Outcomes of extracapsular surgery in eye camps of eastern Nepal

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Abstract

***Background*—Extracapsular cataract (ECCE) surgery is becoming increasingly popular in surgical eye camps of developing countries. This study assesses the outcome of 166 eyes at 6 weeks and 14 and 32 months after ECCE with and without implantation of intraocular lens in refugee camps of eastern Nepal.**

***Method*—All patients operated on in seven refugee camps during the 3 years before the assessment were included in the study population. Visual acuity, examination of anterior segment and posterior segments, and grading of capsular opacification using a standardised grading system were performed.**

***Results*—Of 166 eyes examined, of which 49.4% were aphakic, 58% of eyes had very poor functional vision (WHO severe visual impairment—VA <6/60). After refraction and best correction 19% still had very poor vision. The aphakic eyes had both significantly poorer functional and best corrected vision than the pseudophakic eyes. In patients with intact posterior capsule clinically significant posterior capsular opacification was observed in over 10% of eyes at 14 months and 30% at 32 months.**

***Conclusion*—It was found that ECCE surgery in eye camps in this setting gave unacceptable outcomes because of a high rate of capsular rupture and posterior capsular opacification. Careful consideration should be given to the quality of the surgical set up and available resources and possibilities of postoperative follow up when ECCE is introduced in eye camps.**

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Worldwide cataract blindness continues to be the major cause of all blindness. Of the 44.8 million blind it is estimated that 43% are due to cataract.[1] In India alone over five million people are blind from bilateral cataract, 57.5% of total number of blind. By the year 2020 the elderly population of 60 years and above is expected to double from today's number, increasing the number of blind even more.[2]

Until recently intracapsular cataract extraction (ICCE) with aphakic spectacle correction has been the surgery of choice and the only surgery legally permissible in eye camp surgery in India.[3] ICCE is still being performed in eye camps but is, in many settings, being replaced by the technique of extracapsular cataract extraction (ECCE) which, with the advent of intraocular lenses (IOLs) and microsurgery, has in the past decade been gaining wide popularity in developing countries. In India, where more than three million surgeries are being performed annually, 50% of all surgeries are now performed with ECCE of which 40% are being done without an IOL implant.[4 5] In Nepal ECCE was introduced some 15 years ago and is now the primary surgical procedure of choice in most clinical centres and many eye camps.

This study presents the outcomes of ECCE surgeries on 166 eyes of 166 patients performed in eye camps of eastern Nepal in three groups of patients having postoperative assessment at 6 weeks, 14 months, and 34 months after surgery.

Patients and methods

Since 1990 Bhutanese refugees have settled in scattered camp sites around the jungles of eastern Nepal. Under the auspices of the UN High Commission for Refugees (UNHCR) seven refugee campsites have been set up with basic infrastructure including a primary healthcare programme. In all, 90 000 Bhutanese refugees are now residing in seven different refugee camps. The whole population has access to primary healthcare centres managed by Save the Children UK. In 1994 the UNHCR requested the Lions Eye Care Centre in Kathmandu to conduct annual eye camps for the refugees.

Since then camps have been conducted on a yearly basis. An eyecare team consisting of ophthalmologists, ophthalmic assistants, nurses, and paramedics visits the area once a year and examines patients referred from the primary healthcare centres with chronic eye problems and complaints of visual impairment.

From December 1994 to December 1996, 262 cataract patients were operated on with the ECCE technique. The surgeries were performed by five ophthalmic surgeons all of whom were performing ECCE surgery on a regular basis in surgical clinics of Kathmandu. All surgeries were assisted with a Konan POM 50 coaxial surgical microscope. Preoperative power calculations were not performed.

The surgeries were performed with a limbal incision, can opener anterior capsulotomy, nucleus delivery, and removal of cortical material with an irrigation aspiration cannula using Ringer's lactate solution. IOLs with a range of powers were used based on availability of lens donations. The incision was closed with 9/0 nylon sutures.

Local steroids were used for 3 days postoperatively. Re-examination was done after 6 weeks with suture removal. Aphakic patients were given standard +10 aphakic spectacles.

*Table 1 Grading of posterior capular opacification (PCO)**

PCO grade	*Definition*
Grade 0	Clear posterior capsule
Grade 1	PCO not seen in the central visual axis. A clear view of the optic nerve head and retinal nerve fibre layer and blood vessels is obtained
Grade 2	PCO seen in the central visual axis with mild obscuration of fundus detail: optic nerve head is clearly seen but retinal nerve fibre layer and blood vessels are blurred
Grade 3	PCO in the central visual axis with marked blurrring of fundus details: the margins of the opric nerve head is not clearly defined

*Patients are examined with a undilated pupil using a direct ophthalmoscope.

In December 1996 local UNHCR staff assisted in locating patients who had been operated on and who were still residing in the seven refugee camp sites. All patients residing in the camp sites, who had been operated on in the consecutive eye camps, were brought to an established ophthalmic outpatient clinic of the Amda General Hospital in eastern Nepal. An outcome evaluation team consisting of one ophthalmologist, one ophthalmic assistant, and a driver cum helper visited all camp sites. The ophthalmic assistants (vision testing) and ophthalmologist (eye examination and grading of capsular opacification) conducted the examinations at the local camp primary healthcare centre.

Visual acuity was performed with illuminated illiterate E Snellen's test type. Both the functional presenting vision and the best corrected vision after individual refractions were registered. Functional presenting vision is defined here for aphakic eyes as the visual acuity obtained using standard +10 spherical correction and for pseudophakic eyes as the visual acuity without any additional spectacle correction. Examinations of the anterior segment were performed with a Haag-Streit 900 slit lamp and the fundus was examined with direct ophthalmoscopy and further with the Topcon indirect ophthalmoscopy after dilatation with tropicamide 1% in all cases. The posterior capsule was examined with a slit lamp and graded with direct ophthalmoscopy using a standardised grading system developed for a controlled clinical trial[6] (Table 1).

EPI-INFO Version 6.04b was used for generation of frequency distributions, 2 × 2 tables, and means. Analysis of continuous variables between two groups was tested using the two sample Student's t test. Categorical variables were tested with the χ^2 test with continuity correction or Fisher's exact test. Cornfield 95% confidence limits for odds ratios of single tables for poor vision between patient groups (pseudophakic and aphakic) were performed for functional and best corrected vision for the total study population and for best corrected vision for the three examination intervals—6 weeks, 14 months, and 32 months.

Results

Of the 262 cases that underwent ECCE surgery, 166 (63.4%) were available for follow up. Preoperatively 56% of the cataract patients were blind (VA <3/60). The follow up patients included 89 (53.3%) males and 78 (42.7%) females with a mean age of 67 (SD 10) years; 82 patients (49.4%) were aphakic and 84 (50.6%) were pseudophakic. There was no significant difference in age, sex, or levels of preoperative vision between pseudophakics and aphakics (data not shown). In the pseudophakic group the mean IOL power was 19.6 (2.6) dioptres with a range of 10–27 dioptres; 70% had a power of 18.5–21.5.

Table 2 presents overall functional and best corrected vision by patient group having received lens implant or not (pseudophakic versus aphakic). Of the 166 eyes examined only 13.9% had normal presenting vision without additional refraction (better or equal to 6/18); 58.4% of eye had severe visual impairment (VA <6/60). After refraction and best possible correction 47% of eyes had normal vision and 19.3% had severe visual impairment. The risk of having severe visual impairment was greatest in the aphakic group, both for presenting and corrected postoperative vision (presenting: OR 3.46; 95% CI 1.72–7.02 and corrected: OR 3.25; 95% CI 1.31–8.24).

Table 3 presents the distribution of preoperative vision by follow up groups (6 weeks, 14 months, and 32 months). In all three follow up groups the aphakic eyes had a greater risk of poor visual outcome (<6/18). The differences were statistically significant for 6 weeks (OR 5.67; 95% CI 1.2–30.2) and 32 months (OR 6.09; 95% CI 1.79–21.57).

Table 2 Functional and best corrected vision by patient group—pseudophakic compared with aphakic

	WHO category	*Pseudophakic (n=84)*	*Aphakic (n=82)*	*All 166*	*Risk of poor outcome for aphakics VA <6/60 Odds ratio (95% CI)*
Functional presenting vision*					
≥6/18	0	15 (17.9%)	8 (9.8%)	23 (13.9%)	
<6/18–6/60	1	32 (38.1%)	14 (17.1%)	46 (27.7%)	
<6/60–3/60	2	27 (32.1%)	12 (14.0%)	39 (23.5%)	
<3/60	3	10 (11.9%)	44 (53.7%)	54 (32.5%)	3.46 (1.72–7.02)
PL	4	0	3 (3.7%)	3 (1.8%)	
NPL	5	0	1 (1.2%)	1 (0.6%)	
Best corrected vision†					
≥6/18	0	50 (59.5%)	28 (34.1%)	78 (47.0%)	
<6/18–6/60	1	25 (29.8%)	31 (37.8%)	56 (33.7%)	
<6/60–3/60	2	1 (1.2%)	17 (20.7%)	18 (10.8%)	
<3/60	3	8 (9.5%)	3 (3.7%)	11 (6.6%)	3.25 (1.31–8.24)
PL	4	0	2 (2.4%)	2 (1.2%)	
NPL	5	0	1 (1.2%)	1 (0.6%)	

Relative risk for severe visual impairment (<6/60 = very poor outcome) in aphakics compared with pseudophakics. *Functional vision RR = 1.64 (95% CI = 1.25–2.16). †Best corrected vision: RR = 2.62 (95% CI = 1.29–5.3).

*Table 3 Postoperative best corrected vision by levels of preoperative visual acuity in follow up groups (n=163)**

			Postoperative							
			Pseudophakic				*Aphakic*			
	*WHO**	*Preoperative*	*0*	*1*	*0*	*3–5*	*0*	*1*	*2*	*3–5†*
Group 1 (6 weeks; n=52)										
6/6–6/18	0	—	—	—	—	—	—	—	—	—
<6/18–6/60	1	16 (30.8%)	44.4%	44.4%	14.3%	11.1%	14.3%	57.1%	28.6%	—
<6/60–3/60	2	6 (11.5%)	50.0%	33.3%	—	—	—	—	—	—
<3/60–1/60	3	11 (21.2%)	57.1%	42.9%	—	—	—	75..0%	25.0%	—
Perception of light	4	19 (36.5%)	54.5%	36.4%	25.0%	9.1%	25.0%	37.5%	12.5%	25.0%
All	0–4	52	51.5%	39.4%	15.8%	6.1%	15.8%	52.6%	21.1%	10.5%
Group 2 (14 months; n=42)						—	25.0%	75.0%	—	—
6/6–6/18	0	—	—	—	—	—	100%	—	—	—
<6/18–6/60	1	5 (21.4%)	100%	—	25.0%	—	50.0%	33.3%	16.7%	—
<6/60–3/60	2	7 (16.7%)	66.7%	33.3%	100%	18.2%	40.0%	40.0%	20.0%	—
<3/60–1/60	3	10 (23.8%)	25.0%	75.0%	50.0%	13.0%	52.6%	36.8%	10.5%	—
Perception of light	4	16 (38.1%)	72.7%				20.0%	40.0%		
All	0–4	42	65.2%	21.7%	52.6%					
						—	—	—	—	—
Group 3 (32 months; n=69)						22.2%	33.3%	22.2%	22.2%	22.2%
6/6–6/18	0	—	—	—	—	25.0%	16.7%	33.3%	50.0%	—
<6/18–6/60	1	18 (26.1%)	66.7%	11.1%	33.3%	—	50.0%	37.5%	—	12.5%
<6/60–3/60	2	10 (14.5%)	25.0%	50.0%	16.7%	—	33.3%	33.3%	28.6%	4.8%
<3/60–1/60	3	12 (17.4%)	50.0%	50.0%	50.0%	12.0%	34.1%	31.8%	25.0%	9.1%
Perception of light	4	29 (42.0%)	87.5%	12.5%	33.3%					
All	0–4	69	64.0%	24.0%	34.1%					

*Three eyes that did not have data on preoperative vision are not included in this table.
†Category 5 = no perception of light.

Table 4 Postoperative complications in pseudophakic and aphakic

	6 weeks			*14 months*			*32 months*		
	Pseudophakic	*Aphakic*	*All*	*Pseudophakic*	*Aphakic*	*All*	*Pseudophakic*	*Aphakic*	*All*
Complication	*No (%)*	*No (%)*	*No (%)*	*No (%)*	*No (%)*	*No (%)*	*No (%)*	*No (%)*	*No (%)*
Total examined	33	19	52	25	19	44	26	44	69
Iris prolapse	0	0	0	0	0	0	1 (3.8%)	1 (2.3)	2 (2.9)
Corneal opacification*	0	0	0	0	0	0	0	1 (2.3)	1 (1.4)
Shallow anterior chamber†	0	0	0	0	0	0	0	1 (2.3)	1 (1.4)
Vitreous in anterior chamber	0	8 (42.1)	8 (15.4)	2 (10.5)	0	2 (4.5)	2 (4.5)	0	2 (2.9)
Anterior uveitis (grade 1)	1 (3.0)	0	1 (1.9)	0	0	0	0	0	0
Dislocated IOL‡	3 (9.1)	—	—	1 (4.2)	—	—	1 (3.8)	—	—
	3 (9.1)	—	—	0	—	—	0	—	—
Capsular tear	0	13 (68.4)	13 (25)	1	5 (26.3)	6 (13.6)	0	15 (34.1)	15 (21.4)
Retinal detachment	0	1 (5.3)	1 (1.9)	0	1 (5.3)	1 (2.3)	0	2 (7.7)	2 (2.9)

*Grade 3 = diffuse coreal oedema with epithelial bullae.
†Grade 3 = central iridocorneal touch.
‡Malposition or dislocation and or decentration of IOL (part of haptic or edge of optic seen in in pupillary area on a undilated pupil).

Table 4 presents postoperative complications by treatment groups and time after surgery.

Of the sight threatening complications, 20.5% of patients had capsular tear. Other potentially sight threatening complications recorded were iris prolapse, iris dialysis, and vitreous in wound. A total of four (2.4%) cases, all in the aphakic group (4.8%), had retinal detachment.

Table 5 presents the distribution of posterior capsular opacification in pseudophakic and aphakic eyes at 14 and 32 months; 20.5% of eyes could not be graded because of capsular tears. 77.5% of eyes examined could be graded for degree of posterior capsular opacification. In these patients posterior capsular opacification (PCO) of any grade (1–3) was found in 59.3% of cases. In the 14 month follow up group four eyes (9.1%) had PCO grade 2 and one (2.3%) eye had PCO grade 3. In the 32 month follow up group 12 (17.1%) eyes had PCO grade 2 and 13 (18.6%) had PCO grade 3. There was a larger percentage of cases in the aphakic group with PCO (grades 2–3) compared with the pseudophakic group but the difference was not statistically significant.

Table 5 Posterior capsular opacification in pseudophakic and aphakic in examined groups

	14 months			*32 months*		
	Pseudophakic	*Aphakic*	*All*	*Pseudophakic*	*Aphakic*	*All*
PCO grade	*No (%)*	*No (%)*	*No (%)*	*No (%)*	*No (%)*	*No (%)*
Grade 0	14 (56.9)	9 (47.4)	23 (52.3)	10 (38.5)	5 (11.4)	15 (21.4)
Grade 1	5 (20.0)	5 (26.3)	10 (22.7)	8 (30.8)	6 (13.6)	14 (20.0)
Grade 2	4 (16.0)	0	4 (9.1)	4 (15.4)	8 (18.2)	12 (17.1)
Grade 3	1 (4.0)	0	1 (2.3)	4 (15.4)	9 (20.5)	13 (18.6)
GNP*	1 (4.0)	5 (26.3)	6 (13.6)	0	16 (36.4)	15 (21.4)
All	25	19	44	26	44	70

*Grading not possible.

Discussion

As there was a high rate of attrition in the long term follow ups there may be a bias towards poor outcomes as these patients may be more likely to come forward for follow up. It is unlikely, however, that this is the case as we found that the 6 weeks complete follow up showed very poor vision outcomes (Table 3). Overall, the results found in this study are comparable with those found in population surveys conducted in Nepal,[7] India,[8 9] and China.[10] In this study cortical remnants (at 6 weeks) and posterior capsular opacification (14 and 32 months) were the most important cause of poor vision. Four cases were identified with retinal detachment and one case with corneal decompensation, all in the aphakic group.

Extracapsular surgery is a microsurgical technique that needs a high grade of standardisation with a good logistical support system. In developing countries surgery is still done on a large number of hypermature and morganian cataracts resulting in a higher incidence of surgically related complications,[11] including a higher risk of posterior capsular rupture found to be 10.6% in a large series of ECCE surgeries.[12 13]

In this study 20.5% were observed to have rupture of the posterior capsule.

ECCE, even in the best of surgical hands, gives a varying degree of PCO, occurring in 10% to 50% of cases.[14] PCO has important medical, social, and economic implications. Although it is easy to clear the visual axis by neodymium-YAG laser capsulotomy if this is available, this technique is not without problems and the cost is still prohibitive. Its complications include damage to the intraocular lens (IOL), intraocular pressure elevation, cystoid macular oedema, retinal detachment, IOL subluxation, and localised endophthalmitis exacerbation.[15]

To our knowledge only one report has been published that includes data on PCO of more than 1 year after surgery from eye camps in developing countries—the Madurai IOL study, where four highly trained ECCE surgeons performed all surgeries in a "gold standard" hospital setting.[16] Obscuration of fundus was found in 8.6% of cases; 0.5% of eyes had clinically significant PCO at 1 year follow up which increased to 13.5% after 4 years (subsample).[17] Tobin *et al* in their series of 144 eyes with ECCE PC IOL performed by eight surgeons in a hospital setting in Vietnam found some degree of PCO in 40% of eyes at 1 year follow up; 4% eyes had clinically significant visual impairment due to PCO.[18] Vogel *et al* found in their series of 134 cases of ECCE surgeries in the university clinic in Germany that 80% of the sight threatening PCO came after 18 months.[19] In our study, over 30% of ECCE PC IOL patients examined after 2 years of surgery had PCO grade 2 or more giving obscuration of fundus details; 15% had marked blurring of fundus details giving significant visual impairment (Table 5). It is well known that the risk of PCO decreases significantly when there is apposition of the posterior surface of an IOL to the posterior capsule (the "no space no cells" theory) by reducing lens epithelial cell migration onto the posterior capsule.[20 21] In the aphakic group in patients with intact posterior capsule, over 20% had PCO giving marked blurring of fundus details (grade 3). If these findings are extrapolated to the Indian situation where several hundreds of thousands of surgeries are still being undertaken with ECCE *without* implantation of a PC IOL,[5] thousands of patients may have developed severe visual impairment due to PCO. In Nepal over 60 000 cataract surgeries are being undertaken annually, of which 70% are ECCE. There are no available data on the incidence of PCO or on the number of secondary surgeries performed as a result of PCO.

Extracapsular cataract surgery has become the mainstay of cataract surgery worldwide and an increasing number of surgeons working in developing countries are now converting to ECCE. Young surgeons are today being trained primarily in the ECCE technique including phacoemulsification of the lens nucleus. Intracapsular cataract surgery, which is still the primary surgery of choice in mass cataract surgery in India, is rapidly being replaced by ECCE surgery in clinical centres and increasingly in surgical eye camps.

India pioneered the concept of eye camps, which brought cataract surgery within reach of people in remote areas. The intracapsular surgical technique has been the surgery of choice for eye camps and until recently was used in half of all surgeries in India.[5] Recent clinical controlled trials have shown comparable clinical outcomes of ICCE with modern generation anterior chamber IOL with what has been reported with ECCE with PC IOL in different clinical settings in south Asia.[22–25] The recent population based studies from south Asia and China have shown that in the "real life" setting the outcomes of cataract surgery regardless of technique are still unsatisfactory. As part of the new global initiative for the elimination of blindness,[26] an overriding and crucial issue will be the ability to find an appropriate and pragmatic strategy for the reduction of cataract blindness worldwide. With the introduction of training programmes for young surgeons and retraining programmes of older ICCE surgeons, there is now an urgent need to generate more population based data for both ECCE and ICCE surgeries.

Based on the conclusions of these studies and on a realistic evaluation of the availability of technical and the human resources a complete and pragmatic approach should be considered when developing the training programmes for future eye surgeons who deal with cataract blindness.[27] The final decisions on the most appropriate surgical treatment of cataract should be evidence based, and include data on long term outcomes of clinical trials and population studies in different settings, taking into account the effective use of available resources.[28 29]

1 World Health Organization. *Global initiative for the elimination of blindness.* WHO/PBL/97.61/Rev 1. Geneva: WHO.
2 Minassian DC, Mehra V. 3.8 Million blinded by cataract each year: projections from the first epidemiological study of incidence of cataract blindness. *Br J Ophthalmol* 1990;**74**:341–3.

3 Murthy GVS, Gupta SK, Talwar. Assessment of cataract surgery in rural India. Visual acuity outcome. *Acta Ophthalmol Scand* 1996;**74**:60–3.
4 Gupta AK, Ellwein LB. The patterns of cataract surgery in India. *Ind J Ophthalmol* 1995;**43**:3–8.
5 Gupta AK, Tewari HK, Ellwein Leon LB. Cataract surgery in India. Results of a 1995 survey of ophthalmologists. *Ind J Ophthalmol* 1998;**46**:47–50.
6 Natchiar GN, Thulasiraj RC, Negrel AD, *et al.* The Madurai Intraocular Lens Study I: Methods. *Am J Ophthalmol* 1998;**125**:1–13.
7 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.
8 Dandona L, Dandonda R, Nadulivath TJ, *et al.* Population-based assessment of the outcome of cataract surgery in an urban population in southern India. *Am J Ophthalmol* 1999;**127**:650–8.
9 Fletcher AE, Donoghue M, Devavaram J, *et al.* Low uptake of eye services in rural India: a challenge for programs of blindness prevention. *Arch Ophthalmol* 1999;**117**:1393–9.
10 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.
11 Lewallen MD, LeMeausurier RT. Extracapsular cataract extraction in developing countries. *Arch Ophthalmol* 1993;**111**:18.
12 Cook NJ. Valuation of high volume extracapsular cataract extraction with posterior chamber lens implantation in Sierra Leone, West Africa. *Br J Ophthalmol* 1990;**74**:141–3.
13 Natchiar G, Robin AL, Nalgirkar AR, *et al.* Posterior capsular tears during extracapsular cataract surgery in India. *Arch Ophthalmol* 1993;**111**:707–8.
14 Apple DJ, Solomon KD,Tetz MR, *et al.* Major review: posterior capsule opacification. *Surv Ophthalmol* 1992; **37**:73–116.
15 Murril CA, Stansfield DL, Van Brocklin MD. Capsulotomy. *Optom Clin* 1995;**4**:69–83.
16 Venkatesh P, Chanrakanth SK, Kim R, *et al.* The Madurai Intraocular Lens Study. II: Clinical outcomes. *Am J Ophthalmol* 1998;**125**:14–25.
17 Prajna NV, Ellwein LB, Selvaraj S, *et al.* The Madurai Intraocular Lens Study. IV: posterior capsule opacification. *Am J Ophthalmol* 2000;**130**:304–9.
18 Tobin S, Nguyen QD, Pham B, *et al.* Extracapsular cataract surgery in Vietnam: a 1 year follow-up study. *Aust NZ J Ophthalmol* 1998;**26**:13–17.
19 Vogel M, Behrens-Baumann W, Petersen J, *et al.* Vergleich der Komplikationen nach intra- und extrakapsularer Kataraktextraktionen mit Linseimplantation. Ergebnisse einer prsopektiven, randomiisierten, klinischen Studie. *Klin Monatsbl Augenheilkd* 1993;**203**:43–52.
20 Frezotti R, Caporossi A. Pathogenesis of posterior capsular opacification. Part I: Epidemiological and clinico-statistical data. *J Cataract Refract Surg* 1990;**16**:347–52.
21 Martin RG, Sanders DR, Souchek J, *et al.* Effect of intraocular lens size on posterior chamber intraocular lens design and surgical placement on post-operative outcome. *J Cataract Refract Surg* 1992;**18**:33–41.
22 The South Asian Cataract Management Study Group. The South Asian Cataract Management Study. I The first 662 cataract surgeries: a preliminary report. *Br J Ophthalmol* 1995;**79**:1029–35.
23 Henning A, Evans JR, Pradhan D, *et al.* Randomised controlled trial of anterior-chamber intraocular lenses. *Lancet* 1997;**349**:1129–33.
24 Venkatesh Prajna N, Chandrakanath KS, Kim R, *et al.* The Madurai Intraocular Lens Study. II: Clinical outcomes. *Am J Ophthalmol* 1998;**125**:14–25
25 Snellingen T, Shrestha JK, Huq Fazlul, *et al.* The South Asian Cataract Management Study: complications, vision outcomes and corneal endothelium cell loss in a randomized multicenter clinical trial comparing intracapsular cataract extraction with and without anterior chamber intraocular lens. *Ophthalmology* 2000;**107**:231–40.
26 Thylefors B. Editorial: A global initiative for the elimination of avoidable blindness. *Am J Ophthalmol* 1998;**125**:90–3.
27 Apple DJ. The "Compleat" surgeon. *XVI Congress of Asia Pacific Academy of Ophthalmology* 4 March 1997.
28 Tielsch J. Appropriate technology for cataract surgery [comment]. *Lancet* 1998;**352**:754–5.
29 Wormald R, Evans J, Foster A. Appropriate technology for cataract surgery [letter]. *Lancet* 1998;**352**:1630–1.

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