

A Retrospective Study of the Outcomes of Cataract Surgeries in a Community Setting, Including Visual Acuity and Complication Rates

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Abstract

Background: Globally, the leading cause of avoidable blindness is cataract, particularly in low-resource community settings. Evaluating cataract surgery outcomes in real-world hospital environments is important to ensure quality eye care, better recovery, and early detection of complications that may affect long-term visual outcomes.

Methods: In Katihar, from 1 July 2025 to 31 December 2025, a retrospective study was conducted. Medical records of 600 patients aged 40 years and above who were operated for cataract surgery were reviewed. Using descriptive statistical methods data on demographic characteristics, preoperative and postoperative visual acuity, surgical procedure type, intraoperative events, and postoperative complications were analysed.

Results: With male predominance, the mean age of patients was 62.4 ± 9.8 years. Preoperatively, 72.5% of patients were worse than 6/60 sighted. Postoperatively good vision ($\geq 6/18$) was restored in 78.5% of patients at 6 weeks. Phacoemulsification had superior visual results as compared to Small Incision Cataract Surgery (SICS). There were a low number of complications in general and posterior capsule rupture was the most common intraoperative complication.

Conclusion: Visual results following cataract surgery on a mass scale in the community are acceptable, with low complication rates. Appropriate maintenance of outcomes should be implemented and training may consolidate the quality of community-based eye care.

Keywords: Cataract surgery, visual acuity, postoperative complications, community ophthalmology, retrospective study.

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Introduction

Cataract is the opacity of the eye's lens causing impaired vision and eventually blindness if untreated [1]. It is still the common cause of reversible visual impairment in the world and disproportionately affects communities living in low- and middle-income countries who have limited access to timely eye care. If left untreated, it can be a significant cause of worldwide blindness, and the World Health Organization has reported that an estimated 47.8% of global blindness is due to cataract, which makes it one of the major public health issues in ophthalmology [2]. The cataract prevalence also rises with age, and as life expectancy continues to grow worldwide, the absolute number of affected people is increasing. In India, cataract continues to play a significant role in causing visual impairment accounting for > 60% of avoidable blindness and with ~8 million new cataract cases every year requiring surgical intervention [3]. The burden is particularly more

pronounced in rural and underserved regions where poor infrastructure, shortage of ophthalmologists and socioeconomic barriers contribute to the delayed diagnosis and treatment.

There are many reasons for the huge burden of cataract blind. Age is the most significant risk factor however, a number of systemic diseases like diabetes mellitus, hypertension and malnutrition and environmental factors for example ultraviolet radiation also contribute to increased susceptibility [4]. Late presentation, poverty and ignorance add to this burden such that patients usually present with advanced or overripe cataracts, making surgery difficult and the possibility of achieving optimal postoperative visual results narrow [5].

Cataract operation is an efficient, safe, and cost-effective procedure which can restore sight, increase quality of life and boost sociodemographic productivity [6]. Current surgical methods such as

SICS and phacoemulsification enable early visual recovery accompanied by fewer complications when performed by an experienced surgeon. Cataract surgery in community setting particularly in resource-poor areas such as Bihar and other parts of Eastern India is a cornerstone for preventing avoidable blindness [7,8]. Providing high-quality surgical care in these environments also will lead to a substantial reduction of visual disability, greater independence, and improved quality of life for persons affected by cataract.

Although good results are achieved after cataract surgery, there is a lack of regional data on the postoperative visual acuity and complication rates from community hospitals [9]. A knowledge of these results is important for evaluating the quality of care and for targeting improvement efforts and resource allocation [10,11].

Assessment of cataract surgery in real-life population-based settings has the potential to inform the success of surgery, patient safety and efficacy of eye care programmes to eliminate avoidable blindness.

Rationale for the Study: Despite widespread availability of cataract surgery in India, results may be highly variable influenced by surgical technique, infrastructure, surgeon proficiency and post-operative care.

The majority of evidence for surgical results comes from tertiary referral centres or urban well-resourced hospitals, which may not accurately reflect actual outcomes in the community. Assessment of outcomes after cataract surgery in the community is important to judge the quality and efficacy of eye care provided to a wider cross-section.

Bihar and elsewhere in Eastern India contribute disproportionately to the burden of cataract blindness but local information on postoperative visual outcomes and complications is lacking. The absence of local evidence is a barrier to effective decision-making, resource utilization and programme enhancement. Surveillance of visual acuity results and surgical complications is important for quality assurance, gap analysis, and correcting interventions to lead to better patient outcomes in community ophthalmology services.

Aim and Objectives

Aim: To evaluate the outcomes of community settings that are performed in cataract surgeries.

Objectives

- To assess outcomes of visual acuity in postoperative patients
- To regulate postoperative and intraoperative with complication rates

- To analyse the factors of surgical outcomes that can be affected.

Materials and Methods

Study Design: This study was retrospectively designed as a hospital-based observational analysis to determine the outcomes of community cataract surgeries. The medical records of those who had cataract surgery in the year 2024 were reviewed and analysed. The retrospective nature of this study permitted evaluation of actual surgical results, visual acuity recovery and complication rates without impact on the patient management or clinical decision-making.

Study Setting: The research was carried out in Katihar, Bihar. This was done in a randomly selected hospital (Roshna Bazaar Nursing Home, Labha, Katihar) performing cataract surgeries under Ayushman Bharat Scheme Serving the urban and rural populations of Katihar district in Bihar and adjoining areas. The hospital offers a full range of ophthalmic care, including cataract surgery, and has been a main source for eye care to the underserved population.

Study Period: The study was done between 1ST July 2025 to 31ST December 2025. Patients included were those who underwent surgery for cataract between the one-year period from 1ST January 2024 to 31ST December 2024. Preoperative, intraoperative, postoperative and follow-up records were taken for the study

Study Population and Sample Size: The study subjects were patients with age-related cataract who had cataract surgery in a randomly selected hospital performing cataract surgeries under Ayushman Bharat Scheme over a period of study. A combined sample size of 600 patients was analysed. A Multi-Stage Random Sampling technique was employed to select the study participants. In the first stage, a comprehensive line list of all hospitals in the Katihar district performing cataract surgeries under the Ayushman Bharat Scheme was compiled. From this list, one hospital was selected using simple random sampling. In the second stage, line list of all patients of 40 years and above who underwent cataract surgery in the year 2024 was prepared. From this list, 600 patients were randomly selected. The study included all applicable patients who met the inclusion criteria and whose medical records were complete. Unilateral and bilateral cataract surgery cases were included if they occurred within the time period mentioned.

Inclusion Criteria

1. Patients aged above 40 years at the time of surgery who were residents of Katihar.
2. Patients who had cataract surgery, unilateral or bilateral in the year 2024.

- The availability was completed by intraoperative, preoperative and postoperative records.
- Preoperative and postoperative visual acuity is documented by the assessments of medical records.

Exclusion Criteria

- Patients with traumatic or congenital cataract.
- Cataract cases secondary to ocular injuries or pathological conditions of the eye.
- Patients with medical records which were incomplete or missing from medical data.
- Lack of postoperative follow-up data or having of ocular conditions significantly effect on vision.

Data Collection: The data were obtained from a review of the case records and surgical registers at the hospital. The information includes demographic characteristics, preoperative best corrected visual acuity, mild or mature cataract and the type of surgery (SICS vs phacoemulsification). Postoperative information consisted of visual acuity readings at all follow-up visits and was supplemented by intraoperative and postoperative complication notes.

Outcome Measures: The visual acuity measured at the postoperative 1st day and at about 6 weeks after the operation was the primary end point. Secondary outcome measures were the rates of intraoperative complications and types of complications, as well as

early or late postoperative complications after cataract surgery.

Statistical Analysis: The input and analysis of data were performed using the SPSS version 26. Frequencies, percents and means ± standard deviation were used as descriptive statistics. Factors that contributed to postoperative visual acuity were analysed with inferential statistics.

Chi-square test was used to estimate the correlation of postoperative VAs with the age group, sex, cataract type, preoperative VA and surgical technique as independent variables. Differences were considered statistically significant for $p < 0.05$.

Results

Demographic Profile: In this analysis, 600 randomly selected patients who were treated with cataract surgery during the one-year period in the year 2024 were included. Patients’ ages varied between 40 and 85 years, mean age was 62.4 ± 9.8 years. The age was predominantly (32.5%) observed in the 61–70 years age group followed by 51–60 years age group (28.3%). Males comprised 56.7% of the study population with cataract being more prevalent than among females (43.3%). This higher rate among males can represent more access to health care in the community.

Table 1: Age and Gender Distribution of Study Population (n = 600)

Variable	Number	Percentage
Age group (years)		
40–50	92	15.3
51–60	170	28.3
61–70	195	32.5
>70	143	23.9
Gender		
Male	340	56.7
Female	260	43.3

Preoperative Characteristics: The most common cataract type diagnosed was senile immature cataract (58.0%) followed by senile mature cataract (32.7%) as well as hypermature cataract (9.3%). 72.5% patients having vision poor than 6/60

preoperatively suggestive of advanced visual compromise at presentation. Preoperative visual acuity of more than 6/18 was seen in only (6.8%) patients, indicating a late presentation in most of the cases.

Table 2: Preoperative Clinical Characteristics

Variable	Number	Percentage
Type of cataract		
Senile immature	348	58.0
Senile mature	196	32.7
Hypermature	56	9.3
Preoperative visual acuity		
≥6/18	41	6.8
<6/18–6/60	124	20.7
<6/60	435	72.5

Surgical Details: Among the 600 surgeries, Phacoemulsification was performed in maximum (68.3%, n = 410) cases compared to SICS (31.7%, n = 190). All patients underwent Posterior Chamber

Intraocular Lenses (PCIOL) implantation. Rigid polymethyl methacrylate (PMMA) lenses and foldable acrylic lenses were implanted in 31.7.0% and 68.3% cases respectively.

Table 3: Surgical Techniques and Intraocular Lenses

Variable	Number	Percentage
Type of surgery		
Phacoemulsification	410	68.3
SICS	190	31.7
Type of IOL		
PMMA	190	31.7
Foldable acrylic	410	68.3

Postoperative Visual Outcomes: Postoperative visual acuity was recorded on day one and at 6 weeks. WHO category good visual acuity ($\geq 6/18$) was observed in 471 subjects (78.5%) at 6 weeks. Poor vision ($< 6/18-6/60$) was recorded in 16.0%, and $< 6/60$ in 5.5%. Patients who had

phacoemulsification had better visual results with 84.7% having achieved $\geq 6/18$ versus 75.6% in the SICS group. The results are consistent showing a significant improvement in visual acuity postoperatively from cataract surgery while it is being performed in the community setting.

Table 4: Postoperative Visual Acuity at 6 Weeks

Visual outcome	Number	Percentage
Good ($\geq 6/18$)	471	78.5
Borderline ($< 6/18-6/60$)	96	16.0
Poor ($< 6/60$)	33	5.5

Complication Rates: Intraoperative complications had developed in 5.2% (n = 31). The frequent intraoperative complication was posterior capsular rupture (2.8%) and zonular dialysis (1.4%). Early postoperative complications were noted in 9.0% of cases, with corneal oedema (4.7%) most common.

Late postoperative complications were rare, involving 4.3% of patients - posterior capsular opacification (2.5%) being the most common one. On the whole, rates of complications were low and similar to those reported in other community-based studies of cataract surgery.

Table 5: Intraoperative and Postoperative Complications

Complication	Number	Percentage
Intraoperative		
Posterior capsular rupture	17	2.8
Zonular dialysis	8	1.4
Others	6	1.0
Early postoperative		
Corneal oedema	28	4.7
Anterior uveitis	16	2.7
Raised IOP	10	1.6
Late postoperative		
Posterior capsular opacification	15	2.5
Cystoid macular oedema	6	1.0
Endophthalmitis	5	0.8

Factors Influencing Postoperative Visual Outcomes: To investigate factors associated with surgical outcome, univariate and multivariable postoperative visual acuity at 6 weeks were evaluated by a number of demographic and clinical variables.

Age was a significant correlate of visual outcome. Patients ≤ 70 years of age had significantly better postoperative vision ($\geq 6/18$) compared with those

> 70 years ($p = 0.032$). Poorer results in older subjects can be related with age-related ocular comorbidities and impaired healing. Preoperative visual acuity was highly predictive of postoperative result. Preoperative patients who had vision of N 6/60 had better odds than those with $< 6/60$ to achieve a good post-operative vision, and this was statistically significant ($p < 0.001$). This underscores the importance of delayed presentation in surgical outcome. The type of cataract also affected the

results. Patients with senile immature cataract achieved great improvement of visual acuity compared to those with mature or hypermature cataracts ($p = 0.018$), different from the other types, they had a mild level of difficulty during surgery. Surgical technique was found to be significantly related to postoperative vision. Phacoemulsification

was associated with better visual acuity outcomes than SICS: 84.7% $\geq 6/18$ compared with 75.6% in the SICS group ($p = 0.041$). The smaller size of the incision and minor surgically induced astigmatism may account for this discrepancy ($p = 0.64$). Gender, on the other hand, was not statistically associated with postoperative visual end points.

Table 6: Association Between Clinical Factors and Postoperative Visual Outcome ($\geq 6/18$)

Variable	Good Outcome (%)	Poor Outcome (%)	p-value
Age ≤ 70 years	81.2	18.8	0.032
Age > 70 years	72.1	27.9	
Male	79.1	20.9	0.64
Female	77.8	22.2	
Preoperative VA $\geq 6/60$	88.5	11.5	< 0.001
Preoperative VA $< 6/60$	74.3	25.7	
Senile immature cataract	82.8	17.2	0.018
Mature/Hypermature	71.4	28.6	
Phacoemulsification	84.7	15.3	0.041
SICS	75.6	24.4	

Discussion

The current study assessed the results of cataract surgeries in a community-based hospital and showed promising findings. Almost 4 in 5 patients had a visual outcome ($\geq 6/18$) at the time of final follow-up postoperatively maintaining that or better vision. Visual acuity improved markedly from preoperatively, when the majority of patients were severely visually impaired. The complication rate was low overall; intraoperative complications were few, and most postoperative complications were mild without severe sequelae. These results encourage the surgical practicability and safety of cataract surgery at a secondary healthcare level. This study also found age, preoperative visual acuity, cataract maturity, and surgical technique to be statistically significant factors associated with postoperative vision. Such findings highlight the need for early diagnosis with prompt management, particularly in a community setting where late presentation is still prevalent. The differences in visual recovery by conventional SICS and phacoemulsification, though minimal, affirm progression of the infrastructure facilities for surgery and targeted training of surgeons at the grass-root level of care delivery.

Comparison with Previous Studies

The vision results found in this study 1 are similar to those of other nationals and internationals. Good vision ($\geq 6/18$) postoperatively has been reported at between 70% and 85% after cataract surgery in studies from India, varying according to the surgical technique and setting. The percentage of patients who had achieved good visual acuity at 6 months in the present study (78.5%) is consistent with that reported in these studies, reflecting an acceptable level of quality of surgeries being performed at community hospital levels.

In study 2, including those from developing countries, most patients, approximately 75–80% achieve good visual acuity, which is similar to the results of the present study. The relatively lower results compared with high-income countries may be due to delayed presentation, high number of mature cataracts and reduced availability of postoperative refractive services.

The complication rates in study 3 were also similar to the previous reports and posterior capsular rupture was identified as the most common intraoperative complication, which was also found in other studies. Minor differences between the studies could be due to variations in the experience of the surgeon, patient characteristics, volume and technique employed and technology.

Table 7: Comparison of Visual Outcomes with Previous Studies

Study	Study setting	Sample size	Surgical techniques	Good visual outcome ($\geq 6/18$)
Present study	Community-based tertiary hospital, Bihar	600	SICS, Phacoemulsification	78.5%
Study 1 [12]	Tertiary care teaching hospital	500	Phacoemulsification, SICS	82.0%
Study 2 [13]	Community-based eye care centres	720	SICS	75.4%
Study 3 [14]	Developing countries	> 3000	Mixed techniques	76.0%

Factors Influencing Outcomes: Numerous factors affected postoperative visual results in this study. Age was an important factor, and older patients demonstrated comparatively poorer response, especially those aged over 70 years, probably on the background of systemic or eye comorbidities [15]. Surgical technique was another significant contributing factor as patients who had undergone phacoemulsification achieved superior visual outcome than those with SICS. This may be attributed to smaller wound size, less surgically induced astigmatism, and quicker visual rehabilitation with phacoemulsification might be a reason.

Preoperative visual acuity was a significant determinant of postoperative outcome, as those who had extremely poor vision or those with mature cataracts were more likely to have suboptimal visual results. Late presentation, often seen in developing nations, leads to technically difficult surgery and perioperative morbidity. These results emphasize that prompt diagnosis, surgery and technique selection for visual outcome should be performed.

Strengths and Limitations: A strength of the present study is the relatively large sample size for obtaining reliable and generalizable findings. Furthermore, the use of community-based data renders insight into population-level cataract surgery outcomes in non-highly specialized urban areas. Nevertheless, there are some limitations to the study.

This study design precludes control for data completeness or possible confounding. The relatively short postoperative follow-up is a limitation when evaluating the long-term visual outcome and late complications. Despite these limitations, the study offers important insights into cataract surgery outcomes in a community-based setting.

Conclusion

The outcome of cataract surgeries was completed at a community-based hospital performing Cataract surgeries under Ayushman Bharat Scheme being quite optimal in this retrospective study with considerable improvement in the postoperative visual acuity. Most patients achieved a good visual outcome, suggesting the successful implementation and impact of these cataract surgical services in the community. The rates of inpatient and postoperative complications were low and consistent with other national and international reports, confirming the safety of both procedures if carried out under appropriate standards. These findings demonstrate the ability of community hospitals to provide good quality cataract surgery under resource limitations. Monitoring of surgical results is needed to sustain and enhance quality of practice. Continuous training

for the surgeons and assisting team in combination with using standard surgical routine could further improve the patient results and would help to reduce cataract-induced avoidable blindness.

Recommendations: Enforcement of community ophthalmology services are mandatory to tackle cataract-related visual impairment. A routine check and audit of surgical results should be held to monitor the quality of service and areas for future development. Use of standardized reporting systems, combined with regular training for surgeons and staff, may improve surgical performance and patient safety.

There is a need for patient education on early presentation, postoperative care and follow-up visits to enhance visual outcomes and prevent complications. Furthermore, increased access to refraction services and postoperative care will enhance the overall success of cataract surgery programs in community contexts.

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