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Research Article

Immediate Versus Delayed Cataract Surgery: A Study on Visual Outcome and Patient Satisfaction

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Abstract: ***Background:*** Cataract surgery is an effective treatment for restoring vision and improving quality of life. While delayed sequential bilateral cataract surgery (DSBCS) remains common, immediate sequential bilateral cataract surgery (ISBCS) may offer enhanced clinical and functional outcomes. This study aims to compare visual outcomes and patient satisfaction between immediate and delayed sequential cataract surgery. ***Methods:*** This comparative observational study was conducted at the Department of Ophthalmology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Bangladesh, from August 2013 to July 2014. A total of 80 adults (≥60 years) with bilateral senile cataract and visual acuity <6/18 were enrolled and assigned to either the Immediate Surgery Group (n = 40) or the Delayed Surgery Group (n = 40). Pre- and post-operative best-corrected visual acuity (BCVA), visual function (VF-14), and patient satisfaction were assessed. Data were analysed using SPSS v25.0, with $p < 0.05$ considered statistically significant. ***Results:*** The baseline characteristics were mostly similar between two groups. At one month, the immediate surgery group demonstrated significantly better BCVA (0.11 ± 0.05 vs. 0.14 ± 0.07 logMAR; p = 0.03), greater BCVA improvement (0.56 ± 0.10 vs. 0.51 ± 0.11; p = 0.03), and lower refractive error (0.24 ± 0.10 vs. 0.31 ± 0.12 D; p = 0.005). Contrast sensitivity was higher in the immediate group (1.81 ± 0.22 vs. 1.69 ± 0.24; p = 0.02), and they reported greater satisfaction (9.2 ± 0.8 vs. 8.4 ± 1.1; p = 0.004) and a faster return to daily activities. ***Conclusion:*** Immediate cataract surgery provides superior early visual and functional outcomes, as well as higher patient satisfaction, compared to delayed surgery in appropriately selected patients.

Keywords: Cataract surgery, Visual outcomes, Patient satisfaction, Immediate sequential, Bilateral cataract.

INTRODUCTION

Age-related cataract is the primary reason for reversible blindness worldwide and represents the main cause of cataracts in elderly individuals. The rising demand for cataract surgery, driven by an aging worldwide population, underscores the need for improved surgical methods that combine outstanding outcomes with patient security and cost-effective healthcare. Cataract surgery has become a worldwide leading surgical procedure due to advances in modern phacoemulsification techniques and intraocular lens (IOL) technology, resulting in substantial improvements in post-surgical vision clarity, quality of life, and functional independence [1, 2].

According to standard operating methods, patients undergo their second eye cataract surgery after their first eye has recovered from the initial surgery. Safety requirements, particularly those related to the risk of bilateral endophthalmitis, inform this approach [3, 4]. The safety outcomes of immediate sequential bilateral cataract surgery (ISBCS) are similar to those of traditional surgical procedures when medical centers implement strict infection control protocols [5]. ISBCS provides supplemental benefits, including accelerated visual recovery, as well as decreased operational complexity and financial cost advantages for healthcare organizations and patients [6, 7].

Multiple investigations found that visual results from ISBCS match or surpass those of delayed sequential bilateral cataract surgery (DSBCS). Strengthened refractive results stem from applying optimized biometry measurement along with maintaining homogenous surgical environments between both eyes [8]. Improvement of patient-reported outcomes connects to immediate surgery because the method provides both better contrast sensitivity and faster stereopsis recovery, along with enhanced binocular visual function [9]. The postoperative visual function and quality of life

outcomes, measured by the VF-14 index and EQ-5D, provide strong evidence for a patient-centered evaluation of surgical success [10].

ISBCS adoption remains limited due to physician and legal concerns about bilateral surgical complications along with their related consequences. Medical research based on extensive surveys demonstrates that bilateral endophthalmitis cases from ISBCS remain extremely rare when healthcare providers adopt both antibiotic protection and strict eye-separation methods. Studies about ISBCS have led multiple professional organizations to give their support for this approach in suitable medical scenarios and specific patient groups [11].

The recent advancements in cataract surgery demand detailed investigations that analyze clinical results together with patient satisfaction, along with functional rehabilitation between immediate and delayed cataract surgery. The empirical examination of visual acuity outcomes has given way to comprehensive studies that combine subjective patient feedback alongside life quality measurements alongside surgical recovery durations to assess complete surgical timing effects [12].

The research compares the visual performance results along with assessment of patient satisfaction between patients who received immediate sequential cataract surgery and those who had delayed bilateral procedures. The study results aim to improve clinical practice through patient guidance while providing evidence for surgical decision-making in cataract patient management.

Objective

The objective of this study was to compare visual outcomes and patient satisfaction between immediate and delayed sequential bilateral cataract surgery in adults with age-related cataract.

METHODOLOGY & MATERIALS

This comparative observational study was conducted at the Department of Ophthalmology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from August 2013 to July 2014. A total of 80 patients diagnosed with cataract and eligible for bilateral cataract surgery were enrolled and divided into two groups: the Immediate Surgery Group (n = 40) and the Delayed Surgery Group (n = 40). The population consisted of adult patients attending the ophthalmology outpatient department, representing a diverse demographic from both urban and semi-urban areas.

Sample Selection

Inclusion Criteria

- Adults aged ≥ 60 years with bilateral senile cataract.
- Patients eligible for phacoemulsification with intraocular lens implantation.
- Patients willing to undergo either immediate or delayed sequential cataract surgery.
- Visual acuity less than 6/18 in both eyes.

Exclusion Criteria

- Presence of ocular comorbidities such as glaucoma, retinal disorders, or corneal opacities.
- Patients with systemic illnesses affecting visual outcome (e.g., uncontrolled diabetes, neurological diseases).
- History of previous intraocular surgery.
- Inability to complete follow-up visits or respond to patient-reported questionnaires.

Data Collection Procedure

Data collection was carried out through a combination of structured clinical evaluations, patient satisfaction questionnaires, and visual function assessments. Pre- and post-operative best-corrected visual acuity (BCVA) was measured using a Snellen chart and converted to logMAR format. Patient satisfaction was assessed using a standardized questionnaire (10-point Likert scale), while visual function was measured using the VF-14 index. Informed consent was obtained from all participants before they participated in the study. Confidentiality of patient information was strictly maintained throughout the study.

Statistical Analysis

Data were analysed using IBM SPSS Statistics version 25.0. Descriptive statistics, including mean and standard deviation, were used to summarize continuous variables, while categorical variables were expressed as frequencies and percentages. The independent samples t-test was used to compare mean values (e.g., BCVA, VF-14 scores, satisfaction scores) between the two groups. For categorical data, the Chi-square test was used. A statistically significant p-value was defined as less than 0.05.

RESULTS

Table 1: Baseline characteristics of the respondents (n=80)

Characteristic	Immediate Surgery (n = 40)	Delayed Surgery (n = 40)
Age (mean ± SD, years)	65.5 ± 5.7	64.2 ± 6.1
Gender (Male/Female)	21 / 19	16 / 24
Diabetes Mellitus (%)	9 (22.5)	10 (25.0)
Hypertension (%)	12 (30.0)	11 (27.5)
Pre-op BCVA (logMAR)	0.66 ± 0.15	0.63 ± 0.14
Pre-op VF-14 Score	57.8 ± 10.4	57.3 ± 10.9

Table 1 shows baseline demographic and clinical profiles of both study groups. The mean age was 65.5 ± 5.7 years in the immediate group and 64.2 ± 6.1 years in the delayed group. The gender distribution showed a higher proportion of males in the immediate group (21 males, 19 females) and a higher proportion of females in the delayed group (16 males, 24 females). The prevalence of diabetes mellitus and hypertension was comparable between groups, with no significant differences. Preoperative visual function was similar, with comparable BCVA (logMAR 0.66 ± 0.15 vs. 0.63 ± 0.14) and VF-14 scores (57.8 ± 10.4 vs. 57.3 ± 10.9).

Table 2: Postoperative visual outcomes at 1 month

Outcome Measure	Immediate Surgery (n = 40)	Delayed Surgery (n = 40)	p-value
BCVA (logMAR)	0.11 ± 0.05	0.14 ± 0.07	0.03
Improvement in BCVA	0.56 ± 0.10	0.51 ± 0.11	0.03
Refractive Error (D)	0.24 ± 0.10	0.31 ± 0.12	0.005
Contrast Sensitivity	1.81 ± 0.22	1.69 ± 0.24	0.02

Table 2 presents visual outcomes one month after surgery. The immediate group showed better BCVA (0.11 ± 0.05 logMAR) compared to the delayed group (0.14 ± 0.07 logMAR; p = 0.03). BCVA improvement from baseline was greater in the immediate group (0.56 ± 0.10 vs. 0.51 ± 0.11; p = 0.03). Refractive error was lower in the immediate group (0.24 ± 0.10 diopters) than delayed group (0.31 ± 0.12 diopters; p = 0.005). Contrast sensitivity was higher in the immediate group (1.81 ± 0.22) compared to the delayed group (1.69 ± 0.24; p = 0.02).

Table 3: Patients satisfaction score at 1 month

Satisfaction Measure	Immediate Surgery (n = 40)	Delayed Surgery (n = 40)	p-value
VF-14 Score	93.1 ± 5.0	85.2 ± 6.3	<0.001
EQ-5D Index Score	0.91 ± 0.05	0.87 ± 0.06	0.001
Patient Satisfaction (1–10)	9.2 ± 0.8	8.4 ± 1.1	0.004
Return to Daily Activities (days)	10.2 ± 3.5	12.5 ± 4.3	0.01

Table 3 shows patient-reported outcomes and satisfaction at one month postoperatively. The immediate group had higher VF-14 scores (93.1 ± 5.0) than the delayed group (85.2 ± 6.3; p < 0.001), indicating better functional visual recovery. The EQ-5D index score for health-related quality of life was higher in the immediate group (0.91 ± 0.05 vs. 0.87 ± 0.06; p = 0.001). Patient satisfaction scores (scale 1–10) were greater in the immediate group (9.2 ± 0.8) than the delayed group (8.4 ± 1.1; p = 0.004). Furthermore, the average number of days to return to daily activities was shorter in the immediate group (10.2 ± 3.5 days) compared to the delayed group (12.5 ± 4.3 days; p = 0.01).

DISCUSSION

The researchers evaluated how cataract patients performed and felt about their results when they received their surgery promptly, compared to when the procedure was postponed. At one-month follow-up, immediate cataract surgery yielded superior visual outcomes, as measured by BCVA, contrast sensitivity, and refractive error, and was associated with better patient satisfaction and shorter recovery times compared to delayed surgery. These outcomes contribute valuable knowledge to the discussion about the best timing for bilateral cataract surgery procedures.

The study findings support earlier research that documents the advantages of performing cataract surgery back-to-back, one after the other. According to Herrinton *et al*., individuals who underwent immediate sequential bilateral cataract surgery achieved visual results that were equivalent to or potentially superior to those of patients who waited for delayed surgeries, while experiencing similar improvements in BCVA [13]. Nassiri *et al*. demonstrated that patients experienced better convenience and satisfaction following immediate surgery, as they required fewer hospital visits and recovered visually more rapidly [14]. The findings of our study support earlier observations, along with new

evidence that demonstrates measurable benefits in refractive accuracy and contrast sensitivity following immediate cataract removal.

The immediate group demonstrated better contrast sensitivity outcomes that were confirmed as statistically significant in our study results. The essential role of contrast sensitivity in improving functional vision after post-operative cataract surgery has been confirmed by Williamson *et al*. in their study [9]. The better contrast sensitivity achieved by patients who underwent surgery immediately helped them perform better on quality-of-life evaluations, as measured by the VF-14 and EQ-5D scores. It produced superior outcomes compared to patients who waited for surgery. Desai *et al*. obtained similar results to our study when they found that bilateral cataract patients experienced superior improvements in vision quality of life compared to patients undergoing single-eye surgery [1].

Patient-reported satisfaction levels improved, along with a reduction in the time needed for returning to typical activities among patients in the immediate surgery group. Research by Arsenault *et al*. demonstrated that patients who underwent immediate sequential surgery experienced better satisfaction and improved visual recovery, as their double vision symptoms were resolved more quickly. They faced reduced mental stress from delaying their second procedure [15]. Castells *et al*. and Lundström *et al*. demonstrated that patients experience enhanced functional improvement along with increased independence after receiving second-eye surgery, which should occur without unnecessary timing delays [16, 17].

Many medical facilities use delayed surgery as their standard approach because they want to minimize potential safety risks, which mainly include bilateral endophthalmitis. We found no severe complications in patients within our study, but safety issues still need to be prioritized. The results of Montan *et al*. established intracameral cefuroxime as a preventive treatment against endophthalmitis, which many institutions now use routinely [5]. The implementation of infection control protocols, along with intracameral cefuroxime administration, has successfully reduced the concerns related to conducting procedures simultaneously. The research by Sarikkola *et al*. showed that same-day bilateral patients experienced no higher rates of postoperative problems [18].

Recent economic analyses demonstrate that immediate sequential bilateral cataract surgery (ISBCS) offers cost efficiencies during patient treatment and healthcare system operations under publicly funded healthcare conditions [7, 19]. Standard practice guidelines and policy decisions require economic assessments to gain approval for implementing ISBCS.

The immediate group demonstrated superior refractive outcomes, which can be attributed to various potential reasons. The enhanced expectation of visual results may be due to a more accurate intraocular lens calculation method, combined with precise biometric measurements. Our research did not include modifications to IOL power between operations although this standard procedure can be used to refine the first eye's refractive goals in delayed cases. Multiple investigations revealed that surgeons could achieve minimal outcome improvements by adjusting planned lens powers when performing delayed procedures (Olsen T; Jivrajka *et al*.,) [8, 20], although technological advancements tend to reduce this benefit.

Our study findings carry important clinical value for surgical practices. The surgical intervention enables a speedier visual recovery, along with an enhanced quality of life for both patients and healthcare providers, as long as they adhere to predetermined perioperative safety guidelines. The surgical approach offers advantages to older patients who require prompt care and individuals who are not suitable candidates for non-surgical treatment. Public health can benefit from immediate surgery protocols, which will shorten waiting times and enhance the use of healthcare resources. The findings of this research align with the existing literature, which advocates for cataract surgery to be performed without delay in bilateral patients, as this approach would lead to better quantitative measures and enhanced quality of life satisfaction. The implementation of proper safety measures allows immediate surgery to offer superior patient-centered care and more efficient health service delivery.

CONCLUSION

Immediate cataract surgery yields superior visual outcomes, improved contrast sensitivity, greater refractive precision, and enhanced patient satisfaction compared to delayed surgery. Patients experienced faster return to daily activities, highlighting the functional and psychological benefits of prompt intervention. These findings support the adoption of immediate bilateral cataract surgery in suitable candidates under stringent safety protocols. The results support policy and practice shifts toward immediate sequential surgery to optimize outcomes and healthcare efficiency.

Limitations and recommendations

This study is limited by its short follow-up duration and single-center design, affecting generalizability and long-term outcome assessment. Selection bias cannot be excluded despite matched baseline characteristics. Future multicenter randomized trials with longer follow-up are needed to validate these findings across diverse populations. Studies examining cost-effectiveness, patient-reported outcomes, and safety in high-risk groups will inform clinical protocols and policy development, facilitating broader adoption of immediate sequential cataract surgery.

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