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To Evaluate Factors Affecting Visual Outcome after Cataract Surgery in Patients Attending Tertiary Health Care Centre: A Cross-Sectional Study

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Abstract
The patients' postoperative visual satisfaction, vision related quality of life, ability to function in daily activities and their overall productivity mainly depends on the visual outcome. The present study aimed to evaluate the factors affecting the visual outcome in different types of cataract after surgery among patients attending a tertiary health care centre in M.P. 260 consented patients who were diagnosed with cataract and underwent cataract surgery were included in the study. Each patient was evaluated for the outcome both pre-and post-surgery. Detailed personal and demographic information, systemic and ocular history was collected using a pre-designed semi-structured questionnaire. Follow-up was done after 24 hours, 7 and 14 days. Good pre-operative BCVA was associated with good post-operative visual outcome. Patients with Diabetes Mellitus and Hypertension had poor visual outcome. 26.5% (n = 69) patients underwent Phacoemulsification, of which majority (n = 48) had better post-operative vision whereas 73.5% (n = 191) patients underwent SICS, of which majority (n = 84) had better post operative vision. Phaco had good visual outcome than SICS. Corneal edema (n = 160) was the most common early complication. Posterior capsule opacity was the most common delayed complication. Age, residence, systemic co-morbidities, preoperative visual acuity, coexisting ocular comorbidities, surgical techniques, post-operative factors (Posterior Capsule opacification and uncorrected refractive errors) were the important factors affecting post operative visual outcomes.

INTRODUCTION

Cataract is the leading and most common cause of preventable blindness globally, accounting for 51% of global blindness. About 85% of those blind from cataract live in developing countries where availability or access to cataract services is poor[1]. It is the commonest problem which occurs with age causing visual handicap in middle and elderly age group thus, affecting their lifestyle and working.73.8 percent of visual handicap in India are due to cataract[1]. The main types of cataract surgeries are phacoemulsification, extra capsular cataract extraction (ECCE), intra capsular cataract extraction (ICCE) and small incision cataract surgery (SICS)[2]. Phacoemulsification Cataract surgery is widely known to yield the best results but very expensive while comparably Small Incision Cataract Surgery is known to give visual outcome almost as good as Phacoemulsification but far cheap which made it the ideal technique for developing countries.

Visual acuity following surgery is one of the key indicators for evaluating the quality of surgery. Factors affecting visual outcome are Pre-operative, Intra operative and Post operative. Preoperative factors are Hypertension, Diabetes mellitus, Complicated Cataract. Intra-operative factors are Hemorrhage and Prolapsed iris while Post-Operative Infection includes Corneal Oedema, Hyphema, Posterior Capsular Opacity, Macular Oedema and Retinal Detachment. Results from several anecdotal population-based[3-6] studies conducted show the visual outcome faced difficulties to meet the standards proposed by the World Health Organization (WHO) i.e., visual acuity of 6/6-6/18 (more than 85% of operated eyes should have >6/18 vision at six weeks following cataract surgery)[3]. Hence, there is a need to routinely monitor the outcomes of cataract surgery and to follow standardized cataract surgical protocols and postoperative follow-up care.

The patients postoperative visual satisfaction, vision related quality of life, ability to function in daily activities and their overall productivity mainly depends on the visual outcome. However, there is paucity of data on the visual outcome and its associated factors in the study area. In advent of same we designed this study intending to evaluate the factors affecting the visual outcome in different types of cataract-senile, traumatic, congential and metabolic after cataract surgery among patient attending tertiary health care center. It becomes imperative to carry out further research on visual outcomes following cataract surgery and the postoperative level of visual acuity to provide a baseline information regarding visual outcome and design a standardized protocol to maximize it.

MATERIALS AND METHODS

This cross sectional study was carried out in the Department of Ophthalmology, Mahatma Gandhi Memorial Medical College and MY Hospital, Indore, after approval by Institutional Ethics Committee over a period of 12 months. 260 consented patients who presented to the Upgraded Department of Ophthalmology, were diagnosed with cataract and underwent cataract surgery here were included in the study.

Patients who underwent combined surgeries (like cataract with pterygium, cataract with trabeculectomy, cataract with canaloplasty etc) were excluded from the study.

Each patient was evaluated for the outcome both pre- and post-surgery. The patients were first evaluated for cataract using visual assessment. Detailed personal and demographic information, systemic and ocular history was collected using a pre-designed semi-structured questionnaire. Various other investigations were carried out. These included Visual acuity by Snellen's chart, Slit-lamp examination, Ophthalmoscopy, Schiotz tonometry, A scan, Keratometry, B scan (for posterior segment evaluation), Fundus examination. Fitness was obtained from Medicine, as well as, Anaesthesia Department. The surgery Phacoemulsification/ SICS carried out under Local/ General Anaesthesia depending on the patient. Post-operative vision was also noted. Follow-up of the patients was done after 24 hours, 7 days and 14 days.

Statistical Analysis: Qualitative and Quantitative data pertaining to the research was collected on the basis of pre- and post-operative cases of cataract surgery, compiled and analysed using SPSS 25.0. Results were expressed as the means and standard deviation or as numbers and percentages. Statistical analysis was done by applying Chi-square test/Fisher's exact test. The level of significance was fixed at 95% and $p<0.05$ was considered statistically significant.

RESULTS AND DISCUSSIONS

(Table 1) depicts the various socio-demographic characteristics and type of surgeries undergone by the study participants. A large number of patients (137 out of 260) belonged to the age group of 61-80 years of which 58% had poor vision while rest had better vision, followed by those in the age group of 41-60 years (106 out of 260 patients) of which 42% had poor vision. There were only 15 participants between the age group of 20-40 years and majority (80%) had better vision. The least number of participants i.e. 2 out of 260 were aged more than 80 years. Both (100%) had poor vision. The mean age was found to be 60.03±11.29 years. Female preponderance (52.3 %) was seen. There was found to be no association of post-operative visual outcome with gender (p-value = 0.622). Most of the study participants resided in rural areas (160 of 260). Among these 53% had poor vision post-operatively, while among those who resided in

urban areas, poor vision was observed in 44% only. Most study participants i.e. 132 had cataract in the right eye while 128 had it in the left eye. Poor vision was seen in 54.7% right eyes and 45.3% left eyes. The association between post-operative outcome and laterality was found insignificant (p-value = 0.218). The association between pre-operative BCVA and post-operative visual outcome was highly significant with a p<0.0001, meaning good pre-operative BCVA was associated with good post-operative visual outcome in the study participants. The association was also found highly significant with Diabetes Mellitus and Hypertension with a p<0.0001 and 0.002 respectively, suggesting that patients with these comorbidities had poor visual outcome. Similarly, healthy patients had a better visual outcome (p<0.0001) as compared to unhealthy patients. However, addiction was not related to the outcome (p-value = 0.179). 26.5% (n = 69) patients underwent Phacoemulsification, of which majority (n = 48) had better post-operative vision whereas 73.5% (n = 191) patients underwent SICS, of which majority (n = 84) had better post-operative vision. p-value calculated was<0.0001 which was significant, meaning Phaco had good visual outcome than SICS. Fig. 1 shows the relation of ocular comorbidities with post-operative visual outcome (p<0.0001; significant) i.e. negative association between the ocular co-morbidities and outcome was observed. The surgical complications and their association with visual outcome are depicted in Table 3. Corneal edema (n = 160), subconjunctival haemorrhage (n = 117) and hyphema (n = 39) were the most common early complications; and the association between these and post-operative vision was significant (p-value = 0.03). Posterior capsule opacity was the most common delayed complication. We observed that senile cataract = 80.76% (n = 210) had better post operative visual outcome followed by congenital= 32.43% (n = 12), traumatic cataract = 21.5% (n = 11). P-value was calculated as <0.0001 which was highly significant.

In present study, mean age was 60.03±1.29 years, out of which majority of the patients (137) belonged to the age group 61-80 years. In our study, age >80 years is a risk factors for poor outcomes as compare with the age group <60 years. These findings are similar to the Geng-Yi Yong[7] who found that the age groups = 80 years old had a higher risk of poor post operative visual outcome as compared with subjects aged 59 years and below. Min Jung Ji MD[8] found poor visual outcome in age group = 85year old. Srinivas Marmamula[9] and Sumathi Matta[10] in their study founds age = 70 years risk factors for poor outcomes. No significant association between gender and visual outcome was noted in the present study (p = 0.622) .Similarly Thevi Thanigasalam[11] in their study found that gender was of no significant importance as a predictor of visual outcome. Whereas Nadiah Sa[12] in their study found worsening VA was significantly higher among male patients (OR: 1.11, 95% CI: 1.01, 1.22) G.V.S Murthy MD[13] in their study found female gender was associated negatively with both presenting and best corrected visual acuity outcomes.

In the present study, most study participants i.e. 132 had cataract in right eye while 128 had it in left eye. Poor vision was seen in 54.7% right eyes and 45.3% left eyes. The association between post-operative outcome and laterality was found insignificant (p-value = 0.218). There was no literature found in support of present study finding. Most of the study participants resided in rural areas (160 of 260). Among these 53% had poor vision post-operatively, while among those who resided in urban areas, poor vision was observed in 44% only. Similarly, Srinivas Marmamula[14] also found that significantly higher proportion of subjects in urban area had good outcome as compared to those in the rural area (p = 0.01). In the present study, the most frequent comorbidities were Hypertension (n=60;23.1%) and DM (n = 65, 25%) and Asthma (n = 2, 0.8%). Hypertension (P = 0.002) and diabetes (P = 0.0001) affected post operated visual outcomes. Similarly, Thanigasalam thevi[15] observed one or more systemic

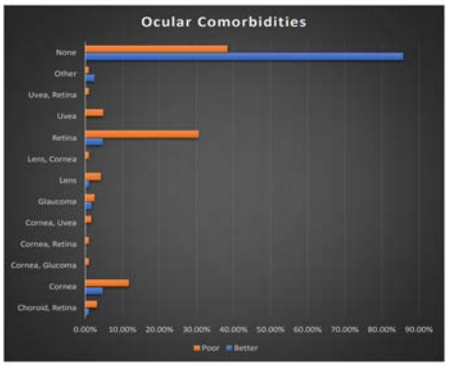

Fig. 1: Relation of ocular comorbidities with post-operative visual outcome (Fisher's exact test was applied, p<0.0001, significant)

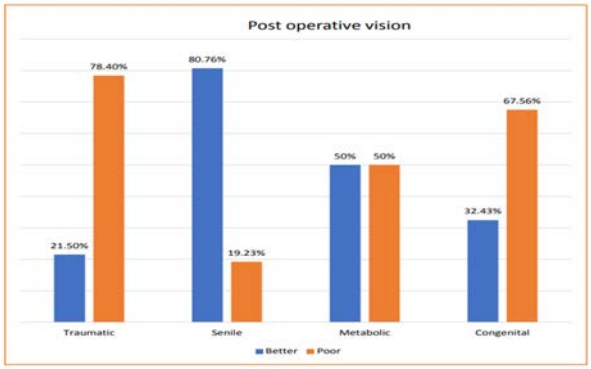

Fig. 2: Comparison of post-operative visual outcome after traumatic, senile, metabolic and congenital cataract surgery (p=<0.0001)

Table 1: Distribution of participants and association of various parameters with post-operative visual outcome

Parameters	Post-Operative Vision: Better N	Better percentage	Poor N	Poor percentage	Total N	Total percentage	p-value
Age							
20-40 years	12	80	3	20	15	100	-
41-60 years	62	58	44	42	106	100	
61-80 years	58	42	79	58	137	100	
>80 years	0	0	2	100	2	100	
Gender							
Female	67	50.8	69	53.9	136	52.3	0.622
Not significant							
Male	65	49.2	59	46.1	124	47.7	
Area							
Urban	56	56	44	44	100	100	-
Rural	76	48	84	53	160	100	
Eye							
Left	70	53.0	58	45.3	128	49.2	0.218
Not significant							
Right	62	47.0	70	54.7	132	50.8	
Pre op BCVA							
6/12 or better	1	0.8	0	0.0	1	0.4	<0.0001
Significant							
6/18-<6/12	1	0.8	0	0.0	1	0.4	
6/60-<6/18	44	33.3	14	10.9	58	22.3	
Less than 6/60	86	65.2	114	89.1	200	76.9	
Diabetes Mellitus							
No	118	89.4	77	60.2	195	75.0	<0.0001
Significant							
Yes	14	10.6	51	39.8	65	25.0	
Hypertension							
No	112	84.8	88	68.8	200	76.9	0.002
Yes	20	15.2	40	31.2	60	23.1	
Asthma							
No	131	99.2	127	99.2	258	99.2	1.000
Not Significant							
Yes	1	0.8	1	0.8	2	0.8	
Healthy/Unhealthy							
Healthy	108	81.8	57	44.5	165	63.5	<0.0001
Significant							
Unhealthy	24	18.2	71	55.5	95	36.5	
Personal factors							
No Addiction	80	60.6	67	52.3	147	56.5	0.179
Not significant							
Addiction (alcohol, smoking ,tobacco chewing)	52	39.4	61	47.7	113	43.5	
Surgical Technique							
PHACO	48	36.4	21	16.4	69	26.5	<0.0001
Significant							
SICS	84	63.6	107	83.6	191	73.5	

Table 2: Relation of surgical complications and 24 hours post-operative vision

Parameters	Post-Operative Vision: Better N	Better percentage	Poor N	Poor percentage	Total N	Total percentage	p-value
Early Surgical Complications							
Corneal Oedema	60	38	100	63	160	100	0.03
Significant							
Hyphema	9	23	30	77	39	100	
High IOP	2	18	9	82	11	100	
Subconjuctival Haemorrhage	41	35	76	65	117	100	
Posterior Synechiae	1	25	3	75	4	100	
Iris prolapse	6	55	5	45	11	100	
Hypopyon	5	56	4	44	9	100	
Optic atrophy	0	0	4	100	4	100	
Blood clot in AC	0	0	14	100	14	100	
Pupillary membrane	0	0	1	100	1	100	
Cortical matter	2	17	10	83	12	100	
Late Surgical Complications							
Corneal Oedema	3	75	1	25	4	100	0.07
Not significant							
Posterior Capsule Opacity	3	27	8	73	11	100	
Vitreous Haemorrhage	0	0	1	100	1	100	
Macular Oedema	0	0	1	100	1	100	
Retinal Detachment	0	0	3	100	3	100	
Pupillary membrane	1	25	3	75	4	100	
IOL displacement in AC	3	100	0	0	3	100	
Later Surgical Complications							
Posterior Capsule Opacity (not significant)	9	13	61	87	70	100	0.906
Vitreous Haemorrhage	0	0	2	100	2	100	
Macular Oedema	2	13	14	88	16	100	
Un-corrective refractive error	9	13	61	87	70	100	
Retinal Detachment	0	0	5	100	5	100	

comorbidities 76.2% (9330) patients, the most frequent of which were hypertension (58.61%), DM (44.89%) and asthma (3.50%). Hypertension (P = 0.03) and diabetes (P = 0.01) affected visual outcomes. Geng-Yi Yong[7] M D Somaiya[16] and TQ Pham[17] also found similar results in their study. In the present study, 26.5% (n = 69) patients underwent Phacoemulsification, of which majority (n = 48) had better post-operative vision whereas 73.5% (n = 191) patients underwent SICS, of which majority (n = 84) had better post operative vision. P-value calculated was <0.0001 which was significant, meaning Phaco had good visual outcome than SICS. Similarly Geng-Yi Yong[7] found better visual outcome in patients who underwent phacoemulsification. M Prasad[18] also stated that phacoemulsification can be utilised for better cataract surgery outcomes when compared to SICS.

In the present study, of the ocular comorbidities, diabetic and HTN retinopathy (n = 45, 17.3%), corneal opacity, scarring and degeneration (n = 21, 8.1%), glaucoma (n = 5, 1.9%) and chorioretinitis (n = 5, 1.9%) were the major ocular comorbidities. Similarly Geng-Yi Yong[7] found in their study diabetic retinopathy (23.6%), glaucoma (12.0%) and other coexisting eye disease are the major risk factors that are associated with poor post-operative visual outcome. D Lee[19] found that absence of diabetic retinopathy was associated with good visual outcome (OR 1.73 (1.02-2.94). Thanigasalam thevi[15] in their study observed that glaucoma (6.71%) and diabetic retinopathy (10.12%) were the main ocular comorbidities affecting visual outcome. Other comorbidities were age-related macular degeneration, corneal opacities, macula diseases affect the visual outcomes. Similarly, N González[20], Sumathi Matta[10] and Mats Lundström[21] also found that the risk of poor visual outcome in patients with coexisting ocular comorbidity was higher as compared with patients with no ocular comorbidity. In the present study, it was observed that PCO (26.52% n = 70) and URE (26.52% N = 70) were the leading causes of poor post-operative visual outcome. In total, 53.04% of the poor visual outcome was due to avoidable causes. Wenyong Huang[22] also found that PCO and uncorrected refractive error were the leading cause of poor post-operative visual outcome. Srinivas Marmamula[23] and Wei Shen[24] also found uncorrected refractive errors as the leading cause of poor post-operative visual outcome. Similarly, Srinivas Marmamula[23] found PCO as the leading cause of poor post-operative visual outcome.

In the present study, it was observed that senile cataract = 80.76% (n = 210) had better post-operative visual outcome followed by congenital = 32.43% (n = 12), traumatic cataract = 21.5% (n = 11). P-value was calculated as <0.0001 which was highly significant. There was no literature found explaining visual outcome in different type of cataract surgery.

CONCLUSION

In this study, we have examined post-operative visual acuity as one measure of visual outcome for cataract surgery. Age, residence, systemic co-morbidities, preoperative visual acuity, coexisting ocular comorbidities, surgical techniques, post-operative factors (Posterior Capsule opacification and uncorrected refractive errors) were the important factors affecting post-operative visual outcomes. Therefore regular eye examinations, proper health care with provision of laser capsulotomy and appropriate refractive correction can substantially improve vision.

REFERENCES

1. Pascolini, D. and S.P. Mariotti, 2012. Global estimates of visual impairment: 2010. Br. J. Ophthalmol., 96: 614-618.
2. Allen, D. and A. Vasavada, 2006. Cataract and surgery for cataract. BMJ, 333: 128-132.
3. Limburg, H., 2005. Routine monitoring of visual outcome of cataract surgery. part 1: Development of an instrument. Br. J. Ophthalmol., 89: 45-49.
4. Dandona, L., and H. Limburg, 2000. What do we mean by cataract outcomes? Comm. eye health., Vol. 13, No. 35.
5. King, B.D., L.C. Harris, F.E. Greifenstein, J.D. Elder and R.D. Dripps, 1951. Reflex circulatory responses to direct laryngoscopy and tracheal intubation performed during general anesthesia. Anesthesiol, 12: 556-566.
6. Kandel, R.P., Y.D. Sapkota, A. Sherchan, M.K. Sharma, J. Aghajanian and K.L. Bassett, 2010. Cataract surgical outcome and predictors of outcome in lumbini zone and chitwan district of Nepal. Ophthalm. Epidemi., 17: 276-281.
7. Yong, G.Y., J. Mohamed-Noor, M.A. Salowi, T.H. Adnan and M. Zahari, 2022. Risk factors affecting cataract surgery outcome: The Malaysian cataract surgery registry. Plos one., Vol. 17 .10.1371/journal.pone.0274939.
8. Joo, H.S. and D.K. Rose, 1999. The intubating laryngeal mask airway with and without fiberoptic guidance. Anesthesia & Analg., 88: 662-666.
9. Marmamula, S., N.R. Barrenakala, R. Challa, T.R. Kumbham and S.B. Modepalli et al., 2020. Prevalence and risk factors for visual impairment among elderly residents in 'homes for the aged' in India: The hyderabad ocular morbidity in elderly study (homes). Br. J. Ophthalmol., 105: 32-36.

10. Matta, S., J. Park, G.P.S. Shantha, R.C. Khanna and G.N. Rao, 2016. Cataract surgery visual outcomes and associated risk factors in secondary level eye care centers of l v prasad eye institute, India. Plos one., Vol. 11 .10.1371/journal.pone.0144853.
11. Thanigasalam, T., S. Reddy and R. Zaki, 2015. Factors associated with complications and postoperative visual outcomes of cataract surgery; a study of 1, 632 cases. J. Ophtha. Vision. Res., 10: 375-384.
12. Sa'at, N., A.K. Ghazali, N.M. Yaacob and M.A. Salowi, 2022. Factors influencing visual improvement after phacoemulsification surgery among Malaysian cataract patients. Int. J. Environ. Res. Public Health, Vol. 19, No. 18 .10.3390/ijerph191811485.
13. Murthy, G.V.S., L.B. Ellwein, S. Gupta, K. Tanikachalam, M. Ray and V.K. Dada, 2001. A population-based eye survey of older adults in a rural district of rajasthan. Ophthalmol., 108: 686-692.
14. Marmamula, S., R.C. Khanna, K. Shekhar and G.N. Rao, 2016. Outcomes of cataract surgery in urban and rural population in the south Indian state of andhra pradesh: Rapid assessment of visual impairment (ravi) project. Plos one., Vol. 11, No. 12 .10.1371/journal.pone.0167708.
15. Thevi, T. and M.A. Godinho, 2017. Predictive factors of visual outcome of Malaysian cataract patients: a retrospective study. Int. J. Ophthalmol., 18: 1452-1459.
16. Somaiya, M.D., J.D. Burns, R. Mintz, R.E. Warren, T. Uchida and B.F. Godley, 2002. Factors affecting visual outcomes after small-incision phacoemulsification in diabetic patients. J. Catar. Refrac. Surg., 28: 1364-1371.
17. Brimacombe, J., S. Newell, R. Swainston and J. Thompson, 1992. A potential new technique for awake fibreoptic bronchoscopy — use of the laryngeal mask airway. Med. J. Australia, 156: 876-877.
18. Prasad, M., S. Daigavane and V. Kalode, 2020. Visual outcome after cataract surgery in rural hospital of wardha district: A prospective study. Jour. Clini. and Diagn. Rese., Vol. 14, No. 2 .10.7860/jcdr/2020/42643.13528.
19. Lee, D., E. Agron, T. Keenan, J. Lovato, W. Ambrosius and E.Y. Chew, 2021. Visual acuity outcomes after cataract surgery in type 2 diabetes: The action to control cardiovascular risk in diabetes (accord) study. Br. J. Ophthalmol., 106: 1496-1502.
20. González, N., J.M. Quintana, A. Bilbao, S. Vidal and N.F. de Larrea, et al 2014. Factors affecting cataract surgery complications and their effect on the postoperative outcome. Can. J. Ophthalmol., 49: 72-79.
21. Lundström, M., P. Barry, Y. Henry, P. Rosen and U. Stenevi, 2013. Visual outcome of cataract surgery; study from the European registry of quality outcomes for cataract and refractive surgery. J. Cata. Refra. Surg., 39: 673-679.
22. Huang, W., G. Huang, D. Wang, Q. Yin, P.J. Foster and M. He, 2011. Outcomes of cataract surgery in urban southern China: The liwan eye study. Invest. Opthalmol. Vis. Sci., 52: 16-20.
23. Marmamula, S., N.R. Barrenakala, R. Challa, T.R. Kumbham and S.B. Modepalli et al., 2020. Visual outcomes after cataract surgery among the elderly residents in the 'homes for the aged' in south India: The hyderabad ocular morbidity in elderly study. Br. J. Ophthalmol., 105: 1087-1093.
24. Shen, W., Y. Yang, M. Yu, J. Li and T. Wei et al., 2013. Prevalence and outcomes of cataract surgery in adult rural Chinese populations of the bai nationality in dali: The yunnan minority eye study. Plos one., Vol. 8, No. 4 .10.1371/journal.pone.0060236.