WORLD VIEW

Visual acuity and quality of life outcomes in cataract surgery patients in Hong Kong

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Background: Visual acuity, visual functioning, and vision related quality of life outcomes after cataract surgery were assessed in a population based study in a suburban area of Hong Kong.
Methods: A cluster sampling design was used to select apartment buildings within housing estates for enumeration. All enumerated residents 60 years of age or over were invited for an eye examination and visual acuity measurement at a site within each estate. Visual functioning (VF) and vision related quality of life (QOL) questionnaires were administered to interview subjects who had undergone cataract surgery and to unoperated people with presenting visual acuity less than 6/60 in either eye, and a sample of those with normal visual acuity.
Results: 36.6% of the 310 cataract operated individuals had presenting visual acuity 6/18 or better in both eyes, and 40.0% when measured by pinhole. 4.5% were blind, with presenting visual acuity less than 6/60 in both eyes. Of operated eyes, 59.6% presented with visual acuity 6/18 or better. 11.2% of the operated eyes were blind with vision less than 6/60. Visual acuity outcomes 6/18 or better were marginally associated with surgery in private versus public hospitals. Lens status (pseudophakic versus aphakic) and surgical period (within the most recent 3 years versus before) were not significantly related to vision outcomes. Mean VF and QOL scores decreased consistently with decreasing vision status. Spearman correlation with vision status was 0.420 for VF scores and 0.313 for QOL scores. Among VF/QOL subscales, correlation was strongest for visual perception ($r = 0.447$) among VF subscales and weakest for self care ($r = 0.171$) among QOL subscales. Regression adjusted VF and QOL total scores for cataract operated individuals were slightly lower than for those of visually comparable unoperated individuals ($p<0.05$).
Conclusions: Cataract operations in Hong Kong did not consistently produce good presenting visual acuity outcomes, suggesting that postoperative monitoring would be useful to minimise visual impairment in this population. Although vision outcomes were consistently correlated with all VF/QOL subscale scores, there was a differential impact with VF subscales usually being affected more by reduced acuity than the more general QOL subscales.

Cataract was found to be leading cause of blindness in individual eyes with presenting visual acuity less than 6/60 among people aged 60 or older in Hong Kong.[1] In recent population based studies in rural China[2 3] and other studies in Western countries,[4 5] advanced age was found to be the most important factor associated with the development of cataract and subsequent vision impairment. As the Hong Kong population ages, morbidity associated with cataract surgery is expected to rise. In planning medical services for cataract patients, it is essential to include the assessment of post-surgical outcomes not only in terms of visual acuity, but also for patient self reported visual functioning and vision related quality of life.

This article presents findings on visual acuity, visual functioning, and quality of life outcomes in a population based, cross sectional sample of elderly Hong Kong Chinese with operated cataract in one or both eyes. Because a similar protocol was employed, the results presented here can be compared directly with findings from two studies in mainland China,[6 7] where the socioeconomic and medical service conditions differ substantially.

METHODS

Sample and design

The study was conducted in the Shatin area of Hong Kong. In this densely populated suburban area, large apartment buildings comprise 95.0% of all housing. Cluster sampling was used to select subjects living in 30 representative apartment buildings from 15 large housing estates. The 15 estate strata represented public, private, and home ownership scheme (government subsidised self purchased) housing.

In door to door enumeration, 4487 eligible subjects 60 years of age or older were identified, of which 3441 (76.7%) completed visual acuity measurement and an ocular examination at a temporary site set up within the neighbourhood. Cataract operated individuals were queried as to the date and hospital where their surgery was performed. Further details regarding the sampling and examination methods are reported in a companion paper.[1]

Visual functioning (VF) and vision related quality of life (QOL) interviews were conducted in those who had cataract surgery, in those presenting with visual acuity worse than 6/60 in either eye, and in approximately 5% of unoperated people with visual acuity ≥6/18 in both eyes.

VF and QOL instruments

The VF/QOL questionnaires used in this study were originally developed for a large scale clinical trial of cataract surgery in India.[8 9] Both questionnaires have been successfully used in surveys of blindness and cataract outcomes in Nepal[10] and in the Shunyi[6] and Doumen[7] districts of China. A translation of the original English version into Cantonese, the local Chinese dialect, was used.[7]

The VF instrument consists of 12 items in four vision subscales—visual perception (activity limitation, near vision, intermediate vision, and distance vision), sensory adaptation (light/dark adaptation, visual search, colour discrimination, and glare disability), peripheral vision (single item), and

depth perception (single item). The QOL instrument contains 12 items, comprising four subscales—self care (bathing, eating, dressing, and toileting), mobility (walking to neighbours, walking to shops, and doing household chores), social interaction (attending functions and meeting friends), and mental wellbeing (burden on others, dejection, and loss of confidence). Both questionnaires assess the current degree of difficulty being experienced by the subject on a four point scale from "not at all" to "a lot." Subscale scores are linearly transformed so that the response range is between 0 and 100. Composite scores for VF (VF Total) and QOL (QOL Total) instruments were calculated by equal weighting of subscale scores.

Interviewers were trained in general interviewing techniques and administration of the questionnaire through the use of a master interviewing audiotape. Practice interviews were conducted on both outpatients and inpatients (none of them were study subjects) at the Hong Kong Eye Hospital and Queen Mary Hospital in Hong Kong. Fifty three additional subjects were interviewed in a pilot study in Shatin conducted before the main study. Intraobserver and interobserver agreement of VF/QOL questionnaire responses were evaluated in 28 of the study subjects. Repeat interviews were conducted approximately 1 hour after the initial one. A weighted kappa statistic was used to assess the degree of agreement across the original 4 point rating scale of each VF/QOL item. Weights were 1.0 for exact agreement and 0.66, 0.33, and 0.0, respectively for disagreement of 1, 2, and 3 points. Kappas for intraobserver agreement (n = 12) were between 0.55 and 1.00 for VF items and between 0.67 and 1.00 for QOL items. Interobserver agreement (n = 16) ranged between 0.52 to 0.87 for VF items and, except for one item, between 0.56 and 1.00 for QOL items. Internal consistency of responses for the 12 items in the VF scales as measured by Cronbach's alpha was 0.87 (average inter-item correlation coefficient = 0.36), and for the 12 items in the QOL scale it was 0.89 (average inter-item correlation coefficient = 0.41). The alpha values for the VF and QOL subscales ranged from 0.74 to 0.87 and 0.82 to 0.89 respectively.

Data analysis

Vision status at the person level was defined using five categories: (1) normal or near normal vision: 6/18 or better in both eyes; (2) unilateral or bilateral visual impairment: worse than 6/18 to 6/60 or better in worse eye, 6/60 or better in better eye; (3) unilateral blindness: worse than 6/60 in worse eye, 6/60 or better in better eye; (4) moderate bilateral blindness: worse than 6/60 in worse eye, less than 6/60 to 3/60 or better in better eye; and (5) severe bilateral blindness: worse than 3/60 in both eyes.

Statistical analyses were performed with appropriate adjustments for the cluster and stratified sample design.[11] The association of presenting visual acuity greater than or equal to 6/18 with procedure type, surgery period, and hospital type was investigated by multiple logistic regression for operated eyes. Associations between vision status and VF/QOL scores were assessed by Spearman correlation coefficients. Differences in VF/QOL scores between aphakic and pseudophakic individuals were assessed by linear regression adjusted for demographic variables. Regression analyses were also used to compare the VF and QOL scores between operated and unoperated individuals using vision status and demographic variables as control variables.

RESULTS

A cross sectional sample of 310 Hong Kong Chinese aged 60 years or older who had cataract surgery in one or both eyes, some of whom had been operated on decades earlier, were identified. Most of them (64.8%) had no formal education, 69.0% were female, 75.4% were 70 years of age or more, and 51.6% lived in public housing estates. Fifty three per cent had bilateral cataract operations. There were 273 (88.1%) pseudophakes, 34 (11.0%) aphakes, and three individuals with undetermined lens status. (None of the cases was aphakic in one eye and pseudophakic in the other.)

Visual acuity outcomes

Table 1 shows presenting visual acuity status for cataract operated individuals. The percentage of subjects with normal/near normal acuity was 36.6%, while 4.5% had visual acuity less than 6/60 in both eyes. Considering only better eye vision, 71.2% had normal or near normal acuity.

Pseudophakes were more likely to have normal/near normal acuity than aphakes; 40.1% (109/272) of the pseudophakes and 88.2% (30/34) of the aphakes wore spectacles for distance correction. With pinhole measurement, the number of subjects with normal/near normal acuity increased from 113 (36.6%) to 124 (40.0%) and the number of bilaterally blind (moderate plus severe blindness) decreased from 14 (4.5%) to 12 (3.9%) (data not shown).

Table 2 shows visual acuity for aphakic and pseudophakic eyes: overall, 59.6% of eyes had presenting visual acuity of 6/18 or better, 29.2% were between less than 6/18 and 6/60, while 11.2% had acuity worse than 6/60. When measured by pinhole visual acuity, 42.8% of the operated eyes with presenting visual acuity between less than 6/18 and 6/60 increased to acuity of 6/18 or greater; and 16.9% with presenting visual acuity below 6/60 increased to acuity between less than 6/18 to 6/60 or greater (none increased to ≥6/18). Accordingly, the overall percentages of operated eyes with pinhole visual acuity of 6/18 or greater, less than 6/18 to 6/60, and below 6/60 were 72.1%, 18.6%, and 9.3%, respectively. Pseudophakic eyes had better vision than aphakic eyes with both presenting and pinhole visual acuity. In particular, 23.7% of aphakic eyes presented with visual acuity less than 3/60, compared to 5.4%

Table 1 Presenting vision of individuals

	Better eye vision acuity No (%) of individuals				
Vision category	≥6/18	<6/18 to ≥6/60	<6/60 to ≥3/60	<3/60	Total
Normal/near normal (≥6/18 both eyes)	113 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	113 (36.6)
Visual impairment (≥6/60 better eye, <6/18 to ≥6/60 worse eye)	73 (62.4)	44 (37.6)	0 (0.0)	0 (0.0)	117 (37.9)
Unilateral blindness (≥6/60 better eye, <6/60 worse eye)	34 (52.3)	31 (47.7)	0 (0.0)	0 (0.0)	65 (21.0)
Moderate blindness (<6/60 to ≥3/60 better eye, <6/60 worse eye)	0 (0.0)	0 (0.0)	9 (100.0)	0 (0.0)	9 (2.9)
Severe blindness (<3/60 both eyes)	0 (0.0)	0 (0.0)	0 (0.0)	5 (100.0)	5 (1.6)
All	220 (71.2)	75 (24.3)	9 (2.9)	5 (1.6)	309 (100.0)*

*Does not include one pseudophakic person with missing visual acuity.

Table 2 Presenting visual acuity and pinhole visual acuity in eyes operated for cataract*

Presenting visual acuity	Pinhole visual acuity				
	≥6/18	<6/18 to ≥6/60	<6/60 to ≥3/60	<3/60	Total
≥6/18					
Aphakic	28 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	28 (47.5)
Pseudophakic	254 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	254 (62.0)
<6/18 to ≥6/60					
Aphakic	3 (14.0)	11 (78.6)	0 (0.0)	0 (0.0)	14 (23.7)
Pseudophakic	56 (45.2)	68 (54.8)	0 (0.0)	0 (0.0)	124 (30.2)
<6/60 to ≥3/60					
Aphakic	0 (0.0)	1 (33.3)	2 (66.7)	0 (0.0)	3 (5.1)
Pseudophakic	0 (0.0)	4 (40.0)	6 (60.0)	0 (0.0)	10 (2.4)
<3/60					
Aphakic	0 (0.0)	2 (14.3)	0 (0.0)	12 (85.7)	14 (23.7)
Pseudophakic	0 (0.0)	2 (9.1)	1 (4.5)	19 (86.4)	22 (5.4)
Undetermined†	0 (0.0)	0 (0.0)	0 (0.0)	4 (100.0)	4 (100.0)
All					
Aphakic	31 (52.5)	14 (23.7)	2 (3.4)	12 (20.3)	59 (100.0)
Pseudophakic	310 (75.6)	74 (18.0)	7 (1.7)	19 (4.6)	410 (100.0)‡
Undetermined†	0 (0.0)	0 (0.0)	0 (0.0)	4 (100.0)	4 (100.0)

*Data are presented as number (%) of eyes; †undetermined lens status due to corneal opacity or phthisical/absent globe; ‡does not include one pseudophakic eye with missing visual acuity.

of pseudophakic eyes, with neither group improving much with pinhole correction.

Cause of vision impairment

Table 3 gives the principal cause of vision impairment or blindness for 31 of 59 aphakic eyes and 156 of 411 pseudophakic eyes with presenting visual acuity less than 6/18, as well as the four eyes with undetermined lens status. Refractive error (34.6%), age related macular degeneration (18.3%), glaucoma (10.5%), and posterior capsule opacity (8.4%) were the four leading causes of visual acuity loss. The causes of visual loss were somewhat different between aphakic and pseudophakic eyes: the leading causes in aphakic eyes were non-glaucomatous optic atrophy (22.6%), glaucoma (19.4%), and refractive error (12.9%), while in pseudophakic eyes the principal causes were refractive error (39.7%), macular degeneration (20.5%), and posterior capsule opacity (10.3%).

Surgical variables

Presenting visual acuity of operated eyes stratified by period of surgery, hospital type, and lens status is shown in Table 4. For bilaterally operated people, only the first operated eye is shown. Second operated eyes were not included to maintain independence among eyes in statistical analyses.[12]

Visual acuity outcomes ≥6/18 were investigated using a multiple logistic regression model with surgical period, type of hospital, and lens status incorporated simultaneously as explanatory variables, and with further adjustments for housing, sex, age, and education level. Operations performed in foreign countries were excluded in the analysis because of their small number. Regression results showed that neither surgical period nor lens status was significantly associated with presenting visual acuity 6/18 or greater ($p = 0.804$ and $p = 0.208$). The better outcomes in private hospitals were of only marginal significance (adjusted odds ratio = 1.84, $p = 0.067$). The cataract operated between the ages of 60 to 69 were found to have better outcomes than those aged 80 or more (adjusted odds ratio = 2.36, $p = 0.016$). Housing type, sex, and education level were not associated with vision outcomes. The interaction between age and surgical period in the regression model was examined and was found to be non-significant.

VF and QOL outcomes

VF and QOL interviews were successfully completed in 299 (96.5%) of the 310 aphakic/pseudophakic individuals, and in 237 (96.3%) of 246 unoperated individuals with presenting visual acuity less than 6/60 in one or both eyes. Also, 87 unoperated individuals with normal/near normal visual acuity had VF/QOL interviews.

Mean VF and QOL scores by presenting vision outcome for cataract operated individuals are shown in Table 5. Increasing vision impairment was correlated with older age (Spearman correlation = 0.157, $p = 0.007$); housing, sex, and education were not. Mean scores decreased consistently across total VF and VF subscales with decreasing vision status, as evidenced

Table 3 Principal causes of impaired vision in operated eyes with presenting acuity less than 6/18

Principal cause	No (%) of eyes with visual acuity <6/18			
	Aphakics	Pseudophakics	Undetermined*	Total
Refractive error	4 (12.9)	62 (39.7)	0 (0.0)	66 (34.6)
Macular degeneration	3 (9.7)	32 (20.5)	0 (0.0)	35 (18.3)
Glaucoma	6 (19.4)	14 (9.0)	0 (0.0)	20 (10.5)
PCO/after cataract	0 (0.0)	16 (10.3)	0 (0.0)	16 (8.4)
Optic atrophy	7 (22.6)	4 (2.6)	0 (0.0)	11 (5.8)
Diabetic/vascular retinopathy	2 (6.5)	8 (5.1)	0 (0.0)	10 (5.2)
Corneal opacity	1 (3.2)	7 (4.5)	1 (25.0)	9 (4.7)
High myopia	3 (9.7)	4 (2.6)	0 (0.0)	7 (3.7)
Phthisical/absent globe	1 (3.2)	1 (0.6)	3 (75.0)	5 (2.6)
Retinal detachment	2 (6.5)	2 (1.3)	0 (0.0)	4 (2.1)
Other/undetermined	2 (6.4)	6 (3.8)	0 (0.0)	8 (4.1)
All	31 (100.0)	156 (100.0)	4 (100.0)	191 (100.0)

*Undetermined lens status due to corneal opacity or phthisical/absent globe.

Table 4 Presenting visual acuity of first operated eyes and association of surgery period, type of hospital, and lens status with visual acuity ≥6/18

	Visual acuity				Adjusted odds ratio* (95% CI)	p Value
	≥6/18	<6/18 to ≥6/60	<6/60	All		
Surgery period						
≤3 years	89 (60.1)	47 (31.8)	12 (8.1)	148	0.93 (0.54 to 1.59)	0.804
>3 years	86 (56.6)	42 (27.6)	24 (15.8)	152	1.00	
Missing	5	4	0	9		
Type of hospital						
Public	74 (51.4)	48 (33.3)	22 (15.3)	144	1.00	
Private	94 (65.7)	42 (29.4)	7 (4.9)	143	1.84 (0.95 to 3.58)	0.067
Foreign country	11 (61.1)	2 (11.1)	5 (27.8)	18		
Missing	1	1	2	4		
Lens status						
Aphakic	14 (40.0)	10 (28.6)	11 (31.4)	35	1.00	
Pseudophakic	166 (61.5)	83 (30.7)	21 (7.8)	270	1.99 (0.66 to 5.99)	0.208
Undetermined	0	0	4	4		
All	180 (58.3)	93 (30.1)	36 (11.7)	309		

*Includes adjustment for housing type, sex, age, education, as well as surgery period, type of hospital, and lens status in a multiple logistic regression model with presenting visual acuity ≥6/18 as the outcome variable.

Table 5 Visual function and quality of life mean scores (and standard errors) for individuals operated on for cataract by presenting vision status

	Vision status					
Demographic variables	Normal (n=110)	Vision impairment (n=114)	Unilateral blindness (n=62)	Mod/severe bilateral blindness (n=13)	All (n=299)	Spearman correlation coefficient (95% CI)
% Public housing	50.0	51.8	51.6	53.8	51.2	
% No education	65.5	64.0	64.5	61.5	64.5	
% Male	26.4	35.1	37.1	15.4	31.4	
Mean age (years)	74.0	75.4	76.5	77.9	75.2	
VF scales						
Visual perception	91.0 (1.2)	81.6 (1.1)	70.3 (4.0)	46.9 (7.9)	81.2 (1.0)	0.447 (0.351 to 0.533)
Peripheral vision	89.8 (1.5)	84.8 (1.6)	69.6 (5.5)	55.8 (12.9)	82.2 (1.2)	0.292 (0.185 to 0.392)
Sensory adaptation	78.4 (1.4)	69.5 (1.8)	61.9 (2.9)	39.5 (6.5)	69.9 (1.4)	0.380 (0.279 to 0.473)
Depth perception	93.0 (1.9)	89.9 (1.5)	80.6 (3.0)	54.8 (8.9)	87.6 (1.1)	0.290 (0.183 to 0.391)
Total VF	88.0 (1.2)	81.5 (1.1)	71.2 (2.9)	49.2 (7.9)	80.4 (0.8)	0.420 (0.322 to 0.509)
QOL scales						
Self care	97.9 (0.7)	98.9 (0.4)	94.2 (1.8)	96.2 (1.3)	97.4 (0.4)	0.171 (0.059 to 0.279)
Mobility	94.9 (1.2)	92.3 (1.4)	84.6 (3.0)	68.1 (11.2)	90.6 (0.9)	0.249 (0.140 to 0.352)
Social	91.3 (1.6)	89.2 (2.2)	81.9 (3.6)	62.6 (10.2)	87.3 (1.6)	0.208 (0.097 to 0.314)
Mental	89.9 (1.5)	80.3 (1.9)	68.2 (5.0)	65.1 (8.6)	80.6 (1.9)	0.293 (0.186 to 0.393)
Total QOL	93.5 (0.9)	90.6 (1.3)	82.2 (2.7)	73.0 (4.3)	89.2 (0.9)	0.313 (0.207 to 0.412)

by Spearman correlation coefficients ranging between 0.290 and 0.447. The correlation was strongest for vision perception and sensory adaptation subscales. Although generally not as pronounced, total QOL and QOL subscales also exhibited significant correlations. The self care subscale was least affected by diminished vision status.

The 60–69 and 70–79 age groups had significantly higher total VF and QOL scores than the 80 or above age group (for VF scores, adjusted $p < 0.001$ and $p = 0.050$ respectively; for QOL scores, $p < 0.001$ and $p = 0.003$ respectively). Housing type, sex, and education were not significantly related to either total VF or total QOL scores (data not shown).

The mean total VF scores for aphakes and pseudophakes were 76.3 and 81.3, respectively, while the total QOL mean scores were 82.9 and 90.1, respectively. These differences in total VF/QOL scores between aphakes and pseudophakes were not statistically significant when investigated by regression with adjustment for demographic variables and presenting visual acuity status (regression coefficient = 0.16, standard error = 3.58, and $p = 0.965$ for VF scores; regression coefficient = 4.22, standard error = 4.72, and $p = 0.380$ for QOL scores).

Table 6 presents VF/QOL data for the unoperated individuals. VF and QOL mean scores were generally higher in the unoperated than the cataract operated individuals with similar vision status. Differences in total VF and QOL mean scores for unoperated and operated individuals were compared using multiple regression, adjusted for presenting vision status and demographic variables: adjusted VF and QOL total mean scores were found to be significantly higher in unoperated individuals (regression coefficient = 5.51, standard error = 1.79, and $p = 0.005$ for VF scores; regression coefficient = 4.24, standard error = 1.90, and $p = 0.034$ for QOL scores). Vision status and age were significant in the regression model. The other demographic control variables (housing, education, and sex) were not statistically significant.

DISCUSSION

As a group, cataract operated eyes had reasonably good visual acuity outcomes, with 59.6% having presenting visual acuity of 6/18 or better. These results are clearly more favourable than that found among rural Chinese populations in Shunyi[6] and Doumen[7] counties, where the percentage of operated eyes with presenting visual acuity of 6/18 or better was 25.0% and

Table 6 Visual function and quality of life mean scores (and standard errors) by presenting vision status in unoperated individuals

	Vision status			
	Normal (n=87)	Unilateral blindness (n=198)	Moderate bilateral blindness (n=25)	Severe bilateral blindness (n=14)
VF scales				
Vision perception	92.9 (0.8)	77.3 (1.9)	61.7 (4.7)	54.2 (4.0)
Peripheral vision	95.2 (1.1)	79.8 (2.1)	69.1 (6.2)	78.9 (6.2)
Sensory adaptation	81.9 (2.4)	68.5 (1.5)	66.1 (3.7)	46.2 (6.4)
Depth perception	97.7 (0.8)	85.6 (2.0)	81.9 (5.2)	70.9 (11.1)
Total VF	91.9 (1.0)	77.8 (1.5)	69.7 (4.3)	62.5 (4.6)
QOL scales				
Self care		98.4 (0.4)	87.5 (3.7)	94.2 (3.6)
Mobility		91.7 (1.2)	72.3 (5.5)	76.6 (8.2)
Social		87.0 (1.7)	77.0 (4.9)	55.6 (12.4)
Mental		84.1 (1.9)	61.4 (5.5)	48.9 (8.3)
Total QOL		90.3 (1.1)	74.6 (3.9)	68.8 (7.1)

23.7%, respectively. The percentage of cases that were pseudophakic, however, was much less: 39.7% in Shunyi and 5.9% in Doumen. The cataract surgery outcomes in Shatin are not as favourable, however, as those obtained in a recent large scale clinical trial of cataract surgery in India, where 4 years after surgery 74.3% of pseudophakic eyes presented with visual acuity ⩾6/18, and 95.7% with best correction.[13 14] Even with pinhole acuity, a large fraction of operated eyes in Shatin failed to attain visual acuity levels of 6/18 or better (27.9% of eyes failed) or 6/60 or better (9.3% failed). While many of these eyes had causes of visual loss unrelated to cataract surgery, consistency in cataract outcomes is an important goal and should be monitored by public health authorities.

Although a substantial percentage of cataract operated eyes with subnormal presenting visual acuity showed improvement when measured by pinhole, pinhole correction still underestimates the best possible corrected visual acuity. With refractive correction operated eyes could be improved even beyond that associated with the reported pinhole corrected level. More attention should be given to ensuring that the implanted intraocular lens is of appropriate power and that cataract operated individuals have suitable corrective lenses when necessary. Posterior capsule opacity (PCO) was another important remediable cause of vision impairment in cataract operated eyes, affecting 8.4% of eyes with presenting visual acuity <6/18. Together, refractive error and PCO accounted for 43.0% of impaired eyes.

Recent and more temporally remote surgery did not show significant differences in terms of visual acuity outcomes. Pseudophakic eyes also showed no significant advantage over aphakic eyes in achieving presenting visual acuity of 6/18 or greater, when adjusted for demographic variables. Private hospitals/practitioners showed a marginally significant advantage over public hospitals in postoperative visual outcomes. Findings such as these must be interpreted with considerable caution, as is the case with all observational studies. In the absence of randomisation, comparisons can be seriously confounded by unrecognised factors. For example, pre-existing ocular conditions before cataract surgery might have varied between groups along with other factors, such as the patients' economic status, which may have been only partially controlled for by the inclusion of housing type in the regression analysis.

Visual functioning and vision related quality of life of the cataract operated population was positively associated with visual acuity. Visual functions that involve the perception of space and distance (that is, peripheral vision and depth perception) were least affected by impaired vision. Visual functions that involve visual discrimination and light perception (visual perception and sensory adaptation) were more adversely affected. A similar pattern between visual functioning and visual acuity status was found among Chinese patients in the Doumen study.[7]

Mobility, social interaction, and mental wellbeing among operated individuals were hampered by poor vision. Self care activities, such as bathing, eating, dressing, and toileting, were not as affected. This is in contrast with the study conducted in Shunyi, a rural county outside of Beijing, where all four quality of life subscales showed more equal detriment with declining vision status.[6] The relatively high quality of life regarding self care despite vision impairment in the Shatin population may be explained, in part, by the small living space (mean size about 50 m^2) among apartment dwellers, which makes self care activities comparatively more accessible. The availability of modern household utilities in Shatin, such as telephone, indoor plumbing, automated hot water, and gas, also may make self care activities easier for people with poor vision.

Comparing the self reported visual functioning and quality of life scores between unoperated and operated individuals within the same vision category provides another assessment of the quality of cataract operations in Hong Kong. Cataract surgery can be considered successful if the operation restores the visual functioning and vision related quality of life in cataract patients to levels similar to that among unoperated individuals with similar vision status. Although the adjusted scores of operated individuals were somewhat lower than those of unoperated individuals, the differences were quite small. Although the differences were statistically significant, they may not be significant from a practical standpoint.

Because the study subjects were a randomly selected, population based sample, the findings presented here are thought to be representative of cataract surgery outcomes in Shatin, and possibly Hong Kong in general. Although the large sample size allowed for investigating factors associated with surgical outcomes using regression analyses, as was noted above caution must be exercised in attributing a cause and effect relation to any predictive factor. The main source of potential bias in this study was the modest examination response rate of 76.7%, a rate low enough to allow for significant participant self selection biases. This was evidenced by the unexpectedly high proportion (69%) of cataract operated cases which were female.

In conclusion, cataract outcomes in the Shatin area of Hong Kong can be substantially improved, with emphasis given to postoperative visual rehabilitation as well. In the majority of cases, simple refraction or posterior capsule opacity lysis could

improve visual status. A programme of monitoring of cataract outcomes would be useful to ensure continuous improvement in quality. With an ageing population, the need for vision function and quality of life restoring cataract surgery will only increase.

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REFERENCES

1 **Michon JJ**, Lau J, Chan WS, *et al*. Prevalence of visual impairment, blindness, and cataract surgery in the Hong Kong elderly. *Br J Ophthalmol* 2002;**86**:(in press).
2 **Zhao J**, Jia L, Sui R, *et al*. Prevalence of blindness and cataract surgery in Shunyi County, China. *Am J Ophthalmol* 1998;**126**:506–14.
3 **Li S**, Xu J, He M, *et al*. A survey of blindness and cataract surgery in Doumen County, China. *Ophthalmology* 1999;**106**:1602–8.
4 **Hirvelä H**, Luukinen H, Laatikainen L. Prevalence and risk factors of lens opacities in the elderly in Finland: a population-based study. *Ophthalmology* 1995;**102**:108–17.
5 **Leske MC**, Chylack LT Jr, Wu S-Y. The Lens Opacities Case-Control Study: risk factors for cataract. *Arch Ophthalmol* 1991;**109**:244–51.
6 **Zhao J**, Sui R, Jia L, *et al*. Visual acuity and quality of life outcomes in patients with cataract in Shunyi County, China. *Am J Ophthalmol* 1998;**126**:515–23.
7 **He M**, Xu J, Li S, *et al*. Visual acuity and quality of life in cataract patients in Doumen County, China. *Ophthalmology* 1999;**106**:1609–15.
8 **Natchiar GN**, Thulasiraj RD, Negrel AD, *et al*. The Madurai intraocular lens study I: a randomized clinical trial comparing complications and vision outcomes of intracapsular cataract extraction with extracapsular cataract extraction with posterior chamber intraocular lens. *Am J Ophthalmol* 1998;**25**:1–13.
9 **Fletcher A**, Vijaykumar V, Selvaraj S, *et al*. The Madurai intraocular lens study. III: Visual functioning and quality of life outcomes. *Am J Ophthalmol* 1998;**125**:26–35.
10 **Pokharel GP**, Selvaraj S, Ellwein LB. Visual functioning and quality of life outcomes among cataract operated and unoperated blind populations in Nepal. *Br J Ophthalmol* 1998;**82**:606–10.
11 **StataCorp**. *Stata statistical software: Release 6.0*. College Station, Texas: Stata Corporation, 1999.
12 **Glynn RJ**, Rosner B. Accounting for the correlation between fellow eyes in regression analysis. *Arch Ophthalmol* 1992;**110**:381–7.
13 **Prajna NV**, Chandrakanth KS, Kim R, *et al*. The Madurai intraocular lens study II: Clinical outcomes. *Am J Ophthalmol* 1998;**125**:14–25.
14 **Prajna NV**, Ellwein LB, Selvaraj S, *et al*. The Madurai intraocular lens study IV: Posterior capsule opacification. *Am J Ophthalmol* 2000;**130**:304–9.

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