CORRESPONDENCE

The south Asian cataract management study

EDITOR,—In reading the preliminary report evaluating the clinical outcome of intracapsular cataract extraction (ICCE) with aphakic correction either via anterior chamber intraocular lens (AC IOL) implants or aphakic spectacles in a developing country setting I was given cause for alarm with regard to the assessment of the differences in visual outcome.¹

While the study is ongoing, I think it is important to recognise that a varying percentage (16–25%) of standard ICCE patients in a developing country setting will lose their spectacles and have problems adapting to the magnified image, forcing some patients not to wear them at all.^{2–4} By the same token, the quality of vision and life enjoyed by those patients with AC IOL implants is likely to be superior to those patients relying on aphakic spectacles, or none at all. However, the report's stress on the stringent use of visual acuity measures alone and its conclusion that 'There was no significant difference in visual outcome between study groups', fails to address adequately the variation attributable to spectacle and non-spectacle using aphakic patients in determining the overall differences in visual outcome between the two study groups.¹ In this regard, recent instruments developed to measure both the preoperative and postoperative visual function and quality of life aspects of cataract patients within the context of a developing country setting offer an avenue for further exploration of the relation between visual acuity and overall patient satisfaction with the visual outcome of cataract surgery.⁵

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- 1 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.
- 2 Reidy A, Mehra V, Minassian D. Outcome of cataract surgery in central India: a longitudinal follow up study. *Br J Ophthalmol* 1991; 75: 102–5.
- 3 Murthy GV, Gupta SK. A community-based evaluation of eyesight and spectacle use after intracapsular cataract extraction in northern India. *J Trop Med Hyg* 1995; 98: 84–8.
- 4 Hogeweg M, Sapkota YD, Foster A. Acceptability of aphakic correction. Results from Karnali eye camps in Nepal. *Acta Ophthalmol* 1992; 70: 407–12.
- 5 Ellwein LB, Fletcher A, Negrel AD, Thulasiraj RD. Quality of life assessment in blindness prevention interventions. *Int Ophthalmol* 1995; 18: 263–8.

Reply

EDITOR,—The south Asian cataract management study (SACMS) was not designed to address the issue of quality of life. There is certainly no longer any controversy that the introduction of an IOL improves the quality of vision compared with aphakic spectacle correction. This is reflected in the significant

increase of IOL implantations being performed in most developing countries every year.

The authors of the SACMS are well aware of the excellent work being undertaken at the Aravind Eye Hospital (Madurai Intraocular Lens Study—MIOLS) addressing the quality of life issue in cataract surgery with and without IOL.

The SACMS group has chosen to focus on documentation of the clinical aspects of surgery with special focus on corneal endothelium survival with a well proved surgical technique after implantation of a modern generation AC IOL. We are confident that the outcome of the SACMS, MIOLS, and other similar randomised prospective studies will give comprehensive conclusive data to guide surgeons and clinical centres on approaches to cataract surgery in these and other settings.

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Peters' anomaly

EDITOR,—I read with interest the recent letter by Saitoh *et al* describing an infant with both Peters' anomaly and Axenfeld's anomaly.¹ Unfortunately the discussion which follows the case description is marred by a failure to mention some significant discoveries which have been made in this field over the past few years. I would like to bring to their attention the finding of a deletion of the PAX6 gene in a child with aniridia and Peters' anomaly, and an intragenic mutation of the same gene in a family with heterogeneous anterior segment malformations including Peters' anomaly.² Deletions and mutations of the PAX6 gene were sought in these patients for the following reasons. The PAX6 gene was known to be deleted or mutated in aniridia, and cases of aniridia with Peters' anomaly had been described.^{3–6}

Furthermore, deletions and mutations of Pax-6, the mouse homologue of PAX6, had been found in the Small eye mouse which phenotypically resembles aniridia and Peters' anomaly.^{7–9}

The PAX6 gene plays a crucial role in development as illustrated by the discovery of homologues in quail, rat, mouse, zebrafish, *Drosophila*, *Caenorhabditis elegans*, and sea urchin. Recent experiments using targeted expression in *Drosophila* led to the production of supernumerary ectopic eyes giving support to the idea that PAX6 is the 'master control' gene for eye formation.¹⁰

The expression pattern of PAX6 has been investigated in both human and mouse.^{3–11} These studies found expression in ocular precursors deriving from neuroectoderm and head surface ectoderm which give rise to the corneal epithelium, the lens, the posterior layers of the iris, the ciliary body, the retina, and the optic nerve. The primary defect in aniridia and Peters' anomaly caused by PAX6 mutations must therefore lie within these tissues and fits well with the spectrum of clinical abnormality seen in these disorders—that is, corneal opacification at the subepithelial level, incomplete separation of the lens, persistent lens stalk, central corneal leucoma, iridolenticular adhesions, iridocorneal adhesions, iris hypoplasia, cataract, macula dysplasia, and optic nerve hypoplasia.^{12–13} Delayed migration of midbrain neural crest cells has been found in the Uchida rat which has an intragenic mutation of the rat homologue of PAX6.¹⁴

However, this does not affect the arrival of neural crest cells at the eye and since the PAX6 gene is not known to be expressed in this tissue it is unlikely to be the site of primary pathology.

Although the concurrence of Peters' anomaly and Axenfeld's anomaly is an interesting finding it may be a little premature to conclude that this is the usual case and has hitherto remained undetected. I would like to suggest that an alternative explanation is that defects in a single gene can produce a variable range of phenotypes with the primary abnormality residing within the expressing tissue—that is, neuroectoderm and head ectoderm, and secondary abnormalities occurring within tissues with which it interacts—that is, neural crest cell mesenchyme. This principle should still hold true for cases of Peters' anomaly not due to abnormality of the PAX6 gene. Some of these may result from a primary disorder of neural crest cells but this has yet to be proved.

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- 1 Saitoh A, Ohira A, Amemiya T. Peters' anomaly in an infant with a mild degree of Axenfeld's anomaly. *Br J Ophthalmol* 1995; 79: 862–3.
- 2 Hanson I, Fletcher J, Jordan T, Brown A, Taylor D, Adams R, Punnett H, van Heyningen V. Mutations at the PAX6 locus are found in heterogeneous anterior segment malformations including Peters' anomaly. *Nature Genetics* 1994; 6: 168–73.
- 3 Ton CCT, Hirvonen H, Miwa H, Weil MM, Monaghan F, Jordan T, *et al*. Positional cloning and characterisation of a paired box and homeobox-containing gene from the aniridia region. *Cell* 1991; 67: 1059–74.
- 4 Jordan T, Hanson I, Zolotarev D, Hodgson S, Prosser J, Seawright A, *et al*. The human PAX6 gene is mutated in two patients with aniridia. *Nature Genetics* 1992; 1: 328–32.
- 5 Glaser T, Jepeal L, Edward JG, Robert Young S, Favor J, Maas RL. PAX6 gene dosage effects in a family with congenital cataracts, aniridia, anophthalmia, and central nervous system defects. *Nature Genetics* 1994; 7: 463–71.
- 6 Beauchamp GR. Anterior segment dysgenesis, keratolenticular adhesion and aniridia. *J Pediatr Ophthalmol Strabismus* 1980; 17: 55–8.
- 7 Hill RE, Favor J, Hogan BLM, Ton CCT, Saunders GF, Hanson IM, *et al*. Mouse Small eye results from mutations in a paired-like homeobox-containing gene. *Nature* 1991; 354: 522–5.
- 8 Jordan T. *Investigations into the genetic basis of aniridia and Small eye*. PhD thesis, MRC Human Genetics Unit, Edinburgh, 1993.
- 9 Jordan T, Fleck B, van Heyningen V. A slit-lamp study of the Small eye mouse, the genetic homolog of aniridia and Peters' anomaly. *Invest Ophthalmol Vis Sci* 1994; 35: 2072.
- 10 Georg H, Callaerts P, Gehring WJ. Induction of ectopic eyes by targeted expression of the eyeless gene in *Drosophila*. *Science* 1995; 267: 1788–92.
- 11 Walther C, Gruss P. Pax-6, a murine paired box gene, is expressed in the developing CNS. *Development* 1991; 113: 1435–49.
- 12 Nelson B, Spaeth GL, Nowinski TS, Margo CE, Jackson L. Aniridia. A review. *Surv Ophthalmol* 1984; 28: 621–42.
- 13 Peters A. Über angeborene Defectbildung der Descemetischen Membran. *Klin Monatsbl Augenheilkd* 1906; 44: 27–40.
- 14 Matsuo T, Osumiyamashita N, Noji S, Ohuchi H, Koyama E, Myokai F, *et al*. A mutation in the Pax-6 gene in rat Small eye is associated with impaired migration of midbrain crest cells. *Nature Genetics* 1993; 3: 299–304.

Reply

EDITOR,—We also have an interest in the recent discoveries of the association between anterior segment anomalies and PAX6 locus. At present, we are analysing the PAX6 locus of an aniridia line using the polymerase chain reaction, single strand conformation polymorphism, and sequencing analysis methods.^{1–4} Jordan's alternative explanation is interesting,