The ocular surface toxicity of paraquat

We describe the clinical appearance and progress of bilateral ocular chemical injury caused by paraquat, a herbicide. Paraquat is used more commonly in developing countries and it has been associated with severe and prolonged ocular surface abnormalities due to the nature of the chemical. The current concepts in managing such an injury are reviewed.

Case report

A 69 year old fruit farmer splashed a 20% solution of paraquat into both his eyes. The exposure of the right eye to the solution was more marked. The eyes were irrigated for less than 5 minutes at the time of the injury, and a formal irrigation, using Ringer’s solution for each eye, was not performed until presentation 5 hours later.

General medical history revealed that apart from controlled hypertension he was otherwise well and he had no previous history of ocular problems.

On arrival uncorrected visual acuity was 6/9 on the right and 6/12 on the left. The intraocular pressure was 14 mm Hg on the right and 19 mm Hg on the left. There was a circular 90% epithelial defect centred over the right cornea. The remaining corneal epithelium was opaque, leathery and oedematous (Fig 1). The left cornea was epithelialised although the conjunctival defect only involved the inferonasal quadrant of the cornea and the superficial vessels remained intact and patent.

The left cornea had punctate epithelial erosions over most of its surface and an epithelial defect involving the inferomedial conjunctiva had just encroached onto the adjacent cornea. The conjunctiva in the left eye was also oedematous and had thronobed vessels around the epithelial defect. Over the next few days the epithelial defect in the left eye enlarged to involve the inferonasal quadrant of the cornea although the conjunctival defect only enlarged slightly.

A severe pseudomembranous conjunctivitis developed in the right eye by the third day with fibrinous adhesions developing in the inferior fornix. Periodic glass rodding was commenced to break early symblepharon formation and the steroid was changed to non-preserved dexamethasone 1% hourly by day.

At 6 days post-injury there was evidence of epithelial healing from the margin of the epithelial defect in the inferior fornix of the right eye. Topical citrate and ascorbate were stopped and treatment was altered to non-preserved topical medication only: topical dexamethasone 1% every 2 hours, chloramphenicol four times daily, and hypromellose every 2 hours. Autologous serum tears (diluted to 20% in sterile saline solution) were also commenced 2 hours after the injury there were persistent epithelial defects in both eyes but the healing edge of conjunctival epithelium had reached the nasal limbus in the right eye. Best corrected visual acuity was 6/24 right and 6/6 left. At this stage there was no pseudomembrane present although the conjunctiva remained inflamed.

By 4 weeks after injury the ocular surface in both eyes had re-epithelialised. The cornea of the right eye at this stage was clear with no vascularisation. Visual acuity remained 6/24 on the right.

Impression cytology of both central corneas was undertaken at this point. The right cornea showed conjunctival-type epithelium with scattered goblet cells, polymorphonuclear leukocytes, and numerous apoptotic bodies. The left cornea demonstrated a corneal phenotype epithelium.

The last review was at 6 months post-injury. Uncorrected visual acuity was 6/9 in both eyes. The conjunctiva of both eyes remained minimally inflamed with mild erythema, chemosis, and subepithelial fibrosis now evident. These changes were more marked in the right eye (Fig 3). There was superficial pannus encroaching onto the right cornea predominantly superonasally. The affected area in the right eye showed subconjunctival fibrosis with vascular disorganisation and localised sceral translucency (Fig 4). Current treatment was dexamethasone 1% twice daily in both eyes.

Comment

Paraquat is a dipyridylium quaternary ammmonium salt that acts as an indiscriminate killer of all plant life. Preparations made commercially commonly contain the related compound diquat as well as surfactants to increase distribution over the leaf and aid penetration. Toxicity in humans is thought to relate to paraquat recycling in the redox reaction (Fig 5). This depletes NADPH and interrupts cell metabolism. The reduced
paraoquat then reoxidises using oxygen to generate a superoxide radical. The oxygen free radicals generated bind macromolecules and damage membrane lipids. Intracellular processes involving calcium are also affected. Paraoquat may not be effectively cleared from the cell, resulting in persistent cell damage. Prolonged clinical effects lasting up to a year have been reported.

Documented cases of paraquat toxicity, although few, have noted a relatively mild initial appearance with a poor visual outcome in the long term. This has been the result of the development of a conjunctivalised corneal surface and chronic inflammation. 11

Paraoquat ingestion can result in early fatality due to multiorgan failure. In less severe cases acute renal and hepatic toxicity is common. Pulmonary fibrosis may result in death. Pulsed methylprednisolone and cyclophosphamide during the inflammatory stages may have a profound effect on reducing the mortality.5 It is unclear whether a similar regimen would circumspect the long term sequelae of ocular paraquat injury.

The patient in this case had significant exposure to a commercial preparation with minimal first aid measures being implemented at the time of injury. He developed a severe surface injury over the first 48 hours with marked epithelial loss over one eye. This implied there were few, if any, viable limbal stem cells remaining. A severe pseudemembranous conjunctivitis then developed.

Previous reports of this extensive type of surface injury show that eventually conjunctivalisation of the cornea with vascular pannus is to be expected. Severe injury may result in a disordered ocular surface with dryness, symblepharon, ankyloblepharon, fornical shortening, entropion, and trichiasis.

Patients with total limbal stem cell loss invariably develop superficial pannus and conjunctivalisation of the cornea. Evidence that previously conjunctival phenotypic epithelium can transdifferentiate into corneal type epithelium is derived from animal experiments with a debrided cornea and limbus where corneal epithelium healed the resultant defect.6 Viable limbal stem cells may thus have remained in the perilimbal crypts of Vogt. The right eye of this patient healed from conjunctival epithelium, confirmed by impression cytology, although most of the cornea remains clear without pannus. It has been reported that transdifferentiation is inhibited once neovascularisation occurs.7 In the left eye, which only had a small zone of limbal stem cell loss if any, the epithelium over the cornea was confirmed as corneal phenotype on impression cytology and there was no vascularity.

A suitable microenvironment for healing should be encouraged through the use of medical therapy. Topical corticosteroids in the first week after injury promote successful healing of epithelial defects by controlling inflammation. Adequate lubrication is also important. Autologous serum tears have been reported to relieve the symptoms of dry eye8 and improve the ocular surface disease more successfully than conventional tear substitutes in dry eye states. These drops have also been instrumental in the healing of persistent epithelial defects.9 Essential components of the tear film present in serum tears include epidermal growth factor, vitamin A, and transforming growth factor β, which are important for the proliferation, differentiation, and maturation of the surface epithelium.10

We present a case of severe paraquat chemical injury to both eyes that had a good outcome from treatment. This case demonstrates a very good result from a usually devastating injury.

Preventing conjunctivalisation of the corneal surface after total loss of the limbal stem cell population remains a challenge. Therapeutic intervention may help restore a more functional surface visually. The use of intensive anti-inflammatory therapy followed by autologous serum tears and non-preserved ocular lubricants may have improved the outcome.

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References

Henoch-Schonlein purpura with bilateral central retinal artery occlusion

Henoch-Schonlein (H-S) purpura is an acute leukocytoclastic vasculitis that primarily affects children and mainly involves skin, joints, gastrointestinal tract, and kidney.1 Reported ophthalmic manifestations of Henoch-Schonlein purpura include episcleritis, scleritis, keratitis, anterior uveitis, and central retinvascularisation.

A suitable microenvironment for healing should be encouraged through the use of medical therapy. Topical corticosteroids in the first week after injury promote successful healing of epithelial defects by controlling inflammation. Adequate lubrication is also important. Autologous serum tears have been reported to relieve the symptoms of dry eye and improve the ocular surface disease more successfully than conventional tear substitutes in dry eye states. These drops have also been instrumental in the healing of persistent epithelial defects. Essential components of the tear film present in serum tears include epidermal growth factor, vitamin A, and transforming growth factor β, which are important for the proliferation, differentiation, and maturation of the surface epithelium.

We present a case of severe paraquat chemical injury to both eyes that had a good outcome from treatment. This case demonstrates a very good result from a usually devastating injury.

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References

Figure 1 Fundus photograph of the right eye demonstrating cherry red spot with severe retinal oedema at macular and peripapillary area, disc oedema, and venous engorgement.

Figure 2 Fundus photograph of the left eye demonstrating cherry red spot with severe retinal oedema at macular and peripapillary area, disc oedema, and venous engorgement.
One month later, her visual acuity was counting finger in both eyes. Fundus examination revealed a pale disc, arterial sheathing, and drusen-like RPE change at foveal area in both eyes. Six months later, her best correction visual acuity was 6/30 in the right eye, and 6/60 in the left.

**Comment**

The dominant clinical manifestations of H-S purpura are cutaneous purpura (100%), abdominal pain (63%), gastrointestinal bleeding (33%), and nephritis (40%). In general, H-S purpura is an acute, self-limiting illness though one third of patients will have one or more recurrences of symptoms. H-S purpura was the cause of renal failure in 2% and 5% of groups of children undergoing haemodialysis in California and France, respectively. Although the aetiology of H-S purpura remains unknown, it is clear that IgA has a critical role in the immunopathogenesis. The clinical features of H-S purpura are a consequence of widespread leukocytoclastic vasculitis due to IgA deposition in vessel walls. Treatment is limited to symptomatic and supportive care. Corticosteroids are often used depending on the severity of the disease.

According to the previous reports, the ocular manifestations of H-S purpura are rare, including episcleritis, scleritis, keratitis, anterior uveitis, and central retinal vein occlusion.** In this case, H-S purpura vasculitis may have an important role in the pathogenesis of bilateral central retinal artery occlusion. To our knowledge this might be the first case of H-S purpura complicated with bilateral central retinal artery occlusion in the literature.

**Primary iris pigment epithelial hyperplasia and glaucoma**

Primary iris pigment epithelial hyperplasia (PIPH) is a rare condition characterised by the presence of iris pigment epithelium on the anterior surface of the iris stroma. There are few reports that are available in the literature** and they generally refer to it as congenital ectropion uveae (CEU). CEU, however, is a misnomer, since the iris pigment layer is known to be separate from the uvea. Yet, the term CEU persists in clinical use.

Primary iris pigment epithelial hyperplasia is a congenital non-progressive condition that is easily differentiated from acquired progressive ectropion uveae, the latter resulting from tractional eversion of posterior pigment layer and sphincter muscle, secondary to glaucoma and/or uveitis.

The most common association is neurofibromatosis** though other ocular** and systemic associations** have been described, including a chromosomal abnormality.**

This report describes two cases of primary iris pigment epithelial hyperplasia with glaucoma and reviews the available literature on this rare abnormality. In one case the presentation of glaucoma was in adolescence and in infancy in the other. Associated ocular features are described. In these two patients there were no systemic features of diagnostic significance.

**Case 1**

A 15 year boy presented with occasional watering in the left eye for 4 years. There was no history of any visual disturbance.

On examination his left eye was apparently normal (Fig 1, top right) with good levator function. The appearance of the right eye since the age of 6 years had a ptosis of 2 mm (Fig 1, top right) with good levator function. The patient’s vision was 20/240 in the right eye (Snellen acuity 1.5D sph, 42.00, 15°, 45.5 D cyl, 105°).

The left eye had extensive hyperplasia of the iris pigment epithelium which overlay the stroma of the iris in an irregular manner but did not reach the angle (Fig 1, top left). The normal iris architecture was lost, but no nodules were seen. There was pigment on the anterior surface of the lens but the iris did not transilluminate. There was anisocoria of 1.5 mm, the left pupil being larger but round, regular and reacting to light. Indirect gonioscopy (Fig 1, bottom left) demonstrated an open angle with iridotrabeculodysgenesis in the form of an anterior insertion of the iris into the trabecular meshwork with excessive pigment deposition and a prominent Schwalbe’s line, this being very marked in some areas. The right eye had a fully open angle with all structures clearly seen. Intraocular pressure (IOP) on the first examination was 52 mm Hg in the left eye and 12 mm Hg in the right. On fundus examination there was an oblique insertion of the disc, with inferonasal crescent and an oval oblique cup involving 0.8:1 part of the disc (Fig 1, bottom right). A B-scan ultrasound of orbit (Fig 1, bottom left) demonstrated an oblique insertion of the disc (Fig 1, bottom right). A B-scan ultrasound of orbit confirmed the apparent proptosis of the left eye was due to a larger axial length (24.36 mm compared with 22.60 mm in the right eye). There were two café au lait spots on the trunk but there was no other systemic abnormality. None of the family members had similar ocular findings or any evidence of neurofibromatosis.

The IOP responded poorly to topical medication and a trabeculectomy was performed which controlled the IOP.

**Case 2**

A 5½ year old girl presented with gradual enlargement of the right eye since the age of 6 years. There was a history of mild photophobia but none of lacrimation or deterioration of vision.

On examination the patient’s Snellen acuity was 20/240 in the right eye (−1.50 sph, −4.00
but may be oval. Bromatosis is the disorder most commonly reported in association with PIPH. Neurofibromatosis, usually a hyperplasia of the former. A congenital exaggeration of this process forms a double layer that includes itself into some cases and larger than its counterpart in that the condition is hereditary in uncomplexed cases, however, those which are associated with conditions such as Rieger's dysgenesis are altered in the same way as the major deformity. A variety of systemic disorders have been reported in association with PIPHI. Neurofibromatosis, a case of associated diabetes mellitus and left facial hemiatrophy, and one each of Prader-Willi syndrome and right facial hemiatrophy. Hetzler reported a case with associated asthma and a dental anomaly. Not all cases have systemic associations. None of the nine patients reported by Dowling et al had any systemic associations. None of the two cases in this report had any identifiable systemic association.

Besides the iris and pupillary abnormalities discussed above, PIPH is frequently associated with additional ocular abnormalities. Isopolar mild ptosis with good levator function was present in six of nine cases reported by Dowling et al and in one case each by Ritch et al and Herrberg. The eye may be slightly proptotic in some cases. The appearance of the upper lid may suggest plexiform neurona even though no mass may be palpable. All these features were present in the first case in this report. Angle anomalies appear to be universal in most of the cases demonstrating anterior insertion of the iris, a prominent Schwalbe's line, prominent iris processes and/or increased pigment. Iridotrabeculodysgenesis was present in both the cases in this present report.

Glaucoma was present in most of the cases reported. Ritch et al found glaucoma in seven out of eight cases of PIPHI, Dowling et al in eight of nine cases, and it was also noted in and other reported cases of PIPHI. It is usually of onset in childhood or early adolescence as was seen in two of the cases in this report but cases with late onset also has been reported. The intraocular pressure shows an initial decrease when the instilled but rises again quickly and filtering surgery was required in most of these cases. Surgical intervention was necessary in both the cases in this report. The features of PIPHI detailed in this report are in concurrence with those previously published. There may be other associated ocular abnormalities, ptosis being the commonest. Neurofibromatosis is the most frequently associated systemic disorder.

Glaucoma may develop at any stage, therefore these cases should be recognised early by healthcare professionals and followed for development of glaucoma.

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References

Unilateral vitreous haemorrhage secondary to caudal epidural injection: a variant of Terson's syndrome

Terson's syndrome is characterised by vitreous haemorrhage accompanying subarachnoid or any other form of intracranial haemorrhage. Although Litten reported vitreous haemorrhage in association with intracranial haemorrhage in 1881, it was Terson who described the syndrome in 1900. Haemorrhage in Terson's syndrome may be contained between the internal limiting membrane and retina or extend into the vitreous cavity. Other findings include multiple periretal, intraretinal, subretinal haemorrhages, as well as macular rings and epiretinal membranes.

Case report
A 47 year old man with chronic back pain due to epidural adhesions (confirmed in magnetic resonance imaging (MRI)) was referred to the anaesthetic department for caudal epidural injection of steroids and saline to break up the epidural adhesions for pain relief. He received the injection through the sacral hiatus between the spinal dura and spinal canal in the caudal epidural space under general anaesthesia. Following recovery from general anaesthesia, he stated that he had lost the sight in his left eye. Ophthalmological examination at that time confirmed vitreous haemorrhage of 6/60 left eye with no apparent pupilary defect, normal anterior segments, and the presence of a dense left vitreous haemorrhage with a normal right eye. There were no other predisposing factors for vitreous haemorrhage. Post-epidural MRI scan of brain and spinal cord was performed. There was no intracranial haemorrhage but the epidural adhesions were still noted to be present. The patient's vision gradually improved to 6/12 over a 3 year period but because of residual severe symptomatic floaters he underwent left pars plana vitrectomy, which allowed his vision to improve to 6/6 unaided.

Comment
Terson proposed that intraocular haemorrhage occurred secondary to intracranial hypertension, which resulted in elevated peri-papillary capillary pressure. The most commonly cited mechanism is that elevated intracranial pressure causes an increase in intracranial haemorrhage is transmitted via the optic nerve sheath and obstructs intracranial venous drainage causing distension and rupture of peripapillary and retinal capillaries resulting in significant haemorrhage in the subhyaloid and vitreous cavity.

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In our patient during the caudal epidural injection the fluid wave of injection did not spread uniformly in the epidural space and break the adhesions but, instead, got trapped in tiny compartments formed by the adhesions and caused lateral pressure on the spinal cord, thus increasing subarachnoid space pressure, resulting in vitreous haemorrhage in the left eye (Fig 1).

Therefore, we feel the cases with pathogenesis of intracranial haemorrhage, secondary to a sudden rise of intracranial pressure, should be considered as the variant of Terson’s syndrome.

The clinical course of Terson’s syndrome is typically one of gradual resolution of the vitreous haemorrhage and return of normal vision. Haemorrhages that do not resolve may require vitrectomy, but several studies have proposed that early vitrectomy also may improve visual outcome.

Indications for early pars plana vitrectomy include vitreous haemorrhage in infants (prevent amblyopia) and in adults with bilateral vitreous haemorrhage. Indications for conservative management include rapidly clearing vitreous haemorrhage, mild haemorrhage, unilateral cases with normal vision in the fellow eye, and pre-existing ocular damage precluding a favourable visual outcome.

**Severe macular pucker after retinal detachment surgery in an infant**

The appearance and clinical course of rhegmatogenous retinal detachments in children are more complicated than those of adults, because the retinal detachments are generally associated with trauma or congenital anomalies. In an infant, especially, an unexpected course may develop; however, the incidence of these detachments is so low that treatment and complications have scarcely been described in the literature. We report an infant who developed severe macular pucker after retinal detachment surgery.

**Case report**

A 2 week old male infant was referred with a diagnosis of bilateral congenital cataracts. The pregnancy and delivery had been uneventful. His mother also had had congenital cataracts. Both eyes of the infant had dense zonular cataracts. The patient had no associated ocular problems on slit lamp biomicroscopy and no abnormalities on physical examination. He underwent bilateral lensectomy and anterior vitrectomy by limbal approach at 3 weeks of age; both fundi were unremarkable. Although his right eye underwent sufficient anterior vitrectomy, retropupillary membrane developed on the residual vitreous surface and the pupil closed 3 months postoperatively. During the second surgery, pupilloplasty was performed and we found a tear in the ciliary epithelium of the pars plana resulting from traction of the retropupillary membrane tissue, and also discovered a localised detachment of the retina and ciliary epithelium (Fig 1A). We performed cryoexy with encircling scleral buckle, vitrectomy, and fluid-air exchange, and the retina was reattached. One month later, macular pucker rapidly developed and enfolded the entire posterior retina (Fig 1B). The original tear was completely sealed, and signs of the recurrent rhegmatogenous retinal detachment with proliferative vitreoretinopathy, including vitreous haze and wrinkling of retina in the other location, were not identified. After additional vitrectomy to remove residual cortex and to form membrane peeling, the retina was finally reattached with a residue of degeneration near the fovea (Fig 1C).

**Comment**

Macular pucker in this infant is significantly different from that in adults. The severe posterior retinal folds may be formed by strong contraction of the epiretinal membrane, a firm vitreoretinal juncture, and an extensible retina. A previous histopathological report on recurrent proliferation after vitrectomy in two children with tractional retinal detachments showed that retinal glial cells were the main reactive cells. However, in our case, the major component of the pucker was retinal pigment epithelium (RPE) cells, the same as in adults with rhegmatogenous retinal detachment. Cytoplasmic actin within the membrane, rather residual vitreous cortex on the retinal surface, may be involved in forming strong contractile elements, which also may underlie idiopathic cases in children. Vessels in the pucker may have originated from the adherent retina, because no residual hyaloid vessels were identified during surgery.

Because excessive cryoexy tends to disperse and activate RPE cells, minimal cryoexy is recommended; laser may be preferable.
to treat rhegmatogenous retinal detachment in infants. Enzyme assisted vitrectomy to separate the firm vitreoretinal juncture may prevent the development of subsequent macular pucker. Frequent examinations and careful management are required even after successful reattachment surgery.

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References

Microbial keratitis associated with extended wear of silicone hydrogel contact lenses

Traditional hydrogel soft contact lenses (SCL) have limited oxygen permeability. Recently introduced silicone hydrogel SCL have much higher oxygen transmissibility (Dk/t O2), allowing near normal oxygen supply to the cornea during extended lid closure, and are hoped by some to ameliorate most of the problems related to corneal hypoxia encountered with previous extended wear soft contact lenses. They have therefore been approved for up to 30 days of continuous wear in both Europe and Australia.

Four cases of microbial keratitis in patients who were using silicone hydrogel SCL (either CibaVision Focus Night and Day lenses (Lotrafilcon A, fluorosiloxane hydrogel) or Bausch & Lomb PureVision lenses (Balafilcon A, silicone hydrogel)) on an extended wear basis are presented. The minimum amount of continuous wear was 24 hours. All cases were treated either in private or at the corneal clinic of the Royal Victorian Eye and Ear Hospital from December 2000 to February 2001. All the patients underwent a complete ophthalmic examination by a corneal specialist. Microbiological specimens were taken from all patients via cornea scrapings and were submitted for Gram and Blankophor staining, and bacterial and fungal cultures via direct inoculation onto sheep blood agar, chocolate agar, and Sabouraud agar. Bacterial sensitivities of cultured organisms were also obtained. Where possible, the contact lenses themselves were also sent for microbial cultures.

Each case is described in brief, and a summary presented in Table 1.

Case 1
This 22 year old man presented with a 2 day history of left ocular injection, pain, photophobia, and blurred vision. He was wearing CibaVision Focus Night and Day SCL continuously for 10 days at a time, discarding the lenses after a month of use. He had swum in a river while wearing the same lenses 1 week earlier, after which he removed the lenses and disinfected them with “Rem” multipurpose solution (boric acid, edetate disodium, poloxamine, sodium borate, sodium chloride, and polyaminopropylbiguanide, manufactured and distributed by Bausch & Lomb, Greenville, SC, USA). Continuous wear was recommenced within a few hours. Examination revealed an uncorrected visual acuity of 3/60 in both eyes, improving to 6/12 in both eyes with pinhole. A paracentral 1 mm epithelial defect with underlying dense infiltrate was noted in the left eye with anterior chamber inflammation of 1+ cells and multiple scattered KP (Fig 1).

Corneal scrapings revealed fungal elements on Gram and Blankophor staining. Cultures grew Acinetobacter species in the enrichment broth, sensitive to ciprofloxacin, chloramphenicol, and tobramycin. Penicillium was later grown on the Sabouraud agar slope. A yeast (not Candida albicans) was grown on Sabouraud agar from the left contact lens, with Penicillium species grown from the right.

Topical ciprofloxacin 0.3% was commenced hourly, after which his symptoms and signs markedly improved. The ciprofloxacin was tapered and changed to topical chloramphenicol 0.5% (Chlorisig, Sigma) 8 days after presentation.

Two weeks later, the epithelial defect had resolved but significant subepithelial scarring remained. His best corrected visual acuity was 6/6 right eye and 6/7.5 left eye.

Case 2
A 16 year old boy presented with a 24 hour history of left eye grittiness, marked photophobia, and hazy vision. He was wearing PureVision SCL on a monthly continuous wear basis. He gave a history of swimming in a river in these lenses 1 week earlier, after which he removed the lenses and disinfected them with “Rem” multipurpose solution (boric acid, edetate disodium, poloxamine, sodium borate, sodium chloride, and polyaminopropylbiguanide, manufactured and distributed by Bausch & Lomb, Greenville, SC, USA). Continuous wear was recommenced within a few hours. Examination revealed an uncorrected visual acuity of 3/60 in both eyes, improving to 6/12 in both eyes with pinhole. A paracentral 1 mm epithelial defect with underlying dense infiltrate was noted in the left eye with anterior chamber inflammation of 1+ cells and multiple scattered KP (Fig 1).

Microbial keratitis associated with extended wear of silicone hydrogel contact lenses
Examination revealed a visual acuity of 6/6 right eye and 6/5 left eye with his spectacle correction. Marked right eye ciliary injection and anterior chamber activity were noted with cells, flare, multiple scattered KPs, and a small paracentral epithelial defect with underlying infiltrate.

Corneal scrapings revealed polymorphs on Gram stain (no organisms seen), and a heavy growth of Corynebacterium species on the sheep blood agar plate, sensitive to penicillin, ciprofloxacin, and chloramphenicol. Culture of the contact lenses was impossible as they had been discarded.

Treatment consisted of hourly topical ciprofloxacin 0.3%. Topical fluoromethalone acetate 0.1% (Flarex, Alcon, Fort Worth, TX, USA) was added four times daily after clinical improvement 24 hours later. All treatment was tapered and ceased after 2 weeks.

The patient failed to attend for any further follow up appointments but on contact by telephone stated his vision had returned to normal.

Case 4
A 17 year old presented with a 5 day history of left eye redness, irritation, photophobia, and blurred vision. He was wearing CibaVision Focus Night and Day SCL on a monthly continuous wear basis and gave a history of swimming in a river with a previous pair of lenses 3 days before the onset of symptoms.

These lenses were discarded and replaced with his current lenses the next day.

Initial treatment by the general practitioner consisted of topical chloramphenicol (0.5%) drops 2 hourly by day and chloramphenicol (1%) ointment (Chlorisig, Sigma) at night. Examination revealed a visual acuity of 6/6 right eye (with SCL) and 3/6 left eye unaided, improving to 6/18 with pinhole. Conjunctival injection was noted in the left eye, with a 3 × 4 mm paracentral area of stromal haze and an associated area of subepithelial infiltrate. The overlying epithelium was intact.

Corneal scrapings revealed no polymorphs or organisms on Gram stain, but grew α haemolytic streptococcus from the enrichment broth sensitive to penicillin, chloramphenicol, ciprofloxacin, and neomycin.

Treatment was with hourly topical ciprofloxacin 0.3%, with tapering after 48 hours. Review 1 week later revealed a persisting subepithelial scar and a best corrected spectacle acuity of 6/7.5.

Comment
Extended wear of soft contact lenses for up to 6 days has been advocated in various forms since the 1980s with traditional hydrogel lenses. However, owing to the relatively high rates of associated microbial keratitis, α extended wear of soft contact lenses has not had widespread use.

The advent of high oxygen permeability silicone hydrogel soft contact lenses has again made extended wear a viable option, as the increased oxygen permeability is thought to reduce the risk of development of a hypoxic epithelial defect, which can serve as a portal of infection. Pre-release extended wear studies did not reveal any cases of microbial keratitis but these studies were relatively small. Lenses with a Dk/t O₂ greater than 50 × 10⁻⁹ have also been shown to have a lesser affinity for P aeruginosa binding during extended wear, further decreasing the risk of microbial keratitis.₁

Our experience suggests that extended wear with even these newer SCL is still a risk factor in the development of microbial keratitis. All four patients had central or paracentral infiltrates, with three patients presenting with an associated epithelial defect. All four patients also had a positive culture or Gram/Blankophor stain from the corneal scrape and had residual scarring after resolution of the acute episode. Although Corynebacterium species are considered by some to be a non-pathogenic organism, it has been described as the causative organism in several cases of microbial keratitis.⁎ We therefore feel that it is very unlikely that any of these cases represent a more benign non-infectious contact lens complication such as CLPU (contact lens induced peripheral ulcer), CLARE (contact lens induced acute red eye), or IK (infiltrative keratitis), which are all described as being conditions that resolve after cessation of contact lens wear alone, without the development of residual corneal scarring.⁎

Previous studies have shown that the most important risk factor for the development of microbial keratitis in soft contact lens wearers is the duration of contact lens wear, where overnight wear in particular aggravates the relative hypoxia of the cornea.₂ However, there are other risk factors such as hypercapnia, trauma, biofilm alterations/contamination, altered corneal sensation, altered tear volume, and composition.₃⁻⁵ Only hypoxia and hypercapnia should be improved by increased contact lens gas permeability.

Three of the four patients described had swum in their lenses within weeks of their presentation. This might be an important risk factor in the development of their microbial keratitis in association with their silicon hydrogel SCL (as it is with other SCL), although the organisms involved were not those typically associated with microbial keratitis from contaminated water exposure. All four of the patients were also males between the ages of 16 and 22 years. These two demographic factors have been linked to an increased risk of microbial keratitis in contact lens wearers.

Recent studies have shown that bacterial populations grown from silicone hydrogel SCL in asymptomatic wear were not statistically different in comparison with those grown from standard HEMA based SCL.₆ This
suggsts that a silicone hydrogel SCL can still be a means of contamination in the pathogenesis of SCL microbial keratitis. Certainly, some of the lenses in this small series did grow the same organisms as the corneal lesions themselves.

Our experience supports a multifactorial causality for the development of microbial keratitis in extended SCL wearers, rather than just corneal epithelial hypoxia, particularly in high risk groups such as the four patients described where high risk behaviour is also undertaken. Further investigation needs to be done on the effects these lenses have in extended wear with regard to the development of microbial keratitis before their long-term safety can be assured.

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Serious corneoscleral complications after pterygium excision with mitomycin C

The use of topical mitomycin C (MMC) to prevent recurrence after pterygium surgery is increasing since its introduction by Kunitomo and Mori in Japan, and its subsequent popularisation in the United States by Singh and associates. Low dose MMC (0.02%) twice daily for 5 days after the operation has been prospectively studied with long term follow up, and few serious side effects have been noted. Intraoperative MMC appeared to be an effective and safe adjunctive treatment of primary pterygium excision.

Case reports

We retrospectively analysed three patients who presented at the Haemek Medical Centre, Afula, Israel with scleral melting which developed after pterygium excision between October and November 2000 with intraoperative application of MMC (0.02% for 3 minutes). The MMC was washed out immediately with an abundant amount of balanced salt solution for at least 3 minutes. During the past 10 years we performed over 300 pterygium excisions with intraoperative use of MMC in Haemek Medical Center with three cases having serious complications.

Case 1 (Fig 1)

A previously healthy 50 year old man underwent recurrent pterygium excision of the right eye using a bare sclera technique with intraoperative application of MMC 0.02% for 3 minutes, having undergone pterygium excision with MMC 10 months earlier in his right eye. Visual acuity was 6/9+ SC. Preoperative ophthalmological examination revealed a nasal flashy wide lesion 4.5 mm over the limbus and inferior symblepharon, with the remainder of the examination being normal. He was released on the same day, following surgery at which time there were no complications. On the first (postoperative day 1) and second (postoperative day 7) follow ups no complaints or complications were noted. However, on postoperative day 30, corneal limbal perforation and iris incarceration in the wound was noted. Immediately he underwent right eye corneal tectonic graft surgery. At his last follow up (12 weeks after the pterygium excision with MMC), the best corrected visual acuity was 6/24 CPH, the graft has good adaptation, no gap and no rejection signs.

Case 2 (Fig 2)

A previously healthy 37 year old man underwent pterygium excision of the left eye using a bare sclera technique with intraoperative application of MMC 0.02% for 3 minutes. His presenting symptoms were cosmetic only. Visual acuity was 6/60 partial SC. Preoperative ophthalmological examination revealed nasal flashy wide lesion 2.8 mm over the limbus with the remainder of the examination being normal. Two years previously he had undergone pterygium excision of the right eye using a bare sclera technique with intraoperative application of MMC 0.02% for 3 minutes. The right eye procedure had been successful and was performed in the same institute. Three weeks after the surgery, on routine follow up scleral melting and necrosis were noted. The scleral defect was unresponsive to topical lubricants, topical antibiotics, topical steroids, and patching. Ten weeks after the left eye pterygium excision and MMC application, he underwent autologous conjunctival graft surgery to repair the defect. Follow up 2 weeks later showed that the graft has good adaptation and re-epithelialisation was noted.

Case 3

A previously healthy 70 year old man underwent pterygium excision of the right eye using a bare sclera technique with intraoperative application of MMC 0.02% for 3 minutes. On preoperative examination visual acuity was 6/24 partial SC in the right eye and 6/60 SC in the left. Anterior segment was quiet except for a nasal temporal pterygium 7 mm over the limbus partially covering the pupil axis in the right eye. The procedure of the right eye pterygium excision with MMC was successful and performed in the same institute. No complaints or complications were noted at the first two follow ups; however, 3 weeks postoperatively right eye temporal scleral melting and ectasia was seen (3 mm x 3 mm in size). Conservative topical treatment with antibiotics, topical anti-inflammatory agents, and steroids failed to resolve the situation. Consequently, 8 weeks after the right eye surgery he underwent right eye conjunctival flap grafting over the area of scleral melting. At his last examination best corrected visual acuity was 6/36 partial, blood vessel growth was noted towards the bare sclera and re-epithelialisation with minimal staining. He is still being treated with topical antibiotics with some improvement.
Table 1

<table>
<thead>
<tr>
<th>No</th>
<th>Age/sex/race</th>
<th>Presenting symptom</th>
<th>Clinical finding</th>
<th>Treatment</th>
<th>Preop VA</th>
<th>v postop VA</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50/M/white</td>
<td>Blurred vision, dust sensation</td>
<td>Limbal perforation with iris incarceration in the wound</td>
<td>Tectonic corneal graft</td>
<td>6/9+ SC 6/24 CPH</td>
<td>Good graft adaptation. No recurrence of pterygium after 12 weeks</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>37/M/white</td>
<td>Cosmetic disturbance</td>
<td>Scleral nasal melting (3 mm x 2 mm)</td>
<td>Trial at conservative topical treatment failed. Autologous conjunctival graft</td>
<td>6/9+ SC 6/12+ SC</td>
<td>Good graft adaptation at last follow up</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>70/M/white</td>
<td>Pterygium covering the pupil visual axis</td>
<td>Scleral temporal melting (3 mm x 3 mm)</td>
<td>Trial at conservative topical treatment failed. Conjunctival flap</td>
<td>6/24 pt CC 6/36 pt CC</td>
<td>Blood vessels growth towards the bare sclera with re-epithelialisation. No recurrence of pterygium after 12 weeks</td>
<td></td>
</tr>
</tbody>
</table>

Comment

Mitomycin C is an antineoplastic antibiotic agent isolated from the fermentation filtrate of Streptomyces caespitosus. Its action is similar to alkylating agents; it alkylates and crosslinks DNA and, in addition, may generate superoxide and hydroxyl radicals in solution. It also inhibits DNA, RNA, and protein synthesis.

These combined effects may result in a long term influence on cellular proliferation.

Scleral melting occurring after pterygium surgery with adjunctive treatment has been well reported. However, no serious complications were noted in the study by Frucht-Pery and Ilser with postoperative use of 0.1 mg/ml MMC twice daily for 5 days (with a mean follow up period of 15.3 months) or in intraoperative MMC treated eyes. A common element in toxicity with MMC is a relatively large cumulative dose. Therefore, most ophthalmologists believe that a single intraoperative exposure to MMC would reduce the complication rate of MMC eye drop regimen.

In the current series, all patients underwent pterygium excision in the bare sclera technique with the low concentration of 0.02% of MMC and a short application of 3 minutes. Among our patients one had corneal perforation that was treated by tectonic keratoplasty and another two had severe deep scleral melting that required conjunctival flaps or autologous grafts. Our patients were all healthy, without conditions predisposing to ulceration or poor wound healing such as Sjögren syndrome, severe keratoconjunctivitis sicca, acne rosacea, atopic keratoconjunctivitis, or herpes keratitis (Table 1). We suspected that the MMC concentration was not appropriate during that period. We checked the concentration and it was difficult to obtain precise results after a waiting period, owing to the degradation of the material.

This report raises serious questions regarding routine use of MMC. Recently, some investigators have evaluated the safety and efficacy of low dose MMC (0.02%) for an even shorter time (30 seconds). All ophthalmologists should be aware of the possibility of vision threatening complications and avoid routine and broad use of mitomycin in all fields.

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References

Extrascleral extension of a choroidal melanoma after argon photoacoagulation and transscleral thermotherapy

The optimal management of small posterior choroidal melanomas remains controversial, especially for tumours located near the optic disc and fovea. Although with increasing rarity, argon laser photoacoagulation continues to be used in the primary treatment of small tumours, despite data suggesting that other therapeutic methods may be more successful. More recently, transscleral thermotherapy (TTT) has emerged as a therapeutic option for the primary treatment of small choroidal melanomas. Initial results are promising, but like any new treatments, more widespread use and longer follow up are needed for a thorough assessment of its efficacy. As a cautionary reminder that additional study is required to define the potential complications of these treatments, we present a case of choroidal melanoma in which treatment with primary argon photoacoagulation followed by TTT was associated with extrascleral extension of the tumour.

Case report

A 38 year old woman presented with decreased visual acuity in her right eye. An ophthalmologist noted a pigmented choroidal lesion with associated subretinal fluid. The lesion was initially treated with argon laser photoacoagulation, but within a month the decision was made to re-treat the lesion with TTT. Over the next 7 months, visual acuity deteriorated to 20/200. The lesion exhibited persistent elevation and subretinal fluid. By ultrasound, a change in the retroscleral echo-genicity was observed, precipitating referral to an ophthalmic oncologist whereupon a diagnosis of choroidal melanoma with extrascleral extension was made. The patient was then referred to UCSF for consideration of proton beam therapy.

On examination, all abnormal findings were confined to the right eye. The patient’s visual acuity was counting fingers at 2 feet. Funduscopic examination revealed a raised pigmentated tumour centred on the fovea, measuring 7 mm vertically by 10 mm horizontally, extending to within 2.3 mm of the disc. Subretinal fluid was present and extended over the nasal aspect of the tumour (Fig 1A). A flat

Figure 1 (A) Fundus photograph of the right eye demonstrating a pigmented choroidal tumour in the macular region with an area nasally exhibiting orange pigment on its surface. There is associated subretinal fluid extending nasally. (B) Fluorescein angiography demonstrates irregular choroidal vessels within the tumour that are bright in the early arterial phase and show late leakage with punctate hot spots.
naevus 2 mm in diameter was also noted infe-
rously (not shown). Fluorescein angio-
graphy was remarkable for an irregular plexus
of choroidal vessels within the tumour noted in
the early arterial phase, mid-phase leakage from
retinal veins overlying the tumour, and late
leakage with punctate hot spots at the tumour
margin (Fig 1B). B-scan ultrasound revealed
choroidal excavation, an acoustic quiet
zone, and orbital shadowing (Fig 2A). A-scan
demonstrated spontaneous pulsation, low to
medium internal reflectivity, and a sharp
posterior spike (Fig 2B). The intraocular thick-
ness was 3.0 mm, with 7.7 mm of extraocular
extension. These findings are consistent with
choroidal melanoma with posterior extracata-
eral extension. Systematic evaluation revealed
no signs of metastasis. The potential for orbital
contamination by tumour made focal therapy
by proton beam a less desirable alternative.
Therefore, enucleation with en bloc resection
of the extrascleral tumour was recommended and
subsequently performed. Pathological exam-
ination confirmed the diagnosis of malignant
choroidal melanoma, mixed cell type, with
vascular invasion. The patient elected to un-
edgo adjuvant post-surgical external beam
radiotherapy to reduce the rate of orbital recur-
rence, presumably from tumour out of reach of
radiotherapy, including the relative sparing of
adjacent normal tissue, and the convenience and
economy of an out-of-hospital outpatient
procedure. In contrast with the shal-
low penetration of the argon laser, however,
TTT employs near infrared light to produce a
3.9 nm depth of tumour necrosis.10 The promise of this technique spurred investi-
gation into its use as a primary treatment for
small posterior choroidal melanomas with
encouraging early results.4
It has been reported that recurrences occur follow apparently successful photo-
coaagulation or TTT because invisible nests of
malignant cells can infiltrate the sclera, a his-
tologically documented phenomenon.11 The
presented case serves as a reminder that this
possibility is not trivial. Extrascleral exten-
sion, presumably from tumour out of reach of
initial argon photocoagulation and subsequent
TTT, resulted in a requirement for aggressive
local surgical therapy with adjuvant therapy, and
adjacent systemic therapy to reduce the risk of
metastatic disease. The unusual degree of
extrascleral extension for a small melanoma
also raises the possibility that either photo-
coaagulation or, more likely, TTT produced some
reduction in scleral integrity allowing focal
egress of tumour cells. Reports of complica-
tions following argon laser are likely to be-
come rarer because advances in modern
radiotherapy have made primary photocoagu-
lation an uncommon treatment.12 The use and
investigation of TTT, however, continue to increase and the risks for extrascleral exten-
sion remain undefined.

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Macular infarction after intravitreal amikacin: mounting
evidence against amikacin

Retinal toxicity attributable to intravitreal use of aminoglycosides for endophthalmitis has been reported. Campochiaro and Conway reported 101 cases of retinal damage due to intravitreal aminoglycosides.1 Amikacin, an aminoglycoside, is in widespread use in the United Kingdom for the treatment of Gram negative organisms in endophthalmitis. We report a case of macular toxicity following the use of intravitreal amikacin for postoperative endophthalmitis, outlining mechanisms of reti-
nal toxicity, and offer alternatives to amikacin. We believe that enough evidence now exists to support a change in the current Royal College of Ophthalmologists’ endophthalmitis treat-
ment guidelines that are based on the Endophthalmitis Vitrectomy Study.4

Case report
A 69 year old white woman presented 1 day after uneventful right phacoemulsification and intraocular lens implantation with a vision of counting fingers (CF), a relative afferent pupil defect, hypopyon with anterior chamber fibrin, and normal intraocular pres-
sure. We were unable to visualise the fundus although a red reflex was noted. Ultrasound examination showed patchy increased vitre-
ous reflectivity with a flat retina and choroid. Pars plana vitreous tap of 0.2 ml was performed followed by injection of 1 mg/0.1
ml of vancomycin and 0.4 mg/0.1 ml of amikacin. Sterile dilution was conducted with typewritten instructions. The apheresis
never became tense. The ocular inflammation re-
solved on a daily regimen of oral prednisolone
60 mg, oral ciprofloxacin 750 mg four times
daily, topical dexamethasone 3% hourly, topical
dexamethasone 0.1% 2 hourly, and topical
atropine 1% once daily. Vision however
remained CF because of angiographically
proved macular ischaemia and vascular occlu-
sion (Figs 1 and 2). There was no microbio-
logical growth from the vitreous sample.

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we support a change in current UK treatment
Ceftazidime is already in clinical use in the
relatively high incidence of Gram negative
organisms. The rationale for amikacin use relates to the
possibility for macular predilection is that this
capable of spontaneous regression.

Comment
The rationale for amikacin use relates to the
relatively high incidence of Gram negative
organisms. The rationale for amikacin use relates to the
possibility for macular predilection is that this
capable of spontaneous regression.

Large studies offer alternatives to
aminoglycosides on the basis of culture
sensitivities. Suggestions include ceftazi-
dime, cefotaxime, and ciprofloxacin. Sensitivi-
ties of Gram negative organisms to ceftazi-
dime range from 61% to 100% according to
published studies. It appears that in most
studies 2 mg (0.1 ml of 20 mg/ml solution) of
ceftazidime has in vitro effectiveness equiva-
ent to or greater than 0.4 mg amikacin. Primate
studies have shown that intravitreal
ceftazidime is non-toxic at doses of 2.25 mg. Ceftazidime is already in clinical use in
the United Kingdom. There have been no re-
ported cases of retinal toxicity with intravit-
real ceftazidime use in humans.43

Spontaneous involution of retinal and intracranial
arteriovenous malformation in
Bonnet-Dechaume-Blanc syndrome
Intracranial arteriovenous malformations are capable of spontaneous regression.44 There
are also numerous recorded events of vascular
remodelling, thrombosis, and autoinvolvement in retinal arteriovenous malformations.45 This
report documents a self obliterated retinal
arteriovenous malformation in a patient with
Bonnet-Dechaume-Blanc syndrome who de-
veloped neurological symptoms due to spon-
taneous regression of the intracranial compo-
nent of the anastomotic malformation.

Case report
A 12 year old man from Guam was evaluated for a history of right parietal headaches for
several months and acquired temporal hemi-
opia in the left eye. He had a history of blindness in the right eye from early child-
hood, and had recently become aware of a
temporal hemianopia in the left eye.

Visual acuity was no light perception in the
right eye and 20/20 in the left eye. The right
pupil was unreactive to light. The left pupil was sluggishly reactive and there was a right
aforementioned pupillary defect. Slit lamp examina-
tion showed conjunctival venous engorge-
ment in the right eye. Retinal examination
disclosed white, sclerotic major retinal vessels,
with no evidence of retinal vascular perfusion
in the right eye (Fig 2). The major retinal ves-
sels were surrounded by non-perfused clus-
ters of white, racemose, telangectatic, vessels
(Fig 1). The left optic nerve showed band
atrophy with corresponding nerve fibre layer
dropout but no other retinal abnormality.

Magnetic resonance imaging showed nu-
merous vascular channels permeating the
right basal ganglia, anterior portion of the
midbrain, prefrontal gyrus, optic chiasm, and
the right orbit. The deep hemispheric portion
of the lesion showed surrounding oedema. CT
scanning showed punctate and conglomerate
calculations in the malformation, as well as
enlargement of the right optic canal. Cerebral
angiography demonstrated an angiomatosus
vascular malformation that permeated the
basal ganglia as well as the optic chiasm
region and extended into the right orbit (Fig 2).
There was a relative lack of deep venous
drainage in the chiasmatic region of the mal-
formation, with diversion to the Sylvian vein
system and over the convexities to the sagittal
sinus. The lack of hypertrophy in these drain-
ing venous channels, together with the
Comment

The syndrome of unilateral retinocephalic arteriovenous malformation was first described in 1937 by Bonnet et al. Six years later, Wyburn-Mason published his report in the English language. These congenital unilateral arteriovenous malformations may involve the visual pathways from the retina to the optic nerve to the ipsilateral optic nerve, and may involve the chiasm, hypothalamus, basal ganglia, midbrain, and cerebellum. Since these arteriovenous malformations are high flow systems in which veins are exposed to arterial blood pressures, they are susceptible to turbulent blood flow and to vessel wall damage which can lead to thrombosis and occlusion. Over time, components of an angiomatous malformation can grow, haemorrhage, sclerose, thrombose, and involute.

Our patient had longstanding involution of his retinal arteriovenous malformation, with new neurological symptoms resulting from thrombosis of the intracranial component of the tumour. Spontaneous occlusion of the major venous drainage within the deep cerebral hemisphere and optic chiasm may have caused headaches by producing regional oedema or by diverting flow to other venous structures. Since the major venous drainage within the malformation was already occluded at the time of presentation, no treatment was advised. The complex evolution of clinical signs in our patient underscores the need to distinguish disease progression from spontaneous involution in symptomatic patients with Bonnet-Dechaume-Blanc syndrome.

Acknowledgement

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NOTICES

Glaucoma

The latest issue of Community Eye Health (No 39) discusses the glaucomas, with an editorial by Professor Gordon J Johnson, director of the International Centre for Eye Health. For further information please contact: Journal of Community Eye Health, International Centre for Eye Health, Institute of Ophthalmology, 11–43 Bath Street, London EC1V 9EL, UK (tel: +44 (0)20 7678 6910; email: eyeresource@ucl.ac.uk; website: www.jchc.co.uk). Annual subscription (4 issues) UK£25/US$40. Free to workers in developing countries.

International Centre for Eye Health

The International Centre for Eye Health has published a new edition of the Standard List of Medicines, Equipment, Instruments and Optical Supplies (2001) for eye care services in developing countries. It is compiled by the Task Force of the International Agency for the Prevention of Blindness. Further details: Sue Stevens, International Centre for Eye Health, 11–43 Bath Street, London EC1V 9EL, UK (tel: +44 (0)20 7670 6910; email: eyeresource@ucl.ac.uk). A second edition of the list is underway.

Second Sight

Second Sight, a UK based charity whose aims are to eliminate the backlog of cataract blind in India by the year 2020 and to establish strong links between Indian and British ophthalmologists, is regularly sending volunteer surgeons to India. Details can be found at the charity website (www.secondsight.org.uk) or by contacting Dr Lucy Mathen (lucymathen@yahoo.com).

Specific Eye ConditionS (SPECS)

Specific Eye Conditions (SPECS) is a not for profit organisation which acts as an umbrella organisation for support groups of any condition or syndrome with an integral eye disorder. SPECS represents over fifty different organisations related to eye disorders ranging from conditions that are relatively common to very rare syndromes. We also include groups who offer support of a more general nature to visually impaired and blind people. Support groups meet regularly in the Boardroom at Moorfields Eye Hospital to offer support to each other, share experiences and explore new ways of working together. The web site www.eyeconditions.org.uk acts as a portal giving direct access to support groups own sites. The SPECS web page is a valuable resource for professionals and may also be of interest to people with a visual impairment or who are blind. For further details about SPECS contact: Kay Parkinson, SPECS Development Officer (tel: +44 (0)1803 524238; email: k@eyeconditions.org.uk; www.eyeconditions.org.uk).

Joachim Kuhlmann Fellowship for Ophthalmologists 2002

In honour of its founder’s memory, the Joachim Kuhlmann AIDS-Stiftung, Essen, Germany, is sponsoring two fellowships for ophthalmologists at a well known institute, who want to train in CMV-retinitis and other HIV related ophthalmologic diseases. The fellowships each include $US 5000. Deadline for application is 31 March 2002.

Detailed applications including a CV and publication list should be sent to: Joachim Kuhlmann AIDS-Foundation, Bismarckstr. 55, 45128 Essen, Germany. Further information is available at www.jk-AIDS-stiftung.de.

12th Meeting of the European Association for the Study of Diabetic Eye Complications (EASDEC)

The 12th meeting of the EASDEC will be held on 24–26 May 2002 in Udine, Italy. The deadline for abstracts is 15 February 2002. Three travel grants for young members (less than 35 years of age at the time of the meeting) are available. For information on the travel grants, please contact Pr CD Agardh, President of EASDEC, Malmö University Hospital, SE-205 02 Malmö, Sweden (tel: +46 46 53 10 16; fax: +46 46 33 73 66; email: carl-david.agardh@endo.mas.lu.se). Further details: NORD EST CONGRESSI, Via Aquilea, 21–31100 Udine, Italy (tel: +39 343 21391; fax: +39 0432 50687; email: nordest.congressi@ud.net.unito.it).

International Society for Behçet’s Disease

The 10th International Congress on Behçet’s Disease will be held in Berlin 27–29 June 2002. Further details: Professor Ch Zouboulis (email: zoubber@zedat.fu-berlin.de).

Singapore National Eye Centre 5th International Meeting

The Singapore National Eye Centre 5th International Meeting will be held on 3–5 August 2002 in Singapore. Further details: Ms Amy Lim, Organising Secretary, Singapore National Eye Centre, 11 Third Hospital Avenue, Singapore 168751 (tel: (65) 322 8374; fax: (65) 227 7290; email: amy_lim@ncc.com.sg).

BEAVRS Meeting

The next BEAVRS meeting will be held in the Dalmahoy Hotel near Edinburgh on 31 October to 1 November 2002. Further details: Susan Campbell, Medical Secretary, Gartnavel General Hospital (email: susan.j.campbell.wg@northglasgow.scot.nhs.uk).