



COMPARATIVE STUDY OF PHACOEMULSIFICATION AND MANUAL SMALL INCISION CATARACT SURGERY WITH RESPECT TO POST OPERATIVE VISUAL ACUITY AND ASTIGMATISM

Ophthalmology

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ABSTRACT

Background: Cataract is a leading cause of preventable blindness, blindness worldwide. Surgically induced astigmatism has been a byproduct of cataract surgery. The present study was conducted to compare post operative visual acuity and astigmatism in patients undergoing phacoemulsification and manual small incision cataract surgery in a tertiary care centre. **Material and Methodology:** The present hospital based comparative study conducted at Department of Ophthalmology from March 2023 to February 2024. The study was conducted from March 2023 to February 2024. A sample size of 154 patients undergoing SICS (Group I=77) and Phacoemulsification surgery (Group II=77) were enrolled for the study. Permission from the Ethical Committee was taken prior to commencement of the study and informed written consent was taken from the participants of the study. After dilation fundus examination of both eyes was done using ophthalmoscope. Data entry and data analysis was done using MS Excel and epi info version 7 (available from WHO). **Results:** The astigmatism reduced to 1.03 ± 0.26 in Group 1 and 0.88 ± 0.24 in Group 2 ($p < 0.0001$), indicating a consistently lower astigmatism in the Phaco group throughout the post-operative period. The comparison of visual acuity among SICS and Phaco group at post-operative day 1, 7 and 42 shows no statistical significance. **Conclusion:** The study concludes that phacoemulsification is the better technique to control post-operative astigmatism as compared to manual small incision cataract surgery.

KEYWORDS

Phacoemulsification, Manual Small Incision Cataract Surgery, Post Operative visual acuity, Astigmatism

INTRODUCTION

Cataract is a leading cause of preventable blindness, blindness worldwide. In 2020, it was estimated that approximately 15 million people older than 50 were blind due to cataracts, and an additional 79 million had moderate to severe visual impairment.¹ It contributes 62.6% of preventable blindness in India.²

Surgical intervention is the treatment of choice. Phacoemulsification and small incision cataract surgery with intraocular lens implantation are the common procedures. Both procedures are relatively safe ophthalmic procedures with few complications like vitreous loss, Posterior capsular rupture and post-operative complications Posterior capsule opacification, retinal detachment and Cystoid macular oedema.^{3,4}

Visual impairment due to cataracts has a negative impact on mobility, participation in social activities, work productivity, leisure activities, reduces the ability to perform daily activities to become dependent, and can cause depression.⁵ The definitive treatment for cataracts is currently surgery. The goal of cataract surgery is to optimize visual function. The decision to perform surgery is not specific depending on the degree of visual acuity, but rather on how much the decrease interferes with the patient's activities.⁶

Corneal astigmatism or surgically induced astigmatism has been a byproduct of cataract surgery since the first limbal incision was made.⁷ Surgically induced astigmatism is a big deterrent to ophthalmologists' aim of making his patients emmetropic because it is an integral part of the post-operative refractive error.⁸

Thus, it is important to study the post operative astigmatism in both types of surgeries so that we can modify the causative factors. That will help in obtaining a more rapid visual rehabilitation, greater patient satisfaction and better optical results along with quality of vision. In fact, today the emphasis is not only on eliminating or minimising surgically induced astigmatism but also neutralising any pre-existing astigmatism.

In this context, the present study was conducted to compare post operative visual acuity and astigmatism in patients undergoing phacoemulsification and manual small incision cataract surgery in a tertiary care centre.

OBJECTIVE:

- To compare post operative visual acuity and astigmatism in patients undergoing phacoemulsification and manual small incision for cataract surgery in a tertiary care centre

MATERIAL AND METHODS:

The present hospital based observational study conducted at Department of Ophthalmology. The study was conducted from March

2023 to February 2024. A sample size of 154 patients undergoing SICS (Group I=77) and Phacoemulsification surgery (Group II=77) were enrolled for the study. Patients who had not given consent, with grade 4 cataract, endothelial cell count less than 2000/mm³, complicated cataract, raised IOP, corneal diseases, history of ocular surgery in concerned eye and patients with history of ocular trauma in concerned eye were excluded. Permission from the Ethical Committee was taken prior to commencement of the study and informed written consent was taken from the participants of the study. Patient demographic and medical details was recorded in the proforma sheet along with the symptoms preceding the disease. The ophthalmic examination was done by a single ophthalmologist. Best corrected visual acuity for distance and near were recorded. Intraocular pressure was also documented. After dilation fundus examination of both eyes was done using ophthalmoscope. Any changes attributable to PIH were documented. All the recent investigations done from the same institute were also noted down in the questionnaire. The data was filled in excel sheet and the results were described as frequency and proportion. Intergroup comparisons are done by unpaired t test and intra group comparisons by paired t test. p value of 0.05 or less was considered for statistically significance. The comparison was done by chi-square test with significance at $p < 0.05$.

RESULTS:

Table 1: Demographic profile distribution among both groups:

Variables	Group 1 (SICS)	Group 2 (Phaco)	P-value
Mean age (years)	65.23 $\pm$ 6.49	64.07 $\pm$ 8.73	P=0.35 (NS)
Male	43 (55.84%)	41 (53.25%)	P=0.37 (NS)
Female	34 (44.15%)	36 (46.75%)	

The above table no 1 shows, the mean age in Group 1 (SICS) was 65.23 ± 6.49 years and Group 2 (Phaco) was 64.07 ± 8.73 years. There was no significant difference in age distribution in two groups. ($p > 0.05$) There were 43 (55.84%) male patients among Group 1 (SICS) and 41 (53.25%) patients in Group 2 (Phaco). There was no gender difference when two groups were compared statistically. ($p > 0.05$)

Table 2: Comparison of average post operative astigmatism in both the groups:

Variables	Group 1 (SICS)	Group 2 (Phaco)	P-value
Post-operative Day 1	1.88 $\pm$ 0.34	1.07 $\pm$ 0.54	<0.0001
Post-operative Day 7	1.28 $\pm$ 0.28	1.02 $\pm$ 0.44	<0.0001
Post-operative Day 42	1.03 $\pm$ 0.26	0.88 $\pm$ 0.24	<0.0001

The table no 2 compares the mean post-operative astigmatism between two surgical techniques. On post-operative Day 1, Group 1 (SICS) showed an average astigmatism of 1.88 ± 0.34 , whereas Group 2 (Phaco) had a significantly lower value of 1.07 ± 0.54 ($p < 0.0001$). By Day 7, the astigmatism decreased in both groups, with Group 1 at 1.28 ± 0.28 and Group 2 at 1.02 ± 0.44 ($p < 0.0001$). On Day 42, the astigmatism further reduced to 1.03 ± 0.26 in Group 1 and 0.88 ± 0.24

in Group 2 ($p < 0.0001$), indicating a consistently lower astigmatism in the Phaco group throughout the post-operative period.

Table 3 : Comparison of Visual Acuity in both the groups:

Uncorrected Visual Acuity (UCVA) LogMAR	Group 1 (SICS)	Group 2 (Phaco)	P value
Pre-operative	0.56 $\pm$ 0.49	0.54 $\pm$ 0.48	0.79
Post-operative Day 1	0.48 $\pm$ 0.33	0.41 $\pm$ 0.30	0.17
Post-operative Day 7	0.32 $\pm$ 0.20	0.28 $\pm$ 0.18	0.19
Post-operative Day 42	0.31 $\pm$ 0.21	0.26 $\pm$ 0.18	0.144

The above table no.3 shows comparison of post-operative visual acuity among patients. It was observed that pre-operative UCVA by LOGMAR for Group 1 patients was 0.56 $\pm$ 0.49 D improved gradually to 0.48 $\pm$ 0.33 D, 0.32 $\pm$ 0.20 D and 0.31 $\pm$ 0.21 D at post-operative day 1, 7 and 42 days respectively with statistically significant difference. ($P < 0.0001$). The comparison of visual acuity among SICS and Phaco group at post-operative day 1, 7 and 42 shows no statistical significance. ($P > 0.05$)

DISCUSSION:

The present study was conducted to compare post operative visual acuity and astigmatism in patients undergoing phacoemulsification and manual small incision cataract surgery in a tertiary care centre.

In the study, the mean age in Group 1 (SICS) was 65.23 $\pm$ 6.49 years and Group 2 (Phaco) was 64.07 $\pm$ 8.73 years. There was no significant difference in age distribution in two groups. ($p > 0.05$) There were 43 (55.84%) male patients among Group 1 (SICS) and 41 (53.25%) patients in Group 2 (Phaco). There was no gender difference when two groups were compared statistically. ($p > 0.05$) (Table 1)

S. Surya et al.⁹ in a study on comparison of visual acuity between post small incision cataract surgery and phacoemulsification observed mean age of the patients was 69.82 $\pm$ 7.49 SD years with range of 60-89 years. There were 55% male patients and 45% female patients with no statistically significant difference in age and gender among two groups. This finding was in accordance to present study. Rath et al.¹⁰ also found that the average age of patients in their study was 63.01 years old.

In the study, the mean post-operative astigmatism between two surgical techniques. On post-operative Day 1, Group 1 (SICS) showed an average astigmatism of 1.88 $\pm$ 0.34, whereas Group 2 (Phaco) had a significantly lower value of 1.07 $\pm$ 0.54 ($p < 0.0001$). By Day 7, the astigmatism decreased in both groups, with Group 1 at 1.28 $\pm$ 0.28 and Group 2 at 1.02 $\pm$ 0.44 ($p < 0.0001$). On Day 42, the astigmatism further reduced to 1.03 $\pm$ 0.26 in Group 1 and 0.88 $\pm$ 0.24 in Group 2 ($p < 0.0001$), indicating a consistently lower astigmatism in the Phaco group throughout the post-operative period.

Vimal J Vyas et al.¹¹ compared surgically induced astigmatism after manual small incision cataract surgery and phacoemulsification surgery observed post operative astigmatism improved more at day 1, 7 and 1 month in Phaco group compared to SICS with statistical significance. Similarly, Rajkumari Bigyabati et al.¹² also observed at the end of 4 weeks post-operatively the mean (SD) astigmatism of the phacoemulsification group (0.471 $\pm$ 0.28 D) was found to be significantly lower as compared to the SICS group (0.885 $\pm$ 0.28 D) ($p < 0.001$).

Phacoemulsification typically induces less postoperative astigmatism than manual small incision cataract surgery (MSICS). This is primarily due to the smaller incision size used in phacoemulsification, which promotes faster healing and less astigmatic changes. Studies have shown that MSICS, with its larger incision, can lead to higher levels of surgically induced astigmatism compared to phacoemulsification.¹⁰⁻¹³

In the present study, comparison of post-operative visual acuity among patients. It was observed that pre-operative UCVA by LOGMAR for Group 1 patients was 0.56 $\pm$ 0.49 D improved gradually to 0.48 $\pm$ 0.33 D, 0.32 $\pm$ 0.20 D and 0.31 $\pm$ 0.21 D at post-operative day 1, 7 and 42 days respectively with statistically significant difference. ($P < 0.0001$). The comparison of visual acuity among SICS and Phaco group at post-operative day 1, 7 and 42 shows no statistical significance. ($P > 0.05$) (Table 3)

Similarly, S. Surya et al.⁹ in a study found uncorrected visual acuity post Small Incision Cataract Surgery and post Phacoemulsification did

not different significantly. Hamid and Habibullah¹⁴ also found that there was no significant difference between uncorrected visual acuity post Small Incision Cataract Surgery and Phacoemulsification. Das et al.¹⁵ also observed UCVA and BVCA had statistically similar results in post SICS and Phacoemulsification.

The study of Kumari et al.¹⁶ found that post phacoemulsification patients had better UCVA results on the first day. Then, they found almost the same UCVA results in the 4th week. This finding was in contrast to present study.

The limitation of this study had small number of patients and short time to collect the samples so that it showed same results in UCVA post SICS and Phacoemulsification. Thus, SICS is a good, safe, effective and economical alternative of phacoemulsification surgery.

CONCLUSION:

The study concludes that phacoemulsification is the better technique to control post-operative astigmatism as compared to manual small incision cataract surgery. SICS can be a good, safe, effective and economical alternative of phacoemulsification surgery.

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