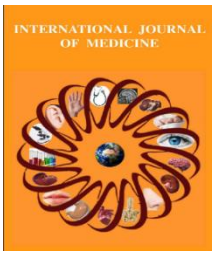

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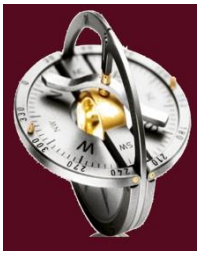

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Original Research

Clinical Evaluation of Poor Visual Outcome Following Cataract Surgery.

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Abstract

Background: Cataract remains the leading cause of avoidable blindness worldwide. Manual Small Incision Cataract Surgery (MSICS) is a safe, cost-effective, and widely practiced surgical technique in developing countries. Evaluating postoperative visual outcomes and identifying causes of poor vision are essential for improving the quality of cataract surgical services. *Objectives:* To evaluate the postoperative visual outcome of patients undergoing MSICS for senile cataract and to identify the causes and factors associated with poor visual outcomes. *Materials and Methods:* This prospective observational study included 200 patients aged 45 years and above who underwent MSICS with posterior chamber intraocular lens implantation. All patients underwent comprehensive preoperative ocular and systemic evaluation and were followed postoperatively on day 1, at 1 week, 3 weeks, and 6 weeks. Visual outcome was assessed using best-corrected visual acuity (BCVA), with poor visual outcome defined as BCVA <6/24 at 6 weeks. *Results:* The mean age of the patients was 65.81 ± 7.29 years, and 62.5% were females. Hypertension and diabetes mellitus were present in 66% and 58.5% of patients, respectively. Pre-existing ophthalmic disease was identified in 19.5% of patients, predominantly diabetic retinopathy (15%) and diabetic maculopathy (3.5%). Intraoperative complications occurred in 4% of cases, with posterior capsular rupture being the most common complication. Against-the-rule astigmatism was the most frequent postoperative refractive error (68.5%), and the mean surgically induced astigmatism was 0.67 ± 0.69 D. Good visual outcomes (BCVA ≥6/18) were achieved in 35.5%, 96.5%, 95%, and 90% of patients on postoperative day 1, at 1 week, 3 weeks, and 6 weeks, respectively. Poor visual outcome was observed in 14 patients (7%), with retinal and macular diseases accounting for the majority of cases. Diabetic maculopathy (3.5%), cystoid macular edema (2%), posterior capsular opacity (1.5%), age-related macular degeneration (0.5%), macular scar (0.5%), and persistent corneal edema (0.5%) were the principal causes of reduced postoperative vision. *Conclusion:* MSICS provided excellent visual outcomes with a low complication rate, achieving good postoperative vision in 90% of patients. Poor visual outcomes were primarily related to pre-existing or postoperative retinal and macular pathology rather than surgical complications. Careful preoperative retinal evaluation, meticulous surgical technique, appropriate postoperative follow-up, and timely refractive correction are essential for optimizing visual outcomes after cataract surgery.

Keywords: *Cataract; Manual Small Incision Cataract Surgery (MSICS); Visual Outcome; Poor Visual Outcome; Posterior Capsular Opacity; Diabetic Retinopathy.*

Introduction

Cataract remains the leading cause of avoidable blindness worldwide and accounts for a substantial proportion of visual impairment, particularly in developing countries. Cataract surgery is the only effective treatment for restoring vision and is considered one of the most cost-effective public health interventions after immunization.[1,2] Despite the increasing number of cataract surgeries performed annually, the global burden of cataract blindness continues to rise due to population growth and aging.[3] Consequently, improving both the quantity and quality of cataract surgical services has become a major public health priority.[4]

Visual outcome is an important indicator of the quality of cataract surgery. Good postoperative vision not only restores functional independence and improves quality of life but also enhances community confidence in cataract surgical services. Regular surgical audits and evaluation of postoperative outcomes are therefore essential components of quality assurance and help identify factors responsible for suboptimal visual results.[5,6]

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In developing countries, Manual Small Incision Cataract Surgery (MSICS) remains the preferred surgical technique because it is cost-effective, safe, and provides visual outcomes comparable to phacoemulsification while requiring less expensive equipment and a shorter learning curve.[7,8] Although modern cataract surgery has become increasingly safe, poor visual outcomes may still occur due to pre-existing ocular pathology, intraoperative complications, postoperative complications, or uncorrected refractive errors.[9]

According to the recommendations of the World Health Organization, postoperative visual outcome is categorized as good, borderline, or poor based on best-corrected visual acuity.[10] Identification of the causes of poor visual outcome is essential for improving surgical quality, guiding postoperative management, and reducing avoidable visual impairment.[5,10]
The present study was undertaken to evaluate the incidence, causes, and clinical profile of poor visual outcome following cataract surgery in patients undergoing MSICS at a tertiary care teaching hospital.

AIM
To evaluate the postoperative visual outcomes of patients undergoing manual small incision cataract surgery and identify the factors associated with poor visual outcomes.

OBJECTIVES
1. To determine the incidence of poor visual outcome following cataract surgery.
2. To identify the causes of poor visual outcome in pseudophakic patients.
3. To evaluate the clinical profile of patients with poor postoperative visual outcomes.

Materials and Methods
Study Design
Prospective observational study.

Study Setting
Department of Ophthalmology, Fathima Institute of Medical Sciences, Kadapa, Andhra Pradesh.
Study Duration
Two years.

Study Population
Patients aged 45 years and above undergoing manual small incision cataract surgery (MSICS) for senile cataract.

Sample Size
A total of **200 patients** were included in the study.

Inclusion Criteria
- Patients aged ≥45 years with senile cataract undergoing MSICS with posterior chamber intraocular lens implantation.
- Patients willing to participate and provide informed consent.

Exclusion Criteria
- Traumatic cataract.
- Complicated cataract.
- Patients with squint or known amblyopia.
- Aphakia or absence of posterior chamber intraocular lens implantation.

Preoperative Evaluation
All patients underwent a comprehensive ophthalmic examination, including:
- Best-corrected and uncorrected visual acuity assessment using LogMAR and Snellen charts.
- Slit-lamp biomicroscopy.
- Goldmann applanation tonometry.
- Dilated fundus examination.
- Keratometry.
- A-scan biometry.

Systemic evaluation included general physical examination and routine preoperative investigations, including fasting blood glucose, electrocardiography, hepatitis B surface antigen (HBsAg), and HIV screening.

Surgical Technique
All patients underwent manual small incision cataract surgery using a superior scleral tunnel incision measuring approximately 6.5 mm. Posterior chamber intraocular lens implantation was performed in all cases.

Postoperative Follow-up
Patients were examined on postoperative Day 1, Week 1, Week 3, and Week 6.
The following parameters were assessed at each visit:
- Uncorrected visual acuity (UCVA).
- Best-corrected visual acuity (BCVA).
- Slit-lamp examination.
- Fundus evaluation.
- Keratometry and refractive assessment at six weeks.
- Postoperative treatment administered.

Outcome Measures
The primary outcome measure was postoperative best-corrected visual acuity (BCVA).
Visual outcome was categorized as:
- **Good outcome:** BCVA ≥6/18
- **Poor outcome:** BCVA <6/24

Patients with poor visual outcome underwent detailed anterior segment and posterior segment evaluation after pupillary dilatation to identify the underlying cause.
Surgically induced astigmatism was calculated by the algebraic subtraction method using preoperative and postoperative keratometric values obtained at six weeks.

Statistical Analysis
Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Statistical significance was assessed using the Chi-square test and Student's *t*-test where appropriate. A p value <0.05 was considered statistically significant.

Results

Table 1. Baseline demographic and systemic characteristics of the study population (N = 200)

Variable	Category	n	%
Age (years)	41-50	6	3.0
	51-60	43	21.5
	61-70	92	46.0
	71-80	58	29.0
	>80	1	0.5
Gender	Male	75	37.5
	Female	125	62.5
Hypertension	Absent	68	34.0
	<5 years	110	55.0
	6-15 years	14	7.0
	16-25 years	8	4.0
	>26 years	0	0.0
Diabetes mellitus	Absent	83	41.5
	<5 years	61	30.5
	6-15 years	37	18.5
	16-25 years	17	8.5
	>26 years	2	1.0

Table 2. Ocular and systemic comorbidities among the study population (N = 200)

Variable	Category	n	%
Diabetic ocular manifestations *(n = 117 diabetics)*	Diabetic retinopathy	30	25.6
	Diabetic maculopathy	7	6.0
	No ophthalmic manifestation	80	68.4
Ischemic heart disease	Present	36	18.0
	Absent	164	82.0
Other systemic comorbidities	None	193	96.5
	COPD	4	2.0
	Diabetic nephropathy	3	1.5
Pre-existing ophthalmic disease	None	153	76.5
	Diabetic retinopathy	30	15.0
	Diabetic maculopathy	7	3.5
	Glaucoma	1	0.5
	Age-related macular degeneration (ARMD)	1	0.5
	Others/Not applicable	8	4.0

Table 3. Best-corrected and uncorrected visual acuity before and after cataract surgery (N = 200)

Visual acuity	Preoperative BCVA n (%)	6-week BCVA n (%)	Preoperative UCVA n (%)	6-week UCVA n (%)
6/6	0 (0.0)	126 (63.0)	0 (0.0)	33 (16.5)
6/9	0 (0.0)	45 (22.5)	0 (0.0)	80 (40.0)
6/12	25 (12.5)	8 (4.0)	17 (8.5)	56 (28.0)
6/18	95 (47.5)	4 (2.0)	52 (26.0)	8 (4.0)
6/24	47 (23.5)	14 (7.0)	62 (31.0)	11 (5.5)
6/36	14 (7.0)	3 (1.5)	43 (21.5)	10 (5.0)
≤6/60	18 (9.0)	0 (0.0)	26 (13.0)	2 (1.0)
Total	**200 (100)**	**200 (100)**	**200 (100)**	**200 (100)**

BCVA improvement was statistically significant (paired proportion test, $p < 0.001$).

Table 4. Change in postoperative refractive cylinder at 6 weeks (N = 200)

Cylinder power (D)	Preoperative n (%)	6 weeks n (%)
<0	17 (8.5)	155 (77.5)
0	136 (68.0)	39 (19.5)
0-2	46 (23.0)	6 (3.0)
>2	1 (0.5)	0 (0.0)

Table 5. Postoperative refractive status and intraoperative complications (N = 200)

Variable	Category	Preoperative n (%)	6 weeks n (%)
Refractive status	**Undetermined**	**27 (13.5)**	**36 (18.0)**
	Myopia	**21 (10.5)**	**3 (1.5)**
	Hypermetropia	**93 (46.5)**	**3 (1.5)**
	Against-the-rule astigmatism	**13 (6.5)**	**137 (68.5)**
	With-the-rule astigmatism	**46 (23.0)**	**21 (10.5)**
Intraoperative complications	**None**	**-**	**192 (96.0)**

	Posterior capsular tear	-	**5 (2.5)**
	Premature wound entry	-	**2 (1.0)**
	Iris prolapse	-	**1 (0.5)**

Table 6. Postoperative management during follow-up

Treatment	Day 1 n (%)	1 Week n (%)	3 Weeks n (%)	6 Weeks n (%)
Routine treatment	**200 (100)**	**200 (100)**	**200 (100)**	**200 (100)**
Planned for Nd:YAG laser	**0**	**0**	**0**	**16 (8.0)**
Topical NSAIDs	**0**	**0**	**4 (2.0)**	**4 (2.0)**
Hypertonic saline drops	**0**	**0**	**2 (1.0)**	**2 (1.0)**
Referral	**0**	**0**	**0**	**1 (0.5)**
Surgical intervention	**1 (0.5)**	**0**	**0**	**0**

Table 7. Postoperative ocular findings during follow-up (N = 200)

Ocular finding	Day 1 n (%)	1 Week n (%)	3 Weeks n (%)	6 Weeks n (%)
No abnormality	0	8 (4.0)	138 (69.0)	138 (69.0)
AC reaction (+1 to +3 cells)	198 (99.0)	180 (90.0)	11 (5.5)	1 (0.5)
Hyphema	3 (1.5)	0	0	0
Striate keratopathy	15 (7.5)	4 (2.0)	2 (1.0)	2 (1.0)
Posterior capsular opacity (PCO)	0	0	6 (3.0)	16 (8.0)
Diabetic retinopathy	30 (15.0)	30 (15.0)	30 (15.0)	30 (15.0)
Maculopathy	9 (4.5)	9 (4.5)	13 (6.5)	13 (6.5)
Optic nerve pathology	1 (0.5)	1 (0.5)	1 (0.5)	1 (0.5)
Retained cortical matter	3 (1.5)	2 (1.0)	1 (0.5)	0
Iris prolapse	1 (0.5)	0	0	0

AC = Anterior chamber.

Table 8. Surgical outcome and final postoperative diagnosis at 6 weeks (N = 200)

Variable	Category	n	%
Surgically induced astigmatism (D)	<0	22	11.0
	0	3	1.5
	0-2	174	87.0
	>2	1	0.5
Final diagnosis	No abnormality	138	69.0
	Diabetic retinopathy	30	15.0
	Posterior capsular opacity	16	8.0
	Diabetic maculopathy	7	3.5
	Cystoid macular edema	4	2.0
	Corneal edema	2	1.0
	Other maculopathy	2	1.0
	Glaucoma	1	0.5

Table 9. Causes of poor visual outcome (BCVA <6/24) at 6 weeks (N = 14)

Cause	n	% of poor outcomes
Diabetic maculopathy	4	28.6
Cystoid macular edema	4	28.6
Posterior capsular opacity	3	21.4
Corneal edema	1	7.1
Age-related macular degeneration	1	7.1
Macular scar	1	7.1
Total	**14**	**100.0**

Table 10. Final diagnosis according to visual outcome at 6 weeks (N = 200)

Diagnosis	Total n (%)	Good outcome (BCVA ≥6/18) n	Poor outcome (BCVA <6/24) n*
No ocular pathology	138 (69.0)	138	0
Diabetic retinopathy	30 (15.0)	28	2
Posterior capsular opacity	16 (8.0)	12	4
Diabetic maculopathy	7 (3.5)	0	7
Cystoid macular edema	4 (2.0)	0	4
Corneal edema	2 (1.0)	1	1
Glaucoma	1 (0.5)	1	0
Age-related macular degeneration	1 (0.5)	0	1
Macular scar	1 (0.5)	0	1

*Poor outcome defined as **BCVA <6/24**.

Table 11. Final diagnosis according to uncorrected visual outcome at 6 weeks (N = 200)

Diagnosis	Total n (%)	Good outcome (UCVA ≥6/18) n	Poor outcome (UCVA <6/24) n*
No ocular pathology	137 (68.5)	137	0
Diabetic retinopathy	30 (15.0)	27	3
Posterior capsular opacity	16 (8.0)	11	5
Diabetic maculopathy	7 (3.5)	0	7
Cystoid macular edema	4 (2.0)	0	4
Corneal edema	2 (1.0)	1	1
Glaucoma	1 (0.5)	1	0
Age-related macular degeneration	1 (0.5)	0	1
Macular scar	1 (0.5)	0	1

*Poor outcome defined as **UCVA <6/24**.

Discussion

Cataract surgery remains the definitive treatment for cataract-related visual impairment and plays a major role in reducing avoidable blindness. Manual Small Incision Cataract Surgery (MSICS) is widely practiced in developing countries because it is cost-effective, safe, and provides visual outcomes comparable to phacoemulsification.[7-11] The present prospective study evaluated the visual outcomes and causes of poor visual outcome following MSICS in 200 patients.

The majority of patients were aged 61-70 years (46%), with females constituting 62.5% of the study population. Hypertension (66%) and diabetes mellitus (58.5%) were the most common systemic comorbidities. Among diabetic patients, diabetic retinopathy (15%) and diabetic maculopathy (3.5%) were the predominant pre-existing ocular diseases.

Visual rehabilitation improved progressively during follow-up. Good best-corrected visual acuity (BCVA ≥6/18) was achieved in 35.5% of patients on postoperative day 1, 96.5% at one week, 95% at three weeks, and 90% at six weeks. Similarly, uncorrected visual acuity (UCVA) of 6/18 or better was achieved in 88.5% of patients at six weeks. These findings are comparable with those reported by Venkatesh et al. and Kongsap et al., who demonstrated excellent postoperative visual outcomes following MSICS.[8,12]

Postoperative refractive assessment showed that against-the-rule astigmatism was the commonest refractive error (68.5%), similar to the observations of Pai et al.[13] The mean surgically induced astigmatism was 0.67 ± 0.69 D, indicating good wound construction and surgical technique.

MSICS proved to be a safe procedure, with intraoperative complications occurring in only 4% of cases. Posterior capsular rupture (2.5%) was the most common intraoperative complication, followed by premature wound entry (1%) and iris prolapse (0.5%). These complication rates are comparable to those reported by Venkatesh et al. and Iechie et al., who also documented low intraoperative complication rates with MSICS.[8,14]

The commonest early postoperative finding was mild anterior chamber inflammation, which resolved with routine treatment. Corneal edema and hyphema were uncommon and improved during follow-up. At six weeks, posterior capsular opacity (8%) was the most frequent postoperative complication, followed by diabetic retinopathy (15%), diabetic maculopathy (3.5%), cystoid macular edema (2%), and persistent corneal edema (1%). Similar postoperative complications have been described by Thapa et al. and Iechie et al., with posterior capsular opacity being one of the commonest late complications after cataract surgery.[14,15]

Poor visual outcome (BCVA <6/24) was observed in 14 patients (7%) at six weeks. Retinal and macular diseases accounted for the majority of poor outcomes, including diabetic maculopathy, cystoid macular edema, age-related macular degeneration, and macular scar. Posterior capsular opacity and persistent corneal edema were other important causes. Similar findings have been reported by Abdelmoaty et al., Talukder et al., and Thapa et al., who identified retinal pathology and posterior capsular opacity as the leading causes of reduced postoperative vision.[16,17]

Overall, the present study demonstrates that MSICS provides excellent visual outcomes with a low rate of complications. Most cases of poor visual outcome were attributable to pre-existing or postoperative retinal and macular disorders rather than surgical complications. These findings emphasize the importance of meticulous preoperative retinal evaluation, optimal control of systemic diseases such as diabetes mellitus, careful surgical technique, and appropriate postoperative follow-up to achieve optimal visual outcomes after cataract surgery.

Conclusion

The mean age of patients undergoing MSICS was 65.81 ± 7.29 years, and 62.5% were females. Good postoperative visual outcomes (BCVA ≥6/18) were achieved in 91.5% of patients, while 7% had poor visual outcomes at six weeks. Retinal and macular diseases, particularly diabetic maculopathy and cystoid macular edema, were the leading causes of poor vision, followed by posterior capsular opacity and persistent corneal edema. MSICS was a safe procedure with a low intraoperative complication rate (4%) and a mean surgically induced astigmatism of 0.67 ± 0.69 D. Against-the-rule astigmatism was the most common postoperative refractive error. Overall, MSICS performed by experienced surgeons provides excellent visual outcomes, emphasizing the importance of careful preoperative retinal evaluation, meticulous surgical technique, postoperative follow-up, and timely refractive correction to achieve optimal visual rehabilitation.

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