middle and low-income countries do, accounting for 47.8% blindness worldwide and being the leading cause of blindness in Pakistan⁴⁻⁵. Phacoemulsification and extra-capsular cataract extraction (ECCE) are the most common surgical modalities available to the surgeons for removing cataracts⁶. Phacoemulsification is a procedure that is much more demanded by the patients, and patients have high expectations regarding its outcomes. However, Phacoemulsification is widely associated with many post-operative complications⁷⁻¹⁰. One of the many complications seen with Phacoemulsification is surgically induced astigmatism (SIA). SIA is a very important factor in determining the desired refractive outcome¹¹. SIA can be modulated by more than one method during cataract surgery. To

achieve the best surgical results, it is vital to rapidly restore visual acuity by reducing SIA and correcting any residual astigmatism¹². Various types of small-incision cataract wounds, such as sclera, posterior Limbal tunnel, and clear corneal have been created surgically at various locations including Superotemporal, Temporal, Superior, and Superonasal. Studies have been carried out on these to determine how these aforementioned incisions have resulted in SIA¹³. Furthermore, the size of incision has also been studied and assessed if incision size has any effect on the amount of SIA created¹⁴. In Pakistan, studies have also been done on Phacoemulsification and SIA but the amount of studies is very minimum¹⁵. Considering the amount of cataract surgeries that take place in the country, a study was conducted to evaluate SIA at 10° o'clock Limbal Incision 2.8mm after Phacoemulsification.

MATERIALS AND METHODS

This study was done at Khairpur Medical College Teaching Hospital from the duration of July 2018 to December 2018. This experimental study included 100 patients on the basis of convenient sampling. The patients with the keratometric astigmatism of 1.5D or less, had no history of ocular trauma, surgery or other underlying diseases that could alter the corneal refractive power were included in this study. The patients were divided into two groups on the basis of eye involvement and site of incision. 50 were involved in Superotemporal and 50 were involved in Superonasal incisional site. After taking an ethical approval from the concerned authority, the study was conducted and written and informed consent from each patient was acquired before they can be included in the study. The same surgeon performed the procedure on each patient, and K readings were recorded pre and post operatively included K1 and K2 readings. The procedure was performed by giving topical anesthesia drop (Alcane). Incision was given at ten o'clock by 2.8 keratom in right eye supra temporal and in left eye supra nasal cataract was removed by phaco procedure, and flodable Intra ocular lens was implanted. Wound was closed by corneal hydration without suture. The data was recorded and enter on data sheet. The data was analyzed through SPSS version 21, and compare the mean of k readings the paired *t* test was applied and level of significance was kept at $P \leq 0.05$.

RESULTS

- The Mean age of the patients on the basis of gender were present in figure 1.1
- The Demographic data was presented in figure 1.2
- The Mean pre and post-operative K reading of both supra temporal and Supra nasal including K1 and K2 readings were shown in figure 1.3

- The level of significance on comparison of Mean values of in both groups was shown in Table-1.

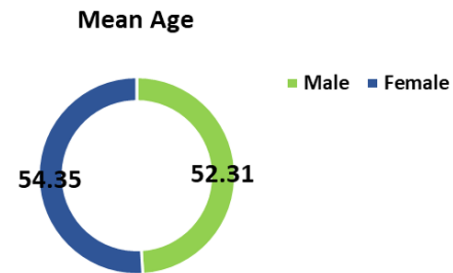


Figure No.1.1: Mean age of the patients on the basis of gender

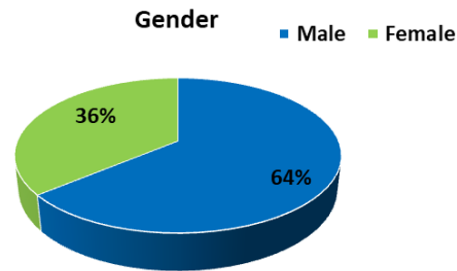


Figure No. 1.2 shows the Percentage of gender based

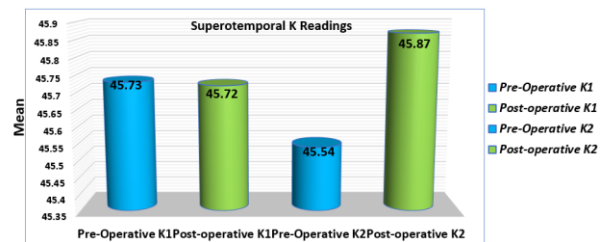


Figure: 1.3 shows the Mean Pre and Post-operative K1/K2 readings in Superotemporal incisional site

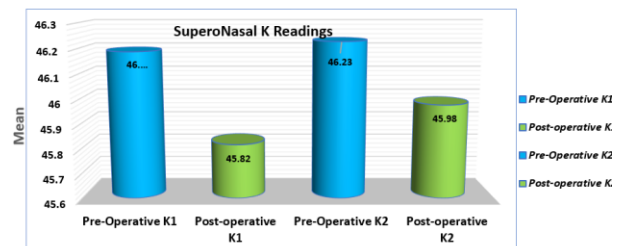


Figure: 1.4 shows the Mean Pre and Post-operative K1/K2 readings in Superonasal incisional site

Table No.1: Level of significance on comparison of Mean K reading among different incisional sites

Compare the Mean Superotemporal K Readings		
P value	Pre-Operative	Post-Operative
K1		0.986
K2		0.384
Compare the Mean Superonasal K Readings		
K1		0.352
K2		0.512

DISCUSSION

The aim of the study was to determine if Limbal incision performed at 10'o clock position will develop concerning levels of SIA, or will instead reduce astigmatism. Since cataract is a widely concerning issue in Pakistan, surgeons should be aware of what type of incision is best and has the lowest rate of developing surgically induced astigmatism. SIA depends mostly on site and size of the incision, as well as the presence of pre-operative astigmatism¹⁶. The prevalence of post-operative astigmatism is less in small sutureless incision as compared to large incisions of extracapsular lens extraction. Our study showed that when carrying out Limbal incision, there was no significant difference in pre and post-operative astigmatism development. Therefore SIA didn't develop significantly to cause caution while carrying out Limbal incision either Superonasally or Superotemporally. Although there was no difference in pre and post-operative astigmatism, However many incisions have led to a reduction in post-operative astigmatism. Piao et al (2020) showed that clear corneal incision leads to a statistically significant reduction of astigmatism¹⁷. Warren et al (2011) compared both Limbal incision and clear corneal incision to assess SIA, in which he showed that 2.2mm square posterior Limbal incision induced significantly less SIA compared to same-sized clear corneal incision, furthermore which will improve refractive outcomes¹⁸. This result is in line with our study in which there was no increase in post-operative SIA. Nikose et al (2018) in his study compared SIA in temporal clear corneal incision and superior clear corneal approach and concluded that temporal clear corneal incision is evidently better concerning SIA¹⁹. Whereas another study showed that there was no significant difference in SIA between Superotemporal incisions and Superonasal incisions after clear corneal incision¹¹. Our study compared pre and post-operative SIA in same groups, future studies can be done to compare SIA in Superotemporal and Superonasal Limbal incisions. Limbal Incision can be carried out in a similar manner to clear corneal incision, these both are strong incision methods that don't increase SIA and rather reduce it.

CONCLUSION

Limbal Incision at 10'o clock position doesn't enhance SIA after Phacoemulsification and therefore can be used in cataract procedures.

Author's Contribution:

Concept & Design of Study: Attaullah Shah Bukhari
Drafting: Shahid Jamal Siddiqui,
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Revisiting Critically: Arif Rabbani

Final Approval of version: Sarmad Jamal Siddiqui

Conflict of Interest: The study has no conflict of interest to declare by any author.

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