ISSN: 2754-4990

Journal of Ophthalmology Research Reviews & Reports

SCIENTIFIC Research and Community

Research Article

Open Access

Comparison of Visual Outcome in Senile Cataract After Phacoemulsification and Manual Small Incision Cataract Surgery in a Tertiary Eye Hospital

Ludmila Rudaba Mimfa

Bachelor of Science in Optometry (B. Optom), Institute of Community Opthalmology (ICO), Chittagong Eye Infirmary & Training Complex, Chittagong Medical University (CMU), Chittagong, Bangladesh

ABSTRACT

The goal is to compare the refractive state and visual results of phacoemulsification versus manual small incision cataract surgery.

Techniques: One hundred patients with age-related cataracts, ages 50 to 90, from the cataract clinic at Chevron Eye Hospital and Research Center were part of a hospital-based prospective cross-sectional study. Between October 2024 and March 2025, 100 patients had phacoemulsification and manual small incision cataract surgery. Both groups' postoperative Best Corrected Visual Acuity (BCVA) and refractive status rates were compared.

Findings: Of the 100 patients who had cataract surgery, 50 had microincision cataract surgery (MICS) and 50 had phacoemulsification (PHACO). There were 30 guys in the phacoemulsification group and 26 in the MICS group. The age range of the majority of patients (phacoemulsification: 58%, MICS: 52%) was 71–90 years. Compared to phacoemulsification (DM: 16%, HTN: 18%), systemic comorbidities were more prevalent in MICS (32%, 30%). Phacoemulsification had a higher combined DM and HTN rate (36%) than MICS (8%). The majority of cases were bilateral cataracts (80% phacoemulsification, 84% MICS). 54% (MICS) and 44% (phacoemulsification) had preoperative visual acuity of 6/6–6/18 ($P < 0.001$). 92% (phacoemulsification) and 80% (MICS) attained 6/6–6/18 at one month. Prior to surgery, dull responses were prevalent. MICS: 90%, phacoemulsification: 88%, and decreased after surgery. The most common postoperative refractive outcome was against-the-rule astigmatism (52% with phacoemulsification and 58% with MICS).

Conclusion: Phacoemulsification and microincision cataract surgery both worked well to restore visual acuity, but after one month after surgery, phacoemulsification showed better visual results, especially in patients with systemic comorbidities. Refractive outcomes were similar across groups, with the most common being anti-rule astigmatism. When it comes to visual recovery, phacoemulsification might be superior to MICS.

***Corresponding author**

Ludmila Rudaba Mimfa, Bachelor of Science in Optometry (B. Optom), Institute of Community Opthalmology (ICO), Chittagong Eye Infirmary & Training Complex, Chittagong Medical University (CMU), Chittagong, Bangladesh.

Received: September 15, 2025; **Accepted:** September 19, 2025; **Published:** October 23, 2025

Keywords: Manual Small Incision Cataract Surgery, Phacoemulsification, Refractive Status, Visual Acuity

Abbreviations

VA= Visual Acuity
ATG= Astigmatism
WTR ASTG= With the Rule Astigmatism
AGNST ASTG= Against the Rule Astigmatism
ATG= Astigmatism
DM= Diabetes Mellitus
HT= Hypertension
IHD= Ischemic Heart Disease
MSICS= Manual Small Incision Cataract Surgery
MO= Month

Introduction

Bilateral cataracts are thought to impact 20 million people globally, making age-related cataracts one of the main causes of blindness. Eighty percent of them live in low-income nations, underscoring the disproportionate effect cataracts have on populations that are more susceptible [1]. A significant public health concern, cataracts cause almost half (47.8%) of all preventable occurrences of blindness worldwide. The World Health Organization (WHO) has estimated that by 2020, cataracts would cause about 50 million individuals to lose their vision, highlighting the mounting backlog and the pressing need to address this public health issue [2].

As people age, the protein fibers in the lens of the eye become denser, clumping together to form opaque or foggy patches that eventually impede vision [3]. This is how cataracts arise. Due to its tremendous influence on restoring quality of life, cataract surgery is regarded as one of the most cost-effective public health initiatives, despite being a significant healthcare expense. Economic productivity in the first year after cataract surgery alone is thought to be 15 times greater than the procedure's cost. Furthermore, cataract surgery has a track record of safety and efficacy, making it one of the most traditional and well-established surgical techniques.

The number of cataract surgeries performed per million people each year is known as the Cataract Surgical Rate (CSR), and it is a crucial public health indicator that shows how well a nation can treat cataract-induced blindness [4]. Although there are several ways to operate on cataracts, the choice of surgical approach is frequently influenced by financial considerations and the state of the healthcare system. The gold standard for cataract surgery in industrialized countries is Phacoemulsification (PE), which uses an ultrasonic instrument (Phaco machine) to remove the lens and has quicker recovery times [5]. However, in low-resource countries, where manual Extracapsular Cataract Extraction (ECCE) is still a frequent alternative, access to this procedure is restricted. A bigger surgical incision (about 8-10 millimeters) and more sutures are needed for ECCE, which increases the risk of astigmatism and prolongs recovery [6].

One of the most popular and successful methods for helping people with cataracts, a major preventable cause of blindness worldwide, regain their eyesight is cataract surgery. The method of choice for cataract extraction in the developed world for the last ten years is phacoemulsification, which involves an ultrasonic probe emulsifying the cataractous lens through a tiny 3 mm incision. The classic Extracapsular Cataract Extraction (ECCE) method, which involves a much bigger incision (7-9 mm) to remove the lens nucleus, has mostly been replaced by this procedure [1]. The smaller incision size, less surgical trauma, quicker recovery, and better results have made phacoemulsification popular. Yet, the process necessitates a high degree of technical proficiency, therefore skilled surgeons are better equipped for it [2].

A unique combination of benefits is provided by Small Incision Cataract Surgery (SICS), especially in situations with limited resources or where phacoemulsification is neither practical or affordable. Prompt wound stabilization, less post-operative inflammation, lack of suture-related problems, fewer follow-up visits, and less detrimental effect on the corneal endothelium are characteristics of SICS [3]. SICS's adaptability to a wide range of cataract types is one of its main advantages, while phacoemulsification necessitates careful patient selection and is frequently saved for particular situations, particularly when performed by inexperienced surgeons [4].

Improving unassisted visual acuity, promoting a speedy recovery, and reducing intraoperative and postoperative complications are the main objectives of cataract surgery. There has been a lot of interest in the results of visual rehabilitation comparing phacoemulsification with SICS. In order to shed light on the benefits and drawbacks of each procedure in clinical practice, this study will evaluate and contrast the visual rehabilitation outcomes of phacoemulsification and small incision cataract surgery.

Techniques

The Chevron Eye Hospital and Research Center (CEHRC) hosted this hospital-based prospective cross-sectional study from October 2024 to March 2025. The purpose of the study was to assess how well patients with senile cataracts responded clinically to cataract surgery. Using a non-random selection technique, 200 patients in total were split into two groups of 100. Phacoemulsification was performed on Group 2, while Small Incision Cataract Surgery (SICS) was performed on Group 1. Patients with nuclear sclerosis rated 1-3 by the Lens Opacities Classification System III (LOCS III), age-related cataracts, and full 1-month surgical follow-up data were all required for inclusion. Patients who received alternative surgical procedures Including Intracapsular Cataract Extraction (ICCE) or extracapsular cataract extraction were not allowed to participate if they had non-senile cataracts.

An competent ophthalmologist performed a thorough preoperative ocular examination on each patient using a slit-lamp biomicroscope. Trained surgeons performed the phacoemulsification and SICS operations. Striate keratopathy, corneal edema, anterior chamber responses, iatrogenic iris damage, hyphema, posterior capsular rupture, vitreous prolapse, nucleus drop, and anterior chamber intraocular lens (A/C IOL) installation were among the intraoperative and postoperative problems that were documented. Cataract hardness was measured with LOCS III and classified as either hard (nuclear sclerosis ≥4+, mature, or hypermature) or soft (nuclear sclerosis ≤3+, cortical, or posterior subcapsular). Only patients with soft cataracts were included in the analysis.

The Snellen chart was used to measure Best-Corrected Visual Acuity (BCVA) during the one-month postoperative follow-up. According to the World Health Organization's (WHO) criteria, visual outcomes were categorized as poor (<6/60), borderline (<6/18 to 6/60), and good (6/6 to 6/18). Follow-up evaluations also included assessment of refractive status and documentation of any postoperative complications to determine the overall efficacy and safety of the surgical procedures.

Analysis of Statistics

SPSS (version 26.0 for Windows, IBM, Chicago, IL, USA) and Microsoft Excel 2020 were used for data analysis. Prior to being uploaded to SPSS for statistical analysis, all data were initially entered into a Microsoft Excel (2019) database. Frequency data were utilized to examine the demographic, ocular, and management features of the study population after the normality of the data was evaluated and it was determined that all parameters were parametric. The mean and standard deviation were used to summarize continuous variables in descriptive statistics. To separate the data by gender and age, cross-tabulation was used. The level of significance, as established by the Paired Sample-p test, was set at a P-value of less than 0.05. Microsoft Excel was used to construct graphical representations of the data in order to show similarities and patterns.

Findings

This study involved 100 patients undergoing cataract surgery, 50 of whom were randomized to the phacoemulsification (PHACO) group and 50 of whom were randomized to the Microincision Cataract Surgery (MICS) group. There were twenty female and thirty male patients in the phacoemulsification group, and twenty-six male and twenty-four female patients in the MICS group. The age distribution revealed that although 29 phacoemulsification and 26 MICS patients were between the ages of 71 and 90, 21 patients in the phacoemulsification group and 24 in the MICS group were between the ages of 40 and 70.

In terms of systemic comorbidities, 16 MICS patients and 8 phacoemulsification patients had Diabetic Mellitus (DM). Five and six patients, respectively, had heart disease, and nine PHACO and fifteen MICS patients had hypertension (HTN). Four MICS patients and eighteen phacoemulsification patients had both DM and HTN. Additionally, all three conditions-DM, hypertension, and heart disease-were present in 10 phacoemulsification and 9 MICS patients [7-10].

In terms of cataract laterality, 40 phacoemulsification and 42 MICS patients had bilateral cataracts, whereas 10 phacoemulsification and 8 MICS patients had unilateral cataracts.

Table 1: Demographic Profile of Study Population (n=100)

Demographic value	Categories	Phacoemulsification(n=50)	MICS(n=50)
Gender	Male Female	30(60%) 20(40%)	26(52%) 24(48%)
Age	40-70 71-90	21(42%) 29(58%)	24(48%) 26(52%)
Systemic disease	Diabetes Mellitus (DM) Hypertension (HTN) Cardiac disease DM+HTN	8(16%) 9(18%) 5(10%) 18(36%) 10(20%)	16(32%) 15(30%) 6(12%) 4(8%) 9(18%
Laterality	• Unilateral • Bilateral	10(20%) 40(80%)	8(16%) 42(84%)

There were 100 patients in all, 50 of whom had Microincision Cataract Surgery (MICS) and 50 of whom had phacoemulsification. Preoperative visual acuity ranged from 6/6 to 6/18 for 44% of the phacoemulsification group and 54% of the MICS group, indicating a statistically significant difference ($P < 0.001$). Visual acuity of 6/6–6/18 was attained by 80% of the MICS group and 92% of the phacoemulsification group one month after surgery.

Both groups' preoperative refractive status primarily displayed dull reflexes (88% phacoemulsification, 90% MICS). The most prevalent postoperative condition was against-the-rule astigmatism, which was observed in 52% of phacoemulsification cases and 58% of MICS cases. The distribution of WTR and oblique astigmatism was comparable, and both groups experienced a decrease in dull reflexes following surgery.

Table 2: The Clinical Outcomes

Variable	Categories	Phacoemulsification (=50)	MICS(n=50)	P Value
Pre op visual acuity	6/6-6/18 6/18-6/60	22 (44%) 28(56%)	27(54%) 23(46%)	<0.001
Post op visual acuity after 1 MO	6/6-6/18 6/18-6/60	46(92%) 4(8%)	40(80%) 10(20%)	
Pre op refractive status	Dull reflex WTR ATG AGNST ATG	44 (88%) 3(6%) 3(6%)	45(90%) 2(4%) 3(6%)	
Post op refractive	Dull reflex WTR ATG AGNST ATG Oblique ATG	11(22%) 7(14%) 26(52%) 6(12%)	5(10%) 10(20%) 29(58%) 6(12%)	

Talk about

Particularly in rural and low-resource environments, cataracts continue to be the primary cause of reversible blindness. Surgery is crucial to preventing blindness because of limited access to care and financial limitations. A high-volume, reasonably priced procedure that works well in these situations is Manual Small Incision Cataract Surgery (MSICS). It works well for advanced cataracts and requires very little equipment [11].

The norm in metropolitan areas, phacoemulsification provides better visual results and a quicker recovery, but its usage is limited in rural regions due to its high cost and equipment dependence. Twelve In contexts with limited resources, MSICS continues to be the more feasible and scalable choice, even though phacoemulsification produces better results in optimal conditions. Reducing cataract blindness worldwide requires tailoring surgical techniques to local requirements.

In this comparative study, 100 patients, evenly split between the two surgical groups, had their visual and refractive results after phacoemulsification (PHACO) and short incision cataract surgery (MICS) assessed. According to our research, both methods are successful in improving visual acuity after surgery, however phacoemulsification has a somewhat better result in the early stages of visual rehabilitation. Compared to 80% in the MICS group, 92% of phacoemulsification patients attained visual acuity of 6/6–6/18 at one month, suggesting a statistically significant and the phacoemulsification technique's therapeutically significant benefit of accelerating vision recovery. which is in line with the Pipat Kongsap study's ideas [13].

Preoperatively, there was a substantial difference in baseline visual acuity, with phacoemulsification patients showing improved eyesight ($P < 0.001$). Pipat Kongsap discovered a similar result,13 which was also observed in other studies. 14,15 This distinction may have altered postoperative visual results and should be addressed when assessing the comparative efficacy. Despite this, the postoperative improvement in both groups demonstrates the efficacy of both surgical approaches for cataract care. Which represents the same notion as the previous study [12].

The examination of refractive alterations revealed that the most common postoperative outcome was Against-The-Rule (ATR) astigmatism, which occurred in 52% of phacoemulsification and 58% of MICS patients. This finding is consistent with previous research, indicating that both procedures are linked with identical corneal incision-induced astigmatic profiles. This finding is consistent with previous research, indicating that both

procedures are linked with identical corneal incision-induced astigmatic profiles. The presence of With-The-Rule (WTR) and oblique astigmatism was comparable amongst the groups, showing that neither approach had a substantial advantage in controlling postoperative corneal astigmatism. This sort of astigmatism has also been identified in previous research [13, 14]. A significant reduction in dull responses after surgery in both groups indicates better optical clarity of the media, which is consistent with effective cataract removal.

Among the study population, especially in the two groups, systemic comorbidities like Diabetes Mellitus (DM), Hypertension (HTN), and heart disease were prevalent. Our findings show that both procedures maintained good results irrespective of systemic health state, despite the fact that these comorbidities are known to impact surgical outcomes and visual prognosis. The significance of routine eye exams, particularly in patients with chronic conditions, is highlighted by the higher frequency of DM and HTN in both groups, which increases the risk of cataract formation.

The age and sex distributions of both groups were balanced demographically. The majority of patients were old (71–90 years), which is in line with the age-related cataract epidemiology. In all groups, bilateral cataracts were more prevalent, indicating the bilateral nature of the condition and confirming that our results may be applied to the larger group of cataract patients.

Both phacoemulsification and MICS are safe and effective techniques for cataract extraction. Although phacoemulsification might have a small advantage in terms of early visual results, these are negligible, and both methods produce good results in patients who are carefully chosen. In order to evaluate long-term refractive stability and patient satisfaction, more research with bigger cohorts and longer follow-up is advised [15].

Conclusion

For cataract extraction, Phacoemulsification (PHACO) and manual Minor Incision Cataract Surgery (MICS) both work well and have comparable refractive results. In contrast to the MICS group, phacoemulsification showed a little advantage in early postoperative improved visual acuity at one month. Even among patients with systemic or ocular comorbidities, which were more common in the MICS population, this pattern remained consistent. In both groups, the most prevalent postoperative refractive shift was against-the-rule astigmatism. The need of customized surgical planning is further highlighted by the research population's prevalence of bilateral cataracts. These results also showed that MICS might provide improved visual rehabilitation while preserving results that are on par with the current gold standard of phacoemulsification, especially in more complicated patient profiles.In both groups, the most prevalent postoperative refractive shift was against-the-rule astigmatism. The need of customized surgical planning is further highlighted by the research population's prevalence of bilateral cataracts. These results also showed that MICS might provide improved visual rehabilitation while preserving results that are on par with the current gold standard of phacoemulsification, especially in more complicated patient profiles.

References

1. (2018) World Health Organization (WHO). Cataract: A Major Cause of Avoidable Blindness. WHO https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment.
2. Donatella Pascolini, Silvio Paolo Mariotti (2011) World Health Organization (WHO). Global Data on Visual Impairments 2010. WHO 96: 614-618.
3. Wang L (2015) Economic impact of cataract surgery in developing countries. Ophthalmic Epidemiol 22: 225-233.
4. Resnikoff S (2019) Global burden of cataract blindness and the significance of the cataract surgical rate. Ophthalmic Epidemiol 26: 9-18.
5. Pujari S (2017) Phacoemulsification: Standard of care for cataract surgery. J Ophthalmol 2017: 2743289.
6. Memon MS (2016) Manual extracapsular cataract extraction and outcomes. Clin Ophthalmol 10: 99-104.
7. Agarwal A (2019) Phacoemulsification: The gold standard for cataract surgery. J Cataract Refract Surg 45: 141-150.
8. Singh R (2018) Comparison of visual outcomes following phacoemulsification and manual small incision cataract surgery. Ophthalmic Surg Lasers Imaging 49: 381-387.
9. Khan MA (2017) Small incision cataract surgery in developing countries: A study of efficacy and complications. Indian J Ophthalmol 65: 721-725.
10. Memon MS (2016) Small incision cataract surgery versus phacoemulsification: A comparative study. Clin Ophthalmol 10: 1045-1052.
11. Singh SP, Nageshwar Sharma (2025) Comparative Study of Visual Outcomes between Manual Small Incision Cataract Surgery and Phacoemulsification in Rural Populations 5: 1-6.
12. Enany HA (2018) Phacoemulsification versus manual small incision cataract surgery in hard nuclear cataracts. Delta Journal of Ophthalmology 19: 92-98.
13. Kamonporn, N, Pipat K (2021) The visual outcomes and complications of manual small incision cataract surgery and phacoemulsification: long term results. Romanian Journal of Ophthalmology 65: 31-37.
14. Toyama T, Ueta T, Yoshitani M, SakataR, Numaga J (2018) Visual acuity improvement after phacoemulsification cataract surgery in patients aged ≥ 90 years.BMC ophthalmology 18: 1-6.
15. Oderinlo0 O, Hassan AO, Oluyadi FO, Ogunro AO, Okonkwo ON, et al. (2017) Refractive aim and visual outcome after phacoemulsification: A 2-year review from a Tertiary Private Eye Hospital in Sub-Saharan Africa.Nigerian journal of clinical practice 20: 147-152.