Ocular Comorbidities among Cataract-Operated Patients in Rural China

The Caring Is Hip Study of Cataract Outcomes and Uptake of Services (SCOUTS), Report No. 3

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Purpose: To determine the prevalence and impact on vision and visual function of ocular comorbidities in a rural Chinese cataract surgical program, and to devise strategies to reduce their associated burden.

Design: Cross-sectional cohort study.

Participants: Persons undergoing cataract surgery by one of two recently trained local surgeons at a government-run village-level hospital in rural Guangdong between August 8 and December 31, 2005.

Interventions: Eligible subjects were invited to return for a comprehensive ocular examination and visual function interview 10 to 14 months after surgery. Prevalent ocular comorbid conditions were identified.

Main Outcome Measures: Presenting and best-corrected vision, visual function, and treatability of the comorbidity.

Results: Of 313 persons operated within the study window, 242 (77%) could be contacted by telephone; study examinations and interviews were performed on 176 (74%). Examined subjects had a mean age of 69.4±10.5 years, 116 (66%) were female, and 149 (85%) had been blind (presenting vision ≤ 6/60) in the operative eye before surgery. Among unoperated eyes, 89 of 109 (81.7%) had ≥1 ocular comorbidities, whereas for operated eyes the corresponding proportion was 72 of 211 (34.1%). The leading comorbidity among operated eyes was refractive error (43/72 [59.7%]), followed by glaucoma/glaucoma suspect (14/72 [19.4%]), whereas for unoperated eyes, it was cataract (80/92 [87.0%]), followed by refractive error (12/92 [13.0%]). Among operated eyes with comorbidities, 90.3% (65/72) had ≥1 comorbidities that were treatable. In separate models adjusting for age and gender, persons with ≥1 comorbidities in the operated eye had significantly worse presenting vision ($P<0.001$) than those without such findings, but visual function ($P = 0.197$) and satisfaction with surgery ($P = 0.796$) were unassociated with comorbidities.

Conclusions: Ocular comorbidities are highly prevalent among persons undergoing cataract surgery in this rural Asian setting, and their presence is significantly associated with poorer visual outcomes. The fact that the great majority of comorbidities encountered in this program are treatable suggests that strategies to reduce their impact can be successful. *Ophthalmology 2007;114:e47–e52 © 2007 by the American Academy of Ophthalmology.*

Cataract remains the leading cause of blindness in the world,[1] though studies have demonstrated excellent potential for return to normal vision with extraction of the cataractous lens in both the developed[2] and developing[3] worlds. In general, some 90% of persons undergoing cataract surgery may expect to achieve postoperative vision of 6/12 or better,[2,3] and a similar proportion report the surgery to have been of subjective benefit.[4] However, an important limitation on the excellent visual results usually associated with cataract surgery is the presence of ocular comorbidities.

Ocular comorbidities are common in patients undergoing

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cataract surgery in the developed world: the reported prevalence ranges from 26% to 49%.[5–7] Systemic comorbidities may be present in as many as 80% of patients.[5] The presence of ocular comorbidities is associated with generally worse cataract surgical outcomes, including poorer vision[8,9]; reduced visual function[9–13] and quality of life[8,9,13]; less satisfaction with vision[13]; more intraoperative and postoperative complications,[14] including aphakia[15]; and less persistent benefit after surgery.[10,16]

Few data have been reported on ocular comorbidities among persons undergoing cataract surgery in rural Asia,[17] where the detection of such conditions may be particularly important. In the setting of scarce health care resources, it may be desirable to limit cataract surgery to those with the best visual potential. Conversely, the preoperative examination for cataract surgery may serve as the only opportunity to diagnose and manage treatable ocular conditions. Dense cataract or incomplete examinations necessitated by large patient volumes may result in a failure to recognize posterior pole abnormalities.[18] For all of these reasons, there is much interest in better understanding the prevalence and impact of ocular comorbidities among persons undergoing cataract surgery in rural Asia, where 36% of the world's population resides.[19]

The Project Vision Study of Cataract Outcomes and Uptake of Services (SCOUTS) is an intensive study of outcomes and service uptake among approximately 300 persons undergoing sutureless manual cataract extraction performed by local surgeons in rural China. The present report examines (1) the prevalence and type of ocular comorbidities present in the cohort, (2) the impact of ocular comorbidities on vision and visual function in this setting, and (3) strategies to improve the preoperative and postoperative detection of ocular comorbidities.

Materials and Methods

The methods of the Sanrao SCOUTS have been reported in detail elsewhere.[20] Persons undergoing cataract surgery in at least one eye by either of 2 local rural surgeons through the Project Vision program at Sanrao Hospital in rural Guangdong Province between August 8, 2005 (the first date on which the surgeons performed independent surgery after completing training) and December 31, 2005 were invited by telephone to return to the hospital for a comprehensive ocular examination and series of questionnaires relating to satisfaction and visual function. These were carried out from October 16 to 21, 2006, an average of 12 months postoperatively. Sanrao Hospital is a village-level government-run facility. Written informed consent was obtained from all subjects, and the study protocol was approved by the institutional review board at the Joint Shantou International Eye Center, which serves as a parent hospital for Sanrao. The Declaration of Helsinki was followed in all study procedures.

All participants in the study had previously undergone cataract surgery in at least one eye at Sanrao Hospital during the above-mentioned eligibility period, at which time age, gender, intraocular lens power, preoperative presenting acuity, and presenting vision on postoperative day 1 were recorded. Subjects unable or unwilling to attend the follow-up examination from October 16 to 21, 2006 were asked to respond to visual function and patient satisfaction questionnaires, which were administered by the same trained study personnel using the same protocol as that employed at the study site. The questionnaire contents and scoring are described in detail elsewhere.[21]

Ocular Examination Techniques

Near and distance presenting vision and best-corrected vision (autorefraction [KR-8800, Topcon Hong Kong Ltd., Hong Kong, China] followed by subjective refinement by an ophthalmologist) were measured for each eye separately for all subjects. Distance vision was measured using an illuminated tumbling-E Snellen chart at a distance of 6 m, and near vision was measured at 33 cm with a handheld chart.

Keratometry (KR-8800) and noncontact tonometry (AT550, Leica Hong Kong Ltd., Hong Kong, China) were carried out bilaterally. All subjects then underwent an ocular examination by a single examiner (NGC). Slit-lamp biomicroscopy (YZ5F1, Suzhou Liuliu Inc., Suzhou, China) of the anterior segment and dynamic gonioscopy were performed, and phakic subjects with a closed angle for 90° or more in either eye underwent yttrium–aluminum–garnet laser peripheral iridotomy (machine). All subjects were then dilated in both eyes. The ocular fundus was examined by slit-lamp biomicroscopy with a 90-diopter (D) lens and indirect ophthalmoscopy with a 20-D lens.

The examiner recorded ≥1 diagnoses for each eye with a presenting acuity of <6/12. Additional diagnoses of conditions not associated with vision<6/12 were also recorded when present. Patients thought to have visually significant cataract or refractive error were offered surgery or refractive correction at Sanrao. Subjects with more complex conditions requiring further treatment or diagnostic studies were referred to the Joint Shantou International Eye Center. Studies such as ocular photography and visual field (VF) testing were not performed as a routine part of the study protocol, as the focus of SCOUTS is ocular abnormalities that an ophthalmologist in a rural hospital setting might be expected to identify with available technology. The goal was not to carry out a disease prevalence study.

Study Definitions

Open-angle glaucoma (OAG): cup-to-disc (C/D) ratio of ≥0.8 or focal notching (remaining rim width < 0.1), with open angle on gonioscopy. Intraocular pressure was not included in the definition.

OAG suspect: C/D ratio of ≥0.7, asymmetry between the two eyes of ≥0.2, or pressure ≥ 25 mmHg without an adequate view of the optic nerve, with an open angle on gonioscopy and not meeting the criteria above for OAG.

Angle-closure glaucoma (ACG): C/D ratio of ≥0.8 or focal notching (remaining rim width < 0.1), with a closed angle for ≥90° on gonioscopy. Intraocular pressure was not included in the definition.

ACG suspect: C/D ratio of ≥0.7, asymmetry between the two eyes of ≥0.2, or pressure≥25 without an adequate view of the optic nerve, with an angle closed for ≥90° on gonioscopy and not meeting the criteria above for ACG.

Narrow angle: angle closed (either synechially or appositionally) for ≥90° and not meeting the criteria for ACG or ACG suspect.

Visual Function Questionnaire

The visual function questionnaire was a Chinese translation of an instrument developed originally by Fletcher et al for use in rural

Table 1. Prevalence of Various Types of Comorbidities among 176 Persons Operated for Cataract in Rural China

	Unoperated Eye (n = 109)			Operated Eye (n = 211)		
	n	*% of All Unoperated Eyes*	*% of All Eyes with Comorbidities*	*n*	*% of All Operated Eyes*	*% of All Eyes with Comorbidities*
Diagnosis						
Normal	20	18.3	—	139	65.9	—
Have ≥1 comorbidities	89	81.7	100	72	34.1	100
Types of comorbidity						
Refractive error*	12	11.0	13.0	43	20.4	59.7
Cataract*	80	73.3	87.0	0	0	0
Corneal and surface disorders*	4	3.7	4.3	6	2.8	8.3
Glaucoma or glaucoma suspect	11			14		
Open angle*	5	4.6	5.4	12	5.7	16.7
Closed angle*	6	5.5	6.6	2	1.1	2.7
Retinal abnormalities	2			14		
Diabetic retinopathy*	0	0	0	6	2.8	8.3
Others	2	1.8	2.2	8	3.8	11.1
Optic nerve abnormalities	0	0	0	2	0.9	2.8
Amblyopia	1	0.9	1.1	3	1.4	4.2

*Treatable comorbidities.

Asia.[21] All questions were administered in the local dialect (Chaoshanhua) by 1 of 3 native speakers after a period of training and standardization. These instruments have previously been validated for use in Chinese[22,23] and are described elsewhere in detail.[21]

Briefly, the visual function questionnaire assesses overall vision, visual perception, limitation in daily activities, sensory adaptation, peripheral vision, light–dark adaptation, visual search, color discrimination, glare disability, and depth perception. The questionnaire could be administered in 5 to 10 minutes. Each response was scored from 1 (no problems) through 4 (maximum problems), with scales in each of the areas calibrated between 100 (best possible score) and 0 (worst score). The overall visual function scale score was calculated by averaging the scores for the different areas, thus giving a summary 0 to 100 score.[21]

Statistical Methods

Multiple linear regression models were employed to assess the association between presence of comorbidities in either operated eye and visual function, adjusting for age and gender. Logistic regression was used to examine the association between presence of comorbidities and satisfaction with surgery, adjusting for age and gender. The association between presence of comorbidities and potential predictors among operated eyes as well as the association between presenting vision and the presence of comorbidities in operated eyes, adjusting for age and gender, were assessed using generalized estimation equation models, which accounted for intracorrelated data from subjects with bilateral surgery. The Proc Genmod program (release 9.1, SAS Institute, Cary, NC) was used to fit generalized estimation equation models. All other statistical analyses were performed using SPSS 14.0 (SPSS Inc., Chicago, IL). All statistical tests were 2 sided, and a P value < 0.05 was considered statistically significant.

Results

Of 313 persons operated within the study window, 242 (77%) could be contacted by telephone; study examinations and interviews were performed on 176 (74%), 63 (26%) underwent telephone interviews without examination, and 3 (1%) refused examination or interview. Examined subjects had a mean age of 69.4±10.5 years, 116 (66%) were female, 149 (85%) had been blind (presenting vision ≤ 6/60, the United States definition) in the operative eye before surgery, and 35 (19.9%) had undergone bilateral cataract operations by Sanrao surgeons (a total of 32 subjects had undergone surgery in the fellow eye by other local surgeons; these eyes are not included in the analyses).[20] As has been reported elsewhere [Congdon NG, Rao SK, Fan H, et al. Visual function and post-operative care after cataract surgery in rural China: the Sanrao Study of Cataract Outcomes and Up-take of Services (SCOUTS), report #2], examined and interviewed patients did not differ significantly from those who could not be contacted with regard to age, gender, preoperative presenting vision, or postoperative day 1 presenting vision in the surgical eye (data not shown).

Table 1 shows the prevalence of the various types of comorbidities present among 211 operated and 109 unoperated eyes. Of unoperated eyes, 89 of 109 (81.7%) had ≥1 ocular comorbidities, whereas for operated eyes, the corresponding proportion was 72 of 211 (34.1%). The leading comorbidity among operated eyes was refractive error (43/72 [59.1%]), followed by glaucoma/glaucoma suspect (14/72 [19.4%]), whereas for unoperated eyes, it was cataract (80/92 [73.3%]), followed by refractive error (12/92 [13.0%]). The prevalence of comorbidities other than refractive error in operated eyes was 17.1% (36/211).

Treatable comorbidities (Table 1) were present in 80.7% (88/109) of unoperated eyes and 30.8% (65/211) of operated eyes. Of operated eyes with comorbidities, 90.3% (65/72) had ≥1 comorbidities that were treatable.

Comorbidities were associated with worse visual outcomes in operated eyes. In separate models adjusting for age and gender, persons with ≥1 comorbidities in the operated eye had significantly worse presenting vision ($P<0.001$) than those without such findings, but visual function ($P = 0.197$) and satisfaction with surgery ($P = 0.796$) were unassociated with comorbidities (Tables 2–4). Of 9 operated eyes (4.3% of all operated eyes) with best-corrected vision < 6/18, 66.7% (6/9) had treatable ocular comorbidities that were wholly or partly responsible for the decrement in vision.

Table 2. Association between Presenting Acuity and Presence of Comorbidities in the Operated Eye Adjusting for Age and Gender (n = 176 Subjects)

Independent Variables	β Value	Standard Error	P Value
Presence of comorbidities	−0.352	0.029	<0.001
Male gender	0.077	0.031	0.013
Age	−0.005	0.002	0.008

Those eyes with preoperative vision > 6/60 had one fifth the odds of having a comorbidity (odds ratio [OR] in the multivariate model, 0.18; 95% confidence interval [CI], 0.05–0.63), and previous wearing of glasses (as an index of access to ocular services) was also protective (OR, 0.31 in the multivariate model; 95% CI, 0.13–0.74). Bilateral surgery was associated with a lower odds of comorbidity in the operated eye (OR, 0.42 in the multivariate model; 95% CI, 0.22–0.81), presumably because those subjects with better visual results in the first eye were more likely to go on to second-eye surgery. Gender and age were unassociated with comorbidities in the operated eye (Table 5).

Discussion

The cataract surgical outcomes for the SCOUTS cohort are generally excellent, as has been reported elsewhere: though nearly 90% of subjects were blind in the operative eye before surgery, 83.4% (176/211) of surgical eyes presented with acuity of 6/18 or better and 95.7% (202/211) had best-corrected vision in this range.[20] Visual function results are comparable to or exceed the best reported from major centers such as Aravind[3] [Congdon NG, Rao SK, Fan H, et al. Visual function and post-operative care after cataract surgery in rural China: the Sanrao Study of Cataract Outcomes and Up-take of Services (SCOUTS), report #2]. Nonetheless, ocular comorbidities were common in this group and were associated with significantly worse presenting vision in the operated eye: subjects without comorbidities were some 5 times more likely to achieve good (≥6/18) presenting postoperative vision than those with them (Table 5).

The 34% prevalence of comorbidities in operated eyes among our rural Chinese subjects is within the range of 26% to 49% reported for studies from the developed world.[5–7] Though few data on comorbidities are available from rural Asia, our results are generally in line with those reported by Bourne et al from Bangladesh. Among operated eyes failing to achieve good (≥6/18) presenting vision, nonrefractive comorbidities (Bangladesh 28%, current study 33%) were the second-leading cause, after refractive error (60% in Bangladesh, 72% in our study).[17] (Note that, due to the presence of both refractive and nonrefractive comorbidities in several eyes in our studies, the sum exceeds 100%.)

Table 3. Association between Visual Function and Presence of Comorbidities in the Operated Eye Adjusting for Age and Gender (n = 176 Subjects)

Independent Variables	β Value	Standard Error	P Value
Presence of comorbidities	−1.914	1.478	0.197
Male gender	0.998	1.545	0.519
Age	−0.107	0.072	0.140

Table 4. Association between Satisfaction with Surgery and Presence of Comorbidities in the Operated Eye Adjusting for Age and Gender (n = 172 Subjects*)

	Very Satisfied with Surgery			
	No (*n = 17*)	*Yes* (*n = 155*)	OR_A (95% CI)	P Value
Presence of comorbidities	12 (70.6%)	110 (71.0%)	0.86 (0.28–2.67)	0.796
Male gender	6 (35.3%)	52 (33.5%)	0.94 (0.32–2.75)	0.916
Age	65.6 (14.4)	70.1 (9.6)	1.04 (0.99–1.09)	0.089

CI = confidence interval; OR_A = odds ratio adjusted for age and gender using logistic regression model.
*Four missing data on satisfaction with surgery.

Among operated eyes, preoperative vision was strongly associated with the presence of comorbidities: patients without coincident ocular disease were some 5 times as likely to have preoperative vision ≥ 6/60. Access to eye care, as indicated by having been fit for glasses (a service not currently offered by our program), was strongly protective against the presence of comorbidities in this cohort, with such persons having one third the odds of having an ocular comorbidity, after adjusting for age and gender. These glasses were largely for reading [Congdon NG, Rao SK, Fan H, et al. Visual function and post-operative care after cataract surgery in rural China: the Sanrao Study of Cataract Outcomes and Up-take of Services (SCOUTS), report #2], and very few subjects brought their glasses to the postoperative examination, so it is unlikely that this effect was mediated through a reduction in refractive error, the most common comorbidity in operated eyes in this cohort.

A principal aim of the current study was to identify strategies to reduce the impact of comorbidities in the context of a rural Asian cataract surgical program. Although preoperative vision was strongly associated with the presence of comorbidities, 86% of subjects were blind in the operative eye before surgery, so a strategy of not operating on subjects with poor vision would be ineffective and undesirable in this program. Similarly, though access to eye care outside of our program, as indicated by having been fit for glasses, had a protective effect on comorbidities in this cohort, only 40% of our subjects had ever received glasses [Congdon NG, Rao SK, Fan H, et al. Visual function and post-operative care after cataract surgery in rural China: the Sanrao Study of Cataract Outcomes and Up-take of Services (SCOUTS), report #2]. In this rural Chinese setting, regular access to eye care is unlikely to be available for the majority of patients.

Our results do, however, provide the basis for a program strategy to reduce the burden of ocular comorbidity: over 30% of operated eyes had ≥1 comorbidities amenable to treatment, with some 90% of eyes with any comorbidities having at least one treatable condition (Table 1). Programs to provide supplementary training in the recognition and treatment of common comorbidities could be expected to

Table 5. Potential Factors Associated with Presence of Comorbidities among Operated Eyes (n = 211)

	Presence of Comorbidity					
	No (n = 139)	*Yes (n = 72)*	OR_U	*P* Value	OR_A (95% CI)	*P* Value
Age	68.7 (9.9)	70.6 (10.9)	1.02	0.210	1.01 (0.98–1.05)	0.462
Male gender	50 (36.0%)	22 (30.6%)	0.85	0.616	1.38 (0.67–2.88)	0.382
Preoperative presenting vision (>6/60 vs. ≤6/60)	29 (21.2%)	3 (4.2%)	0.17	0.006	0.18 (0.05–0.63)	0.007
Bilateral surgery	76 (54.7%)	26 (36.1%)	0.42	0.007	0.42 (0.22–0.81)	0.009
Had glasses previously	52 (38.0%)	12 (17.4%)	0.36	0.008	0.31 (0.13–0.74)	0.008

CI = confidence interval; OR_A = odds ratio adjusted for other factors using a generalized estimation equation (GEE) model; OR_U = univariate odds ratio obtained using a GEE model with adjustment for paired eye data from subjects with bilateral surgery.

have a significant effect on visual outcomes in this program, given that 67% of eyes with best-corrected postoperative vision < 6/18 had ocular comorbidity as a contributing reason. It is also important to remember that many of the comorbidities detected, such as most cases of glaucoma, may have no effect on central vision currently, but can severely impact vision eventually if untreated. According to the observed distribution of comorbidities in the current study, training programs should focus principally on diabetic retinopathy, OAG, and closed-angle glaucoma and would thus be expected to cover gonioscopy, management of the narrow angle, techniques of retinal examination, and laser treatment for proliferative retinopathy and edema.

Refractive error accounted for 72% of the eyes failing to achieve 6/18 acuity. We report elsewhere that the proportion of patients in this setting who had refraction within ±1 D of the target (−0.50 D) was 73.2%,[24] well within international norms.[25–28] Despite this, modest refractive error was quite common, though patient willingness to accept spectacles was low. Among the 87% of patients who could improve by ≥2 lines in the operated eye at near or distance with spectacles, only 35% of such persons would accept spectacles, the key reason being lack of perceived need [Congdon NG, Rao SK, Fan H, et al. Visual function and postoperative care after cataract surgery in rural China: the Sanrao Study of Cataract Outcomes and Up-take of Services (SCOUTS), report #2]. Efforts to redress the comorbidity of refractive error will probably need to focus on educational efforts emphasizing the visual benefits of wearing glasses.

The results of this study must be interpreted in the context of the limitations of SCOUTS. Not all persons eligible for interview and examination as part of the cohort operated during the study period could actually be contacted, so it is at least possible that those examined were not representative of all persons operated at Sanrao, let alone of persons undergoing cataract surgery elsewhere in rural Asia. It is known, however, that examined and contacted subjects did not differ from one another with regard to a number of critical demographic and clinical factors. Although all subjects underwent thorough examination by a fellowship-trained glaucoma specialist, VF tests and other ancillary examinations were not performed as part of the SCOUTS protocol. Thus, it is quite possible that the figures given here represent an underestimate of the true burden of comorbid ocular disease. However, the current research was designed to elucidate the scope and impact of comorbidities potentially detectable by a well-trained ophthalmologist in a modestly equipped rural hospital, and not to constitute a prevalence study.

Despite its limitations, the current study remains one of the few to give information on the burden of ocular comorbidities among cataract-operated persons in rural Asia. Our conclusion that these conditions are common and significantly associated with poor vision outcomes, and that the majority are treatable, has important implications for surgical programs in this region.

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References

1. Resnikoff S, Pascolini D, Etya'ale D, et al. Global data on visual impairment in the year 2002. Bull World Health Organ 2004;82:844–51.
2. Powe NR, Schein OD, Gieser SC, et al. Synthesis of the literature on visual acuity and complications following cataract extraction with intraocular lens implantation. Arch Ophthalmol 1994;112:239–52.
3. Prajna NV, Chandrakanth KS, Kim R, et al. The Madurai Intraocular Lens Study. II: clinical outcomes. Am J Ophthalmol 1998;125:14–25.
4. Lundstrom M, Stenevi U, Thorburn W, Roos P. Catquest questionnaire for use in cataract surgery care: assessment of surgical outcomes. J Cataract Refract Surg 1998;24:968–74.
5. Riley AF, Malik TY, Grupcheva CN, et al. The Auckland cataract study: co-morbidity, surgical techniques, and clinical outcomes in a public hospital service. Br J Ophthalmol 2002; 86:185–90.
6. Pham TQ, Wang JJ, Rochtchina E, et al. Systemic and ocular comorbiditity of cataract surgical patients in a western Sydney public hospital. Clin Experiment Ophthalmol 2004;32:383–7.
7. Noertjojo K, Mildon D, Rollins D, et al. Cataract surgical outcome at the Vancouver Eye Care Centre: can it be predicted using current data? Can J Ophthalmol 2004;39:38–47.
8. Lundstrom M, Brege KG, Floren I, et al. Cataract surgery and quality of life in patients with age related macular degeneration. Br J Ophthalmol 2002;86:1330–5.

9. Pham TQ, Cugati S, Rochtchina E, et al. Age-related maculopathy and cataract surgery outcomes: visual acuity and health-related quality of life. Eye 2007;21:324–30.
10. Lundqvist B, Monestam E. Longitudinal changes in subjective and objective visual function 5 years after cataract surgery: prospective population-based study. J Cataract Refract Surg 2006;32:1944–50.
11. Lundstrom M, Brege KG, Floren I, et al. Impaired visual function after cataract surgery assessed using the Catquest questionnaire. J Cataract Refract Surg 2000;26:101–8.
12. Lundstrom M, Stenevi U, Thorburn W. Outcome of cataract surgery considering the preoperative situation: a study of possible predictors of functional outcome. Br J Ophthalmol 1999; 83:1272–6.
13. Espallargues M, Alonso J, Barcelona I-PORT Investigators. Effectiveness of cataract surgery in Barcelona, Spain: site results of an international study. J Clin Epidemiol 1998;51:843–52.
14. Willerscheidt AB, Healey ML, Ireland M. Cataract surgery outcomes: importance of co-morbidities in case mix. J Cataract Refract Surg 1995;21:177–81.
15. Lundstrom M, Brege KG, Floren I, et al. Postoperative aphakia in modern cataract surgery. Part I: analysis of incidence and risks based on 5-year data from the Swedish National Cataract Register. J Cataract Refract Surg 2004;30:2105–10.
16. Lundstrom M, Wendel E. Duration of self assessed benefit of cataract extraction: a long term study. Br J Ophthalmol 2005; 89:1017–20.
17. Bourne RR, Dineen BP, Ali SM, et al. Outcomes of cataract surgery in Bangladesh: results from a population based nationwide survey. Br J Ophthalmol 2003;87:813–9.
18. Dandona L, Dandona R, Naduvilath TJ, et al. Is current eye-care-policy focus almost exclusively on cataract adequate to deal with blindness in India? Lancet 1998;351:1312–6.
19. World urbanization prospects. The 1999 revision. Annex tables. New York: United Nations; 1999. Available at: http://www.un.org/esa/population/publications/wup1999/WUP99ANNEXTABLES.pdf. Accessed June 20, 2007.
20. Lam DS, Rao SK, Fan H, et al. Visual outcomes and astigmatism after sutureless, manual cataract extraction in rural China: the Sanrao Study of Cataract Outcomes and Up-take of Services (SCOUTS). Report no. 1. Arch Ophthalmol. In press.
21. Fletcher AE, Ellwein LB, Selvaraj S, et al. Measurements of vision function and quality of life in patients with cataracts in southern India: report of instrument development. Arch Ophthalmol 1997;115:767–74.
22. He M, Xu J, Li S, et al. Visual acuity and quality of life in patients with cataract in Doumen County, China. Ophthalmology 1999;106:1609–15.
23. 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.
24. Zhou ZX, Congdon N, Zhang ZM, et al. Distribution and visual impact of postoperative refractive error after cataract surgery in rural China: the Study of Cataract Outcomes and Up-take of Services (SCOUTS), report #4. J Cataract Refract Surg. In press.
25. Nuzzi G, Cantu C, De Giovanni MA. Older age as a risk factor for deviation from emmetropia in pseudophakia. Eur Ophthalmol 2001;11:133–8.
26. Guzowski M, Rochtchina E, Wang JJ, Mitchell P. Refractive changes following cataract surgery: the Blue Mountains Eye Study. Clin Experiment Ophthalmol 2002;30:159–62.
27. Zaidi FH, Corbett MC, Burton BJ, Bloom PA. Raising the benchmark for the 21st century—the 1000 Cataract Operations Audit and Survey: outcomes, consultant-supervised training and sourcing NHS choice. Br J Ophthalmol 2007;91: 731–6.
28. Lundstrom M, Stenevi U, Thorburn W. The Swedish National Cataract Register: a 9-year review. Acta Ophthalmol Scand 2002;80:248–57.