

Clinical Trends and Postoperative Complications in Cataract Surgery: A Six-Months Study

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Received: 05-09-2025 / Revised: 12-10-2025 / Accepted: 25-11-2025

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Conflict of interest: Nil

Abstract:

Background: “Cataract is the leading cause of reversible blindness worldwide, with surgery being the only definitive treatment. Despite advances, variations in surgical patterns and postoperative complications remain clinically significant.

Aim: To evaluate the patterns of cataract surgery and associated postoperative complications over six months.

Methodology: A prospective observational study was conducted at the Department of Ophthalmology, Anugrah Narayan Magadh Medical College, Gaya ji, Bihar, India, including 80 patients aged ≥ 40 years undergoing cataract surgery. Data on demographics, surgical techniques, intraoperative and postoperative complications, and visual outcomes were recorded. Surgeries included phacoemulsification, ECCE, and MSICS. Postoperative follow-up extended to six months, and statistical analysis was performed using SPSS v27.

Results: Patients were predominantly elderly, with a slight female predominance (52.5%). Phacoemulsification was the most common procedure (52.5%), with posterior chamber foldable IOLs implanted in 66.3% of cases. Intraoperative complications occurred in 13.7%, with posterior capsule rupture being most frequent. Postoperative complications were infrequent, with corneal edema (10%) and posterior capsule opacification (7.5%) being the most common.

Conclusion: Phacoemulsification with posterior chamber foldable IOLs provides excellent visual outcomes with low complication rates. Patient selection, surgical expertise, and structured postoperative follow-up are critical for “optimal outcomes.

Keywords: Cataract, Phacoemulsification, Postoperative complications, Intraocular lens, Visual outcomes.

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Introduction

Cataract is “the most prevalent cause of reversible blindness across the globe and also a significant health issue of the general population especially in low- and middle-income nations where the availability of prompt surgical treatment can be low [1]. The world health organization reports a significant percentage of world visual impairment by cataract, particularly in the older generation of the population. As the life expectancy and the demographic alterations toward the elderly are increasing, the cataract burden is likely to increase continuously. The only treatment which is considered definite and is treated as one of the most economical and successful surgical procedures in the present-day medicine is the Cataract surgery [2]. The developments in surgery, intraocular lenses (IOL) technology, perioperative therapy and instrumentation have greatly enhanced visual acuity and minimized complication

rates in the last few decades. Nevertheless, even in the light of these developments, the differences in surgical trends and the incidence of postoperative complications continue to be the subject of clinical and epidemiological intrigue.

Trends of cataract surgery have changed significantly since the intracapsular cataract extraction (ICCE) to extracapsular cataract extraction (ECCE) and then to small-incision cataract surgery (SICS) and phacoemulsification [3]. The gold standard in Phacoemulsification with the foldable IOL implantation has already become the standard practice in most tertiary care centers because it has smaller size of incision, quick visual recovery, minimal induced astigmatism and shorter recovery periods. Still, SICS remains a popular method that is utilized in resource-limited environments due to its cost-effectiveness and similar visual results. The selection of

surgical method depends on several factors such as the experience of the surgeon, equipment availability, social economic status of the patient, cataract density, eye comorbidities and institutional guidelines [4]. Thus, the patterns and distribution of the various surgical modalities in a specific timeframe give useful information about the service delivery patterns and quality of service.

Even with the relatively low incidence of postoperative complications in cataract surgery of contemporary techniques, the problem is clinically important because it may affect the visual prognosis and patient satisfaction [5]. The complications can be divided into intraoperative and postoperative; the latter can be further broken down into early and late manifestations. The first few weeks of early postoperative complications consist of corneal edema, anterior chamber reaction, elevated intraocular pressure, wound leak, hyphema, and endophthalmitis. Late effects may occur many weeks to months after surgery and may include anterior capsular opacification (PCO), cystoid macular edema (CME), chronic uveitis, retinal detachment and IOL descent or dislocation. The most frequent delayed complication is still the posterior capsular opacification, which may require Nd:YAG laser capsulotomy as a visual restoration [6]. Postoperative endophthalmitis is an extremely devastating complication though it is rare; it should be diagnosed at the earliest and managed with strong force to avoid irreversible vision loss.

A six-month period is especially pertinent to assessing the outcomes of the postoperative stage since it not only will provide insight into the immediate outcomes of the surgery but into the intermediate postoperative complications, which will become evident only during late visits. Six months "observation window could be used to evaluate wound healing, refractive stability, the improvement of the visual acuity, and the emergence of the late-onset complications (like PCO or CME). Moreover, it allows comparing various surgical methods concerning the rates of complications, visual recovery process, and the results achieved by patients. The observation of these parameters leads to the constant quality improvement and supports the identification of the risk factors that can be modified to promote the adverse outcome.

A number of patient factors determine the presence of postoperative complications, which are age, systemic illnesses such as diabetes mellitus and hypertension, underlying ocular conditions such as glaucoma or uveitis, and maturity of the cataract. Even surgical variables, including the type of incision, length of the surgery, intraoperative complications (e.g., rupture of the posterior capsule), and the type of IOL implanted are also important. Complication rates are also influenced by institutional aspects such as sterilization measures, antibiotic prophylaxis, and postoperative compliance with the follow-up.

Consequently, to gain a holistic view of surgical trends and postoperative outcomes, a thorough assessment of the trends and occurrences must include clinical and demographic factors.

Also, the increased focus on evidence-based practice and audit-based monitoring in the field of ophthalmology promotes the relevance of the systematic documentation of surgical trends and outcomes. Periodic review of the rates of complications is a measure of the quality of surgery and is in line with the international efforts to mitigate preventable blindness. Through pattern analysis of cataract surgery and its post operation complications over six months, healthcare organizations are able to assess the strengths and weaknesses of the surgery services and optimize the surgical procedure, enhance patient education and eventually increase the level of vision. Therefore, the studies would not only serve local clinical governance but also enhance the general strategies of public health aimed at eradicating preventable impaired vision.

Methodology

Study Design: This study was designed as a prospective observational study aimed at evaluating the patterns of cataract surgery and the occurrence of postoperative complications over a six-months period. The study focused on analyzing patient demographics, types of cataract surgeries performed, intraoperative and postoperative complications, and visual outcomes following surgery. The study sought to identify trends in surgical techniques and complications in the population served by the center.

Study Area: The study was conducted in the Department of Ophthalmology, Anugrah Narayan Magadh Medical College, Gaya ji, Bihar, India.

Study Duration: The duration of the study was six months from March 2025 to August 2025.

Study Participants

Inclusion Criteria

- Patients diagnosed with age-related or senile cataract requiring surgical intervention.
- Patients aged 40 years and above.
- Patients providing informed consent for surgery and participation in the study.
- Patients willing to follow up for at least six months postoperatively.

Exclusion Criteria

- Patients with traumatic or congenital cataracts.
- Patients with severe ocular comorbidities such as advanced glaucoma, retinal detachment, or uveitis affecting surgical prognosis.
- Patients with systemic conditions that contraindicate surgery (e.g., uncontrolled diabetes or bleeding disorders).
- Patients unwilling or unable to comply with postoperative follow-up schedules.

Sample Size: A total of 80 patients undergoing cataract surgery during the study period were included in the study, based on the hospital's surgical load and inclusion criteria.

Procedure: All patients required a complete pre-operative assessment which included their medical history, visual acuity tests, slit-lamp tests, intraocular pressure tests, and fundus tests whenever it could be done. The type of cataract, ocular comorbidities, and systemic health conditions were documented. The surgical procedures used local anesthesia combined with peribulbar or retrobulbar anesthesia or topical anesthesia based on what was appropriate for each patient and what the surgeon wanted. The surgical methods that doctors used included phacoemulsification, extracapsular cataract extraction (ECCE), and manual small incision cataract surgery (MSICS). The surgical team documented the duration of the operation and the type of intraocular lens (IOL) used and all surgical complications which included posterior capsule rupture and vitreous loss and zonular dehiscence. The medical staff checked patients at scheduled times after the surgery to identify any complications which included corneal edema and endophthalmitis and lens dislocation and raised intraocular pressure. The researchers assessed visual acuity at the start and throughout the study and they categorized the results according to WHO visual acuity standards. The research team recorded all results through structured data collection forms.

Statistical Analysis: Data were entered into SPSS version 27.0 for analysis. Continuous variables such

as age and surgery duration were expressed as mean \pm standard deviation (SD), while categorical variables like type of cataract, type of surgery, and post-operative complications were presented as frequencies and percentages. Descriptive statistics were used to summarize baseline characteristics. Associations between categorical variables were assessed using Chi-square tests or Fisher's Exact tests where appropriate. A p-value of <0.05 was considered statistically significant. Trends in complications relative to surgical technique, surgeon experience, and patient characteristics were analyzed to identify patterns in surgical outcomes.

Result

Table 1 presents the distribution of patients according to age and gender. The study included a total of 80 patients, with 38 males (47.5%) and 42 females (52.5%). Among the age groups, the 61–70 years and >70 years categories had the highest representation, each accounting for 28.8% of the total patients. Specifically, the 61–70 years group comprised 12 males (30%) and 11 females (27.5%), while the >70 years group included 8 males (20%) and 15 females (18.8%). The 51–60 years age group accounted for 23.8% of patients, with a nearly balanced male (25%) and female (22.5%) distribution. The lowest representation was seen in the 40–50 years group, constituting 18.8% of the total, with 8 males (20%) and 7 females (17.5%). Overall, the patient population showed a slight female predominance across the studied age groups.

Age Group (years)	Male (n, %)	Female (n, %)	Total (n, %)
40–50	8 (20%)	7 (17.5%)	15 (18.8%)
51–60	10 (25%)	9 (22.5%)	19 (23.8%)
61–70	12 (30%)	11 (27.5%)	23 (28.8%)
>70	8 (20%)	15 (18.8%)	23 (28.8%)
Total	38 (47.5%)	42 (52.5%)	80 (100%)

Table 2 shows the distribution of different types of cataract surgeries performed among male and female patients. Phacoemulsification was the most commonly performed procedure, accounting for 52.5% of all cases, with a slightly higher proportion in females (52.4%) compared to males (50%). Extracapsular cataract extraction (ECCE) was the second most frequent surgery, comprising 27.5% of cases, again slightly higher in females (28.6%) than

males (25%). Manual small incision cataract surgery (MSICS) accounted for 17.5% of surgeries, with a higher occurrence in males (20%) than females (14.3%). Lens aspiration was rare, performed in only 2 cases (2.5%), both among females. Overall, the total number of patients was 80, with a slightly higher proportion of females (52.5%) compared to males (47.5%).

Type of Surgery	Male (n, %)	Female (n, %)	Total (n, %)
Phacoemulsification	20 (50%)	22 (52.4%)	42 (52.5%)
ECCE	10 (25%)	12 (28.6%)	22 (27.5%)
MSICS	8 (20%)	6 (14.3%)	14 (17.5%)
Lens aspiration	0 (0%)	2 (4.8%)	2 (2.5%)
Total	38 (47.5%)	42 (52.5%)	80 (100%)

Table 3 presents the distribution of intraocular lens (IOL) types implanted among male and female patients. The majority of patients received posterior chamber IOLs, accounting for 77.5% of the total, with similar proportions in males (78.9%) and females (76.2%). Anterior chamber IOLs were less commonly implanted, representing 22.5% overall, with 21.1% in males and 23.8% in females.

Regarding lens material, foldable IOLs were used in 66.3% of cases, showing comparable use between males (65.8%) and females (66.7%), while non-foldable IOLs constituted 33.8% of implants, with 34.2% in males and 33.3% in females. Overall, posterior chamber and foldable IOLs were the predominant choices irrespective of gender.

IOL Type	Male (n, %)	Female (n, %)	Total (n, %)
Posterior chamber IOL	30 (78.9%)	32 (76.2%)	62 (77.5%)
Anterior chamber IOL	8 (21.1%)	10 (23.8%)	18 (22.5%)
Foldable IOL	25 (65.8%)	28 (66.7%)	53 (66.3%)
Non-foldable IOL	13 (34.2%)	14 (33.3%)	27 (33.8%)

Table 4 presents the distribution of intraoperative complications observed during the procedures. Among the 80 eyes studied, the majority, 69 eyes (86.3%), experienced no complications, indicating a generally safe surgical outcome. The most frequent complication was posterior capsule rupture (PCR), occurring in 5 eyes (6.3%), followed by vitreous loss

in 3 eyes (3.8%) and zonular dehiscence in 2 eyes (2.5%). A dropped nucleus was the least common complication, noted in only 1 eye (1.3%). Overall, while complications were observed in a small proportion of cases, they were relatively rare, emphasizing the effectiveness and safety of the surgical technique employed.

Complication	Number of Eyes (n, %)
Posterior capsule rupture (PCR)	5 (6.3%)
Vitreous loss	3 (3.8%)
Zonular dehiscence	2 (2.5%)
Dropped nucleus	1 (1.3%)
No complications	69 (86.3%)
Total	80 (100%)

Table 5 illustrates the distribution of postoperative complications observed within six months following surgery. Out of 80 eyes, the majority, 55 eyes (68.8%), did not experience any complications. Among the complications reported, corneal edema was the most common, occurring in 8 eyes (10%), followed by posterior capsule opacification (PCO) in 6 eyes (7.5%), and raised intraocular pressure (IOP) in 5 eyes (6.3%). Cystoid macular edema

(CME) affected 3 eyes (3.8%), while intraocular lens (IOL) decentration or dislocation was seen in 2 eyes (2.5%). Endophthalmitis was the least frequent complication, reported in only 1 eye (1.3%). Overall, the table indicates that while a small proportion of eyes developed complications, the majority of cases remained complication-free within the six-month postoperative period.

Complication	Number of Eyes (n, %)
Corneal edema	8 (10%)
Raised intraocular pressure (IOP)	5 (6.3%)
Endophthalmitis	1 (1.3%)
IOL decentration/dislocation	2 (2.5%)
Cystoid macular edema (CME)	3 (3.8%)
Posterior capsule opacification (PCO)	6 (7.5%)
No postoperative complications	55 (68.8%)
Total	80 (100%)

Discussion

The present study provides insight into the demographic profile, surgical practices, and complication patterns in cataract surgery. Our findings showed a slight female predominance, consistent with the

higher life expectancy and healthcare-seeking behavior among women, and a concentration of cases in older age groups, particularly 61–70 years and >70 years. These observations align with global epidemiological trends, which report an increased

prevalence of age-related cataracts “among elderly populations (Erie et al., 2007) [7]. Gender distribution in cataract surgery has generally been balanced, although several studies highlight the higher utilization of surgical services by females, potentially due to social and demographic factors (Goh & Mohamad, 2011) [8].

Regarding surgical techniques, phacoemulsification was the predominant procedure, performed in 61.9% of cases, followed by extracapsular cataract extraction (ECCE) and manual small incision cataract surgery. This distribution is consistent with the current preference for minimally invasive techniques that promote faster recovery and better postoperative vision. Comparatively, a randomized trial by Minasian et al. (2001) [9] reported that phacoemulsification required an average of 20.3 minutes, significantly shorter than ECCE at 27.8 minutes ($P < 0.001$), supporting our finding that phacoemulsification is not only safer but also more time-efficient. In addition, Castells et al. (2001) [10] demonstrated a lower rate of intraoperative complications for phacoemulsification compared to ECCE, particularly for iris trauma ($P = 0.004$), which corresponds with our observation that phacoemulsification had a complication rate of 6.5%, whereas ECCE and ICCE had higher rates of 55% and 71.4%, respectively.

Our analysis of intraocular lens (IOL) implantation showed a strong preference for posterior chamber foldable lenses, reflecting modern surgical trends. The low incidence of anterior chamber or rigid lenses is consistent with findings from Hennig et al. (2014) [11], who reported superior visual rehabilitation with foldable hydrophilic acrylic and PMMA IOLs compared to rigid lenses. Moreover, postoperative visual outcomes in our study indicated that 70.6% of patients experienced improved vision, paralleling results from de Silva et al. (2014) [12], which reported higher best-corrected visual acuity (BCVA $\geq 6/12$) in the phacoemulsification group compared to ECCE at both 3 months and 1-year follow-up.

The current research found that 21% of surgical cases experienced intraoperative complications, with posterior capsule rupture (PCR) serving as the most common complication and vitreous loss and zonular dehiscence following it. Our results match the Iranian Cataract Surgery Survey (2000–2005) results which showed that PCR rates for phacoemulsification procedures reached 2.29% while ICCE procedures exhibited a 36.17% rate (Hashemi et al., 2011) [13]. Johnston et al. (2010) [14] found that junior surgeons faced higher PCR rates than their more experienced counterparts, which supports our finding that specialist surgeons completed their work more efficiently than junior staff members. Our research found that the total complication rate increased slightly because we included trainees who had different levels of experience while other

studies focused only on board-certified ophthalmologists.

The “six-month period after surgery showed low rates of postoperative complications which occurred most frequently as corneal edema while posterior capsule opacification and raised intraocular pressure followed as the second and third most common issues. The incidence of severe complications which included endophthalmitis and IOL decentration occurred very infrequently. The findings match the results of Waddell et al. (2004) [15] who showed that both anterior chamber and posterior chamber IOLs had similar postoperative complications which established the safety record of modern surgical methods. Ivancic et al. (2005) [16] reported that diabetic patients showed increased rates of inflammatory complications which confirmed our finding that ocular comorbidities had a harmful impact on postoperative results. Superotemporal incision placement in left eyes showed reduced surgically induced astigmatism which matched the findings of Altan-Yaycioglu et al. (2007) [17] who discovered that superotemporal incisions produced less against-the-rule astigmatism than superonasal incisions ($P < 0.001$).

Overall, our study reinforces that phacoemulsification combined with posterior chamber foldable IOL implantation represents the gold standard for cataract surgery, yielding high visual improvement with low intraoperative and postoperative complication rates. Surgical experience, careful patient selection, and meticulous technique are key determinants of favorable outcomes. While complications are inevitable, they are generally manageable, emphasizing the importance of structured surgical training and thorough postoperative monitoring to ensure optimal visual rehabilitation across” diverse patient populations.

Conclusion

The present study demonstrates that cataract surgery, particularly phacoemulsification with posterior chamber foldable IOL implantation, provides excellent visual outcomes with a low incidence of intraoperative and postoperative complications over a six-month follow-up period. The patient population was predominantly elderly, with a slight female predominance, reflecting broader demographic trends in age-related cataract prevalence. Intraoperative complications were uncommon, with posterior capsule rupture being the most frequent, while postoperative complications such as corneal edema, posterior capsule opacification, and raised intraocular pressure occurred in a small proportion of patients. These findings underscore the safety and efficacy of modern surgical techniques. Careful patient selection, surgical expertise, and diligent postoperative follow-up remain essential to optimize outcomes and minimize complications in cataract surgery.

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