



African Journal of Biological Sciences



Evaluating Visual Outcomes and Complications of Cataract Surgery at Tertiary Hospital and Research Centre: A Prospective Observational Study.

Arpita Acharya¹, Neelima Sahu^{2*}, Lopamudra Beura³, Pratima Baisakh⁴

^{1,2,3} Ophthalmology, IMS & SUM Hospital, Siksha 'O' Anusandhan University, Bhubaneswar, IND

⁴ Anatomy, IMS & SUM Hospital, Siksha 'O' Anusandhan University, Bhubaneswar, IND

***Corresponding Author:** Neelima Sahu

Email: drneelimasahu2015@gmail.com

Article History

Volume 6, Issue 5, May 2024

Received: 18 Apr 2024

Accepted: 21 May 2024

Doi: [10.33472/AFJBS.6.5.2024.4018-4025](https://doi.org/10.33472/AFJBS.6.5.2024.4018-4025)

Abstract

Background: Cataract surgery, critical for restoring vision in patients with lens opacification, generally achieves successful outcomes. However, the variability in postoperative outcomes necessitates ongoing evaluation against global health standards.

Objective: This study evaluates the visual outcomes and complications associated with cataract surgery at Jawaharlal Nehru Hospital and Research Centre, Bhubaneswar, comparing these results with WHO standards and assessing the impact of patient age and intraoperative complications.

Methods: This prospective observational study included 400 patients undergoing cataract surgery from September 2016 to August 2017. Visual outcomes were classified as good, borderline, or poor based on postoperative visual acuity measurements. The incidence and types of intraoperative and postoperative complications were also recorded.

Results: The study found that 91.75% of patients achieved good visual outcomes, significantly exceeding WHO recommendations. However, a decline in optimal outcomes was observed with increasing patient age. Intraoperative complications were recorded in 5.25% of cases, with posterior capsular rupture being the most common complication directly influencing visual acuity results. Postoperative complications such as corneal edema and posterior capsular opacity were managed effectively with standard care protocols.

Conclusions: The high success rate of cataract surgeries at the study site underscores the efficacy of current surgical practices. Yet, the age-related decline in outcomes and the notable impact of surgical complications highlight areas for improvement. The study recommends enhancing surgical training, upgrading equipment, and tailoring postoperative care to improve patient outcomes further and align with the best global practices in ophthalmology.

Categories: Preventive Medicine, Ophthalmology

Key words: global health standards, postoperative complications, intraoperative complications, visual outcomes, cataract surgery

Introduction

Cataracts are the leading cause of blindness globally, significantly impacting aging populations. Surgical removal of the cataractous lens and its replacement with an artificial lens is the only effective treatment known for its high success rate. This study aims to evaluate the efficacy of cataract surgeries performed at Jawaharlal Nehru Hospital and Research Centre and identify potential areas for improvement [1,2].

The high prevalence of cataracts and the critical nature of maintaining visual function underscore the importance of cataract surgery. Despite the procedure's high success rate, a significant proportion of surgeries result in suboptimal outcomes, including varied levels of visual impairment post-operation [3,4]. Understanding and studying these outcomes are crucial as they directly affect the patient's quality of life, ability to perform daily activities, and overall socioeconomic status. The factors influencing visual outcomes and the occurrence of complications can provide invaluable insights into improving surgical techniques, patient care, and post-operative management. [5–9].

The primary objective of this study is to evaluate the visual outcomes and associated complications following cataract surgery at Jawaharlal Nehru Hospital and Research Centre in Bhilai. By analyzing the surgical results from September 2016 to August 2017, this research aims to identify the key factors contributing to less-than-optimal visual results and complications. These insights are intended to aid in enhancing surgical outcomes, reducing the incidence of complications, and ultimately improving patient satisfaction and visual quality post-cataract surgery. The findings could also contribute to establishing protocols or frameworks that could be implemented in similar settings to improve overall surgical outcomes. [4,10].

Materials And Methods

Study Setting and Population:

This prospective observational study was conducted at the Department of Ophthalmology, Jawaharlal Nehru Hospital and Research Centre, Bhilai, from September 2016 to August 2017. The study enrolled 400 patients undergoing cataract surgery, adhering to specified inclusion and exclusion criteria. The inclusion criteria targeted patients over the age of 40 years requiring cataract extraction, while exclusion criteria omitted those with previous ocular surgeries, co-existing major ocular diseases, or systemic conditions affecting visual outcomes.

Study Design:

The study design entailed detailed preoperative, intraoperative, and postoperative assessments.

Preoperative Evaluation: Comprehensive baseline data were collected, including demographic details and medical and ocular history. Preoperative assessments involved visual acuity measurements using Snellen charts, slit lamp examinations for anterior segment evaluation, and intraocular pressure measurements with applanation tonometry.

Surgical Procedures: All surgeries used phacoemulsification or manual minor incision cataract surgery (SICS) techniques. Details of the surgical procedure, intraocular lens choice, and intraoperative complications were meticulously documented.

Postoperative Follow-ups: Follow-up visits were scheduled for one day, one week, six weeks, and three months post-surgery to monitor recovery and identify complications. These visits included repeated measurements of visual acuity, intraocular pressure, and detailed anterior and posterior segment evaluations using slit lamp and indirect ophthalmoscopy. Additional diagnostic tests like

optical coherence tomography (OCT) and fundus fluorescein angiography (FFA) were performed if indicated.

Ethical Considerations: This study received approval from the Institutional Review Board (IRB) of Jawaharlal Nehru Hospital and Research Centre, Bhilai, adhering to the Declaration of Helsinki. Informed consent was meticulously obtained, ensuring all participants were fully informed of the study's scope, potential risks, and benefits. Strict confidentiality measures were enforced, with all personal data securely anonymized. Risk management protocols were in place to mitigate surgical risks, and the study maintained a commitment to transparent reporting of all findings, thereby upholding the highest standards of research integrity.

Statistical Analysis: Data were analyzed using SPSS (Version 25.0, IBM Corp). Descriptive statistics, chi-square tests, and ANOVA were utilized to evaluate surgical outcomes and complications, with a significance level set at $p < 0.05$. This approach ensured a reliable interpretation of the efficacy and safety of cataract surgeries.

Results

Overview of Visual Acuity Outcomes

Our study categorized the visual outcomes of cataract surgery based on postoperative visual acuity. A significant majority of the patients experienced positive results, with 367 (91.75%) achieving good visual acuity (BCVA of 6/6–6/18), 30 (7.5%) having borderline vision (BCVA of 6/24–6/60), and only 3 (0.75%) classified under poor vision (BCVA worse than 6/60), and only 3 (0.75%) classified under poor vision (BCVA worse than 6/60). These results suggest that the cataract surgery at the Jawaharlal Nehru Hospital and Research Centre is highly effective, with a success rate considerably surpassing WHO recommendations of less than 20% poor outcomes (Table 1).

Table 1 DISTRIBUTION OF BCVA (at 6 wks) AMONG THE SAMPLES

Vision Assessment	Good Vision	Borderline Vision	Poor Vision	Total	Significance
UCVA (Unaided Corrected Visual Acuity)	343 (85.75%)	54 (13.5%)	3 (0.75%)	400 (100%)	P = 0.021 (Significant)
BCVA (Best Corrected Visual Acuity)	367 (91.75%)	30 (7.5%)	3 (0.75%)	400 (100%)	P = 0.021 (Significant)

Statistical Analysis of Visual Outcomes

The statistical analysis utilized chi-square tests and ANOVA to compare preoperative and postoperative visual acuity measurements, with a significance level set at $p < 0.05$. This comparison revealed a significant improvement in visual acuity post-surgery ($p < 0.05$), as demonstrated in Table 1, providing a robust statistical foundation to confirm the efficacy of the surgical procedures.

Age-Related Outcomes

Visual outcomes varied with age, demonstrating a noticeable decline in older age groups. For patients aged 81 and above, only 10 (55.56%) maintained good visual outcomes compared to younger age groups, where good outcomes were almost universal (Table 2). This age-related decline in visual acuity was statistically significant ($p < 0.0001$), highlighting the need for tailored approaches in older demographics.

Table 2 BCVA COMPARISON AMONGST DIFFERENT AGE GROUPS

Age Group (years)	BCVA: 6/18	BCVA: 6/60	BCVA: >6/18- >6/60	Total No.	Significance
≤ 50	1 (100%)	0 (0%)	0 (0%)	1 (100%)	Highly Significant
51-60	95 (96.94%)	3 (3.06%)	0 (0%)	98 (100%)	Highly Significant
61-70	180 (96.77%)	5 (2.69%)	1 (0.54%)	186 (100%)	Highly Significant
71-80	81 (83.51%)	15 (15.46%)	1 (1.03%)	97 (100%)	Highly Significant
≥ 81	10 (55.56%)	7 (38.89%)	1 (5.55%)	18 (100%)	Highly Significant
Total	367 (91.75%)	30 (7.5%)	3 (0.75%)	400 (100%)	Highly Significant

Distribution of Intraoperative Complications

Intraoperative complications were documented in 21 (5.25%) of the cases. The most common complications included posterior capsular rupture (PCR) occurring in 10 (2.5%) of the surgeries (Table 3) and (figure 1). Intraoperative complications significantly impacted the visual acuity outcomes (p=0.02), indicating a direct correlation between surgical complications and postoperative vision quality.

Table 3 DISTRIBUTION OF INTRAOPERATIVE COMPLICATIONS

Complication	Cases (%)	p-value
RBH (Retained lens fragments)	1 (0.25%)	0.02
PCR (Posterior Capsule Rupture)	10 (2.5%)	0.02
PCR + VL (Vitreous Loss)	3 (0.75%)	0.02
DMD (Descemet Membrane Detachment)	2 (0.5%)	0.02
Premature Entry	2 (0.5%)	0.02
Zonular Dialysis	2 (0.5%)	0.02
Iris Tear	1 (0.25%)	0.02

Postoperative Complications

Early and late postoperative complications were also monitored, with early complications such as corneal edema observed in 49 (12.25%) patients on the first postoperative day (Table 4). Late complications were less frequent but included significant issues such as posterior capsule opacification (PCO) in 23 (5.75%) patients (Table 5). The management of these complications was crucial for ensuring successful long-term outcomes.

Table 4 DISTRIBUTION OF COMPLICATIONS IN EARLY POST OPERATIVE PERIOD

Early Post-Operative Complications	Day 1	Week 1
Striate Keratitis	40 (10%)	11 (2.75%)
Corneal Edema	49 (12.25%)	16 (4%)
AC Reaction	25 (6.25%)	6 (1.5%)

Early Post-Operative Complications	Day 1	Week 1
Wound Leak	3 (0.75%)	-
Hyphema	2 (0.50%)	-
TASS	1 (0.25%)	-

Table 5 DISTRIBUTION OF LATE POST-OPERATIVE COMPLICATIONS

Late Post-Operative Complications	N	%
Posterior Capsular Opacification (PCO)	23	5.75
Pseudophakic Bullous Keratopathy (PBK)	2	0.50
IOL Dislocation	1	0.25
Cystoid Macular Edema (CME)	3	0.75

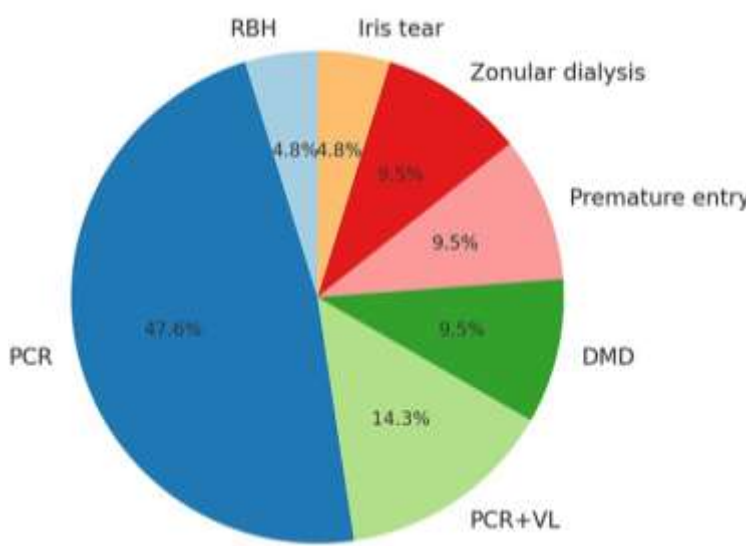


Figure 1 Complication frequencies

Discussion

This study, conducted at the Jawaharlal Nehru Hospital & Research Centre in Bhilai, aimed to identify factors influencing visual outcomes following cataract surgery. 400 patients were rigorously selected based on specific inclusion and exclusion criteria from 550 eligible cases identified from September 2016 to August 2017.

The visual outcomes documented in this study surpass the benchmarks set by the World Health Organization, which suggests that less than 20% of cataract surgeries should result in poor visual outcomes [11,12]. Our findings show that only 0.75% of surgeries fell below this threshold, indicating an exceptionally high standard of care at Jawaharlal Nehru Hospital and Research Centre.

Impact of Age on Visual Outcomes: A significant study finding is the observed decline in visual acuity with increasing age. Similar findings have been reported in other regions, indicating that age is critical to post-surgical outcomes in cataract patients [4]. Tailored surgical and postoperative care for older patients is essential to optimize visual recovery and maintain their quality of life.

Role of Intraoperative Complications: Our study documents an intraoperative complication rate of 5.25%. This emphasizes the importance of continual surgical training and technological advancements to minimize complications, which can significantly impact visual acuity outcomes

[13,14]. Addressing these complications through improved training and technology could improve patient outcomes.

Early and Late Postoperative Complications: The prevalent early and late postoperative complications identified were corneal edema and posterior capsular opacification, respectively. These complications highlight the need for rigorous postoperative management to ensure successful long-term outcomes [15–17]. Effective management strategies could significantly improve patient satisfaction and reduce the incidence of long-term complications.

The insights from this study reaffirm the high efficacy of current surgical practices and highlight critical areas for improvement. By addressing the specific challenges associated with age and intraoperative complications, there is potential to elevate the standard of cataract surgery care even further.

Recommendations:

1. Preoperative Assessment Enhancements:

- Conduct thorough preoperative evaluations to identify ocular comorbidities affecting visual outcomes or leading to intraoperative and postoperative complications.

2. Systemic Disorder Management:

- Ensure that associated systemic disorders are well-controlled before surgery, as comorbidities significantly influence the surgical outcome.

3. Operation Theatre Sterility:

- Maintain high standards of sterility in the operation theatre to prevent complications such as endophthalmitis, a severe and potentially vision-threatening infection.

4. Special Considerations for Elderly Patients:

- Perform cataract surgery on elderly patients with extra care and precision, considering their vulnerability to complications and typically more challenging postoperative recovery.

5. Monitoring and Continuous Improvement:

- Implement continuous monitoring of surgical outcomes to guide improvements in surgical techniques and minimize complications.
- Regularly update and improve surgical techniques and equipment to keep pace with technological advancements and best practices in the field.

6. Postoperative Care and Monitoring:

- Provide meticulous visual monitoring and prompt refraction postoperatively to all patients to ensure optimal visual recovery.
- Emphasize the importance of follow-up visits post-surgery to detect and treat any complications early, thereby improving the overall success rate of the surgeries.

7. Outcome Monitoring as a Service Standard:

- Integrate outcome monitoring into the standard service protocol, treating it with the same importance as performing the surgery to ensure high patient care and satisfaction standards.

Study Limitations and Strengths:

While our study offers valuable insights, it is limited by the absence of long-term follow-up data, which could reveal late-onset postoperative complications. Additionally, the lack of equipment like specular microscopy restricted our ability to assess endothelial cell health pre- and post-surgery comprehensively.

In conclusion, our study contributes significantly to the knowledge on cataract surgery outcomes, particularly highlighting phacoemulsification's effectiveness and patient age's impact on visual

recovery. Future research should focus on long-term outcomes and explore the potential benefits of incorporating newer surgical technologies and techniques to enhance visual outcomes across all age groups.

Conclusion

Our study conclusively demonstrates that cataract surgery, primarily through phacoemulsification, significantly improves visual outcomes, with good visual acuity achieved in over 91% of cases. The age of patients notably influences the success rates, with younger patients exhibiting better outcomes. Intraoperative and early postoperative complications were well within acceptable limits, underscoring the effectiveness of current surgical practices at our institution. This study reinforces the efficacy of modern cataract surgery techniques and highlights the importance of patient selection and surgical expertise in optimizing visual outcomes.

References

1. Murthy GVS, Gupta SK, Bachani D, Jose R, John N: Current estimates of blindness in India . Br J Ophthalmol. 2005, 89:257–260. 10.1136/bjo.2004.056937
2. Yin Q, Hu A, Liang Y, et al.: A two-site, population-based study of barriers to cataract surgery in rural China. Invest Ophthalmol Vis Sci. 2009, 50:1069–1075. 10.1167/iovs.08–2783
3. Anand R, Gupta A, Ram J, Singh U, Kumar R: Visual outcome following cataract surgery in visual Punjab . Indian J Ophthalmol. 2000, 48:153–158.
4. Bachani D, Gupta SK, Murthy GV, Jose R: Visual outcomes after cataract surgery and cataract surgical coverage in India. Int Ophthalmol. 1999, 23:49–56. 10.1023/A:1006435312612
5. Matta S, Park J, Shantha GPS, Khanna RC, Rao GN: Cataract surgery visual outcomes and associated risk factors in secondary level eye care centers of LV Prasad Eye Institute, India. PLoS One. 2016, 11:0148101. 10.1371/journal.pone.0144853
6. Murthy GV, Vashist P, John N, Pokharel G, Ellwein LB: Prevalence and vision-related outcomes of cataract surgery in Gujarat, India. Ophthalmic Epidemiol. 2009, 16:400–409. 10.3109/09286580903315809
7. Baranano AE, Wu J, Mazhar K, Azen SP, Varma R: Visual acuity outcomes after cataract extraction in adult Latinos. The Los Angeles Latino Eye Study. Ophthalmology. 2008, 115:815–821. 10.1016/j.ophtha.2007.05.052
8. Kandel RP, Sapkota YD, Sherchan A, et al.: Cataract surgical outcome and predictors of outcome in Lumbini Zone and Chitwan District of Nepal. Ophthalmic Epidemiol. 2010, 17:276–281. 10.3109/09286586.2010.508355
9. Lindfield R, Kuper H, Polack S, et al.: Outcome of cataract surgery at one year in Kenya, the Philippines and Bangladesh. Br J Ophthalmol. 2009, 93:875–880. 10.1136/bjo.2008.152744
10. Muller A, Zerom M, Limburg H, et al.: Results of a rapid assessment of avoidable blindness (RAAB) in Eritrea. Ophthalmic Epidemiol. 2011, 18:103–108. 10.3109/09286586.2010.545932
11. Lindfield R, Griffiths U, Bozzani F, Mumba M, Munsanje J: A Rapid Assessment of Avoidable Blindness in Southern Zambia. Wedrich A, ed. PLoS ONE. 2012, 7:38483. 10.1371/journal.pone.0038483
12. Limburg H, Foster A, Vaidyanathan K, Murthy G: Monitoring visual outcome of cataract surgery in India . Bull World Health Organ. 1999, 77:455–460.
13. Thylefors B, Negrel A–D, Pararajasegaram R, et al.: Global data on blindness . Bull World Health Org. 1995, 73:115–121.

14. Pascolini D, Mariotti SP: Global estimates of visual impairment 2010 . Br J Ophthalmol. 2012, 96:614–618. 10.1136/bjophthalmol-2011-300539
15. Bourne RR, Jonas JB, Flaxman SR, et al.: Prevalence and causes of vision loss in high-income countries and in Eastern and Central Europe: 1990–2010. Br J Ophthalmol. 2014, 98:599–604. 10.1136/bjophthalmol-2013-304033
16. Jonas JB, George R, Asokan R, Flaxman SR: Keeffe J, Leasher J, et al. Prevalence and causes of vision loss in Central and South Asia: 1990–2010. Br J Ophthalmol. 2014, 98:592–598. 10.1136/bjophthalmol-2013-303998
17. Vijaya L, George R, A R: Outcomes of cataract surgery in a rural and urban south Indian population . Indian Journal of Ophthalmology. 2010, 58:223–228. 10.4103/0301-4738.62648

Cite this article as: Neelima Sahu, Evaluating Visual Outcomes and Complications of Cataract Surgery at Tertiary Hospital and Research Centre: A Prospective Observational Study, African Journal of Biological Sciences. 6(5), 1–8.

DOI: xyz