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CLINICAL PROFILE, RISK FACTORS, AND VISUAL OUTCOME AFTER CATARACT SURGERY IN ELDERLY PATIENTS: A HOSPITAL-BASED STUDY

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Abstract

Background: The elderly are the most affected segment of the cataracts which is the common cause of blindness. After cataract surgery assessment of visual outcomes and their associated risk factors is important for quality improvement of eye care services.To describe the clinical profile, identify risk factors, and evaluate visual outcomes after cataract surgery in elderly patients (≥60 years) at a tertiary care hospital in central India.

Methods: A hospital-based observational study was conducted from January 2022 to June 2022 involving 200 patients aged ≥60 years who underwent cataract surgery with IOL implantation. The visual outcome was classified as good (BCVA ≥6/18), borderline (BCVA <6/18 to ≥6/60) or poor (BCVA <6/60) at 4–6 weeks after surgery.

Results: The average age was found to be 68.4. Participants were 52% male. Thirty-five percent (35%) of diabetes mellitus and forty-five percent (45%) hypertension. 20% had a posterior segment diseases prior. The overall visual outcome was satisfactory in 84% of cases, borderline in 11.5% and poor in 4.5%. The presence of posterior segment disease, intraoperative complications, and older age were significantly associated with poor outcomes.

Conclusion: Cataract surgery at tertiary care center in central India in elderly patients gives a good visual outcome in most of the patients. Further improving outcomes requires the addressal of modifiable risk factors such as posterior segment disease, diabetes, and surgical complications.

Keywords: Cataract surgery, elderly, visual outcome, risk factors, central India, BCVA.

Introduction

The lens of the eye can become cloudy for any one of many reasons and this optical distortion is termed a cataract. It is a well-known fact that cataract is the most common cause of blindness in the world including India.[1] Furthermore, it is the most preventable and reversible cause of blindness worldwide as well as in India. According to The National Blindness and Visual Impairment Survey India (2015-2019), among the population above the age of 50years cataracts are responsible for 66.2% blindness, 80.7% severe visual impairment and 70.2% moderate visual impairment.[2] Furthermore, even as cataract surgical rates have seen a significant upsurge, a substantial proportion of operated cataracts still have poor visual outcomes, especially in developing countries.[3]

The older population (≥60 years of age) suffers a higher burden of visual disability due to cataract because of age-related lens changes and more importantly, because of accumulated systemic comorbidities such as diabetes mellitus, hypertension and their ocular sequelae such as diabetic

retinopathy, macular degeneration, and glaucoma.[4] These comorbidities are risk factors for cataracts but also affect post-operative visual recovery and make this age group clinically significant.[5].

An audit on cataract surgeries performed in rural secondary-level eye care centers of L V Prasad Eye Institute (LVPEI) in India found that 91.7% of eyes had a good outcome based on best-corrected visual acuity (BCVA) at 4-11 weeks; nevertheless, poor outcome was significantly more common in individuals aged ≥70 years, females, those with preoperative ocular comorbidities and eyes with intraoperative complications.[6] A community-based cross-sectional study in urban slums of Raipur, Chhattisgarh, central India found that 84.5% of operated eyes had good visual acuity with available correction, while factors significantly associated with visual outcome were age at surgery, literacy, type of surgery and place of surgery.[5] Similarly, WHO monitoring data from India showed that only 37.8% of eyes had good outcome (VA ≥6/18) with available correction in some settings, indicating the need for better quality control and follow-up.[4].

Studies conducted in rural central India which are population based have reported incorrect power of IOL, PCO, and macula pathology being responsible for high rate of post operative visual impairment. 5 Even with the advancement in surgical technique SICS and phacoemulsification and development of better IOLs, a section of elderly are over unhappy with their outcomes. As the elderly population in India continues to rise and the burden of non-communicable diseases continues to increase, there is an increasing need to systematically study the clinical profile, risk factors and outcomes of cataract surgery in the elderly population. These aged above sixty five years.[7]

There is a relative lack of hospital-based data on the elderly (≥60 years) from central India. Keeping the above findings in mind, the present study was conducted in order to describe the clinical profile of elderly patients undergoing cataract surgery, to identify systemic and ocular risk factors for poor visual outcome and to evaluate postoperative visual outcomes at 4-6 weeks at a tertiary care hospital in Central India.

Methods and Materials.

Study Design and Setting

It was a hospital-based, prospective observational study conducted in the Department of Ophthalmology of a tertiary care teaching hospital of central India. The hospital has a urban-mixed rural population which comes from the district neighbor hood. This study was conducted from January 2022 to June 2022.

Study Population

Inclusion criteria: The study included patients aged >60 years with age-related cataract, who underwent cataract extraction with an implantation of posterior chamber IOL (MSICS or phacoemulsification), who gave written informed consent, and who came for follow-up at 4–6 weeks post-operatively.

Exclusion criteria: The patients having traumatic cataract or congenital cataract or secondary cataract; and patients with a history of previous intraocular surgery in study eye; persistent and disabling non-cataractous causes of irreversible blindness (end-stage glaucoma, advanced macular degeneration with no potential for vision); and patients who do not complete the 4–6 week follow up.

Sample Size

Throughout the study period, a total of 200 patients who met the inclusion criteria were enrolled consecutively.

Data Collection

Each patient was assessed using a predesigned pretested proforma.

• Information about the age, sex, type of residence (rural/urban), educational status and occupational category.
• Systemic history: Diabetes mellitus hypertension and other major systemic disease duration and treatment status.
• Ophthalmic examination entails a check of the presenting visual acuity (PVA) and best-corrected visual acuity (BCVA) using the Snellen chart. Apart from this a slit-lamp examination is done for cataract grading. Intra-ocular pressure check is done. Finally, a dilated fundus examination is done using indirect ophthalmoscopy and slit-lamp biomicroscopy with a 90D/78D lens.
• Biometry involves the A-scan ultrasonography or optical biometry followed by proper IOL power calculation formula.
• Surgical details: Types of surgery (MSICS or phaco), types of anesthesia, types of IOL, and intraoperative complications.
• Postoperative follow-up (4–6 weeks): BCVA, slit-lamp evaluation (assessing corneal clarity, anterior chamber, IOL position, PCO), fundus examination, and postoperative complications.

Outcomes Definitions
The operative visual result was characterized as per WHO operational definitions.
• Good outcome: BCVA ≥ 6/18.
• Borderline result: BCVA between <6/18 and ≥6/60.
• Unfavorable result: best-corrected visual acuity (BCVA) worse than 6/60.

Statistical Analysis.
Data were evaluated using freely available statistical calculators. Categorical variables were expressed as frequency and percentages, while continuous variables were expressed as mean ± standard deviation. Chi-square test and Fisher Exactly's test were used to find an association between risk factor and visual outcome. A p-value below 0.05 was significant.

Results
The study comprised of 200 elderly patients (200 eyes) in total. The patients had a mean age of 68.4 ± 6.3 years (range 60-88 year) The most prominent demographic was 60-69 years (60%), followed by 70-79 years (30%), and ≥80 years (10%). The study population comprised significantly more males than females (52% vs 48%). Patients coming from rural areas are 58% and urban 42% The sociodemographic profile of central India was represented by 62% of illiterates and primary-educated patients in the cohort. Farming/manual labor (44%) was the most common occupation, followed by homemakers (36%).The most common systemic comorbidity encountered was diabetes mellitus (70 cases). Hypertension was found in 90 (45%)patients. There were 38 (19%) patients who suffered from diabetes and hypertension concurrently. Other comorbidities were ischemic heart diseases in 12 (6%) and chronic obstructive pulmonary disease in 8 (4%) patients.

Table 1: Sociodemographic and systemic profile of study participants (n=200)

Variable	Category	n (%)
Age group (years)	60–69	120 (60.0)
	70–79	60 (30.0)
	≥80	20 (10.0)
Sex	Male	104 (52.0)
	Female	96 (48.0)
Residence	Rural	116 (58.0)
	Urban	84 (42.0)
Education	Illiterate	86 (43.0)
	Primary	38 (19.0)
	Secondary and above	76 (38.0)

Diabetes mellitus	Present	70 (35.0)
	Absent	130 (65.0)
Hypertension	Present	90 (45.0)
	Absent	110 (55.0)

Table 2: Pre-existing ocular findings in study participants (n=200)

Ocular Finding	n (%)
Posterior segment disease (any)	40 (20.0)
– Diabetic retinopathy	18 (9.0)
– Age-related macular degeneration	12 (6.0)
– Glaucomatous optic neuropathy	6 (3.0)
– Myopic macular degeneration	4 (2.0)
Cataract morphology – Nuclear	116 (58.0)
Cataract morphology – PSC	48 (24.0)
Cataract morphology – Cortical	36 (18.0)
Mature/Hypermature cataract	22 (11.0)

Forty (20%) patients had existing posterior segment disease which included 18 (9%) with diabetic retinopathy; 12 (6%) with age-related macular degeneration (AMD); 6 (3%) with glaucomatous optic neuropathy and 4 (2%) with myopic macular degeneration. The most prevalent types of morphology observed were nuclear cataract (58%), posterior subcapsular cataract (PSC) (24%), and cortical cataract (18%). 22 (11%) Patients exhibited mature/hypermature cataract.

Table 3: Postoperative visual outcome at 4–6 weeks (n=200)

Outcome Category	BCVA	n (%)
Good	≥6/18	168 (84.0)
Borderline	<6/18 to ≥6/60	23 (11.5)
Poor	<6/60	9 (4.5)

Out of the total, 130 (65%) underwent MSICS with IOL implantation and 70 (35%) phacoemulsification. In 85% of the cases, peribulbar anesthesia was used. Intraoperative complications were encountered in 18 (9%) eyes, the most common of which was posterior capsule rupture with vitreous loss (n = 10, 5%), followed by zonular dialysis (n = 5, 2.5%) and dropped nucleus (n = 3, 1.5%). At 4–6 weeks post-op, 168 (84.0%) of patients had a good outcome (BCVA ≥6/18), 23 (11.5%) had a borderline outcome (BCVA <6/18 to ≥6/60) while 9 (4.5%) a poor outcome (BCVA <6/60).

Table 4: Association of risk factors with postoperative visual outcome (n=200)

Variable	Category	Good ≥6/18 n (%)	Borderline n (%)	Poor <6/60 n (%)	p-value
Age group	60–69 years	108 (90.0)	10 (8.3)	2 (1.7)	**0.001**
	70–79 years	48 (80.0)	8 (13.3)	4 (6.7)	
	≥80 years	12 (60.0)	5 (25.0)	3 (15.0)	
Sex	Male	90 (86.5)	10 (9.6)	4 (3.9)	0.412
	Female	78 (81.3)	13 (13.5)	5 (5.2)	
Diabetes mellitus	Present	54 (77.1)	10 (14.3)	6 (8.6)	**0.018**
	Absent	114 (87.7)	13 (10.0)	3 (2.3)	
Hypertension	Present	75 (83.3)	10 (11.1)	5 (5.6)	0.472
	Absent	93 (84.5)	13 (11.8)	4 (3.6)	
Posterior segment disease	Present	24 (60.0)	10 (25.0)	6 (15.0)	**<0.001**

	Absent	144 (90.0)	13 (8.1)	3 (1.9)	
Type of surgery	MSICS	110 (84.6)	15 (11.5)	5 (3.9)	0.831
	Phacoemulsification	58 (82.9)	8 (11.4)	4 (5.7)	
Intraoperative complication	Present	10 (55.6)	4 (22.2)	4 (22.2)	**<0.001**
	Absent	158 (86.8)	19 (10.4)	5 (2.7)	
Rural residence	Rural	92 (79.3)	16 (13.8)	8 (6.9)	**0.041**
	Urban	76 (90.5)	7 (8.3)	1 (1.2)	
Education	Illiterate	64 (74.4)	14 (16.3)	8 (9.3)	**0.011**
	Literate	104 (91.2)	9 (7.9	1 (0.9)	

Table 5: Causes of borderline and poor visual outcome (n=32)

Cause	Borderline n (%)	Poor n (%)	Total n (%)
Posterior segment disease (DR/AMD/glaucoma)	10 (43.5)	6 (66.7)	16 (50.0)
Intraoperative complication (PCR/vitreous loss)	4 (17.4)	4 (44.4)	8 (25.0)
Refractive error/IOL power error	6 (26.1)	0 (0.0)	6 (18.8)
Corneal edema/decompensation	3 (13.0)	2 (22.2)	5 (15.6)
Posterior capsule opacification (early)	2 (8.7)	0 (0.0)	2 (6.3)

Poor visual outcome was significantly associated with posterior segment disease ($p<0.001$), intraoperative complication ($p<0.001$), advanced age ≥80 years ($p=0.001$), diabetes mellitus ($p=0.018$), rural residence ($p=0.041$), and illiteracy ($p=0.011$).

Discussion-

This study on patients at a tertiary hospital in central India was undertaken to evaluate the clinical profile, risk factors and visual outcome of cataract surgery in elderly patients (≥60 years). The total good overall outcome (BCVA ≥ 6/18) rate of 84.0% at 4 – 6 weeks is comparable to other Indian studies and indicates satisfactory surgical quality.[1-3,8-10]

The mean age of 68.4 years, with a predominance of the 60–69 year age group, is in-keeping with population-based data from south India and national surveys, which depict a steep rise in cataract prevalence after 60 years of age. A large proportion of people living in rural areas along with individuals having low education status in our cohort represents the population of central India and is similar to the patterns of reporting from rural central India and urban slum population.[8-10] The high proportion of diabetes and hypertension among elderly people in this study corroborates findings from earlier studies done in India. Further, it highlights the need for integrated non-communicable disease management in cataract surgery services.

The 84.0% good outcome rate for our study is similar to the 84.5% good outcome with available correction in the urban slum study of Raipur and somewhat lower than the BCVA-based good outcome of 91.7% in the LVPEI secondary centre audit.[5] According to the Tirunelveli study and other population-based surveys a large proportion of operated eyes achieve good vision.[8] However, a large minority (aboutone-third) is still visually impaired due to refractive error, sequelae of surgery and/or coexistent ocular disease. The India study of age-related eye disease also found that many elderly had cataract and vision related disabilities maybe so we could think of their cataract surgery demand.[10] When considered as a whole, our results are in line with this and suggest that quality cataract surgery yields high rates of rehabilitation among the elderly when performed in appropriately equipped centres.

In our study, age was a significant outcome determinant. Patients aged ≥80 years had a considerably lower percentage of good outcome compared to patients aged 60-69 years. This finding coheres with that of Matta S et al.[4] who noted that patients aged ≥70 years stood significantly higher chances of poor outcomes in rural secondary eye care centres. With advancing age, there are

increased rates of dense or mature cataract and posterior segment pathology. With reduced retinal reserve, this could limit visual recovery after surgery.

Our analysis found that the most significant risk factor for poor visual outcome was pre-existing posterior segment disease. An excellent outcome was achieved in 90% of patients without posterior segment disease compared to 60% of those with the disease.[4] According to the central India prevalence study and other population-based studies, macular pathology, glaucoma, and other posterior segment conditions are the leading causes of visual impairment after surgery. With half of borderline and poor outcomes attributable to diabetic retinopathy, AMD or glaucoma, meticulous preoperative fundus examination and counseling of patients with realistic outcome expectations is warranted [7–10]

In our study, we found that diabetes mellitus had a significant association with poorer outcomes as we know that diabetic patients are at an increased risk of macular edema, ischemic maculopathy, and other microvascular complications. As established by population-based eye surveys, the high burden of diabetes in older Indians means that an increasing proportion of patients undergoing cataract surgery will have concomitant diabetic eye disease. In this respect, maximal visual gain is dependent upon optimum glycemic control, coordinated medical care, and careful intraocular surgery timing.[8-10]

The occurrence of complications during surgery, as well as their association with a poor outcome, was seen in 9%. Almost a quarter of eyes with a complication ended up in poor outcome category. The most common complication is the rupture of the posterior capsule with loss of vitreous. It has been widely acknowledged that these complications indicate inadequate visual outcome.[9] This is particularly the case when associated with difficulty placing the IOL, as well as postoperative inflammation or cystoid macular edema. The high-quality surgical training, graded case allocation, and standard operating protocol use in a tertiary teaching hospital where the residents and fellows do a large part of the surgeries is emphasized by our findings.

Notably, no significant outcome difference was found between MSICS and phacoemulsification, consistent with evidence showing that well-done MSICS has yield competative outcomes with phacoemulsification in India and other LMICs. Resource-constrained settings relying predominantly on MSICS for high-volume cataract surgery have important implications.[10]

Rural residence and illiteracy were also significantly associated with poor outcomes. Similar studies in urban settlements and rural settings have revealed that lower literacy, lower socioeconomic status, and limited access to postoperative refraction and follow-up contribute to poorer outcomes in functional vision.[8] These findings suggest that surgical quality alone does not determine final visual status. Social determinants and health-system factors such as patient education, transport, or affordability of spectacles play an important role.

Our observation that a large proportion of borderline and poor outcomes were due to posterior segment disease and comorbidity mentioned earlier raises a concern from the public health perspective. Almost exclusive programmatic focus on cataract surgery may not be sufficient to reduce blindness in India in totality. Dandona et al.[9] analysed the policies which also target the major causes which lead to the loss of vision. The data we have from elderly patients with major co-morbidities refers to this claim. To this end, comprehensive strategies to ensure eye care for older adults, which incorporates cataract surgery along with screening and management for diabetic retinopathy, glaucoma and age-related macular degeneration, are essential.

There are many strengths of our study like the prospective designing of the study, systematic documentation of preoperative and postoperative variables, and the focus on elderly patients from a tertiary center in central India. The drawbacks refer to the single centre hospital based study which limits its generalisability to community settings, follow up period was only for 4–6 weeks therefore not allowing us to study the long term results and PCO and last the referral bias as a tertiary centre is often loaded with complicated cases. Nonetheless, our results add to the evidence available on cataract surgery outcomes in India, and point to important quality improvement areas.

Conclusion

The outcome of this cataract surgery type (BCVA ≥6/18) was considered satisfactory in 84% of patients at 4-6 weeks postoperatively in elderly patients at a Tertiary care hospital in central India. The poor visual outcome (PVO) was found to be affected mostly by pre-existing posterior segment disease, intraoperative complications, old age and diabetes mellitus. To achieve the best visual rehabilitation for these patients, comprehensive pre-operative retinal assessments, adequate surgical technique, optimal control of hyperglycaemia, and appropriate postoperative refractive corrections are necessary.

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