Section: Ophthalmology

Original Research Article

A PROSPECTIVE STUDY TO DETERMINE VISUAL OUTCOME IN ONE-EYED PATIENTS AFTER CATARACT SURGERY AT GOVERNMENT GENERAL HOSPITAL, NIZAMABAD, TELANGANA

G. Sujatha[1], N. Krishna[2], Maheshwaram Sravanthi[3], Dumpalagadda Pratyusha[4], Girhe Pawan Ramesh[5]

[1]Assosciate Professor, Department of Ophthalmology, Government Medical College and General Hospital, Nizamabad, Telangana, India
[2]Assosciate Professor, Department of Ophthalmology, Government Medical College and General Hospital, Kamareddy, Telangana, India
[3]Post Graduate, Department of Ophthalmology, Government Medical College and General Hospital, Nizamabad, Telangana, India
[4]Post Graduate, Department of Ophthalmology, Government Medical College and General Hospital, Nizamabad, Telangana, India
[5]Post Graduate, Department of Ophthalmology, Government Medical College and General Hospital, Nizamabad, Telangana, India

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Corresponding Author:
Dr. G. Sujatha,
Email: drkrishnaneredu@gmail.com

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Abstract

Background: Cataract remains a leading cause of avoidable blindness worldwide. In one-eyed patients, surgical intervention carries additional psychological and clinical challenges due to reliance on a single functional eye. This study aimed to determine the visual outcomes and complication profile following manual small incision cataract surgery (MSICS) in one-eyed patients. **Materials and Methods:** A prospective, hospital-based study was conducted at the Government General Hospital, Nizamabad, Telangana, over 18 months. Fifty one-eyed patients above 40 years of age with cataract in the only functional eye were enrolled. Preoperative, intraoperative, and postoperative data were collected. Visual acuity was assessed using best-corrected visual acuity (BCVA) on day 1, day 5, and at 1 month post-surgery. Data analysis was performed using SPSS v20, with $p \leq 0.05$ considered statistically significant. **Result:** The mean age of participants was 71.14 ± 12.09 years; 52% were male. Hypertension and diabetes were present in 56% and 60% of participants, respectively. The most common causes of vision loss in the non-functional eye included amblyopia (22%) and strabismus (16%). Postoperatively, BCVA of ≥6/18 was observed in 88% of participants by 1 month. Significant improvement in visual acuity was recorded over time ($p < 0.001$). Minimal complications were observed: capsular rupture (2%), corneal edema (4.1%), and Descemet's detachment (4.1%). **Conclusion:** MSICS is a safe and effective surgical option in one-eyed patients, offering substantial visual rehabilitation with minimal complications. Timely intervention can lead to favorable outcomes in this vulnerable population.

INTRODUCTION

Cataract is one of the leading causes of reversible blindness worldwide, accounting for nearly 45% of global blindness and a significant burden on healthcare systems, particularly in developing countries like India. The condition is characterized by progressive opacification of the crystalline lens, resulting in visual impairment that adversely affects quality of life and functional independence.[1][2] Despite the advancements in surgical techniques and intraocular lens (IOL) technology, cataract continues to present challenges, particularly among vulnerable patient populations.[3]

One such group includes one-eyed patients—individuals with only one functional eye due to irreversible visual loss in the fellow eye from causes such as amblyopia, retinal diseases, trauma, or previous surgical complications.[4][5] For these patients, cataract development in the sole seeing eye introduces substantial anxiety and apprehension regarding surgical outcomes. The lack of a visual safety net makes both patients and surgeons more cautious in decision-making, preoperative assessment, and intraoperative execution.[6]

Manual Small Incision Cataract Surgery (MSICS) remains a cost-effective, sutureless alternative to phacoemulsification, especially in resource-limited settings. It provides good visual outcomes with a low

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complication rate, even in complex cases.[7] However, the data on the visual outcomes and complication rates of MSICS in one-eyed patients remain sparse in the Indian context.

This study was undertaken to evaluate the visual outcomes and complications of MSICS in one-eyed patients, thereby contributing evidence toward informed clinical decision-making, improved surgical planning, and enhanced patient counseling in this high-stakes subgroup.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective, hospital-based observational study conducted in the Department of Ophthalmology, Government General Hospital, Nizamabad, Telangana, India, over a period of 18 months from September 2022 to March 2024.

Study Population

The study included one-eyed patients aged above 40 years, with cataract in the only functional eye (visual acuity between 6/24 to perception of light [PL+]), and visual acuity ≤20/200 in the contralateral (non-functional) eye.

Inclusion Criteria

One-eyed patients aged >40 years

Visual acuity between 6/24 and PL+ in the functional eye

Willingness to undergo MSICS with written informed consent

Exclusion Criteria

One-eyed patients with complicated or traumatic cataract in the affected eye

Patients with congenital ocular anomalies, dense corneal opacities, or advanced glaucoma

Patients aged <40 years

Unwilling or non-consenting individuals

Sample Size

A total of 50 patients were enrolled using convenient sampling. The sample size was determined using the formula $n = Z^2pq/d^2$, considering an 18% prevalence of visual improvement in one-eyed patients (based on Charles et al.) with 11% precision and 95% confidence level.

Surgical Intervention

All participants underwent Manual Small Incision Cataract Surgery (MSICS) under local anesthesia by experienced ophthalmic surgeons[8]. Appropriate intraocular lens (IOL) power was calculated using axial length and keratometry readings.

Preoperative Evaluation

Comprehensive ocular examinations were conducted, including:

Best corrected visual acuity (BCVA)

Slit-lamp biomicroscopy

Intraocular pressure measurement (Schiotz tonometry)

Gonioscopy

Fundus examination (90D lens, direct and indirect ophthalmoscopy)

B-scan ultrasonography (if fundus not visible)

Systemic evaluations (blood pressure, random blood sugar, HIV, HBsAg)

Postoperative Follow-Up:

Visual acuity was assessed on postoperative day 1, day 5, and at 1 month using BCVA. Patients were monitored for intraoperative and postoperative complications, including capsular rupture, corneal edema, Descemet's detachment, and raised intraocular pressure.

Statistical Analysis

Data were analyzed using IBM SPSS version 20. Descriptive statistics (mean, standard deviation, frequency, and percentage) were calculated. Categorical data were analyzed using the Chi-square test, with $p \leq 0.05$ considered statistically significant.

Ethical Consideration

The study received ethical clearance from the Institutional Ethics Committee of Government General Hospital, Nizamabad. Written informed consent was obtained from all participants prior to enrollment.

RESULTS

A total of 50 one-eyed patients who underwent manual small incision cataract surgery (MSICS) were included in the study. The mean age of the study population was 71.14 ± 12.09 years, with the majority (72%) aged between 61 and 80 years. Males constituted 52% of the cohort, and females accounted for 48%. A significant proportion of patients had systemic comorbidities, with 56% having hypertension and 60% diagnosed with diabetes mellitus (Table 1).

The most common etiology of vision loss in the non-functional eye was amblyopia of unspecified origin (22%), followed by strabismus (16%). Retinal detachment, age-related macular degeneration, phthisis bulbi, and complications from prior cataract surgery each contributed to 8% of the cases. Other less frequent etiologies included corneal degeneration, various forms of glaucoma, central retinal artery or vein occlusion, and other retinal pathologies (Table 2).

Regarding the type of cataract in the functional eye, nuclear sclerosis was the most prevalent (22%), followed by posterior subcapsular (18%) and hypermature cataracts (18%). Cortical cataracts accounted for 12% of cases, and various mixed morphologies were also observed (Table 3).

Visual outcomes were assessed based on best-corrected visual acuity (BCVA) at three postoperative intervals: day 1, day 5, and 1 month. A progressive improvement in visual acuity was noted across all intervals. On day 1, 46.8% of patients achieved a BCVA of 6/18, while only 31.9% and 17% achieved 6/24 and 6/36 respectively. By the fifth postoperative day, 51.1% of patients had a BCVA of 6/18, and 12.8% achieved 6/12. At the end of 1 month, 59.6% of patients attained a BCVA of 6/12,

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with 29.8% at 6/18. The overall improvement was statistically significant ($p < 0.001$) (Table 4).

Complications were minimal. Intraoperatively, one case (2%) of capsular rupture was reported. Postoperatively, corneal edema and Descemet's membrane detachment were each observed in 2 cases (4.1%). Elevated intraocular pressure was reported in one patient (2.05%). No major sight-threatening complications were encountered during follow-up (Table 5).

Table 1: Demographic Profile of Study Participants (n = 50)

Parameter	Categories	Frequency (n)	Percentage (%)
Age (years)	40–50	1	2
	51–60	12	24
	61–70	12	24
	71–80	13	26
	>80	11	22
Gender	Male	26	52
	Female	24	48
Comorbidities	Hypertension	28	56
	Diabetes Mellitus	30	60

Table 2: Etiology of Vision Loss in Non-Functional Eye

Etiology	Frequency (n)	Percentage (%)
Amblyopia (unspecified)	11	22
Strabismus	8	16
Retinal Detachment	4	8
Age-related Macular Degeneration	4	8
Phthisis Bulbi	4	8
Cataract surgery complications	4	8
Others (e.g., corneal degeneration, glaucoma, CRAO)	15	30

Table 3: Types of Cataract in the Functional Eye

Type of Cataract	Frequency (n)	Percentage (%)
Nuclear	11	22
Cortical	6	12
Posterior Subcapsular	9	18
Hypermature	9	18
NC–CC	3	6
NC–PSC	5	10
CC–PSC	5	10
NC–CC–PSC	2	4

Table 4: Visual Outcomes (Best Corrected Visual Acuity - BCVA)

Visual Acuity (BCVA)	Day 1 (%)	Day 5 (%)	1 Month (%)
6/12	0	12.8	59.6
6/18	46.8	51.1	29.8
6/24	31.9	27.7	8.5
6/36	17	6.4	2.1
6/60	4.3	2.1	0
p-value	-	-	**<0.001**

Table 5: Complications Observed Post MSICS

Complication Type	Frequency (n)	Percentage (%)
Capsular Rupture (Intra-op)	1	2
Corneal Edema (Post-op)	2	4.1
Descemet's Detachment	2	4.1
Increased IOP	1	2.05

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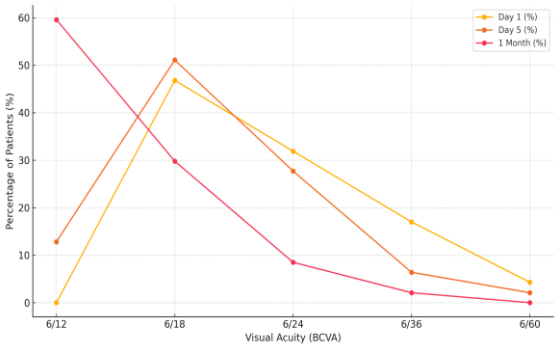


Figure 1: Visual Outcomes Over Time After Cataract Surgery (BCVA)

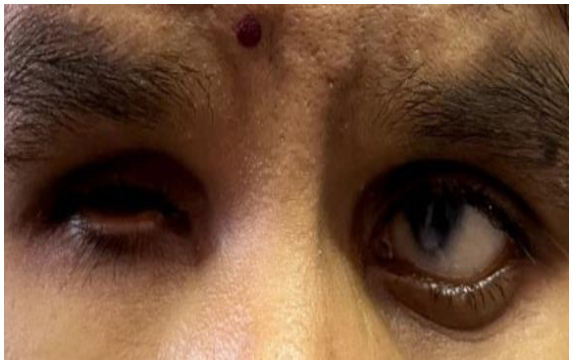
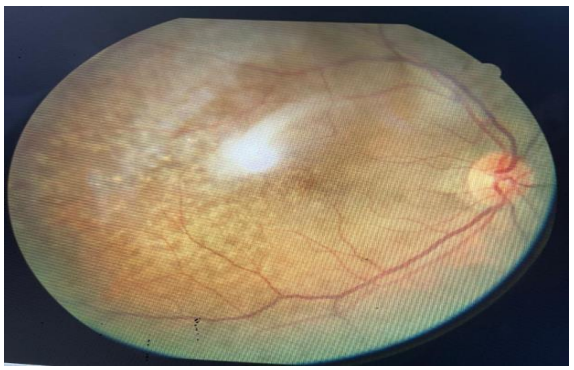


Figure No:2.(RE) Phthisis bubli , (LE) PSC

Figure No:3.(RE) NC-CC, (LE) Corneal Degeneration

Figure No:4.(RE) Strabismus , (LE) Cortical Cataract



Figures 5 & 6 : (RE) ARMD , (LE) NC-CC- PSC

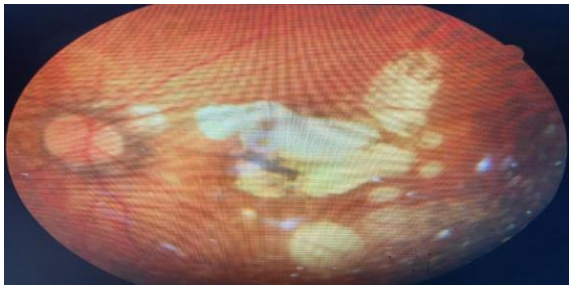


Figure 7 & 8 : (RE) Hyper-mature Cataract , (LE) Myopic Macular Degeneration

DISCUSSION

This prospective study aimed to assess the visual outcomes and complication rates following Manual Small Incision Cataract Surgery (MSICS) in one-eyed patients—a particularly high-risk and psychologically vulnerable subgroup. The results demonstrate that MSICS is a safe and effective surgical modality in restoring visual function among monocular individuals, with significant improvements in best-corrected visual acuity (BCVA) and minimal complication rates.

The mean age of the study population was 71.14 ± 12.09 years, which aligns closely with findings from Charles et al. (74.01 years) and Kataguiri et al. (73.05 years), suggesting that cataract incidence peaks in the elderly due to cumulative oxidative stress and lens protein degeneration with aging.[11,10] The nearly equal gender distribution observed in our study corresponds to general population trends; however, other studies, such as those by Li et al. and Pomberg et al., reported a higher proportion of female patients, which may reflect

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differences in healthcare accessibility or cultural influences.[9,12]

Regarding the etiology of vision loss in the non-functional eye, amblyopia (22%) and strabismus (16%) were the leading causes in this cohort. These findings underscore the importance of early vision screening in childhood. Retinal detachment and age-related macular degeneration (each 8%) were also notable, consistent with the patterns reported by Charles et al. in similar patient populations.[11]

Postoperative visual improvement was substantial. On day 1, 48% of participants achieved BCVA of 6/18, which improved to 59.6% achieving 6/12 by one month. These results are comparable to those of Khanna et al., who reported that 88% of monocular patients attained a BCVA of ≥6/18 at final follow-up, reinforcing the functional success of MSICS in this subgroup.[13] The progressive gain in acuity, with statistically significant improvement over time ($p < 0.001$), supports the effectiveness of MSICS in visual rehabilitation.

The complication profile was minimal. Only one patient (2%) experienced intraoperative capsular rupture. Corneal edema and Descemet's membrane detachment were reported in 4.1% each, all resolving without lasting deficits. These findings are comparable to complication rates reported in other cohort studies such as those by Khanna et al. and Charles et al., where similar adverse event frequencies were noted.[13,11,14]

Despite the encouraging results, this study has limitations. The modest sample size (n=50) may limit generalizability. Additionally, the one-month follow-up period could have missed late-onset complications such as posterior capsular opacification or cystoid macular edema. The absence of a control group—such as binocular patients or those undergoing phacoemulsification—further limits comparative analysis. Previous studies have demonstrated that monocular patients may experience different psychological and functional outcomes compared to binocular individuals.[9,10,12]

CONCLUSION

This study demonstrates that Manual Small Incision Cataract Surgery (MSICS) is a safe and effective procedure for one-eyed patients, providing significant visual improvement with minimal complications. By one month postoperatively, 59.6% of patients achieved a BCVA of 6/12, highlighting the procedure's potential to restore functional vision in a high-risk group. Complication rates were low and manageable, affirming the safety of MSICS in monocular individuals. Given the psychological and clinical challenges faced by this population, timely surgical intervention, careful preoperative evaluation, and diligent postoperative follow-up are essential to optimize outcomes and preserve the quality of life in one-eyed patients.

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