

Impact of Different Location of Incisions on Surgically Induced Astigmatism (SIA) after Phacoemulsification: A Comparative Study

Incisions on Surgically Induced Astigmatism (SIA) after Phacoemulsification

Attaullah Shah Bukhari¹, Suhail Ahmed Shah², Abdul Qadeem Soumro³, Mazhar Ali⁴, Ashiq Hussain⁵ and Muhammad Faaz Malik³

ABSTRACT

Objective: To evaluate the Impact of different locations of incisions on surgically induced astigmatism (SIA) after phacoemulsification.

Study Design: Longitudinal study

Place and Duration of Study: This study was conducted at the Khairpur Medical College and Teaching Hospital, Khairpur Mir's from July 2020 to December 2020.

Materials and Methods: A longitudinal study in which 100 patients with Keratometric Astigmatism of 1.5 D or less were included in the study after their consent. The participants were divided into two groups based on the type of incision. Group A received a Limbal incision, whereas, in Group B, a clear corneal incision was carried out. The pre and post-operative Keratometry K1 and K2 readings were recorded and tabulated on a data sheet. Data were analyzed using SPSS Version 21.0 and the paired t-test was applied to compare the mean K1 and K2 values of the different types of incisions at different sites (Superotemporal and Superonasal).

Results: Significant differences were seen in the K1 and K2 ($P=0.002$, $P=0.039$) Superotemporal readings in Group A. No significant difference was seen in the K1 and K2 ($P=0.339$, $P=0.337$) Superonasal readings in Group A. Significant difference was seen in the K1 and K2 ($P\leq 0.001$, $P\leq 0.001$) Superotemporal readings in Group B. Significant difference was seen in the K1 and K2 ($P\leq 0.001$, $P\leq 0.001$) Superonasal readings in Group B.

Conclusion: Both successfully showed less SIA post-operatively, however, Limbal incision induced less SIA after cataract surgery.

Key Words: Impact of Different Location, Surgically Induced Astigmatism (SIA), Phacoemulsification

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INTRODUCTION

Pakistan is a third-world country in which most of the population is poor and lives in rural areas. Pakistan is another country filled with cataract patients and suffers from it the same way other countries do.

Eye related issue is common worldwide, with 45 million people being blind with visual acuity of less than 3/60. Furthermore, half of the people residing in developing countries, similar to Pakistan are blind due to cataract¹. The leading cause of blindness in Pakistan is also due to cataracts²⁻³. Cataract related surgery is one of the most frequently occurring surgical procedures on the plant, with about 19 million per annum cataract patients having to undergo cataract surgery, with studies suggesting this number to go up to 30 million by 2020⁴. Phacoemulsification is now considered to be the gold standard in treating cataract, replacing manual extracapsular cataract surgery because it is simple, safe, quick, and produces lesser amount of corneal astigmatism⁵. Furthermore, it is associated with lesser complications than its predecessor extracapsular cataract surgery which can cause macular and corneal edema, rupturing of the posterior capsule, and endophthalmitis⁶⁻⁷. Phacoemulsification is a procedure that has come into the knowledge of many patients and is more demanded by the patients due to its favorable outcomes, however, there are still some post-operative complications

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associated with Phacoemulsification⁸⁻⁹. One of these is surgically induced astigmatism (SIA). To obtain the desired outcome, reduction in SIA and correcting any residual astigmatism is crucial in modern cataract surgery¹⁰⁻¹¹. The relation of SIA is linked to the type and location of the incisions made during surgery. These types of incisions include scleral, clear corneal, and posterior Limbal incisions, being carried out at different locations such as temporal, Superotemporal, Superonasal, and superior. Various studies have investigated SIA with regards to the type and location of incisions being carried out¹²⁻¹³. These types of studies are anecdotal in the country; therefore, a comparative study was conducted to evaluate the Impact of different locations of incisions on surgically induced astigmatism (SIA) after phacoemulsification

MATERIALS AND METHODS

After seeking the required approval from the institutional review board to carry out this study, a longitudinal interventional study was conducted at the Khairpur Medical College and Teaching Hospital from July 2020 to December 2020. In this study, there were 100 patients selected with equal gender distribution based on the convenience sampling technique. Patients with a keratometric astigmatism of 1.5D or less and who were enlisted for cataract surgery were included in this study. The patients were divided into two groups based on the type of incision to be performed. In Group A, a Limbal incision was to be carried out, whereas, in Group B, a clear corneal incision was to be performed. In both, groups, the site of incision was to be Superotemporal and Superonasal. Before the inclusion of the participants, they were informed thoroughly about their inclusion in the study, and they were only included in the study once written and verbal consent was acquired from them. Surgery was performed on all the patients by an experienced and well-qualified surgeon, with the Pre and Post-Operatively K1 and K2 readings being recorded. The procedure of giving the incision was carried out using topical anesthesia solution, in which Superotemporal incision was given in the right eye and Superonasal incision was given in the left eye. The size of the incision was 2.8mm Wound was eventually closed by corneal hydration without suture. Data were recorded and tabulated on a datasheet, analyzed using SPSS version 21, and the mean K values were compared using paired t-test with the level of significance being kept at $P \leq 0.05$.

RESULTS

Figure 1: Shows the gender distribution in the two groups

Figure 2: Shows the pre and post-operative Superotemporal Keratometry

Figure 3: Shows the pre and post-operative Superonasal Keratometry

Table 1: Shows the comparison of Pre and Post-operative mean Keratometry values in Group A and B.

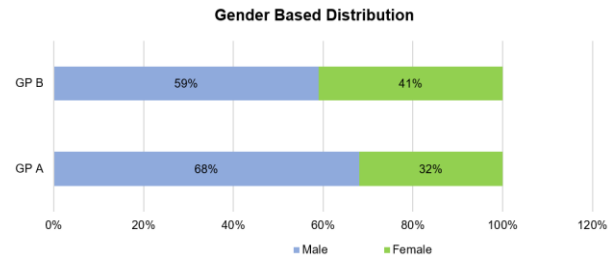


Figure No.1: Shows the gender distribution in the two groups

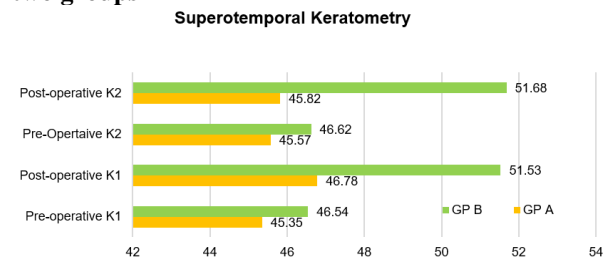


Figure No.2: Shows the pre and post-operative Superotemporal Keratometry

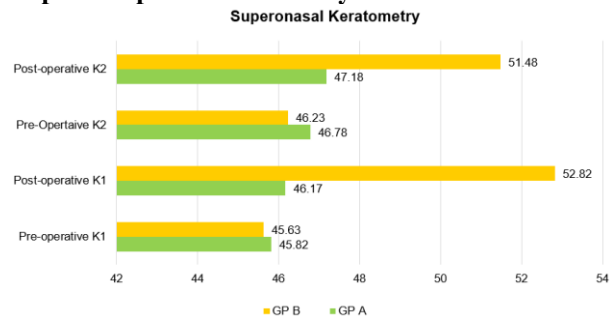


Figure No.3: Shows the pre and post-operative Superonasal Keratometry

Table No.1: Shows the comparison of Pre and Post-operative mean Keratometry values in Group A and B

Pre and Post-Operative P-Value	
Compare the Mean Superotemporal K Readings of Group A	
K1	0.002
K2	0.039
Compare the Mean Superonasal K Readings of Group A	
K1	0.339
K2	0.337
Compare the Mean Superotemporal K Readings of Group B	
K1	≤ 0.001
K2	≤ 0.001
Compare the Mean Superonasal K Readings of Group B	
K1	≤ 0.001
K2	≤ 0.001

Paired t-test, p-value ≤ 0.05

DISCUSSION

SIA depends primarily on the size, type, and size of the incision, as well as the position and comfort of the surgeon that is performing this surgery¹³. There is scarcity in Pakistan on studies concerning which type and location of the incision are best suited to reduced SIA in patients, and since cataract is a highly concerning issue at hand in the region, more studies need to be conducted similar to ours. In our study, we conducted two different types of incisions, Limbal incision and the clear corneal incision at Superotemporal and Superonasal locations. Our study showed that both of the types of incisions produced a redundant SIA, however, Limbal incision induced less SIA than the clear corneal incision. Ernest et al, (2011) in his study showed similar results to our study when he compared surgically induced astigmatism between Limbal incisions and clear corneal at the time of cataract surgery. His study concluded that Limbal incision induced significantly less SIA relative to clear corneal incision¹⁴. This reduced induction of SIA is significant, as it will lead to a better visual and refractive outcome in patients. The literature also states that Limbal incisions offer a much faster healing rate and having greater resistance to deformation during pressure than those in the cornea¹⁵. Furthermore, clear corneal incisions also increase the susceptibility of endophthalmitis¹⁶. It can be concluded that in terms of surgical safety, Limbal incisions don't have any demerits. Reducing the width of the Limbal incision width can also have an impact on the amount of SIA, as shown by another study in which is the incision size was 2.2mm as compared to the 2.75mm group, there would be a lesser amount of SIA, corneal flattening and torque after one week (P: = .003, .006, and .014, respectively)¹⁷. Superotemporal and temporal incisions produce less SIA, this can be seen in our study and another study which stated that temporal incisions are associated with little SIA. Furthermore, it stated that if there are higher levels of preoperative astigmatism, superior incisions are more favorable and provided better outcomes when combine methods are not applied¹⁸. Our study shows that both Limbal and clear corneal are good methods of incisions, but surgeons should lean more towards Limbal incisions due to it producing little SIA. In the left eye, Superonasal incisions should be done, whereas in the right Superotemporal incisions should be carried out.

CONCLUSION

Both Limbal and clear corneal incision reduce SIA, however, a lesser amount of SIA is seen in Limbal incision.

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

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