

Clinical Characteristics of Cataract Patients and Outcome of Cataract Surgery in Tertiary Care Hospital in Central Nepal

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ABSTRACT

Background

Cataract remains the leading cause of avoidable blindness in low-income countries such as Nepal. Despite the availability of surgical interventions for cataract in leading institutions, still a large number of patients from remote areas delay or have difficulty in getting treatment, present late or with complications.

Objective

To determine the clinical characteristics and visual outcome of patients undergoing cataract surgery in Tertiary Care Hospital in Central Nepal.

Method

We retrospectively reviewed the medical records of 138 patients who underwent cataract surgery at a tertiary care hospital from January 2018 to September 2022. R version 4.0.3 was used for the data analysis. Categorical variables are presented as frequency (percentages) and the numerical ones are presented as mean (standard deviation).

Result

During follow-up visits between one to three weeks, 91.9% out of 135 patients had normal/near normal presenting visual acuity and with best correction it was 96.9% out of 131 patients. About 1.6% out of 124 operated eyes still had moderate visual impairment after best correction when they visited for follow-up at 12 weeks.

Conclusion

The study findings underline the ongoing gap in increasing access to cataract treatment, given the large proportion of individuals who still presented extremely late.

KEY WORDS

Cataract, Complication, Characteristics, Outcome, Surgery

INTRODUCTION

Cataract is the leading cause of blindness globally, particularly in developing countries. According to the World Health Organization (WHO) report on vision 2019, at least 1 billion individuals have avoidable moderate or severe distant vision impairment or blindness, with cataract accounting for 65.2 million of them.¹ Surgical procedures designed to restore sight are used in the process of visual rehabilitation. Cataract surgery has become the most common and cost-effective surgical operation worldwide, even in developing nations like Nepal, where it has seen a dramatic growth in patient numbers in recent years.² Measuring the result of cataract surgery for an individual or a specified community is thus as essential as counting the number of surgical procedures done.³

The results of the 1981 Nepal National Blindness Survey showed that 0.84% of the Nepalese population was bilaterally blind (< 3/60); in those aged 45 years and older the percentage was 3.77%.⁴ It was estimated that 80% of this blindness is either curable or preventable. The major cause of blindness was cataract: 83% in those \geq 45 years (65.4% in all ages).⁵ Despite the availability of surgical interventions for cataract in leading institutions, still a large number of rural patients present late or with complications in Nepal. It is important to know the clinical characteristics and surgical outcomes in cataract patients so that specific programs can be designed for quality improvement of surgical interventions. Clinical characteristics outcomes of cataract surgery have been reported by several population-based studies conducted in South Asia.⁶⁻¹⁰ However, in Nepal, there are very few studies that have reported the outcomes of cataract surgery in a large population.

In this context, we aimed to determine the clinical characteristics and visual outcome of patients undergoing cataract surgery in Tertiary Care Hospital in central Nepal.

METHODS

A retrospective chart review was conducted including patients with cataract surgery at the Dhulikhel Hospital in Nepal, from January 2018 to September 2022. Data on cataract surgery were retrieved from the database of the medical records of Dhulikhel Hospital.

The sample size was calculated using Cochran's formula assuming a prevalence of ocular complication 13.6%, based on the study by Greenberg et al., 6.0% absolute error and 5% level of significance.¹¹ Our calculated sample size was 125. However, we recruited 138 patients conveniently.

Those patients with both standard extracapsular cataract extraction and phacoemulsification were included in the study. The eligible data of 138 patients were carefully reviewed by two independent researchers. The records and information of all patients were anonymized and de-identified prior to analysis. Information on patients' eye

conditions, including operated eye, type of Intraocular lens (IOL), IOL power, preoperative visual acuity in right and left eye and preoperative pinhole in right and left eye, was also extracted and analyzed. Information on patients' outcome after surgery such as complication in operated eye and number of sutures were also extracted from the record.

The ethical approval letter was obtained from the Institutional Review Board. All data was kept on password-protected computers accessible to researchers only. Confidentiality and anonymity of all patients were maintained.

For analysis of vision status, classification of WHO was used that includes visual acuity as per Snellen's Chart and Perception or Non-Perception of Light (PL/NPL):

Normal/near normal (NN): 6/6-6/18

Moderate Visual Impairment: 6/24-6/60

Severe Visual Impairment: 3/60

Legally Blind: 1/60-PL

Totally Blind: NPL

R version 4.0.3 (2020-10-10) for statistical analysis was used in this study. Parametric numerical variables were presented as mean and standard deviation, and categorical variables as frequency and percentage.

RESULTS

Table 1 depicts that among 138 operated eyes, nearly half (50.7%) were male while the other half were female (49.3%) with the mean age of 69.4 ± 9.7 years. Similarly, about half (48.6%) of the operations were performed on the right eye while the other half (51.4%) were performed on the left eye.

The type of IOL used was polymethylmethacrylate (PMMA) in 84.1% and foldable intraocular lens (FIOL) in 15.9%. Posterior chamber intraocular lens (PC-IOL) technique was used in 95.7% of the eyes while for the remaining 4.3%, anterior chamber intraocular lens (AC-IOL) technique was used.

Table 2 shows that on the basis of pinhole examination during the preoperative period, 11.6% of the patients had normal/near normal vision in both of their eyes while it was seen that 13.8% of the patients had moderate visual impairment in their right eye and normal/near normal vision in their left eye before surgery which constituted the most part overall. Only 0.7% of the patients were legally blind in both eyes before surgery.

Table 3 shows that on the basis of normal VA measurement during preoperative period, patients with normal/near normal visual acuity in both eyes were 2.9%. Maximum patients (18.1%) during this period presented with moderate visual impairment in both eyes while the

Table 1. Clinical characteristics of cataract patients (n=138)

Variables	n(%)
Age in years ¹	69.4±9.7; 71.0 (65.0, 76.0)
Sex	
Male	70 (50.7%)
Female	68 (49.3%)
Comorbidity	
Present	22 (15.9%)
Absent	116 (84.1%)
Operated eye	
Right eye	67 (48.6%)
Left eye	71 (51.4%)
Type of Intraocular lens (IOL)	
Polymethylmethacrylate (PMMA)	116 (84.1%)
Foldable Intraocular lens (FIOL)	22 (15.9%)
Intraocular lens (IOL)	
Posterior chamber intraocular lens	132 (95.7%)
Anterior chamber intraocular lens	6 (4.3%)
IOL power¹	21.1±1.8; 21.0 (20.0, 22.5)
Number of suture	
No suture	126 (92.6%)
Interrupted suture	10 (7.4%)

Table 2. Distribution of classification of WHO blindness of both eyes before surgery (based on pinhole measurement of Visual Acuity)

Left Eye (n=138)	Right Eye (n=138)				Overall
	Normal/near normal	Moderate Visual Impairment	Severe Visual Impairment	Legally Blind	
Normal/near normal	16(11.6)	19(13.8)	4(2.9)	14(10.1)	53(38.4)
Moderate Visual Impairment	15(10.9)	11(8)	4(2.9)	3(2.2)	33(23.9)
Severe Visual Impairment	9(6.5)	4(2.9)	3(2.2)	4(2.9)	20(14.5)
Legally Blind	17(12.3)	8(5.8)	6(4.3)	1 (0.7)	32(23.2)
Overall	57(41.3)	42(30.4)	17(12.3)	22(15.9)	

Note: n(%)

least of them (2.2%) presented either with severe visual impairment in both eyes or legally blind in both eyes.

Table 4 shows that only 4.3% of 138 patients had normal/near normal preoperative visual acuity according to normal examination and 13.8% had the same according to pinhole examination. After surgery, at the time of discharge, 41.9% out of 136 patients (2 missing) had normal/near normal presenting visual acuity and with best correction, it was 73% out of 137 patients.

Table 3. Distribution of classification of WHO blindness of both eyes before surgery (based on normal Visual Acuity measurement)

Left Eye (n=138)	Right Eye (n=138)				Overall
	Normal/near normal	Moderate Visual Impairment	Severe Visual Impairment	Legally Blind	
Normal/near normal	4(2.9)	15(10.9)	3(2.2)	9(6.5)	31(22.5)
Moderate Visual Impairment	14(10.1)	25(18.1)	4(2.9)	7(5.1)	50(36.2)
Severe Visual Impairment	9(6.5)	6(4.3)	3(2.2)	4(2.9)	22(15.9)
Legally Blind	14(10.1)	11(8.0)	7(5.1)	3(2.2)	35(25.4)
Overall	41(29.7)	57(41.3)	17(12.3)	23(16.7)	

Note: n(%)

Likewise, during follow-up visits between one to three weeks, 91.9% out of 135 patients had normal/near normal presenting visual acuity and with best correction it was 96.9% out of 131 patients. The table shows that after best correction, the patients with normal/near normal visual acuity of operated eyes increased to 97.6% during four to eleven weeks follow-up visits. Moreover, almost all (98.4%) out of 124 operated eyes had normal/near normal visual acuity after best correction during follow-up visits at 12 weeks. It can also be observed from the table that only 1.6% out of 124 operated eyes still had moderate visual impairment after best correction when they visited for follow-up at 12 weeks.

It is also clear from table 4 that 37% out of 138 operated eyes were legally blind before surgery on the basis of normal examination and it was 34.8% on the basis of pinhole examination which illustrates that so many people with cataracts still present at later stages for the surgery.

Table 5 shows that only eight percent out of 138 patients had complications in their operated eye. Out of those with complications, we found that the most common (72.7%) was capsule rupture without vitreous loss. The remaining patients (27.3%) presented with vitreous loss (9.1%), retained lens matter (9.1%) and wound leak (9.1%) as complications in their operated eye.

DISCUSSION

Due to the widespread occurrence of cataracts and the scarcity of effective treatment options, cataract surgery is consistently ranked as a high-volume operation in different studies. Only cataract surgery can repair the damage to the eye's lens and restore normal vision. Despite this, a number of studies have shown that many variables impact the expected results from surgical procedures. Therefore,

Table 4. Change in WHO classification of operated eye before operation, at discharge, on different week follow ups

WHO classification of operated eye	Pre operation (n%)		At discharge (n%)		Follow up 1-3 (n%)		Follow up 4-11 (n%)	Follow up 12 (n%)
	Pinhole	Normal	BCVA	UCVA	BCVA	UCVA	BCVA	BCVA
Normal/near normal	19 (13.8)	6 (4.3)	100 (73.0)	57 (41.9)	127 (96.9)	124 (91.9)	124 (97.6)	122 (98.4)
Moderate Visual Impairment	48 (34.8)	55 (39.9)	26 (19.0)	61 (44.9)	4 (3.1)	6 (4.4)	3 (2.4)	2 (1.6)
Severe Visual Impairment	23 (16.7)	26 (18.8)	2 (1.5)	6 (4.4)	0 (0.0)	2 (1.5)	0 (0.0)	0 (0.0)
Legally Blind	48 (34.8)	51 (37.0)	9 (6.6)	12 (8.8)	0 (0.0)	3 (2.2)	0 (0.0)	0 (0.0)

Note: In each follow up, the total sum is not 138 due to presence of missing data.

BCVA (Best corrected visual acuity) UCVA (Uncorrected visual acuity)

Table 5. Complication of cataract surgery (N=138)

Variables	n(%)
Complication in operated eye	
No	127 (92.0%)
Yes	11 (8.0%)
Complication in operated eye	
Capsule rupture without vitreous loss	8 (72.7%)
Vitreous loss	1 (9.1%)
Retained lens matter	1 (9.1%)
Wound leak	1 (9.1%)

the purpose of this study was to determine the clinical characteristics of cataract patients and assess the outcome of cataract surgery in a Tertiary Care Hospital in Nepal.

Our study showed that the visual acuity of the majority of the patients was improved during 12 weeks of follow-up period, i.e., 98.4% of the participants had normal/near normal visual acuity after best correction while they came for follow-up 12 weeks after surgery. This is in line with the results of another study conducted in St Erik's Eye Hospital, Stockholm which also showed that the visual acuity with the best spectacle correction improved significantly one year after surgery compared to their preoperative visual acuity in all study groups.¹² However, the surgical technique used in our study is mostly manual while the study in Stockholm utilized phacoemulsification.

Similarly, the results of another study done in Bhaktapur district, Nepal showed that among pseudophakics, the people having visual acuity of $\geq 6/18$ increased from 122 (57.5%) at presentation to 162 (76.2%) after best correction.¹³ Likewise, a study conducted in six districts of Lumbini zone and Chitwan district showed that the visual acuity of 6/18 or better increased from 61.4% at presentation to 84.7% after best correction.¹⁴ Another study conducted in Gujarat, India showed that there was an increase in visual acuity of $\geq 20/63$ from 50.7% (658) at presentation to 74.5% (968) with best correction.¹⁵

According to a recommendation made by WHO, at least 80% of the operated eyes should have a presenting visual acuity of 6/6 - 6/18 after surgery which is referred to as a good visual outcome. After best correction, it should

increase up to at least 90%.¹⁶ Our study showed that only 41.9% of the operated eyes had a normal/near normal visual acuity (6/6 - 6/18) after surgery and it increased up to 73% after best correction at the time of discharge. However, the presenting and best corrected visual acuity did increase up to 91.9% and 96.9% respectively during the follow-up visits between one to three weeks among 131 operated eyes. Therefore, the outcome of the cataract surgery seems to be satisfactory in this study unlike in the study conducted in North West Ethiopia, where the level of postoperative visual acuity was found to be significantly lower than WHO's recommendation indicating a large number of individuals with highly compromised vision-related quality of life as well as loss of productivity after surgery.³ This grid based on the standard WHO visual acuity categories is useful for monitoring cataract surgery programs.

One of the interesting findings of our study is that the pre-operative status of vision among the patients was very poor as around 10% patients presented with legally blind status in either of the eyes (10.1% in right eye and 12.3% in left eye). Although the eye care infrastructure and services have drastically improved in Nepal since 1981, this late presentation of the patients still suggests that new strategies are required to enhance the access to timely care.

Measuring the outcome of cataract surgery for an individual or a specific community is just as essential as measuring the quantity of surgical procedures performed. Out of those with complications, we found that the most common (72.7%) was capsule rupture without vitreous loss. Retinal detachment, cystoid macular edema, uveitis, glaucoma, and dislodged intraocular lenses (IOLs) are only some of the serious morbidities linked to capsule rupture.¹⁷ Posterior capsule (PC) rupture is a frequent intraoperative complication of cataract surgery and is linked with a poor visual prognosis due to cystoid macular oedema and retinal detachment.¹⁸ Some studies have shown a satisfactory visual outcome (visual acuity of 6/12 or greater) in eyes following PC rupture.¹⁹⁻²¹

The study has some limitations. This is a retrospective hospital-based study. We could only extract the data presented in the record. Limitations of the medical chart

itself in retrospective studies includes: inaccurate, or incomplete documentation, as well as variance in the quality and location of the information recorded by medical professionals.

CONCLUSION

This study reconfirms the outstanding outcome of cataract surgery in a tertiary care setting in Nepal. Additionally,

it also highlights the existing gap in improving access to cataract care given the significant number of patients who had still presented very late. Future studies may explore the barriers and facilitators to cataract care to help get more in-depth insights into the strategies to improve access to cataract surgery in Nepal.

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