Visual loss as a result of age-related cataract

Cataract is a common cause of impaired quality of life in the elderly. Cataract extraction with implantation of an artificial lens within the eye is a safe and effective treatment. Initiatives are required to deliver surgery to the increasing numbers of patients who would benefit.

A cataract is a focal or diffuse opacity of the lens of the eye that reduces visual function. Although cataract can be congenital or develop in childhood the vast majority of cataracts are the result of ageing. In the elderly visual impairment can be a major reason for reduced quality of life, and poor vision may increase the risk of other comorbidities such as loss of independence, falls and fractures. Blindness from cataract is a major public health problem in many developing countries. In this article the authors review the epidemiology, pathogenesis, clinical features, and treatment of cataract.

The epidemiology of cataract in the UK

Lens opacities are common in people over 65 years of age. The reported prevalence varies as a result of differences in the population studied and the reduction in acuity used to define cataract. A commonly used clinical threshold is a Snellen visual acuity of ≤6/9, the normal acuity being 6/6. A reduction of visual acuity to ≤6/12 is more frequently used for epidemiological studies. In a large random sample of people aged 65 years and over living in north London, 30% were found to have visually impairing cataract in one or both eyes, while a further 10% had had previous cataract surgery (Reidy et al, 1998). Importantly, most (88%) of the people with visual impairment were not in touch with eye health services. However, blindness from cataract (<6/60 in each eye) is an uncommon reason for blind registration in the UK, a voluntary process (Bamashmus et al, 2004).

Optometrists, GPs and geriatricians have a vital role in identifying visual problems and potentially treatable cataract in the elderly. Raising public awareness of the symptoms and treatment of cataract can help bring patients with visual symptoms in contact with eye health services.

The size of the problem

Approximately 270 000 cataract operations were performed in the financial year 2002–3 in England and Wales (Royal College of Ophthalmologists, 2004). This is a lower rate than in many other developed countries. In Australia the cataract surgery rate is 6300 surgeries per million population per year, in the USA it is 5700, Sweden 4000, but the UK has a cataract surgery rate of 2700 (Taylor, 2000). Great advances have been made in delivery of treatment (ambulatory surgery, modern cataract surgical techniques). In 2000, it was estimated that an extra 95 000 operations per year would be required over 5 years, in addition to 200 000 operations performed per year at that time, to prevent growth of waiting lists in England and Wales (Minassian et al, 2000). It would appear therefore that the recent rise in cataract surgery numbers in England and Wales has stemmed the increase in waiting lists, as long as criteria for eligibility for surgery remain relatively constant (e.g. 75% of operations being performed for visual acuity less than 6/12). The outcomes using modern techniques of small incision surgery with phacoemulsification and intraocular lens implantation are so good that an acuity of 6/9 and 'trouble with vision' as a result of cataract is commonly accepted as sufficient indication for surgery.

Most patients with cataract have cataract in both eyes and research confirms that surgery on the second eye confers a benefit to the patient in terms of both visual acuity and satisfaction with vision (Javitt et al, 1995; Busbee et al, 2003). Cataract extraction is one of the most cost-effective treatments across the whole of medicine, but the reduced threshold at which surgery is appropriate and the continued increase in the proportion of elderly patients in the community have greatly increased the number of patients eligible for surgery and placed additional demands on surgical resources.

The global impact of cataract

In 2002 the World Health Organisation estimated that over 160 million people suffer visual impairment (visual acuity less than 6/18); of these 37 million are considered blind (visual acuity of less than 3/60). Almost 50% of these are blind from cataract, with a higher than average prevalence in developing countries (Resnikoff et al, 2004). In Australia, USA and Barbados over 50% of older people with visual impairment have cataracts (Wang et al, 2000; Congdon et al, 2004; Leske et al, 2004). In a study of the Chinese population of Taiwan 42% of blindness was from cataract (Hsu et al, 2004). Estimates of cataract as a cause of visual loss in India and Paraguay are over 60% (Duerksen et al, 2003; Murthy et al, 2005).

The World Health Organisation in collaboration with the International Agency for the Prevention of Blindness and other eye care organizations launched the 'Vision 2020: The Right to Sight' initiative in 1999, targeting the world's leading causes of avoidable blindness (Pizzarello et al, 2004). It has been estimated that without intervention there will be 76 million blind people globally by the year 2020, and if the programme is successful in treating avoidable blindness this number would be cut by two-thirds, preventing a total of 429 million blind-person years with an economic benefit of $102 billion (Frick and Foster, 2003). Cataract treatment presents a major challenge in this initiative, with resource implications for delivering cheap, but safe and effective treatment in developing countries. Additionally adequate infrastructure, physician and patient education and specialized equipment is required, with often prohibitive cost implications as technology used for small incision cataract surgery is still unaffordable in many developing centres (Vasavada and Raj, 2005).

Risk factors for cataract

Increasing age is the major risk factor for the development of cataract and women are more frequently affected. The overall prevalence in the UK increases from 11% in the 65–69 year age group to 33% in the 75–79 year age group, rising to 56% in persons of 85 years or more (Minassian et al, 2000). Diabetes mellitus, steroid treatment, lifetime ultraviolet exposure, smoking, trauma, and alcohol consumption are also risk factors (West and Valmadrid, 1995). The rate of progression varies greatly between individuals but there is a tendency for cataract to progress slowly with time and, left untreated, 33% of patients with cataract experience deterioration over the course of 2 years and 50% deteriorate over the course of 5 years (Leske et al, 1996). Without intervention most patients with cataract will eventually become severely visually disabled. Race, nutrition and socioeconomic status can affect the onset of cataract. The prevalence of cataract is higher in poor inner city areas (Reidy et al, 1998) and the age of onset of cataract is lower in patients from the Indian subcontinent living in the UK (Das et al, 1994).

Pathogenesis and morphology

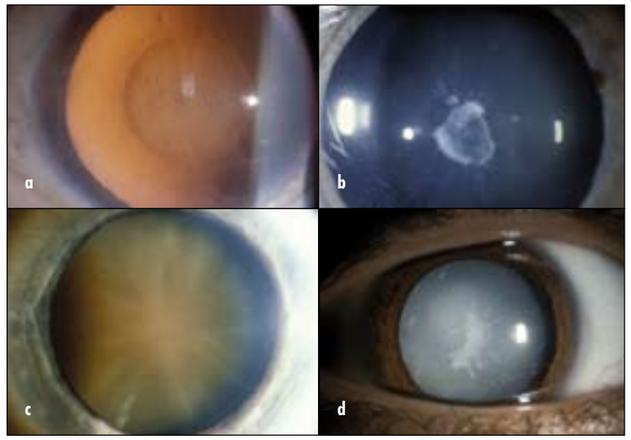
Lens changes associated with ageing result in denaturation of lens proteins and an alteration in the hydration of the lens. Approximately 33% of the wet weight of the human lens consists of protein, of which 80% is water-soluble – mainly of the crystallin family. These proteins (α, β and γ crystallins) are structural, although developmentally mutations in some of these proteins are linked to congenital cataracts. The proportion of water-insoluble proteins, such as major intrinsic polypeptide, is thought to increase in the ageing lens. These form aggregates that can scatter light. Some aggregates have been found to contain a yellow-brown protein in nuclear cataract. Hydration of the lens is critical for lens clarity (65% of the lens is water), and disturbance of the sodium potassium adenosine triphosphatase pump (Na/K/ATPase), which maintains ionic balance, leads to increased hydration and the formation of cortical lens opacities. Hyperglycaemic metabolic effects with increased use of the sorbitol pathway, and ultravoilet light photo-oxidative stress with accumulation of yellow/brown chromophores, have also been implicated in cataract formation. Oxygen free radicals form peroxide derivatives of cell membrane lipids, resulting in the formation of cross linkages and molecular aggregates, which induce cataract (Vavvas et al, 2002). Inherited, congenital, metabolic, traumatic and toxic cataracts account for only a small proportion of cases of cataract and the majority are age-related.

Morphological classification of cataract is based on the region of the lens that is affected (*Figure 1*). There are two common visually significant lens changes. Nuclear sclerosis is yellowing of the lens nucleus with an increased refractive index. Posterior subcapsular cataract is the term used to describe lens opacity in the posterior cortical zone of the lens and it is associated with steroid use or diabetes mellitus. Occasionally, the opacity increases until the lens is white (mature cataract). Lens grading systems are research tools used for epidemiological studies. The lens opacity classification system or similar quantification methods can be used to grade and quantify cataract (Hall et al, 1997). The morphological features of a cataract do not usually influence the technique of surgery or the anticipated outcome.

Clinical evaluation

Cataract typically produces a gradual and painless reduction in vision. Loss of vision may be insidious and patients may be relatively asymptomatic. Blurred vision for distance and difficulty reading are commonly reported. The power of the eye may change to a more

Figure 1. Types of cataract: (a) nuclear opacity, (b) anterior subcapsular, (c) nuclear sclerosis, (d) white cataract.



Mr Mandeep S Sagoo *is Fulbright Fellow in Ocular Oncology Service, Wills Eye Hospital, Thomas Jefferson University, Philadelphia, PA 19107, USA and Specialist Registrar, Moorfields Eye Hospital, London and* **Mr Stephen J Tuft** *is Consultant Ophthalmic Surgeon in the Cataract Service, Moorfields Eye Hospital, London*

Correspondence to: Mr MS Sagoo

short-sighted (myopic) refraction and there may be difficulty distinguishing colours. Glare can be troublesome, particularly when driving at night. Light scattered by the cataract may produce monocular double vision.

The most common form of assessment is measure of the visual acuity using a Snellen visual acuity chart at 6 metres, but this test provides little information on other aspects of visual function such as glare, colour vision, or contrast sensitivity. Measuring Snellen visual acuity using a pinhole can neutralize about 6 dioptres of refractive error and can give an indication of the visual prognosis following cataract surgery. Patients should be asked specifically about their visual symptoms and the impact these have on daily tasks such as reading, crossing the road unaided, and driving. Some patients with focal cataract experience considerable difficulty with glare despite a normal Snellen visual acuity while, conversely, a reduced Snellen visual acuity does not reflect overall disability or handicap. Specifically designed questionnaires have been used to provide an index of overall visual disability, but these are time consuming and not used routinely (Steinberg et al, 1994).

A general threshold for surgery based on the Snellen acuity is not appropriate for all patients as elderly patients in particular have a lower outcome. Offering surgery is determined by factors such as the patient's occupation, visual demands, and mobility. A common misconception is that a cataract has to be 'ripe' before surgery is possible; with modern phacoemulsification surgery cataracts can be operated on whenever they are visually significant. Although cataract blurs vision it does not damage the eye in other ways and visual outcome is not affected by a delay in intervention. In very advanced cataract the lens can dislocate or become swollen and cause uveitis or secondary glaucoma. These complications are rarely seen in the UK.

The presence of opacity in the visual pathway can be detected by viewing the red reflex using a hand-held direct ophthalmoscope, but more thorough examination requires a binocular slit-lamp. Before predicting a surgical prognosis ocular co-morbidity should be assessed and examination of the macular and optic disc should be performed to assess the expected benefit from surgery. Most patients with cataracts have no other eye problems (Desai et al, 1999), but 17% also have age-related macular degeneration, 11% have glaucoma, and 3% have diabetic retinopathy as coexisting ocular morbidity (see other articles in this symposium). Although patients with associated ocular disease such as age-related macular degeneration have a limited visual outcome following surgery, they usually still benefit from removal of a cataract (Lundstrom et al, 2002). Patients with diabetic retinopathy may require early cataract extraction to permit treatment of retinal disease.

Systemic considerations

Several general factors must be considered before surgery. It is essential that any pre-existing hypertension is well controlled. Patients with a diastolic pressure greater than 110 mmHg have an increased risk of massive intraocular haemorrhage during surgery. Anticoagulants can increase the risk of intraocular haemorrhage during cataract surgery and increase the risk of haemorrhage during an injection of local anaesthetic behind the eye. Guidelines usually require an international normalized ratio of 3.0 or less on the day of surgery. However, if anticoagulants cannot be safely stopped, topical drop anaesthesia or even general anaesthesia combined with an incision made through the avascular cornea means that surgery is still possible in most cases. If a local anaesthetic is planned it is important to ascertain that the patient will be able to lie flat and then keep relatively still for approximately 20 minutes.

Treatment of cataracts

The huge majority of cataract surgery is performed under local anaesthesia, usuing either topical drops or local infiltration with a peribulbar or subtenon injection of local anaesthetic. General anaesthesia is now usually reserved for apprehensive or non-cooperative patients. The choice of anaesthetic does not influence the overall complication rate nor does it affect the visual outcomes after surgery.

There are different techniques for cataract extraction. Intracapsular cataract removal involves removing the entire lens and capsule. It can be quick and inexpensive and thus is the method most often used in developing countries where high volume surgery and cost containment are critical. If no lens implant is used thick aphakic glasses are prescribed to focus the vision, but an intraocular lens implant that is supported by the iris can be used. Extracapsular surgery removes the nucleus and cortex of the lens but leaves most of the lens capsule, which can then support a lens implant in the anatomically correct position behind the iris. Extracapsular surgery is routinely performed by phacoemulsification with high frequency ultrasound through a small incision (3.2 mm) that is self-sealing (*Figure 2*). The intraocular lens is folded before it is inserted through the wound and it is unfolded within the eye. Extracapsular surgery can also be performed by expression of the nucleus through a larger incision that is then sutured closed. Visual recovery is faster following phacoemulsification than after standard extracapsular surgery, the final visual acuity is slightly better, and there is less surgically induced astigmatism (Desai et al, 1999; Minassian et al, 2001).

Patients with bilateral cataract are typically offered surgery for the second eye within 3 months of the first procedure. Bilateral simultaneous cataract extraction is rarely performed because of the small risk of severe delayed complications such as bilateral endophthalmitis and associated risk of blindness.

The lens accounts for about one third of the refractive power of the eye. Following cataract extraction the eye is extremely long sighted (hyperopic) unless visual correction is provided, and an intraocular lens implant (pseudophakia) is now routinely inserted. The power of the lens to be implanted is calculated for each eye from measurements of the axial length of the eye and the radius of curvature of the cornea. Preoperative hyperopia or myopia can be reduced or eliminated by selecting an appropriate lens implant and over 70% of eyes are within 1 dioptre of the planned refraction (Murphy et al, 2002). However, glasses may still be necessary to correct residual postoperative refractive error, and glasses are normally needed for reading as the power of the implanted lens is fixed and, unlike the natural lens of the eye, it cannot accommodate to change focus. Following cataract surgery 80% of eyes without ocular co-morbidity achieve a final best corrected visual acuity of 6/9 or better (92% better than 6/12) (Desai et al, 1999). Multifocal intraocular lenses that produce a focused image for both distance vision and reading vision are available. Although some patients are pleased with the results from these lenses, they are not used routinely as they are relatively expensive and are associated with a higher incidence of postoperative visual symptoms such as glare.

Risks of cataract surgery

Sight-threatening complications of cataract surgery are rare (Desai et al, 1999). Posterior capsular opacification is haziness of the residual capsule of the lens that is left behind at surgery to support the intraocular lens implant. It is the commonest complication of extracapsular surgery and results in secondary deterioration of vision after surgery. Approximately 20% of eyes eventually need treatment for posterior capsular opacification, although this depends upon the lens material and design (Schaumberg et al, 1998; Hollick et al, 1999; Apple et al, 2001). It can be treated effectively by making a gap in the capsule using a neodymium:yttrium aluminum garnet laser. The need for a second procedure has delayed widespread acceptance of extracapsular techniques in developing countries. Laser capsulotomy can damage the lens implant and there is a small risk (about 1 in 150) of a retinal detachment.

Cystoid macular oedema develops in 1% of cases and this causes blurring of vision (Powe et al, 1994). The risk of oedema is increased if there is excessive postoperative inflammation or if the posterior lens capsule is torn during surgery. Treatment of this condition is initially with systemic acetazolamide and topical steroid and non-steroidal anti-inflammatory drops. Retinal detachment occurs in about 0.4% of eyes following cataract surgery and is commoner following intracapsular surgery, in younger patients, males and in patients whose eyes have high myopia (Olsen and Olson, 2000). Retinal detachment requires surgical correction, which is usually successful, although the final visual outcome may be reduced if the macula has been detached. Pooled data from many case series show that postoperative intraocular infection (endophthalmitis) develops after approximately one in 750 operations (Powe et al, 1994). Although endophthalmitis can lead to loss of an eye, useful vision can often be preserved if there is early treatment with injection of intraocular antibiotics. Those who have only one seeing eye should be counselled carefully preoperatively that they are taking the risk of total blindness should severe complications occur.

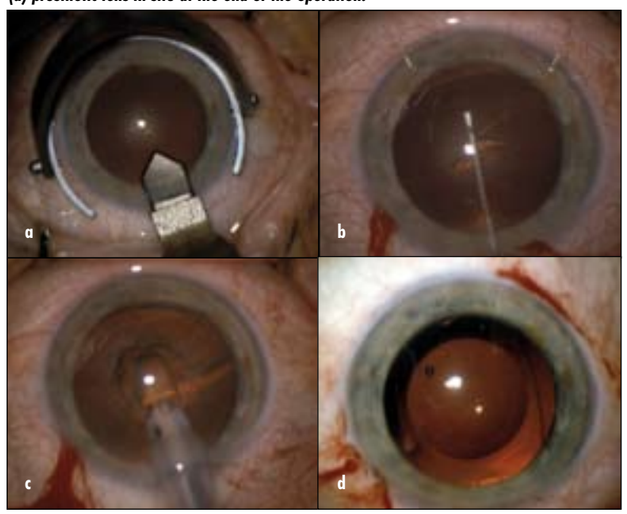
Prevention of cataract

The refractive error from early cataract can often be corrected with glasses. However, with progression of the lens opacity it becomes increasingly difficult to neutralize the blur caused by light scatter and surgery is then indicated. Methods to prevent or delay the onset of cataract would have a dramatic effect on the cataract workload. Although there are reports of nutritional supplements reducing the progression of cataract (Sperduto et al, 1993; Leske et al, 1997), most studies to evaluate the effects of nutritional supplements (carotenoids) or antioxidants (vitamin C and E) have been inconclusive (Meyer and Sekundo, 2005). A small trial using the lipid membrane antioxidant dipeptide, N-acetylcarnosine, administered in drop form to eyes twice a day has reported a beneficial effect in visual acuity and glare symptoms (Babizhayev et al, 2001), but this study has not been repeated. Aspirin has been reported to prevent the progression of cataract in some studies (Christen et al, 2001; Klein et al, 2001).

Future developments

Accommodating intraocular lenses that permit a change in focus for distance vision and reading vision to mimic the natural process of accommodation are being are being evaluated in clinical trials. Phacoemulsification through incisions of less than 1 mm is also possible, the potential advantage of less induced astigmatism needs to be assessed. Currently this technique is limited by lens design – the incision has to be widened to implant a folded artificial lens. However, lens materials that allow the implant to be rolled up, inserted via a 1 mm incision, and unrolled in the eye are becoming available.

Figure 2. Surgeon's view of phacoemulsification surgery: (a) 3.2 mm clear corneal incision being constructed, (b) the anterior lens capsule is opened with a modified needle, (c) the phacoemulsification probe being used to fragment the cataract with high speed ultrasound, (d) prosthetic lens in situ at the end of the operation.



Investigation into ways of preventing posterior capsular opacification is continuing. This could eliminate the need for many thousands of return clinic visits after cataract surgery, especially in countries where access to health care is difficult.

Conclusions

Cataract surgery is the second most commonly performed elective procedure in England on the NHS. Over the next 20 years the UK population over the age of 65 years is expected to double and surgical rates will have to keep pace with this in order to prevent an epidemic of avoidable loss of vision. BJHM

Conflict of interest: none.

Apple DJ, Peng Q, Visessook N et al (2001) Eradication of posterior capsule opacification: documentation of a marked decrease in Nd:YAG laser posterior capsulotomy rates noted in an analysis of 5416 pseudophakic human eyes obtained postmortem. *Ophthalmology* **108**: 505–18

Babizhayev MA, Deyev AI, Yermakova VN et al (2001) N-acetylcarnosine, a natural histidine-containing dipeptide, as a potent ophthalmic drug in treatment of human cataracts. *Peptides* **22**: 979–94

Bamashmus MA, Matlhaga B, Dutton GN (2004) Causes of blindness and visual impairment in the West of Scotland. *Eye* **18**: 257–61

Busbee BG, Brown MM, Brown GC, Sharma S (2003) Cost-utility analysis of cataract surgery in the second eye. *Ophthalmology* **110**: 2310–17

Christen WG, Ajani UA, Schaumberg DA, Glynn RJ, Manson JE, Hennekens CH (2001) Aspirin use and risk of cataract in posttrial follow-up of Physicians' Health Study I. *Arch Ophthalmol* **119**: 405–12

Congdon N, O'Colmain B, Klaver CC et al (2004) Causes and prevalence of visual impairment among adults in the United States. *Arch Ophthalmol* **122**: 477–85

Das BN, Thompson JR, Patel R, Rosenthal AR (1994) The prevalence of eye disease in Leicester: a comparison of adults of Asian and European descent. *J R Soc Med* **87**: 219–22

Desai P, Minassian DC, Reidy A (1999) National cataract surgery survey 1997-8: a report of the results of the clinical outcomes. *Br J Ophthalmol* **83**: 1336–40

Desai P, Reidy A, Minassian DC (1999) Profile of patients presenting for cataract surgery in the UK: national data collection. *Br J Ophthalmol* **83**: 893–6

Duerksen R, Limburg H, Carron JE, Foster A (2003) Cataract blindness in Paraguay--results of a national survey. *Ophthalmic Epidemiol* **10**: 349–57

Frick KD, Foster A (2003) The magnitude and cost of global blindness: an increasing problem that can be alleviated. *Am J Ophthalmol* **135**: 471–6

Hall AB, Thompson JR, Deane JS, Rosenthal AR (1997) LOCS III versus the Oxford clinical cataract classification and grading system for the assessment of nuclear, cortical and posterior subcapsular cataract. *Ophthalmic Epidemiol* **4**: 179–94

Hollick EJ, Spalton DJ, Ursell PG, Pande MV, Barman SA, Boyce JF, Tilling K (1999) The effect of polymethylmethacrylate, silicone, and polyacrylic intraocular lenses on posterior capsular opacification 3 years after cataract surgery. *Ophthalmology* **106**: 49–54

Hsu WM, Cheng CY, Liu JH, Tsai SY, Chou P (2004) Prevalence and causes of visual impairment in an elderly Chinese population in Taiwan: the Shihpai Eye Study. *Ophthalmology* **111**: 62–9

Javitt JC, Steinberg EP, Sharkey P et al (1995) Cataract surgery in one eye or both. A billion dollar per year issue. *Ophthalmology* **102**: 1583–92

Klein BE, Klein R, Lee KE, Danforth LG (2001) Drug use and five-year incidence of age-related cataracts: The Beaver Dam Eye Study. *Ophthalmology* **108**: 1670–4

Leske MC, Chylack LT Jr, Wu SY, Schoenfeld E, He Q, Friend J, Wolfe J (1996) Incidence and progression of nuclear opacities in the Longitudinal Study of Cataract. *Ophthalmology* **103**: 705–12

Leske MC, Wu SY, Connell AM, Hyman L, Schachat AP (1997) Lens opacities, demographic factors and nutritional supplements in the Barbados Eye Study. *Int J Epidemiol* **26**: 1314–22

Leske MC, Wu SY, Hyman L, Nemesure B, Hennis A, Schachat AP (2004) Four-year incidence of visual impairment: Barbados Incidence Study of Eye Diseases. *Ophthalmology* **111**: 118–24

Lundstrom M, Brege KG, Floren I, Lundh B, Stenevi U, Thorburn W (2002) Cataract surgery and quality of life in patients with age related macular degeneration. *Br J Ophthalmol* **86**: 1330–5

Meyer CH, Sekundo W (2005) Nutritional supplementation to prevent cataract formation. *Dev Ophthalmol* **38**: 103–19

Minassian DC, Reidy A, Desai P, Farrow S, Vafidis G, Minassian A (2000) The deficit in cataract surgery in England and Wales and the escalating problem of visual impairment: epidemiological modelling of the population dynamics of cataract. *Br J Ophthalmol* **84**: 4–8

Minassian DC, Rosen P, Dart JK et al (2001) Extracapsular cataract extraction compared with small incision surgery by phacoemulsification: a randomised trial. *Br J Ophthalmol* **85**; 822–9

Murphy C, Tuft SJ, Minassian DC (2002) Refractive error and visual outcome after cataract extraction. *J Cataract Refract Surg* **28**: 62–6

Murthy GV, Gupta SK, Bachani D, Jose R, John N (2005) Current estimates of blindness in India. *Br J Ophthalmol* **89**: 257–60

Olsen G, Olson RJ (2000) Update on a long-term, prospective study of capsulotomy and retinal detachment rates after cataract surgery. *J Cataract Refract Surg* **26** 1017–21

Pizzarello L, Abiose A, Ffytche T et al (2004) VISION 2020: The Right to Sight: a global initiative to eliminate avoidable blindness. *Arch Ophthalmol* **122**: 615–20

Powe NR, Schein OD, Gieser SC, Tielsch JM, Luthra R, Javitt J, Steinberg EP (1994) Synthesis of the literature on visual acuity and complications following cataract extraction with intraocular lens implantation. Cataract patient outcome research team. *Arch Ophthalmol* **112**: 239–52

Reidy A, Minassian DC, Vafidis G et al (1998) Prevalence of serious eye disease and visual impairment in a north London population: population based, cross sectional study. *BMJ* **316**: 1643–6

Resnikoff S, Pascolini D, Etya'ale D, Kocur I, Pararajasegaram R, Pokharel GP, Mariotti SP (2004) Global data on visual impairment in the year 2002. *Bull World Health Organ* **82**: 844–51

Royal College of Ophthalmologists (2004) Cataract surgery guidelines. Royal College of Ophthalmologists, London

Schaumberg DA, Dana MR, Christen WG, Glynn RJ (1998) A systematic overview of the incidence of posterior capsule opacification. *Ophthalmology* **105**: 1213–21

Sperduto RD, Hu TS, Milton RC et al (1993) The Linxian cataract studies. Two nutrition intervention trials. *Arch Ophthalmol* **111**: 1246–53

Steinberg EP, Tielsch JM, Schein OD et al (1994) The VF-14. An index of functional impairment in patients with cataract. *Arch Ophthalmol* **112**: 630–8

Taylor HR (2000) Cataract: how much surgery do we have to do? *Br J Ophthalmol* **84**: 1–2

Vasavada AR, Raj SM (2005) Cataract treatment where resources are scarce. *Lancet* **365**: 550–1

Vavvas D, Azar NF, Azar, DT (2002) Mechanisms of disease: cataracts. *Ophthalmol Clin North Am* **15**: 49–60

Wang JJ, Foran S, Mitchell P (2000) Age-specific prevalence and causes of bilateral and unilateral visual impairment in older Australians: the Blue Mountains Eye Study. *Clin Experiment Ophthalmol* **28**: 268–73

West SK, Valmadrid CT (1995) Epidemiology of risk factors for age-related cataract. *Surv Ophthalmol* **39**: 323–34

KEY POINTS

- Cataract is the commonest treatable cause of visual impairment in the elderly.
- Worldwide there is still a large, unmet need for cataract surgery. The Vision 2020 initiative aims to eliminate avoidable blindness by the year 2020.
- Good visual acuity on the Snellen chart does not exclude visual problems from cataract.
- Small incision surgery with an intraocular lens implant is routinely used and accommodating implants are becoming available.