



ORIGINAL RESEARCH ARTICLE

Clinical Profile and Visual Outcome of Manual Small Incision Cataract Surgery in Patients with Age-Related Cataract: A Prospective Study

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Abstract

Background: Cataract remains the leading cause of reversible blindness worldwide, and manual small incision cataract surgery (SICS) has emerged as a cost-effective, sutureless alternative to phacoemulsification, particularly relevant in resource-limited settings.

Objectives: To study the clinical profile of patients undergoing manual SICS and to evaluate visual outcome and complication rates over a six-week postoperative follow-up period.

Methods: A prospective observational study was conducted on 188 eyes of patients undergoing manual SICS with posterior chamber intraocular lens implantation. Visual acuity was assessed pre-operatively and at day 1, week 1, and week 6 postoperatively, and intraoperative and postoperative complications were recorded.

Results: The 60–69 year age group was most commonly affected (38.3%). Best corrected visual acuity of 6/18 or better was achieved in 92.0% of eyes by six weeks, meeting WHO outcome targets. Posterior capsule rupture (4.8%) and striate keratopathy (7.4%) were the most common complications.

Conclusion: Manual SICS achieves good visual outcomes meeting WHO-recommended benchmarks, with an acceptable complication profile, supporting its continued use as an effective, low-cost surgical option in high-volume cataract surgery settings.

Keywords: Cataract, manual small incision cataract surgery, visual acuity, WHO outcome indicators, ophthalmology.

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1 | INTRODUCTION

Cataract remains the single largest cause of reversible blindness globally, accounting for a substantial proportion of blindness in low- and middle-income countries, where the burden of unoperated cataract continues to outpace surgical

capacity in many settings.¹ The World Health Organization has established recommended outcome benchmarks for cataract surgery, stipulating that at least 80% of operated eyes should achieve a presenting visual acuity of 6/6 to 6/18 with available correction, in order to be considered a good visual outcome.²

Manual small incision cataract surgery (SICS) has emerged as a sutureless, cost-effective alternative to phacoemulsification, particularly relevant in high-volume, resource-limited surgical settings where the capital cost and consumable expense of phacoemulsification machines may not be sustainable.⁶ Unlike conventional extracapsular cataract extraction, manual SICS employs a self-sealing scleral tunnel incision that avoids the need for suturing, thereby offering more rapid visual rehabilitation and reduced surgically induced astigmatism compared with traditional extracapsular surgery.⁷

Several large randomised controlled trials conducted in India and Nepal have demonstrated that manual SICS achieves visual outcomes broadly comparable to phacoemulsification, at a fraction of the equipment cost, making it a particularly attractive option for high-volume cataract surgical programmes in developing countries.^{4,5} Despite this substantial body of evidence, ongoing prospective evaluation of visual outcomes and complication rates in different practice settings remains valuable for local quality assurance and audit purposes.

This study was undertaken to describe the clinical profile of patients undergoing manual SICS and to prospectively evaluate visual acuity outcomes and complication rates over a six-week postoperative period, benchmarked against WHO-recommended outcome indicators.

2 | REVIEW OF LITERATURE

Early audits of cataract surgical outcomes in developing country settings, such as the population-based assessment conducted in southern India,

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identified considerable gaps between actual and potential visual outcomes following cataract surgery, prompting the development of standardised WHO outcome monitoring indicators to drive quality improvement.^{2,18} Subsequent large-scale population-based surveys, including a nationwide survey in Bangladesh, similarly highlighted the importance of systematic outcome monitoring in identifying modifiable causes of poor postoperative vision, such as uncorrected refractive error and posterior capsule opacification.¹⁵

The landmark randomised controlled trial conducted by Gogate and colleagues, comparing phacoemulsification with manual SICS, found no statistically significant difference in visual outcomes between the two techniques at six weeks, providing robust evidence supporting the continued use of manual SICS as an equally effective but substantially less expensive alternative to phacoemulsification.^{4,6} A subsequent prospective randomised trial conducted in Nepal similarly confirmed comparable visual outcomes and complication rates between the two techniques, further consolidating the evidence base supporting manual SICS in resource-limited settings.⁵

A meta-analysis pooling data from multiple randomised controlled trials comparing phacoemulsification and manual SICS confirmed broadly equivalent visual acuity outcomes between the two techniques, while noting a modestly higher rate of surgically induced astigmatism with manual SICS, attributable to the larger incision size compared with phacoemulsification.¹⁰ Comparative work evaluating endothelial cell loss following the two techniques found no clinically significant difference between manual SICS and phacoemulsification, addressing an important theoretical concern regarding corneal endothelial trauma with the larger incision used in manual SICS.⁹

Community-based studies evaluating extracapsular cataract surgery compared with manual SICS in a rural Indian eye care setting demonstrated that manual SICS achieved significantly better uncorrected visual acuity and lower surgically induced astigmatism compared with conventional sutured extracapsular surgery, supporting its adoption as the preferred surgical technique in high-volume community eye

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care programmes.⁷ Similarly, an audit of extracapsular cataract extraction outcomes in East Africa highlighted the importance of posterior chamber intraocular lens implantation and systematic outcome auditing in achieving and sustaining good visual outcomes in large-scale surgical programmes.¹⁶

3 | MATERIALS AND METHODS

3.1 | Study Design and Setting

This was a hospital-based, prospective observational study conducted in the Department of Ophthalmology of a tertiary care teaching hospital.

3.2 | Study Population

A total of 188 eyes of patients with age-related cataract undergoing manual SICS with posterior chamber intraocular lens implantation were enrolled after obtaining informed consent.

3.3 | Inclusion Criteria

Patients aged 40 years and above with age-related cataract causing visually significant functional impairment, suitable for manual SICS with posterior chamber intraocular lens implantation, were included.

3.4 | Exclusion Criteria

Patients with complicated cataract (traumatic, congenital, or secondary to uveitis), pre-existing corneal or retinal pathology likely to independently limit visual outcome, and those unwilling to provide consent were excluded from the study.

3.5 | Surgical Technique

All surgeries were performed using the standard manual SICS technique via a superior or superotemporal sclerocorneal tunnel incision, with nucleus delivery by viscoexpression and implantation of a rigid or foldable posterior chamber intraocular lens in the capsular bag.

3.6 | Follow-up and Outcome Assessment

Visual acuity was assessed using a Snellen chart pre-operatively and at postoperative day 1, week 1, and week 6. Best corrected visual acuity at six weeks was categorised according to WHO outcome indicators as good (6/6-6/18), borderline (<6/18-6/60), or poor (<6/60). Intraoperative and postoperative complications were recorded at each visit.

3.7 | Statistical Analysis

Data were analysed using descriptive statistics. Categorical variables were expressed as frequencies and percentages. Results were tabulated and represented graphically using multiple chart formats, including a schematic illustration of the surgical outcome.

4 | RESULTS

Of the 188 eyes studied, 98 (52.1%) were of male patients and 90 (47.9%) were of female patients. The age and gender-wise distribution is summarised in Table 1 and illustrated in Figure 1.

The 60–69 year age group accounted for the largest proportion of cases (38.3%), consistent with the well-established age-related increase in cataract prevalence.

As shown in Table 2 and Figure 2, the proportion of eyes achieving BCVA of 6/18 or better increased progressively from 4.3% pre-operatively to 92.0% by six weeks, exceeding the WHO-recommended benchmark of 80% good visual outcome.

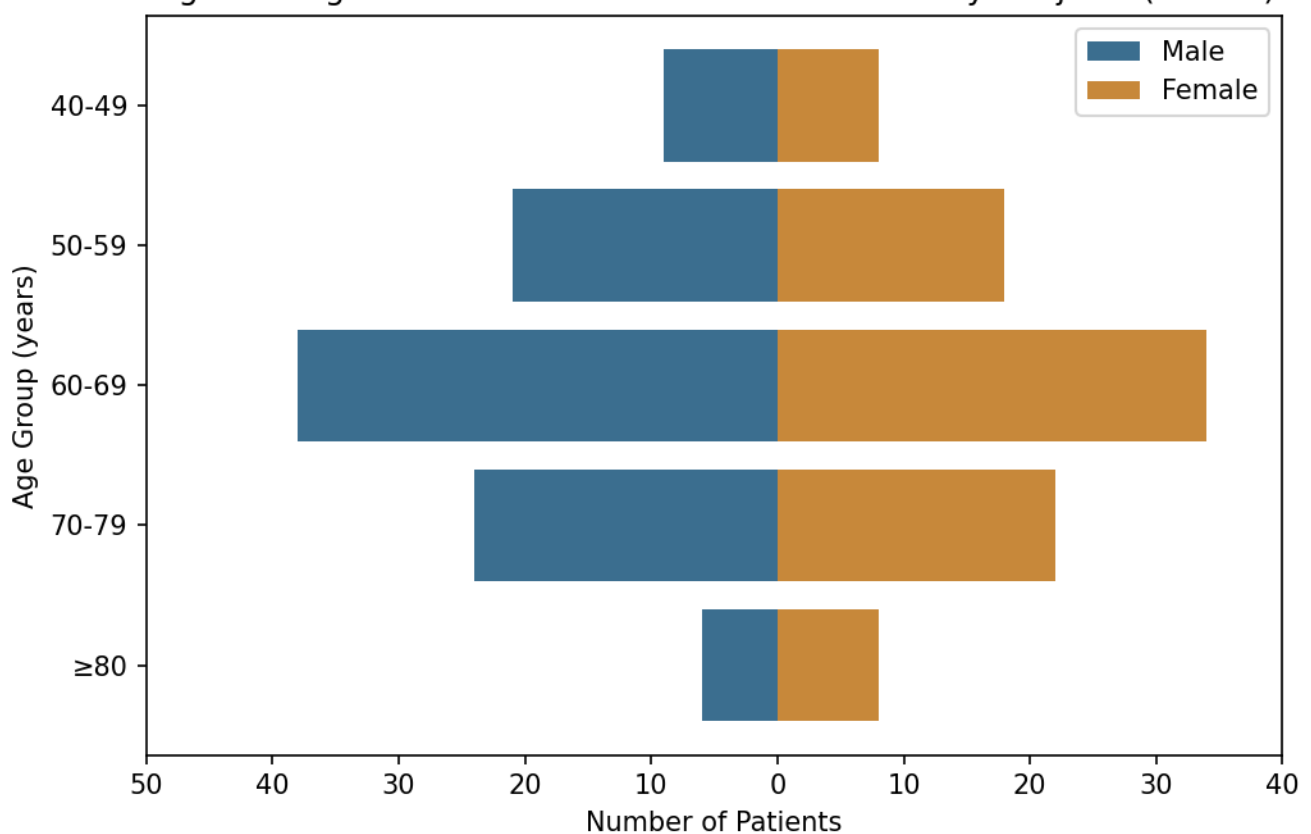
No intraoperative or postoperative complications were recorded in 78.2% of eyes. Striate keratopathy was the most common complication (7.4%), typically resolving spontaneously within one to two weeks, followed by posterior capsule rupture (4.8%).

At six weeks, 92.0% of eyes achieved a good visual outcome (BCVA 6/6-6/18), 5.9% had a borderline outcome, and only 2.1% had a poor outcome (BCVA <6/60), comfortably meeting WHO-recommended targets for cataract surgical outcome.

Figure 4 provides a schematic illustration comparing the cataractous, opacified lens before surgery with

TABLE 1: Age and Gender-wise Distribution of Study Subjects (n = 188)

Age Group (years)	Male (n)	Female (n)	Total (n)	Percentage (%)
40-49	9	8	17	9.0
50-59	21	18	39	20.7
60-69	38	34	72	38.3
70-79	24	22	46	24.5
80 and above	6	8	14	7.5
Total	98	90	188	100.0

Figure 1: Age and Gender-wise Distribution of Study Subjects (n=188)**TABLE 2: Proportion of Eyes Achieving Good Visual Acuity Over Time (Figure 2)**

Visit	Patients with BCVA $\geq$ 6/18 (%)
Pre-operative	4.3
Post-operative Day 1	58.0
Post-operative Week 1	79.3
Post-operative Week 6	92.0

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Figure 2: Proportion of Patients Achieving Good Visual Acuity Over Time

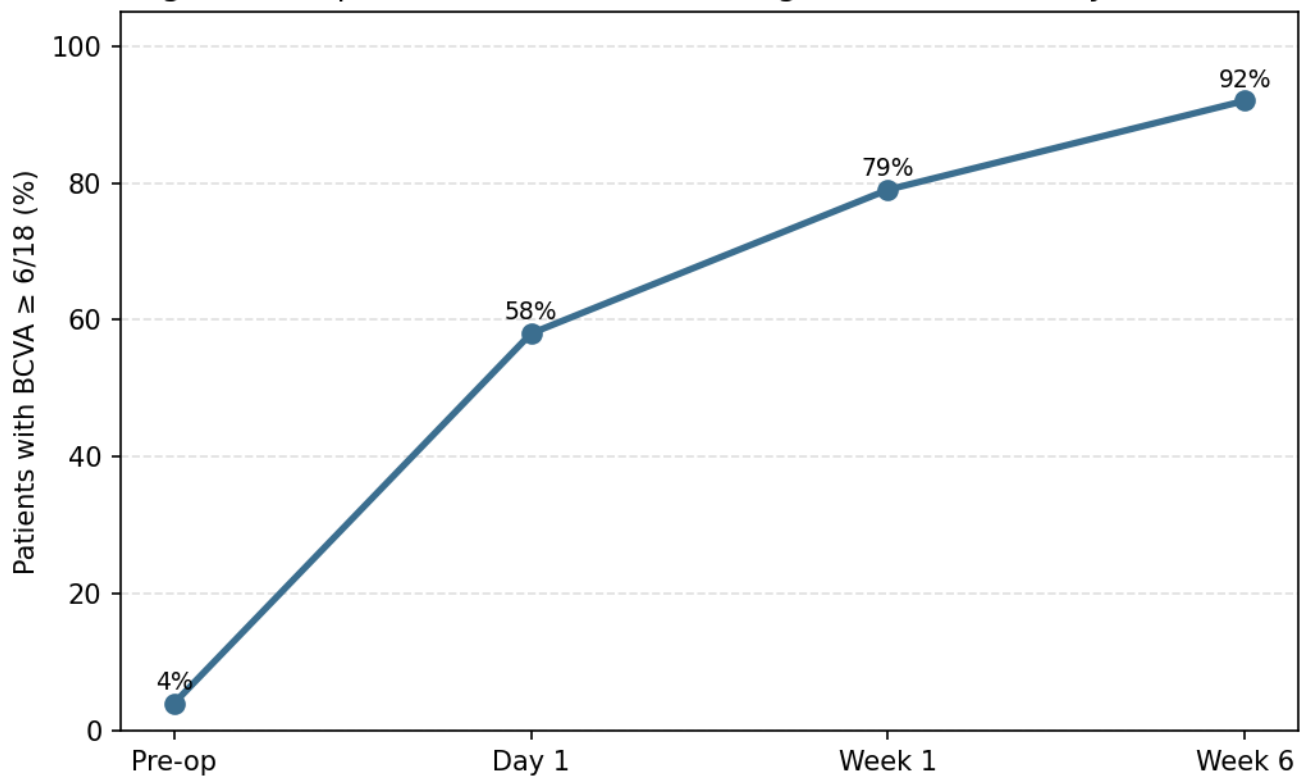


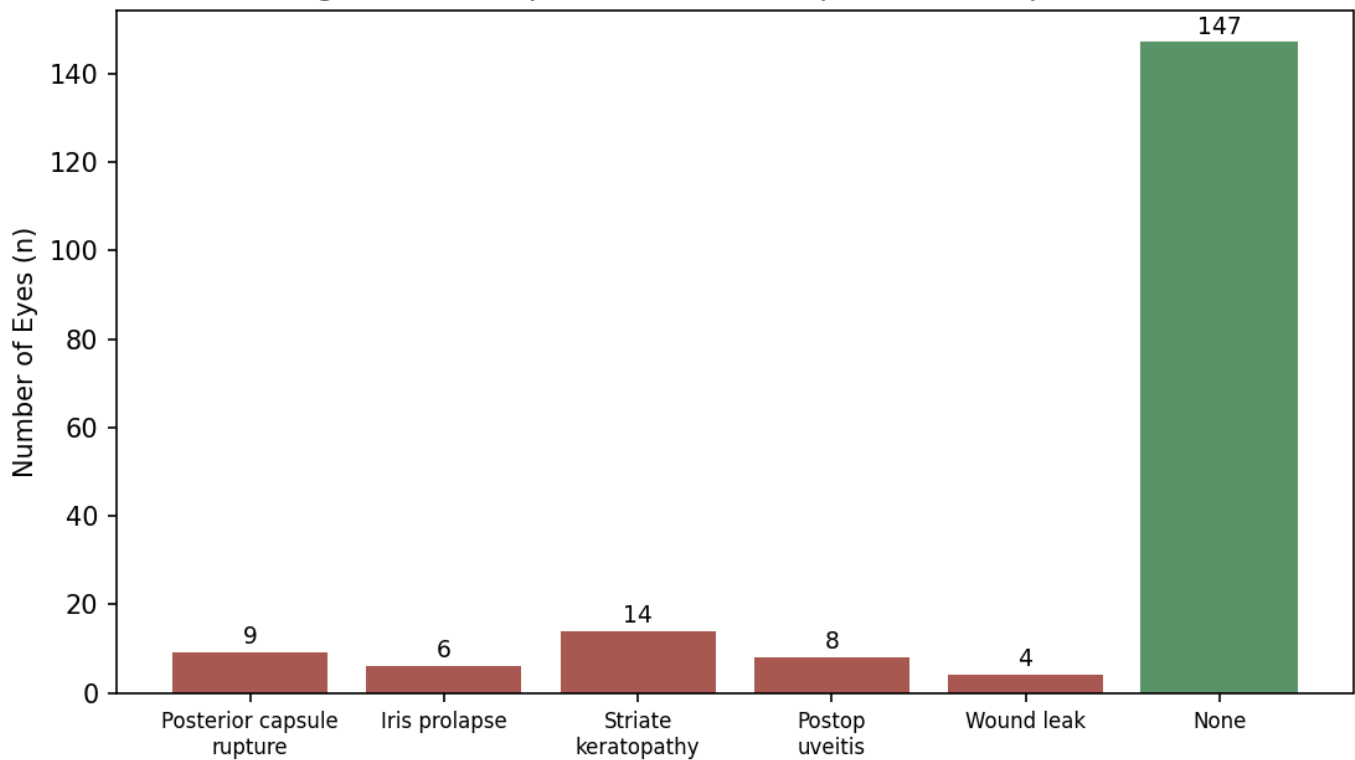
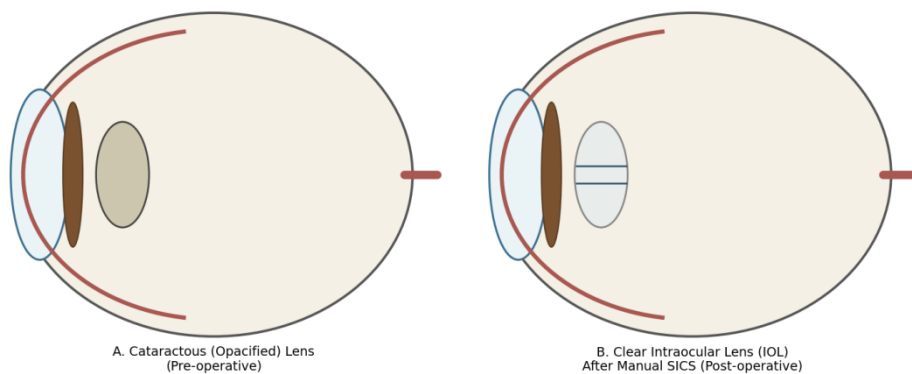
TABLE 3: Intraoperative and Postoperative Complications (Figure 3)

Complication	Number of Eyes (n)	Percentage (%)
Posterior capsule rupture	9	4.8
Iris prolapse	6	3.2
Striate keratopathy	14	7.4
Postoperative uveitis	8	4.3
Wound leak	4	2.1
No complication	147	78.2

TABLE 4: Best Corrected Visual Acuity at Six Weeks (WHO Categories)

Best Corrected Visual Acuity Category (WHO)	Number of Eyes (n)	Percentage (%)
6/6 – 6/18 (Good)	173	92.0
<6/18 – 6/60 (Borderline)	11	5.9
<6/60 (Poor)	4	2.1

Figure 3: Intraoperative and Postoperative Complications

Schematic Illustration: Eye Cross-Section Before and After Manual Small Incision Cataract Surgery
(Illustrative diagram, not an actual clinical photograph)

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the clear intraocular lens in position following manual SICS.

5 | DISCUSSION

The visual outcomes observed in this study, with 92.0% of eyes achieving good visual acuity at six weeks, compare favourably with WHO-recommended benchmarks and are consistent with outcomes reported in major randomised controlled trials comparing manual SICS with phacoemulsification.^{2,4,5} These findings reaffirm the substantial body of evidence supporting manual SICS as a visually effective technique, even in comparison with more technologically advanced phacoemulsification.^{6,10}

The complication profile observed in this study, with posterior capsule rupture in 4.8% of eyes, is broadly consistent with rates reported in comparable prospective series, and reflects the inherent surgical challenges of nucleus delivery in manual SICS.⁶ The relatively high but self-limiting rate of striate keratopathy observed in this study likely reflects transient corneal endothelial trauma related to nucleus manipulation through the sclerocorneal tunnel, a finding similarly described in prior comparative endothelial cell loss studies.⁹

The progressive improvement in visual acuity from day 1 to week 6 observed in this study mirrors the expected trajectory of visual recovery following manual SICS, with early visual improvement reflecting resolution of corneal oedema and later gains reflecting stabilisation of refractive status and resolution of any residual postoperative inflammation.⁷ This pattern is consistent with the well-documented rapid visual rehabilitation achievable with the sutureless, self-sealing incision used in manual SICS, compared with traditional sutured extracapsular techniques.^{7,17}

These findings collectively support the continued role of manual SICS as a highly effective, low-cost surgical option for cataract in high-volume surgical settings, particularly relevant in developing countries where the infrastructure and consumable costs of phacoemulsification may limit its widespread availability.^{6,12,21} Systematic outcome

auditing, benchmarked against WHO indicators, should remain an integral component of quality assurance in cataract surgical programmes to identify and address modifiable causes of suboptimal visual outcome.^{2,15}

6 | SUMMARY

This prospective study of 188 eyes undergoing manual SICS found that 92.0% achieved good visual acuity ($BCVA \geq 6/18$) by six weeks postoperatively, exceeding WHO-recommended outcome benchmarks. Complications were infrequent and largely self-limiting, with striate keratopathy and posterior capsule rupture being the most common.

7 | LIMITATIONS

This study has several limitations that merit consideration. First, its single-centre design and involvement of multiple operating surgeons of varying experience levels may have introduced variability in surgical outcome. Second, the six-week follow-up period, while sufficient to assess most early complications and visual rehabilitation, may not capture later complications such as posterior capsule opacification. Third, this study did not include a comparative phacoemulsification arm, limiting direct within-study comparison of outcomes between the two techniques.

8 | RECOMMENDATIONS

Based on the findings of this study, manual SICS should continue to be regarded as an effective, low-cost surgical option for age-related cataract, particularly suited to high-volume surgical settings with limited access to phacoemulsification equipment. Regular outcome auditing benchmarked against WHO indicators should be incorporated into routine surgical quality assurance programmes. Extended follow-up beyond six weeks would help capture later complications such as posterior capsule opacification, and future comparative studies with a pha-

coemulsification arm would further strengthen the local evidence base for technique selection.

9 | CONCLUSION

Manual small incision cataract surgery achieves good visual outcomes meeting WHO-recommended benchmarks, with an acceptable and largely self-limiting complication profile. These findings support its continued use as an effective, low-cost surgical option for age-related cataract, particularly in high-volume and resource-limited surgical settings.

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