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Original Research Article

An Observational Study to Assess Visual Outcome after Cataract Surgery in Rural Population

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Abstract

Aim: The aim of the present study was to assess the visual outcome after cataract surgery in rural population of Bihar**.**

Material & Methods: We carried out a population-based cross-sectional study at department of Ophthalmology. All the adults who were 50 years and older for over 1 year were included in the study.

Results: The odds of poor visual outcomes among those aged over 80 years was higher than for those 50–59 years. The most likely causes were visual impairment and blindness in eyes with presenting visual acuity worse than 6/18. Factors associated with risk of poor visual outcomes were evaluated using univariate multivariate logistic regression.

Conclusion: Cataract outcomes can be definitely improved with a good follow-up component in the cataract blindness program that results in elimination of the treatable causes for poor outcomes. Though the proportion of IOL implant surgery has increased, support services such as the availability of YAG lasers and infrastructure for follow-up have not kept pace. There is a need to enhance the cataract surgery program to include adequate infrastructure for postoperative monitoring and appropriate management. By improving this facility, the prevalence of visual impairment in pseudophakics can be minimized.

Keywords: Cataract Surgery, Epidemiology, India, Population, Visual Impairment.

Introduction

Cataract remains the leading cause of visual impairment (VI) worldwide though proportions vary across regions. [1,2] Cataract surgery is one of the most commonly performed ophthalmic surgical procedures, globally. Recent reviews concluded an improved quality of life after cataract surgery. [3,4] Recent decades have witnessed technological advances in cataract surgery and transition from intra capsular cataract extraction with aphakic spectacle correction to phacoemulsification and small incision cataract surgery with intraocular lens (IOL) implantation, and more recently, femtosecond laser assisted cataract surgery. However, despite all these, globally, in most developing countries, there are issues with outcomes of cataract surgeries with poor outcomes ranging from as low as 11.4% to as high as 44%. [5-7]

In comparison to the developed countries, the developing ones have a higher prevalence and earlier age of onset of cataract, which makes the social and medical cost of cataract-related blindness exorbitantly high in such countries. [8] Particularly in rural areas, there are often large numbers of persons who are blind from cataract and whose sight could be restored by relatively simple surgical procedures. Although safe and effective cataract surgical techniques are available that could restore normal vision to a large number of those affected, the cataract burden continues to increase annually, because of the backlog of patients to be operated on, and the growing number of cataract cases due to increased life expectancy. Moreover, the availability of cataract surgical services is not uniform across the globe. Further, the mere availability of cataract surgical services

does not suffice as there exist social and economic barriers to the utilization of these services. All these factors collectively are responsible for the high prevalence of blindness due to cataracts.

Since cataract is the commonest cause of blindness, intervention against cataract blindness has received priority attention in the global initiative called "VISION 2020: The Right to Sight" [9] which is committed to eliminating avoidable blindness, especially due to cataract by increasing the number and quality of cataract surgeries to achieve the satisfactory visual outcome and improved quality of life by the year 2020. Age-related cataract or senile cataract occurs in people aged >50 years of age and results from increasing opacification of the ocular lens, eventually leading to visual impairment or loss among older adults throughout the world. [10] The role of environmental and personal risk factors for the development of age-related cataract in this population is uncertain. The pathogenesis of age-related cataract is multifactorial and not completely understood. [11]

The purpose of this study was to report the visual outcome of cataract surgery and associated factors that influenced visual outcomes in the population.

Material & Methods

We carried out a population-based cross-sectional study at department of Ophthalmology, Icare Institute of Medical Sciences and Research, Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal. All the adults who were 50 years and older for over 1 year were included in the study.

Identification of Study Subjects

The Community Health Department maintains an updated computerized, demographic surveillance system for all individuals in a block. Health aides visited individuals on the list and identified persons who had undergone cataract surgery in one or both eyes and invited them to study clinics specially set up in the villages on specific dates. Following written informed consent, eligible individuals were recruited at the study clinic and examined, over a period of 5 months. PVA and best-corrected visual acuity (BCVA) were determined by an optometrist using a retro-illuminated, logarithm of the minimum angle of resolution (LogMAR) tumbling E chart at 4 m, assessed indoors in a dimly lit room. A Heine retinoscope was used for retinoscopy in a darkened room. Two trained social workers administered the questionnaires, which included details on demo- graphic characteristics, SES, systemic comorbidities, site of inclusion to study, questions relating to surgery (place of screening, date, place of surgery) and post- operative follow-up. The principal investigator examined all eyes to get information on type of surgery, presence of complication, pupil status, lens status and posterior capsular status using a handheld slit lamp (Heine HSL 100 (X-99.105). Individuals with BCVA 6/18 or worse in the operated eye were examined in further detail. This included detailed examination of the anterior segment, instillation of 1 drop of tropicamide for dilatation of the pupil, and indirect ophthalmoscopy. The principal investigator determined the type of cataract surgery based on discharge summary and/or clinical examination. Where more than one cause of visual impairment was noted, the principal investigator assigned the most important contributor as the primary cause. Refractive error was considered the primary cause in eyes that improved to 6/15 or better with best correction. After qualifying the status of correction as uncorrected, presenting, pinhole or best-corrected, "blindness in an eye" was defined as distance visual acuity <6/60 (logMAR >1). Visual out- comes were defined as good if visual acuity in the operated eye was better than or equal to 6/18 (logMAR ≤0.47), fair if worse than 6/18 but better than or equal to 6/60 (logMAR ≥0.48 but ≤1.0) and poor if worse than 6/60 (logMAR >1).

Non-respondents were contacted at home (home visit), where visual acuity was tested on a daylight illuminated logMAR E chart validated for 3 m. Pinhole visual acuity was assessed instead of BCVA. All patients visited at home received anterior segment examination as in the study clinic, and where required, dilated direct ophthalmoscopy (Heine beta 200). Those requiring further evaluation or treatment were referred to the base hospital and provided care free of cost. We looked at the association of literacy, systemic comorbidities, years since surgery, type of surgery, causes of poor vision, place of screening, place of surgery, site of recruitment and SES with visual outcome.

A socioeconomic score was determined from data in the database using a previously validated scoring system, which included details regarding caste, type of house, occupation, education and land ownership (low <7, middle 7–9, high >9).

Statistics

Frequencies of all quantitative variables were computed. Prevalence of good, fair, and poor visual out- comes along with 95% CIs were determined. Effect of duration was studied using the chi square test for trends. Associations with poor visual outcomes were assessed using logistic regression models while adjusting for age at first eye surgery, sex, literacy, socioeconomic score, site of screening and surgery, and duration since surgery. All statistical analyses was conducted using SPSS version 15.0 (SPSS Inc, Chicago, IL, USA).

Results

Table 1: Association between age and poor visual outcomes in eyes having undergone cataract surgery

Poor visual outcome			Odds ratio (95% CI)
Age group, years	**n**	**Total eyes**	
50–59	8	12	1 (reference)
60–69	20	26	1.0 (0.4–2.5)
70–79	30	36	1.4 (0.6–3.4)
80–100	22	26	2.5 (1.0–6.5)
Total	80	100	

The odds of poor visual outcomes among those aged over 80 years was higher than for those 50–59 years.

Table 2: Most likely causes of poor and fair presenting visual acuity in study eyes

Cause	Poor, n	Fair, n	Total, n
Treatable	25	150	175
Corneal pathology	8	3	11
Unilateral aphakia	12	2	14
Refractive error	2	112	114
Posterior capsular opacity	3	32	35
Preventable	3	8	11
Glaucoma	2	8	10
Wound dehiscence	1	0	1
Fibrous ingrowth	1	0	1
Retained lens matter	0	1	1
Incurable	22	42	64
Endophthalmitis	1	0	1
Cystoid macular edema	1	7	8
Macular pathology	9	24	33
Other retinal causes	8	5	13
Optic atrophy	3	5	8
Known	50	200	240
Unknown			7
Missing			3
Total	50	200	250

The most likely causes were visual impairment and blindness in eyes with presenting visual acuity worse than 6/18.

Table 3: Association of age, sex, literacy, socioeconomic score, place of screening, place of cataract surgery and duration since surgery with poor visual outcomes

Factor	Odds ratio (95% CI)
Age at first eye surgery ≥64 years	0.9 (0.5–1.5)
Male sex	0.8 (0.5–1.4)
Illiterate	1.0 (0.6–1.7)
Low socioeconomic score	1.0 (0.6–1.8)
Screening (first eye) at camp	0.8 (0.5–1.4)
Cataract surgery at government hospital	2.3 (1.2–4.3)
Duration since surgery ≥3 years	7.7 (1.9–32.1)

Factors associated with risk of poor visual outcomes were evaluated using univariate multivariate logistic regression.

Discussion

More than 90% of disability-adjusted life years lost due to cataract occur in low- and middle-income countries, highlighting the inequalities in the burden of cataract.[12] A rapid assessment of avoidable blindness (RAAB) survey conducted in 2006 across India found that the prevalence of blindness (presenting visual acuity <6/60 in the better eye) in those aged 50 years and older was 8.0% (95% confidence intervals, CI, 7.5–8.5%), with cataract contributing to 77.5% of blindness.[13] The National Program for Control of Blindness (NPCB) facilitates a public private partnership involving governmental and non-governmental organizations delivering eye care within districts in India. [14] While mass camps conducted in the field for screening and surgery at a base hospital is a cost effective strategy, [15] the most critical performance indicator is visual outcomes after surgery. The World Health Organization (WHO)

recommends that over 80% of eyes undergoing cataract surgery should result in good presenting visual acuity (PVA) of 6/18 or better. [16]

The odds of poor visual outcomes among those aged over 80 years higher than for those 50–59 years. Risk factors predicting blindness in first operated eyes were similar to those in Tirunelveli (those operated in government facilities having 2–6-fold higher odds of blindness compared to those operated at non-governmental organizations), [17] also no significant difference between the sexes were seen and higher adjusted odds for blindness among those operated before 1998. [18] The trend for duration since surgery was exponential, and the risk of poor visual outcome at 3 years was twice as high as for those undergoing surgery more recently due to posterior capsular opacification. The odds of poor visual outcomes in those operated >10 years prior was 13 times greater than those operated in the last 1–2 years.

The most likely causes were visual impairment and blindness in eyes with presenting visual acuity worse than 6/18. Factors associated with risk of poor visual outcomes were evaluated using univariate multivariate logistic regression. Like other studies [19-21] increasing age was a risk factor for poor outcome and it is likely that with increasing age, there are other co-existing morbidities, which could affect outcomes. Similarly, those in rural areas were also having poor outcomes and it could be due to the fact that most of these surgeries were done in government and NGO hospitals, including free of cost surgeries. Most of these surgeries in rural areas are done through outreach programs as part of the National Program for Control of Blindness (NPCB) activity where they are transported to the base hospital for surgeries and given one-time free glasses six weeks after cataract surgery. It is seen that, if the glasses are broken or lost, many of these patients do not get a replacement of a new pair of glasses, and manage with the existing vision, thus affecting outcomes. Socioeconomic score did not appear to significantly affect visual outcome or access to screening camps. This may reflect the fact that people from all socioeconomic score categories perceive screening camps to be equally good. Although it has been reported that SES is an important determinant for visual impairment. [22]

Conclusion

Cataract outcomes can be definitely improved with a good follow-up component in the cataract blindness program that results in elimination of the treatable causes for poor outcomes. Though the proportion of IOL implant surgery has increased, support services such as the availability of YAG lasers and infrastructure for follow-up have not kept pace. There is a need to enhance the cataract surgery program to include adequate infrastructure for postoperative monitoring and appropriate management. By improving this facility, the prevalence of visual impairment in pseudophakics can be minimized.

References

1. Khairallah M, Kahloun R, Bourne R, Limburg H, Flaxman SR, Jonas JB, Keeffe J, Leasher J, Naidoo K, Pesudovs K, Price H. Number of people blind or visually impaired by cataract worldwide and in world regions, 1990 to 2010. Investigative ophthalmology & visual science. 2015 Oct 1;56(11):6762-9.
2. Stevens GA, White RA, Flaxman SR, Price H, Jonas JB, Keeffe J, Leasher J, Naidoo K, Pesudovs K, Resnikoff S, Taylor H. Global prevalence of vision impairment and blindness: magnitude and temporal trends, 1990–2010. Ophthalmology. 2013 Dec 1;120(12):2377-84.
3. Finger RP, Kupitz DG, Fenwick E, Balasubramaniam B, Ramani RV, Holz FG, Gilbert CE. The impact of successful cataract surgery on quality of life, household income and social status in South India.
4. Lamoureux EL, Fenwick E, Pesudovs K, Tan D. The impact of cataract surgery on quality of life. Current opinion in ophthalmology. 2011 Jan 1;22(1):19-27.
5. Dandona L, Dandona R, Naduvilath TJ, McCarty CA, Mandal P, Srinivas M, Nanda A, Rao GN. Population-based assessment of the outcome of cataract surgery in an urban population in southern India. American journal of ophthalmology. 1999 Jun 1;127(6):650-8.
6. Huang W, Huang G, Wang D, Yin Q, Foster PJ, He M. Outcomes of cataract surgery in urban southern China: the Liwan Eye Study. Investigative ophthalmology & visual science. 2011 Jan 1;52(1):16-20.
7. Kandel RP, Sapkota YD, Sherchan A, Sharma MK, Aghajanian J, Bassett KL. Cataract surgical outcome and predictors of outcome in Lumbini Zone and Chitwan District of Nepal. Ophthalmic epidemiology. 2010 Oct 1;17(5):276-81.
8. West SK. Who develops cataracts? Archives of ophthalmology. 1991 Feb 1;109(2):196-8.
9. Thylefors B. A global initiative for the elimination of avoidable blindness. Community Eye Health 1998; 11:1-3.
10. Sundaresan P, Ravindran RD, Vashist P, Shanker A, Nitsch D, et al. EPHA2 polymorphisms and age-related cataract in India. PLOS ONE. 2012;7(3): e33001.
11. Bandhu SD, Vabale YG, Sambarey PP, Raje SS. A study of morphology of cataract in western India. J Clin Ophthalmol Res. 2015; 3:91-3.

12. Khanna R PS, Sangwan V. Cataract surgery in developing countries. Curr Opin Ophthalmol 2011; 22:10–14.
13. Neena J, Rachel J, Praveen V, Murthy GV, RAAB India Study Group. Rapid assessment of avoidable blindness in India. PloS one. 2008 Aug 6;3(8):e2867.
14. Jose R, Rathore AS, Rajshekar V, Sachdeva S. Salient features of the National Program for Control of Blindness during the XIth five-year plan period. Indian Journal of Ophthalmology. 2009 Sep;57(5):339.
15. Dua AS. Background papers: Burden of disease in India. National program for control of blindness. New Delhi, India: National Commission on Macroeconomics and Health, Ministry of Health and Family Welfare, Government of India, 2005.
16. Fletcher AE, Ellwein LB, Selvaraj S, Vijaykumar V, Rahmathullah R, Thulasiraj RD. Measurements of vision function and quality of life in patients with cataracts in southern India: report of instrument development. Archives of Ophthalmology. 1997 Jun 1;115(6): 767-74.
17. Nirmalan PK, Thulasiraj RD, Maneksha V, Rahmathullah R, Ramakrishnan R, Padmavathi A, Munoz SR, Ellwein LB. A population based eye survey of older adults in Tirunelveli district of south India: blindness, cataract surgery, and visual outcomes. British Journal of Ophthalmology. 2002 May 1;86(5):505-12.
18. Murthy GV, Vashist P, John N, Pokharel G, Ellwein LB. Prevalence and vision-related outcomes of cataract surgery in Gujarat, India. Ophthalmic epidemiology. 2009 Dec 1;16(6): 400-9.
19. Murthy GV, Ellwein LB, Gupta S, Tanikachalam K, Ray M, Dada VK. A population-based eye survey of older adults in a rural district of Rajasthan: II. Outcomes of cataract surgery. Ophthalmology. 2001 Apr 1;108(4):686-92.
20. Thulasiraj RD, Reddy A, Selvaraj S, Munoz SR, Ellwein LB. The Sivaganga Eye Survey: II. Outcomes and cataract surgery. Ophthalmic epidemiology. 2002 Jan 1;9(5):313-24.
21. Vijaya L, George R, Rashima A, Raju P, Arvind H, Baskaran M, Ramesh SV. Outcomes of cataract surgery in a rural and urban south Indian population. Indian journal of ophthalmology. 2010 May;58(3):223.
22. Tielsch JM, Sommer A, Katz J, Quigley H, Ezrine S. Socioeconomic status and visual impairment among urban Americans. Archives of ophthalmology. 1991 May 1;109(5):637-41.