Section: Ophthalmology

Original Research Article

VISUAL OUTCOME FOLLOWING CATARACT SURGERY IN PATIENTS WITH AND WITHOUT OCULAR AND SYSTEMIC COMORBIDITIES IN A TERTIARY HOSPITAL

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Received : 09/06/2025
Received in revised form : 23/07/2025
Accepted : 14/08/2025

Keywords:
Cataract surgery, Visual outcome, Comorbidity, Systemic illness, Ocular disorder, Postoperative vision.

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DOI: 10.47009/jamp.2025.7.4.239

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (4); 1263-1268

ABSTRACT

Background: Cataracts are the leading cause of reversible visual impairment worldwide. Although cataract surgery generally offers good recovery, the presence of eye or general health conditions may affect the visual outcomes. This study aimed to assess visual improvement after cataract surgery and evaluate the impact of ocular and systemic comorbidities in patients at a tertiary hospital in Tamil Nadu, India. **Materials and Methods:** This retrospective study included 812 patients who underwent cataract surgery at a tertiary hospital. Basic demographics, comorbidities, and preoperative and postoperative visual acuity were analysed. Postoperative vision was recorded at discharge, and its association with clinical variables was examined statistically. **Result:** Most patients were aged > 61 years (67.5%) with an equal gender distribution. Right, left, and bilateral eye involvement were nearly equal in frequency. A large majority (98.3%) underwent cataract surgery alone, whereas 1.7% underwent combined cataract and glaucoma surgeries. Preoperative vision was <6/60 in most eyes. After surgery, 74.3% achieved vision >6/18, 16.4% had vision between 6/24 and 6/60, and 9.3% had vision <6/60. Among patients without comorbidities, a higher proportion had good eyesight (86.7%). In contrast, only 46.1% of patients with ocular comorbidities and 48.6% of patients with both systemic and ocular illnesses achieved >6/18 vision. At the same time, when systemic comorbidities alone were considered 70.6% achieved vision >6/18. Poor vision was significantly associated with the presence of ocular comorbidities ($p < 0.0001$). The common systemic conditions included diabetes, hypertension, and heart disease. Ocular conditions, such as diabetic retinopathy, pseudoexfoliation, and glaucoma, were major contributors to poor recovery. **Conclusion:** Most patients showed favourable visual recovery after cataract surgery. However, systemic and ocular comorbidities significantly affected postoperative outcomes, highlighting the need for early diagnosis and appropriate preoperative care in these patients.

INTRODUCTION

Cataract surgery is one of the most commonly performed procedures worldwide and generally has a high success rate. However, because of the large number of surgeries performed, visual loss can still occur due to complications that are present before surgery, arise during the procedure, or develop afterwards.[1] A recent study from Northwest Ethiopia found that approximately 1 in 4 patients (25.7%) had poor vision after cataract surgery (vision worse than 6/18). This is much higher than the World Health Organization's recommended limit of less than 5%. Eye problems such as glaucoma, corneal scars, and other existing eye conditions are common reasons for poor vision after surgery.[2] Although issues in the anterior segment of the eye are usually detected, diseases in the posterior segment of the eye may be missed, especially when the cataract is very dense, making it difficult to examine the retina. This may also occur due to a lack of proper evaluation.[3] Therefore, it is important to determine the factors that can lead to poor vision after cataract surgery and take the necessary steps to improve visual outcomes to match international standards.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Ocular comorbidities such as glaucoma, age-related macular degeneration, diabetic retinopathy, high myopia, and optic atrophy can affect visual outcomes on their own, regardless of the surgical method used.[4] Systemic illnesses, especially diabetes mellitus and hypertension, may lead to poorer results by slowing the healing process, damaging small blood vessels, or increasing the risk of problems after surgery.[5] These conditions may not always be found before the operation, particularly in hospitals with limited resources or where complete eye and general health checks are not performed. One study showed that routine fundus exams missed hidden retinal pathology in 20% of eyes and significant pathology in about 7% of cases, which could affect postoperative vision.[6]

Cataract surgery is usually successful, and patients with these existing conditions may not see well after the operation. In contrast, patients without such problems tended to have better visual outcomes. Understanding this difference is important to improve how patients are selected, prepared, and advised before surgery, and how they are cared for during and after the procedure.[7,8] This is especially important in a tertiary care hospital, where patients often have more complicated health conditions and where such comorbidities are more common. It is necessary to study not only how often these risk factors occur but also how much they affect the final visual results after cataract surgery in a real-life hospital setting.[9,10] Therefore, this study aimed to examine the different factors present before surgery and to determine how systemic and ocular comorbidities, alone or together, affect vision after cataract surgery. In addition, this study aims to recommend simple and effective steps to improve visual outcomes, such as better presurgical screening, proper referrals, and personalised care during the surgical process.

MATERIALS AND METHODS

This retrospective observational study was conducted in the Department of Ophthalmology at the Kanyakumari Government Medical College. The study included 812 patients with complete medical records from 2015 to 2016 and was approved by the Institutional Ethics Committee.

Inclusion and Exclusion Criteria

Patients who underwent cataract surgery in one or both eyes between 2015 and 2016 and had complete medical records with proper vision details before and after surgery were included. Patients with incomplete records, missing vision data, or unclear medical histories were excluded.

Methods

Preoperative information collected included history of systemic diseases, uncorrected visual acuity (UCVA) in the worse eye, Ocular evaluations included intraocular pressure (IOP) measured by applanation tonometry, and assessment of nasolacrimal duct patency, indirect ophthalmoscopy of the retina and optic nerve, slit-lamp biomicroscopy, and A-scan for intraocular lens (IOL) power calculation. Systemic assessments involved measuring random, fasting, and postprandial blood glucose levels, blood pressure, electrocardiogram (ECG), and a physician's assessment of the patient's fitness for surgery.

All patients underwent cataract surgery, and postoperative visual outcomes were recorded as best-corrected visual acuity (BCVA) in the same eye. BCVA was classified as no or mild, moderate, severe visual impairment, or blindness, based on the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (WHO, Geneva, 1992). Visual outcomes on postoperative day 1 and at the time of discharge were analysed.

Statistical analysis

The collected data were analysed using IBM SPSS Statistics version 27. Numerical values are presented as means, and categorical variables are expressed as frequencies and percentages.

RESULTS

The study included 812 patients, with the majority aged > 61 years (67.5%), followed by those aged between 41 and 60 years (31.3%), and a small proportion aged < 40 years (1.2%). The gender distribution was almost equal, with 50.7% males and 49.3% females. Most patients (98.3%) underwent cataract surgery alone, whereas a few (1.7%) underwent combined cataract and glaucoma surgery. The right eye (33.9%), left eye (32%), and both eyes (34.1%) were almost equally affected by the disease. Regarding systemic comorbidities, 48.4% had none, while 14.2% had both diabetes and hypertension, 13.8% had diabetes alone, 13.3% had hypertension, 8.1% had ischaemic heart disease, and 2.2% had chronic obstructive pulmonary disease. Ocular comorbidities were absent in 79.4% of the patients. Among those present, diabetic retinopathy (3.3%), age-related macular degeneration (3%), glaucoma (3%), pseudoexfoliation (3%), and others (7.9%) were observed; hypertensive retinopathy was observed in 0.5%.

Preoperatively, 30.4% had vision <1/60, 20.4% had vision between <3/60 and 1/60, 24.5% of patients had vision between <6/60 and 3/60, 22.7% between 6/24-6/60 and a smaller number had vision >6/18 (2%). Postoperatively, vision improved significantly, with 74.3% achieving >6/18, 21.6% between 6/24 and 6/60, 2% between <6/60 and 3/60, 0.7% between <3/60 - 1/60 and 1.4% remaining at <1/60 (Table 1).

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 1: Demographic, clinical, and visual profile of patients undergoing cataract surgery

		Frequency (%)
Age group	<40	10(1.2%)
	41-60	254(31.3%)
	>61	548(67.5%)
Sex	Female	400(49.3%)
	Male	412(50.7%)
Surgery	Cataract + Glaucoma	14(1.7%)
	Cataract alone	798(98.3%)
Eye	Both	277(34.1%)
	Left	260(32%)
	Right	275(33.9%)
Systemic comorbidity	DM with HTN	115(14.2%)
	COPD	18(2.2%)
	DM	112(13.8%)
	HT	108(13.3%)
	IHD	66(8.10%)
	None	393(48.4%)
Ocular comorbidities	ARMD	24(3%)
	DR	27(3.3%)
	GLAU	24(3%)
	HTR	4(0.5%)
	None	645(79.4%)
	Others	64(7.9%)
	PXF	24(3%)
Pre vision	< 1/60	247(30.4%)
	<3/60 -1/60	166(20.4%)
	<6/60 -3/60	297(36.6%)
	6/24-6/60	86(10.6%)
	>6/18	16(2%)
Post vision	<1/60	12(1.5%)
	<3/60-1/60	10(1.2%)
	<6/60-3/60	54(6.7%)
	6/24-6/60	133(16.4%)
	>6/18	603(74.3%)

Among patients with systemic comorbidities, 70.6 % achieved a visual acuity of >6/18, while 25.5% and 2.1% attained visual acuity of 6/24–6/60 and <6/60–3/60, respectively. Poorer outcomes were observed in 0.9% of patients with vision <3/60–1/60 and 0.7% with <1/60 vision (p = 0.015). Ocular comorbidities showed a stronger association with limited visual recovery, with only 46.1% achieving >6/18. While (43.7%)percentage of patients with ocular conditions had postoperative vision of 6/24–6/60, (3.5%) <6/60–3/60, (2.3%) <3/60–1/60, and (4.1%) <1/60 , (p < 0.0001). When both systemic and ocular comorbidities were present, 48.3% achieved vision >6/18, with (44.9%) in the 6/24–6/60 group, 3.4% in the <6/60–3/60 group, and (3.4%) in the <3/60–1/60 group, while no one had vision <1/60 (p < 0.0001) (Table 2).

Table 2: Association of systemic and ocular comorbidities with postoperative visual outcomes

Vision post-op	>6/18	6/24–6/60	<6/60–3/60	<3/60–1/60	<1/60	P value
Systemic comorbidity	296 (70.6%)	107 (25.5%)	9 (2.1%)	4 (1%)	3 (0.8%)	<0.0001
Ocular comorbidities	77 (46.1%)	73 (43.7%)	6 (3.6%)	4 (2.4%)	7 (4.2%)	<0.0001
Both systemic and ocular comorbidities	43 (48.3%)	40 (44.9%)	3 (3.4%)	3 (3.4%)	0 (0%)	<0.0001

ISSN (O): 2687-5365; ISSN (P): 2753-6556

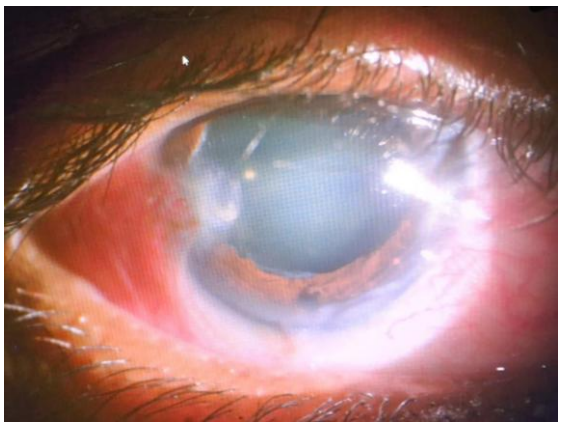

Figure 1: Immature cataract with pterygium

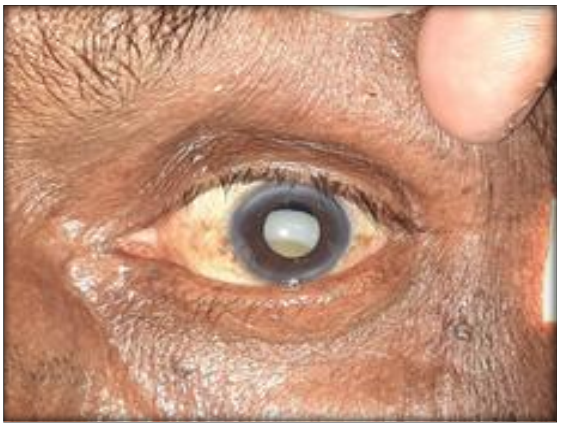

Figure 2: Hypermature morgagnian cataract

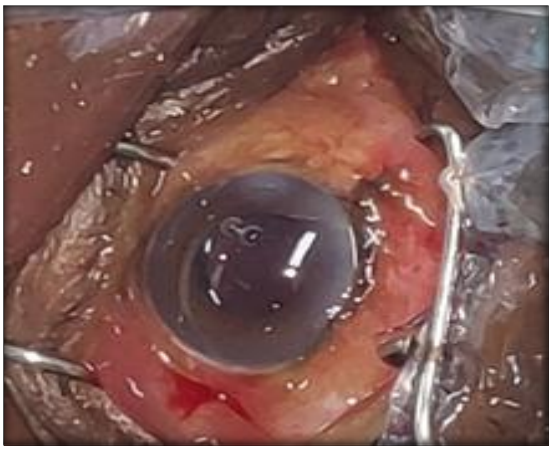

Figure 3: Intra operative picture with PCIOL

DISCUSSION

Our study evaluated the visual outcomes after cataract surgery in 812 patients, considering variables such as age, comorbidities, type of surgery (unilateral or bilateral), and preoperative and postoperative vision. Most patients were over 61 years of age, with a nearly equal male-to-female distribution. Cataract surgery was mainly unilateral, with equal involvement of the eyes. Combined cataract and glaucoma surgeries were performed in a small proportion (1.7%) of cases. Similarly, Tsegaw and Dea conducted a retrospective study on 459 patients, with a median age of 60 years, 45.1% aged over 60, and 31.8% between 46 and 60 years; the gender distribution was 50.98% males and 49.02% females.[11] Senthil et al. studied 126 eyes; half underwent cataract surgery alone, and the rest had combined surgery.[12] Kim et al. reported in a Korean audit of 989 paediatric cases that 20.1% had bilateral cataracts, and 79.9% had unilateral involvement.[13] Cataracts mainly affect older adults with slightly higher preponderance in females as per latest studies and commonly involve both eyes, unlike paediatric cases with more unilateral involvement. Surgery is usually performed alone, with combined procedures reserved for patients with coexisting glaucoma.

Our study showed that nearly 48.4% of patients had no systemic illness. Among those with comorbidities, diabetes with hypertension (14.2%) was the most common, followed by diabetes (13.8%), hypertension (13.3%), ischaemic heart disease (8.1%), and COPD (2.2%). Sathyan and Sathyan reported systemic illnesses in 51.3% of 2,634 patients, with diabetes (60.2%) and hypertension (62.2%) being the most.[14] Mishrikotkar et al. found comorbidities in 35.7% of 412 patients; hypertension (53.7%) and diabetes (32%) were most common, with ischemic heart disease and asthma less frequent.[15] Systemic diseases, especially diabetes and hypertension, are common in cataract patients and contribute to preoperative risks.

In our study, most patients (79.4%) had no ocular comorbidities; among those affected, diabetic retinopathy (3.3%), age-related macular degeneration (3%), glaucoma (3%), pseudoexfoliation (3%), and other disorders (7.9%) were observed. Sharghi et al. observed pseudoexfoliation in 8.2%, diabetic retinopathy in 6.8%, and glaucoma in 4.2%.[5] Chu et al. noted age-related maculopathy (12.6%), diabetic retinopathy (9.0%), and glaucoma (10.6%) as common ocular comorbidities.[16] Although most patients lack ocular comorbidities, conditions such as maculopathy and diabetic retinopathy pose risks to surgical outcomes.

In our study, preoperatively, most patients had vision worse than 6/60, indicating significant visual impairment. Postoperatively, 74.3% achieved vision better than 6/18, reflecting a marked improvement following cataract surgery. Chu et al. found 63.5% had vision <6/60 and 8.5% had >6/18 pre operatively.16 Chen et al. reported that 51.7% had vision worse than 6/60.[17] Ilechie et al. observed 41.2% with good vision (6/6–6/18), 50% with borderline vision, and 9.5% with poor outcomes.[18] Mohammed et al. reported 40% with good outcomes (≥6/18), 38.3% borderline, and 21.5% poor vision (<6/60).[19] Preoperative vision was poor in most patients; however, postoperative outcomes showed significant improvement, aligning with findings from prior studies.

Our study showed that among those with systemic illnesses, 70.6% achieved vision >6/18, with some cases showing moderate-to-poor vision ($p = 0.015$). Similarly, Sahu et al. found that 56.1% achieved

ISSN (O): 2687-5365; ISSN (P): 2753-6556

≥6/18, while 24.9% had borderline and 19% had poor outcomes.[20] Lee et al. reported that 67.1% of 1,136 diabetic eyes had 20/40 or better vision, with better outcomes in eyes without retinopathy ($p = 0.04$).[21] Systemic conditions, particularly diabetes and hypertension, are linked to poorer postoperative outcomes, especially when retinopathy is present.

Our study found that only 46.1% of patients with ocular conditions achieved >6/18 vision. Moderate to poor outcomes were also there in this group: 6/24–6/60 (43.7%), <6/60–3/60 (3.6%), <3/60–1/60 (2.3%), and <1/60 (4.2%), with strong significance ($p < 0.0001$). Similarly, Jemeberie et al. found that 25.7% of patients had poor outcomes, often associated with pseudoexfoliation, glaucoma, and macular degeneration.[2] Ponder et al. noted that eyes with RVO had worse outcomes (mean 20/50) than those without (mean 20/25, $p < 0.0001$).[22] Ocular comorbidities significantly reduce the visual prognosis after surgery, particularly with retinal or optic nerve involvement.

In our study, patients with ocular comorbidities had the poorest outcome, with both systemic and ocular comorbidities coming next, with only 48.3% with both conditions achieving >6/18 ($p < 0.0001$). Similarly, Thanigasalam et al. found that 63.9% of patients had systemic and 19.6% had ocular comorbidities; those with both showed poorer outcomes, while those without ocular disease had better vision ($p < 0.001$).[23] Coexisting systemic and ocular diseases significantly impair postoperative visual recovery, emphasising the need for a thorough preoperative evaluation.

Our study highlights that elderly patients were the most affected, and surgery yielded favourable outcomes in most cases. However, systemic and ocular comorbidities adversely influenced postoperative visual improvement in this study. Early detection and management of comorbidities may enhance the surgical outcomes.

Limitations

This retrospective single-centre study may have been limited by incomplete records and restricted generalisability. Visual outcomes were assessed only at discharge without long-term follow-up, and dense cataracts may have hindered adequate retinal evaluation. Additionally, variations in surgical expertise were not analysed, which could have affected the results.

CONCLUSION

Our study showed that most patients who underwent cataract surgery had good visual recovery, especially those without either ocular or systemic diseases. Better outcomes were observed in patients with no comorbidities, whereas those with ocular conditions had the poorest visual improvement. Most patients were elderly, and most underwent cataract surgery alone. Preoperative vision was generally poor, but significant improvement was observed after surgery in most cases. These findings highlight the importance of early detection, timely surgery, and careful evaluation of coexisting conditions to improve visual outcomes after cataract surgery.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556