Clinical Outcomes of Cataract Surgery in Very Elderly Adults

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OBJECTIVES: To investigate the clinical outcomes of cataract surgery elderly adults.

DESIGN: Retrospective cohort study.

SETTING: Two clustered hospitals.

PARTICIPANTS: Two hundred seven individuals aged 90 and older who underwent cataract surgery for primary senile cataracts.

MEASUREMENTS: Best-corrected preoperative and postoperative Snellen visual acuity, type of cataract, surgical techniques, preoperative systemic or ocular comorbidities, and intraoperative and postoperative complications were assessed. Improvement of visual acuity was defined as a decrease in logMAR acuity of 0.1. Factors associated with visual outcome within 6 months after surgery were identified using logistic regression modeling. The duration of postoperative survival was calculated.

RESULTS: In the 207 participants (mean age 92.0 ± 2.1), 79.7% achieved visual improvement after cataract surgery. Forty-eight percent (mean age 97.4 ± 2.8) were alive on December 31, 2012. The most common systemic comorbidities were hypertension (66.2%), diabetes mellitus (25.1%), and myocardial infarction (19.8%). Age-related macular degeneration (AMRD) (15.9%), glaucoma (10.6%), and myopic degeneration (5.3%) were the three most common ocular comorbidities. Uncomplicated cataract surgery was performed in 87.0% cases. The most common complications were vitreous loss (8.2%), posterior capsular rupture (7.2%), and zonular rupture (4.8%). Participants with AMRD ($P = .001$, odds ratio (OR) = 4.77, 95% confidence interval (CI) = 1.86–12.26) and vitreous loss ($P = .001$, OR = 12.86, 95% CI = 2.71–61.10) were less likely to achieve postoperative visual improvement.

CONCLUSION: Despite a high prevalence of systemic and ocular comorbidities in very elderly adults, good clinical outcomes of cataract surgery were attainable. ARMD and vitreous loss were associated with a lower chance of postoperative visual improvement. **J Am Geriatr Soc 62:165–170, 2014.**

Key words: cataract surgery; elderly; visual outcome; morbidity; risk factor

Approximately 10 million cataract operations are performed each year in the world.[1] The procedure has well-established efficacy and safety profiles.[2] Many studies have documented substantial improvement not only in visual acuity, but also in quality of life after cataract surgery,[2,3] although the effect of age on the outcome of cataract surgery is a concern.[4] Higher complication rates and greater prevalence of preexisting ocular and systemic diseases in older adults can lead to poorer cataract surgery outcomes.[4,5]

With the advancement of health care, the average life expectancy of the population is increasing. The number of very elderly adults (≥90) awaiting cataract surgery is expected to increase.[6] The clinical outcomes of cataract surgeries in individuals younger than 90 have been reported in the literature,[7,8] but data regarding clinical outcomes in very elderly adults are limited (Appendix S1). Three previous studies reported that approximately 70% of very elderly adults could achieve improvement in visual acuity after cataract surgery.[9–11] Small sample size or short duration of follow-up constrained these studies. Larger sample size and longer duration of follow-up will provide a clearer picture of the clinical outcomes in this group of individuals.

Systemic and ocular comorbidities have been shown to be associated with poorer outcomes in cataract surgery.[4] Individuals with ocular comorbidity were 2.8 times as likely to be dissatisfied with the cataract surgery as those without.[12] Systemic disease and intraoperative changes in systemic condition could lead to poorer cataract surgery outcomes.[13] Complications of cataract surgery, such as posterior capsule rupture, were associated with poorer postoperative visual acuity.[2] Nevertheless, few studies have investigated the effect of an array of surgical complications

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and systemic and ocular comorbidities on visual outcomes after cataract surgery in very elderly adults.[14]

The aim of the current study was to investigate the clinical outcomes of cataract surgery in individuals aged 90 and older and to examine the effects of demographic characteristics, types of cataract, surgical technique, surgical complications, and ocular and systemic comorbidities on visual outcomes in this group of individuals. The understanding of the determining factors of visual outcomes will be useful to ophthalmologists and elderly adults considering cataract surgery. These findings will also be helpful to administrators in the overall delivery of cataract surgery in aging populations.

METHODS

Participant Selection and Data Collection

This was a retrospective study that the review board of the Prince of Wales Hospital, Hong Kong, approved. Individuals aged 90 and older who underwent cataract surgery at the Prince of Wales Hospital and Alice Ho Miu Ling Hospital, Hong Kong, between January 1, 2002, and December 31, 2009, were identified from the operating theater records. Individuals who had cataract surgery under general anesthesia were excluded. For bilateral cases, the second eye of participants was excluded for an independent-sample analysis. Clinical data were retrieved from the clinical notes and the electronic healthcare database. Clinical data collected included best-corrected preoperative and postoperative Snellen visual acuity, type of cataract, surgical technique, systemic or ocular comorbidities other than cataract, and intraoperative and postoperative complications (Appendix S2). Data regarding systemic and ocular comorbidities at the time of cataract surgery were extracted using *International Classification of Diseases, Ninth Revision, Clinical Modification*[15] and Current Procedural Terminology[16] codes from the above sources. Systemic comorbidities in the Charlson Comorbidity Index[17] (except hemiplegia), together with hypertension, hyperlipidemia, and hearing loss, were included for analysis. Type of cataract was determined using a slit lamp using the Lens Opacities Classification System III[18] during participants' preoperative visits. Best-corrected Snellen visual acuity, corneal status, intraocular lens position, changes in anterior and posterior capsule, and posterior segment pathology were noted at follow-up visits. Best-corrected Snellen visual acuity at follow-up was compared with the preoperative clinical assessment. Comparison was based on the logMAR acuity calculated from the Snellen visual acuity. Improvement in visual acuity was defined as a drop in logMAR acuity of 0.1, which corresponded to a one-line visual gain on the Early Treatment Diabetic Retinopathy Study chart.[19] On December 31, 2012, whether participants were still alive was checked using the population register. Date of death was recorded for all who had died, and duration of postoperative survival was calculated.

Outcomes

The primary outcome examined in this study was the percentage of participants with improvement in visual acuity after cataract surgery. Secondary outcomes included prevalence of various types of cataract, surgical techniques, systemic comorbidities and ocular comorbidities other than cataract, and intraoperative and postoperative complications. Duration of postoperative survival to December 31, 2012, was calculated, and a subgroup analysis examining the chance of postoperative visual improvement within 6 months was conducted for different demographic characteristics, type of cataract, surgical technique, systemic and ocular comorbidities, and intraoperative and postoperative complications.

Statistical Analyses

Descriptive statistics such as frequencies were used to describe the distribution of baseline characteristics and clinical parameters. Numerical data were expressed as means ± standard deviations when appropriate. The chi-square test was used for comparison of categorical variables and proportions except for conditions for which incidence was rare. The Fisher exact test was used to test the differences between participants who did and did not have postoperative visual improvement. Backward stepwise logistical regression modeling was used to identify the independent predictors of visual improvement after cataract surgery with model exit criteria of $P = .05$. Potential predictors of the postoperative visual outcome that were investigated included demographic characteristics, type of cataract, surgical technique, systemic and ocular comorbidities, and intraoperative and postoperative complications. All reported *P*-values were two-tailed. Statistical analysis was performed using SPSS version 18 (SPSS, Inc., Chicago, IL).

RESULTS

Participant Enrollment

There were 224 eyes of 211 individuals who met the inclusion criteria identified from 16,324 cases of cataract surgery between January 1, 2002, and December 31, 2009. Six eyes of four individuals with cataract surgery under general anesthesia and second eyes of 11 individuals with bilateral cataract surgery were excluded. Eventually, 207 eyes of 207 individuals were included in the study.

Baseline Characteristics

There were 158 women (76.3%) and 49 men (23.7%). The mean age of individuals undergoing cataract surgery was 92.0 ± 2.1 (range 90–103). There were 109 left eyes (52.7%) and 98 right eyes (47.3%) (Appendix S3). Mean follow-up was 24.2 ± 22.1 months (range 1–92 months). The most common type of cataract was nuclear cataract (n = 85, 41.1%), followed by mature (n = 49, 23.7%), cortical (n = 42, 20.3%), posterior subcapsular (n = 24, 11.6%), and hypermature (n = 7, 3.4%) cataracts. Residents performed 77 cases (37.2%) under supervision, and specialists performed 130 cases (62.8%). Fifty-eight (28.0%) cases were performed with peribulbar or retrobulbar anesthesia and 149 (81.0%) under topical anesthesia. Phacoemulsification accounted for 77.3% of cataract

surgeries, extra capsular cataract extraction (ECCE) for 15.9%, and sutureless large incision manual cataract extraction (SLIMCE) for 3.9%.[20] Six cases (3.0%) of phacoemulsification were converted to ECCE because of complications. Seven cases (8.2%) required anterior vitrectomy because of complications including posterior capsular rupture, zonular rupture, and vitreous loss.

Prevalence of Systemic and Ocular Comorbidities

One or more medical morbidities were noted in 190 cases (91.8%) (Table 1). The most common systemic comorbidities were hypertension (n = 137, 66.2%), diabetes mellitus (n = 52, 25.1%), myocardial infarction (n = 41, 19.8%), cerebrovascular disease (n = 40, 19.3%), and congestive heart failure (n = 40, 19.3%). The prevalence rates of other systemic comorbidities are listed in Table 2. One or more ocular comorbidities were noted in 88 cases (42.5%). Age-related macular degeneration (ARMD; n = 33, 15.9%), glaucoma (n = 22, 10.6%), and myopic degeneration (n = 11, 5.3%) (Table 1) were the three most common ocular comorbidities.

Prevalence of Surgical Complications

Uncomplicated cataract procedure was performed in 180 cases (87.0%). The most common complication was vitreous loss (n = 17, 8.2%) (Table 1), followed by posterior capsular rupture (n = 15, 7.2%) and zonular rupture (n = 10, 4.8%). Less-common complications are listed in Table 1. In 192 cases (92.8%), the intraocular lens (IOL) was placed in the capsular bag. Eight cases (3.9%) received a sulcus IOL. Three cases (1.4%) were left aphakic. Three cases (1.4%) received an anterior chamber intraocular lens. A scleral fixated intraocular lens (SFIOL) was placed in two cases (1.0%) as a secondary procedure.

Predictors of Visual Outcome of Cataract Surgery

Improved visual acuity was achieved in 165 cases (79.7%), same visual acuity in 38 cases (18.4%) and worse visual acuity in four cases (1.9%) (Table 2). Sixty-one participants (29.5%) achieved visual acuity of 20/40 or better, and 113 (54.6%) achieved visual acuity of 20/60 or better. Participants with visual acuity of less than 20/200 accounted for 13 (6.3%) cases. The visual outcome of participants within 6 months and at 12, 24, 36, and 48 after cataract surgery is shown in Table 2. Participants with hypermature, mature, and posterior subcapsular cataracts were more likely to have visual improvement after cataract surgery ($P = .001$) (Appendix S3). Participants who received ECCE and SLIMCE were more likely to achieve visual improvement after cataract surgery ($P = .04$). Presence of systemic morbidities was not significantly associated with postoperative visual outcome ($P = .32$), although ocular comorbidity was significantly associated with lower chance of postoperative visual improvement ($P < .001$, OR = 0.22, 95% CI = 0.10–0.46) (Table 1). Presence of ARMD ($P = .003$) and central retinal vein occlusion ($P = .008$) significantly reduced the chance of postoperative visual improvement. The vision of 20 of the 33 participants with ARMD (60.6%) improved after the surgery. Two of 13 participants without postoperative visual improvement (6.1% of individuals with AMRD) had postoperative decrease in visual acuity due to progression of ARMD. There were 11 cases (5.3%) of posterior capsular opacification; four of which (1.9%) required yttrium aluminum garnet laser capsulotomy. Individuals with surgical complications had a significantly lower chance ($P = .005$, OR = 0.30, 95% CI = 0.13–0.72) of obtaining visual improvement after cataract surgery. Participants with surgical complications who experienced vitreous loss ($P = .02$), posterior capsule rupture ($P = .049$), and residual lens materials ($P = .04$) had a significantly lower chance of postoperative visual improvement. Backward stepwise logistical regression modeling was used to examine factors associated with postoperative improvement in visual acuity (Table 3). Participants with AMRD ($P = .001$, OR = 4.77, 95% CI = 1.86–12.26) and vitreous loss ($P = .001$, OR = 12.86, 95% CI = 2.71–61.10) were less likely to achieve postoperative visual improvement.

Survival

On December 31, 2012, whether participants were still alive was checked in the population register; 99 (47.8%) were alive. For the 108 participants who had died, mean age on the date of cataract surgery was 92.0 ± 2.0, and the mean age of participants who had died by December 31, 2012, was 95.4 ± 2.8 when they died. For the 99 living participants, mean age on the date of cataract surgery was 91.9 ± 2.2 and mean age on December 31, 2012, was 97.4 ± 2.8.

DISCUSSION

This is one of the largest studies of clinical outcomes of cataract surgery in very elderly adults (≥90) (Appendix S1). This study investigated the broader associations between participant demographic characteristics, type of cataract, surgical technique, surgical complications, systemic and ocular comorbidities and postoperative visual outcomes in this group of participants. According to the Swedish National Cataract Register, approximately 4% of individuals undergoing cataract surgery were aged 90 and older.[21] Advanced age has been considered as a factor that prevents ophthalmologists from considering cataract surgery for very elderly adults. Cataract surgeons often need to manage complexities related to advanced age, especially the medical and ocular comorbidities of individuals. Higher complication rates and greater prevalence of preexisting ocular and systemic diseases in older adults could lead to poorer cataract surgery outcomes.[4,5]

In the current study, improvement in visual acuity after cataract surgery was found in 80% of participants. The result was comparable with the results of several studies investigating the visual outcome of individuals aged 90 and older in recent years (Appendix S1). Three studies showed that approximately 70% of very elderly adults achieved improvement in visual acuity.[9–11] One study demonstrated that visual acuity improved in 94% of individuals aged 90 and older.[12] The difference could be attributed to the prevalence of systemic and ocular comorbidities,

Table 1. Baseline Comorbidities and Prevalence of Surgical Complications

Characteristic	All Participants	Participants with Improvement in Visual Acuity	Participants without Improvement in Visual Acuity	*P*-Value[a]
	n (%)			
Systemic comorbidities	190 (91.8)	153 (73.9)	37 (17.9)	.33
Hypertension	137 (66.2)	108 (52.2)	29 (14.0)	.66
Diabetes mellitus	52 (25.1)	38 (18.4)	14 (6.8)	.17
Myocardial infarction	41 (19.8)	33 (15.9)	8 (3.9)	.89
Cerebrovascular disease	40 (19.3)	28 (13.5)	12 (5.8)	.09
Dementia	34 (16.4)	28 (13.5)	6 (2.9)	.67
Congestive heart failure	33 (15.9)	27 (13.0)	6 (2.9)	.74
Chronic pulmonary disease	24 (11.6)	21 (10.1)	3 (1.4)	.42[b]
Chronic renal disease	19 (9.2)	18 (8.7)	1 (0.5)	.13[b]
Peptic ulcer disease	19 (9.2)	16 (7.7)	3 (1.4)	.77[b]
Hearing loss	18 (8.7)	12 (5.8)	6 (2.9)	.15
Malignant neoplasms	16 (7.7)	13 (6.3)	3 (1.4)	>.99[b]
Hyperlipidemia	14 (6.8)	11 (5.3)	3 (1.4)	>.99[b]
Diabetes mellitus with complications	12 (5.8)	10 (4.8)	2 (1.0)	>.99[b]
Peripheral vascular disease	4 (1.9)	3 (1.4)	1 (0.5)	>.99[b]
Cirrhosis	3 (1.4)	3 (1.4)	0 (0.0)	>.99[b]
Metastatic solid tumor	3 (1.4)	2 (1.0)	1 (0.5)	.49[b]
Multiple myeloma or leukemia	2 (1.0)	1 (0.5)	1 (0.5)	.36[b]
Ocular comorbidities	88 (42.5)	58 (28.0)	30 (14.5)	<.001
Age-related macular degeneration	33 (15.9)	20 (9.7)	13 (6.3)	.003
Glaucoma	22 (10.6)	19 (9.2)	3 (1.4)	.58[b]
Myopic degeneration	11 (5.3)	8 (3.9)	3 (1.4)	.70[b]
Blepharitis	10 (4.8)	8 (3.9)	2 (1.0)	>.99[b]
Central corneal opacity	9 (4.3)	6 (2.9)	3 (1.4)	.39[b]
Diabetes with ophthalmic complications	5 (2.4)	3 (1.4)	2 (1.0)	.27[b]
Miotic pupil	5 (2.4)	5 (2.4)	0 (0.0)	.58[b]
Fuchs dystrophy	4 (1.9)	3 (1.4)	1 (0.5)	>.99[b]
Epiretinal membrane	4 (1.9)	3 (1.4)	1 (0.5)	>.99[b]
Central retinal vein occlusion	3 (1.4)	0 (0.0)	3 (1.4)	.008[b]
Branch retinal vein occlusion	3 (1.4)	1 (0.5)	2 (1.0)	.10[b]
Ischemic optic neuropathy	3 (1.4)	1 (0.5)	2 (1.0)	.10[b]
Uveitis	3 (1.4)	3 (1.4)	0 (0.0)	>.99[b]
Posterior synechiae	3 (1.4)	3 (1.4)	0 (0.0)	>.99[b]
Pseudoexfoliation syndrome or glaucoma	2 (1.0)	1 (0.5)	1 (0.5)	.36[b]
Glaucoma filtration or shunt	1 (0.5)	1 (0.5)	0 (0.0)	>.99[b]
Surgical complications	27 (13.0)	16 (7.7)	11 (5.3)	.005
Vitreous loss	17 (8.2)	10 (4.8)	7 (3.4)	.02
Posterior capsule rupture	15 (7.2)	9 (4.3)	6 (2.9)	.049
Zonular rupture	10 (4.8)	9 (4.3)	1 (0.5)	.69[b]
Iris prolapse	5 (2.4)	3 (1.4)	2 (1.0)	.27[b]
Iridodialysis	3 (1.4)	2 (1.0)	1 (0.5)	.49[b]
Intraocular lens capture	3 (1.4)	3 (1.4)	0 (0.0)	>.99[b]
Aphakia	3 (1.4)	2 (1.0)	1 (0.5)	.49[b]
Residual lens materials	2 (1.0)	0 (0.0)	2 (1.0)	.04[b]
Intraocular lens dislocation or exchange	2 (1.0)	2 (1.0)	0 (0.0)	>.99[b]
Hyphema	1 (0.5)	1 (0.5)	0 (0.0)	>.99[b]
Corneal decompensation	1 (0.5)	0 (0.0)	1 (0.5)	.20[b]
Retinal detachment	1 (0.5)	0 (0.0)	1 (0.5)	.20[b]

[a]Two-tailed chi-square test.
[b]*T*-tailed Fisher exact test.

variation in sample size, and duration of follow-up. Although direct comparison of the results was difficult, these studies demonstrated that cataract surgery in very elderly adults can lead to satisfactory outcomes. Subgroup analysis revealed that individuals with mature cataracts (usually treated using ECCE or SLIMCE) and posterior subcapsular cataracts were more likely to achieve visual improvement after cataract surgery. This was probably related to their worse preoperative visual acuity rather than the intrinsic advantages of these types of conditions (Table 2). Furthermore, logistical regression analysis did not show a significant association between type of cataract and cataract surgery and postoperative visual outcome (Table 3).

Eighty-seven percent of participants in the current study had undergone an uncomplicated cataract surgery.

Table 2. Visual Outcomes of Cataract Surgery Based on Preoperative Visual Acuity (VA) of Participants According to Follow-Up Interval

	Within 6 Months		12 Months		24 Months		36 Months		48 Months	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Visual Acuity	n (%)									
Improvement in VA	165 (79.7)	42 (20.3)	96 (46.4)	30 (14.5)	63 (30.4)	21 (10.1)	37 (17.9)	15 (7.2)	24 (11.6)	8 (3.9)
Baseline visual impairment (VA)										
Very severe (<10/200)	68 (32.9)	7 (3.4)	35 (16.9)	6 (2.9)	23 (11.1)	6 (2.9)	11 (5.3)	3 (1.4)	9 (4.3)	1 (0.5)
Severe (≥10/200–<20/200)	11 (5.3)	4 (1.9)	6 (2.9)	3 (1.4)	4 (1.9)	3 (1.4)	2 (1.0)	2 (1.0)	0	2 (1.0)
Moderate (20/200–<20/70)	55 (26.6)	22 (10.6)	35 (16.9)	16 (7.7)	24 (11.6)	11 (5.3)	17 (8.2)	9 (4.3)	12 (5.8)	5 (2.4)
Mild (≥20/70)	31 (15.0)	9 (4.3)	20 (9.7)	5 (2.4)	12 (5.8)	1 (0.5)	7 (3.4)	1 (0.5)	3 (1.4)	0
Participants remaining at follow-up	207 (100)		126 (60.9)		84 (40.6)		52 (25.1)		32 (15.5)	

Table 3. Characteristics of Cataracts, Surgical Complications, and Ocular Comorbidities Associated with Visual Outcome in Regression Analysis

Characteristic	OR (95% Confidence Interval)	*P*-Value
Nuclear cataract	2.63 (0.27–25.61)	.40
Cortical cataract	3.04 (0.29–31.89)	.35
Posterior subcapsular cataract	0.86 (0.07–11.25)	.91
Mature cataract	—	>.99
Age-related macular degeneration	4.77 (1.86–12.26)	.001
Ischemic optic neuropathy	12.95 (0.99–169.89)	.05
Vitreous loss	12.86 (2.71–61.10)	.001

If odds ratio (OR) > 1, participant with corresponding factor would not have postoperative visual improvement. If OR < 1, participant with corresponding factor would have postoperative visual improvement.

The most common complications were vitreous loss, posterior capsular rupture, and zonular rupture. Vitreous loss has been reported to be associated with worse postoperative visual acuity.[22] The current study had the same finding for very elderly adults. The overall complication rate in the current study was 13%, which was similar to 13.5% reported previously.[23] This figure was also comparable with the 10% reported in two previous studies.[11,24] One of these studies also reported a prevalence rate of 7% for vitreous loss, which was similar to the finding of the current study.[23] For the general population, the prevalence of vitreous loss, posterior capsular rupture, and zonular rupture was approximately 2.0% to 3.5%,[7,8] whereas the reported rate of posterior capsular tear in very elderly adults ranges from 2.0% to 8.5% in the literatures.[9,23–25] The higher rate of posterior capsular rupture in the current study might be related to a large proportion of mature and hypermature cataracts. In elderly adults, the density of the cataract and a zonule-free zone on the capsule could predispose to higher complication rates.[26] Although individuals with surgical complications would have a significantly lower likelihood of obtaining visual improvement after cataract surgery, the current study demonstrated that 87% of very elderly adults had uneventful surgery. These results could provide more evidence that very elderly adults are not at greater risk of complications simply because of their age.

The prevalence of systemic comorbidities increases with age.[27] One study reported a prevalence of medical morbidity of 81% in individuals with cataracts aged 90 and older,[13] whereas a cross-sectional analysis in the United States reported a prevalence of 82% in adults aged 65 and older with chronic medical illnesses.[27] The current study revealed an even higher prevalence (92%) of medical morbidities. This finding could be related to a broader scope of medical comorbidities being analyzed in the current study (Appendix S2), although ocular comorbidities were common in very elderly adults, with a prevalence rate of 43% in the current study. ARMD, glaucoma, and myopic degeneration were the three most common ocular comorbidities. The overall prevalence of ocular comorbidities was similar to reports in a Western population,[5] except that a higher prevalence of myopic degeneration and lower prevalence of pseudoexfoliation syndrome was observed in the Chinese population.[28,29]

The presence of medical comorbidities was not significantly associated with the postoperative outcome of the participants, although the previous study found poorer cataract surgery outcomes in participants aged 90 and older because of systemic disease and intraoperative changes in systemic condition.[13] Ocular comorbidities were more significant predictors of visual outcome in this age group than systemic morbidities. Backward logistical regression demonstrated the association between ARMD and postoperative visual outcome. ARMD was known to be an important determinant of postoperative visual outcome in older persons undergoing cataract surgery,[14] although people with varying degrees of severity of ARMD might still benefit from cataract surgery, with improvement in postoperative visual acuity.[30] Individuals with ARMD alone should therefore not be discouraged from undergoing cataract surgery.

The main weakness of the current study was its retrospective nature. Prospective population-based studies with a large sample size can better investigate clinical outcomes of cataract surgery in elderly adults. The current study focused on postoperative visual acuity as the outcome of cataract surgery. Previous studies have found that cataract extraction might improve cognitive performance in individuals with early cognitive impairment.[3] Such functional, psychological, and cognitive benefits of cataract surgery in

very elderly adults were not examined in this study, although a small incidence of some comorbidities and complications was noted. Although initial subgroup analysis demonstrated some comorbidities or complications as significant factors, small sample size limited the significance of these factors. Backward logistic regression was used to identify significant factors associated with visual outcomes.

CONCLUSION

The clinical outcome of cataract surgery was satisfactory in individuals aged 90 and older, despite the high prevalence of systemic and ocular comorbidities. The majority of participants had uncomplicated cataract surgery, and 79.7% achieved improvement of visual acuity within 6 months after cataract surgery. Participants with AMRD and vitreous loss were less likely to achieve postoperative visual improvement.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Recent studies of cataract surgery in the very elderly.

Appendix S2. Conditions included in the current study (International Classification of Diseases, 9th Revision, Clinical Modification codes[15] and Current Procedural Terminology[16] used to describe cataract type, comorbidities, and complications).

Appendix S3. Characteristics of patients and cataract surgeries.

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