LETTERS TO THE EDITOR

Indocyanine green angiography in choroidal tuberculomas

EDITOR,—An 85 year old white woman presented with progressive asthenia, fever, coughing, and dyspnoea. Chest roentgenogram showed interstitial pulmonary infiltrates and right pleural effusion. Cultures of the bronchoalveolar lavage fluid subsequently confirmed the presence of *Mycobacterium tuberculosis*.

On admission, best corrected visual acuity was 20/400 in a right amblyopic eye and 20/50 in the left eye. Biomicroscopic examination revealed no sign of anterior or posterior inflammation. Multiple choroidal lesions (Fig 1) were present in both eyes. The choroidal lesions were deep, white-yellowish, with indistinct borders. Fluorescence angiography (FA) revealed early nodular hypofluorescence, and late moderate hyperfluorescence (Fig 2). Indocyanine green (ICG) angiography revealed prolonged hypofluorescence and in the late stage images, moderate delineation of the lesions by a peripheral hyperfluorescent ring (Fig 3).

**Figure 1** Multiple choroidal granulomas in the left posterior pole.

**Figure 2** (A) Early prolonged blockage and (B) late moderate hyperfluorescence of the choroidal lesions on fluorescein angiography.

**Figure 3** ICG angiograms reveal early (A) and late (B) phase blockage by the choroidal granulomas.

**COMMENT**

Ocular tuberculosis may occur by haematogenous spread from a pulmonary focus. Choroidal tuberculomas are rare ophthalmic findings even in miliary tuberculomas. Only one description of ICG angiography in a case with presumed ocular tuberculosis has been reported previously in the literature. We found similar angiographic characteristics in our case, which represents, to our knowledge, the first ICG angiography description of multiple choroidal tuberculomas in microbiologically confirmed miliary tuberculosis. Hypofluorescence in ICG images may be due to a masking effect of the choroidal vessels by the overlying granulomas.

Ophthalmic examination may be contributive when disseminated tuberculosis is suspected. In this case ICG angiography, which was performed to assess the choroidal involvement, showed prolonged hypofluorescence.

DAN MILEA
CHRISTINE FARDEAU
LIVIA LUMBRICO
Department of Ophthalmology, Hôpital de la Pitie-Salpêtrière, Paris, France

THOMAS SIMILOWSKI
Department of Respiratory and Intensive Care Medicine, Hôpital de la Pitie-Salpêtrière, Paris, France

PHUC LEHOANG
Department of Ophthalmology, Hôpital de la Pitie-Salpêtrière, Paris, France

Correspondence to: Phuc Le Hoang, MD, Service d’Ophthalmologie, Hôpital de la Pitie-Salpêtrière, 47-83 Boulevard de l’Hôpital, 75651 Paris Cedex 13, France. Accepted for publication 3 December 1998


Diagnosis of an atypical case of ocular toxoplasmosis using the demonstration of intraocular antibody production and the polymerase chain reaction

EDITOR,—Ocular toxoplasmosis is the most frequent infectious cause of choriotinal inflammation in immunocompetent individuals. Diagnosis is usually made by observing the typical fundus lesion, by detecting the presence of anti-Toxoplasma antibodies in the serum, and by excluding other causes of necrotising fundus lesions. In unusual cases, invasive procedures may be required to aid diagnosis.

**CASE REPORT**

A 17 year old white male presented complaining of floaters and reduced visual acuity in the left eye. Visual acuity was 6/9 in the left eye, 6/6 in the right. Examination revealed moderate anterior chamber activity, marked vitritis, and an active retinochoroiditis adjacent to an area of old chorioretinal scarring inferonasal to the optic disc. A diagnosis of ocular toxoplasmosis was suspected, and topical and oral steroids, and oral clindamycin were commenced. Peripheral blood anti-Toxoplasma IgG antibodies, measured using the dye test, were positive (16 IU/ml). Despite treatment, the ocular inflammatory signs increased and 5 weeks following initial presentation he developed a confluent area of retinal necrosis in the peripheral retina leading to a superotemporal retinal detachment. This was distinct from the original area of inflammation. The presence of severe vitreous inflammation and peripheral retinal necrosis suggested a unilateral acute retinal necrosis syndrome. Three port trans pars plana vitrectomy with perfluorocarbon liquid and fluid/silicone exchange was performed. At vitrectomy, vitreous humour was taken for anti-Toxoplasma IgG antibodies, and antiviral antibody levels and a retinal biopsy was also obtained. Postoperatively, he was commenced on sulfadiazine, pyrimethamine, and folic acid and continued on oral steroid medication. Levels of IgG, IgA, and IgM were measured in serum and vitreous aspirate at the same time. The Goldmann–Witmer coefficient using IgG was greater than 59, using IgA greater than 45, and using IgM greater than 65. This is evidence of intraocular antibody production. Samples were negative for antiviral antibodies. Intraocular Toxoplasma DNA was demonstrated by a polymerase chain reaction (PCR) assay using primers for the P30 gene. PCR testing for viral DNA was negative. Insufficient material was obtained to attempt to isolate the parasite using tissue culture or animal inoculation. Retinal biopsy demonstrated a mixed inflammatory response without a specific infective agent. The patient subsequently responded to treatment and the intraocular inflammatory signs subsided.


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COMMENT
Ocular toxoplasmosis is a common cause of retinochoroiditis, and can usually be diagnosed clinically. Rarely is it possible to obtain vitreous and retinal biopsies to aid diagnosis, but in doubtful cases, it may be appropriate to perform anterior or posterior chamber aspiration to confirm the diagnosis. The assessment of Toxoplasma antibodies in serum is of limited use, unless rising titres can be demonstrated, since the incidence of Toxoplasma infection in the general population is high. The demonstration of antibody production within the eye is particularly valuable in the diagnosis of difficult cases. The finding of higher anti-Toxoplasma antibody levels in the aqueous humour than in the serum (the Goldmann–Witmer coefficient) indicates intraocular antibody production. A further investigation which is extremely useful is the demonstration of parasite DNA within ocular fluid by PCR. With PCR a sequence of DNA is amplified from minute amounts of DNA making it amenable to direct analysis. De Boer et al used a combination of the demonstration of intraocular antibody production and PCR analysis to confirm the diagnosis of a variety of infectious uveitis cases. In this case we initially made a diagnosis of ocular toxoplasmosis, but the disease progressed clinically and did not respond to treatment. The patient was treated with prescribed medication, and had no evidence of immunocompromise. Retinal detachment is unusual in ocular toxoplasmosis, but is typical of acute retinal necrosis syndrome, suggesting an alternative diagnosis in this case. We were, however, able to confirm the diagnosis of toxoplasmosis by evidence of intraocular antibody production and by positive PCR amplification.

M MINIHAN
Department of Ophthalmology, Cork University Hospital and University College, Cork

B CRYAN
Department of Medical Microbiology, Cork University Hospital and University College, Cork

R HOLLIMAN
Toxoplasma Reference Unit, Public Health Laboratory, St George’s Hospital, Blackshaw Road, London

Correspondence to: Ms Minihan.
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Protein C and protein S deficiency associated with retinal, optic nerve, and cerebral ischaemia

EDITOR—Deficiencies in the vitamin K dependent factors protein C and protein S can lead to arterial or venous thrombosis. Branch and central retinal arterial and venous occlusions have been associated with deficiencies in plasma proteins, as have amaurosis fugax and stroke. We report, to the best of our knowledge, the first case of ischaemic optic neuropathy associated with combined protein C and protein S deficiency.

CASE REPORT
A 47 year old woman with non-insulin dependent diabetes mellitus with documented absence of previous retinopathy presented with blurring of vision and bright flashing lights in her right eye for 2 weeks, associated with vague periocular discomfort and left sided facial and leg numbness. Best corrected visual acuity was 20/30 right eye and 20/25 left eye. The anterior segment examination was unremarkable and the intraocular pressures were 15 mm Hg right eye and 14 mm Hg left eye. A large cotton wool spot was present inferotemporal to the right optic disc (Fig 1). The overlying retinochoroid was clear. The retinal vessels appeared moderately tortuous but undilated. Fluorescein angiography revealed normal arterial filling but markedly delayed arteriovenous filling and late disc hyperfluorescence. When she returned 2 weeks later, this cotton wool spot was smaller, but other cotton wool spots superior to the disc had appeared (Fig 2). The patient underwent carotid Doppler and cerebral angiography studies which revealed near complete occlusion of the right internal carotid artery. Coumadin therapy was instituted and extensive diagnostic evaluation was pursued. She returned 2 weeks later and all the cotton wool spots were resolving.

Three days later she was admitted to the hospital with syncope and left hemiparesis due to arterial or venous thrombosis. Branch and central retinal arterial and venous occlusions have been associated with deficiencies in plasma proteins, as have amaurosis fugax and stroke. We report, to the best of our knowledge, the first case of ischaemic optic neuropathy associated with combined protein C and protein S deficiency.

COMMENT
This patient, with combined protein C and protein S deficiency, suffered ipsilateral retinal, optic nerve, and cerebral ischaemia within a period of 6 weeks. The rapid changes in the appearance of cotton wool spots over a period of several days, which is not consistent with their natural course in diabetic retinopathy, combined with neurological symptoms prompted us to search for systemic causes of ischaemia, including evaluation for hypercoagulable states. We suggest that new cotton wool spots in a patient free of other signs of vascular retinopathy such as microaneurysms or retinal haemorrhages should raise the spectre of a systemic basis for the ischaemia. As the ERG was not compatible with occlusion of the ophthalmic or central retinal arteries, we turned to a search for a hypercoagulable state. We identified deficiencies in protein C and protein S and administered anticoagulation therapy.

JAYAKRISHNA AMBATI

Department of Ophthalmology, Foundation (Dr Ambati) and an unrestricted grant from Research to Prevent Blindness, Inc, New York, NY (University of Rochester), USA.

Letters

Figure 1 Initial large cotton wool spot inferotemporal to right optic disc.

Figure 2 Initial cotton wool spot along the inferotemporal vessel resolving 2 weeks later with appearance of new cotton wool spots superiorly.

Figure 3 Six weeks after initial presentation. Note pale disc with narrowing of the retinal arterioles and an overall reduction in venous calibre and tortuosity.
Macular hole following YAG capsulotomy

EDITOR,—Since the initial identification of macular holes as pathological entities in the middle of the 19th century,1 there has been an evolution in the understanding of their aetiology. Tangential macular traction by perifoveal vitreous cortex is now accepted as the causative factor in the development of idiopathic macular holes.2,3 The widespread use of extracapsular cataract extraction procedures, posterior capsulotomy is a frequent complication. YAG laser capsulotomy and subsequent retinal complications. Thus, the intact capsule acts as a diffusion barrier for hyaluronic acid. This concept of a diffusion barrier was again employed by Miyake4 to theorise a role for the posterior capsule in the development of cystoid macular oedema due to iris synthesised prostaglandins. Significant liquefaction of the vitreous, postulated to be the result of acoustic transients accompanying the laser irradiation, has been documented in monkey and rabbit eyes following Nd:YAG laser irradiation of the posterior vitreous cortex.5 Other more direct injuries to the retina can be associated with both anterior and posterior complications following YAG laser capsulotomy.

In a case report by Blacharski and Newsome,6 bilateral macular holes were reported following Nd:YAG laser posterior capsulotomy. In the first eye, a macular hole formed 21 days after capsulotomy in the absence of vitreous prolapse or an elevated IOP post laser. In the second eye, careful biomicroscopic examination before Nd:YAG capsulotomy and despite the absence of complication, a macular hole formed 10 days after treatment. These authors believed it unlikely that the shock wave generated by the Nd:YAG laser caused the macular hole as relatively low energies were used on both occasions (18 mJ and 29 mJ).

In our case, we propose that the macular hole was formed secondary to the perifoveal traction after Nd:YAG laser capsulotomy due to vitreous instability 10 days after treatment. This was performed under local anaesthesia in a previously healthy individual or as part of a complex malformation syndrome.7 Histologically, it is a well demarcated, excavated, infrapapillary area of absent retina, pigment epithelium, Bruch’s membrane, and choriocapillaris, with variable attenuation of the choroid.8 Some retinocapillaris colobomas incorporate the optic disc and cause the inferior aspect of the optic disc to appear retracted or absent within the excavation.9 The purpose of this study was to determine whether such malformations are associated with hypoplasia of the intrachoroidal optic nerve.10

For patients with unilateral retinocapillaris coloboma involving the optic disc, magnetic resonance imaging (MRI) of the head to rule out associated intrachoroidal malformations. Patients consisted of two males and three females with ages at presentation of MRI ranging from 2 weeks to 4 years. All patients had large unilateral retinocapillaris colobomas that incorporated the optic disc (Fig 1).

Magnetic resonance imaging of colobomatous optic hypoplasia

EDITOR,—Retinocapillaris coloboma is a common ocular malformation that can occur as an isolated finding in an otherwise healthy individual or as part of a complex malformation syndrome.1 Histologically, it is a well demarcated, excavated, infrapapillary area of absent retina, pigment epithelium, Bruch’s membrane, and choriocapillaris, with variable attenuation of the choroid.2 Some retinocapillaris colobomas incorporate the optic disc and cause the inferior aspect of the optic disc to appear retracted or absent within the excavation.3 The purpose of this study was to determine whether such malformations are associated with hypoplasia of the intrachoroidal optic nerve.

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hypoplasia of corresponding sectors of optic nerve. Focal retinal lesions can produce segmental intracranial optic nerve size was seen. When only the inferior aspect of the optic disc was present but retruded posteriorly within the colobomatous defect (case 1), the corresponding intracranial optic nerve was only slightly diminished in size relative to the normal optic nerve (large arrow).

In all patients, coronal MRI showed a smaller intracranial optic nerve on the side corresponding to the retinochoroidal coloboma (Fig 1). The degree of intracranial optic nerve hypoplasia varied according to the ophthalmoscopic configuration of the optic disc.

Orbital haemangiopericytoma simulating an intraocular mass

Ezör et al—Most patients with orbital tumours present with proptosis. It is uncommon for an orbital mass to cause symptoms and signs simulating intraocular disease. We report the case of a patient with an orbital tumour that was initially suspected to be an intraocular tumour.

CASE REPORT

A 71 year old woman noted a photopsia, diplopia, and peripheral scotoma in her left eye. She was evaluated and underwent laser treatment for suspected retinal hole at the margin of a presumed retinal detachment. After non-resolution of the “detachment”, a second ophthalmologist raised the possibility that the fundus lesion was a choroidal melanoma. The patient was then referred to the oncology service for further management. Ocular examination revealed corrected visual acuity of 6/7.5 in both eyes. Proptosis of 3 mm with minimal limitation of supraduction and infraduction was noted. Fundus examination showed an elevated choroidal mass with normal appearing retinal and choroidal vessels overlying the mass. The mass did not shift with eye position. Fluorescein angiography demonstrated retinal and choroidal isofluorescence in the area of the mass (Fig 1). B-scan ultrasonography showed an echoluent mass compressing the sclera, measuring 16×16×12 mm. Based on these findings, an orbital tumour producing globe compression was suspected.

Magnetic resonance imaging was performed to more clearly delineate the soft tissue mass. A well circumscribed intracranial mass was seen and adjacent to the sclera intramurally, producing globe compression and inferior rectus displacement (Fig 2). On T1 weighted images, the lesion was isointense and on T2 weighted images, hyperintense with respect to muscles. Marked enhancement of the lesion with gadolinium was found. Our differential diagnosis included orbital cavernous haemangioma, neurofibroma, schwannoma, fibrous histiocytoma, and haemangiopericytoma.

The patient underwent transconjunctival excisional biopsy. The pink encapsulated mass was composed of spindle cells with moderate mitotic activity. Staghorn vascular channels were evident, and in several areas the tumour cells invaded the pseudocapsule.

The histopathological diagnosis was benign haemangiopericytoma. The patient has been followed for 1 year without further problems.

COMMENT

Haemangiopericytoma is a rare vascular tumour derived from an abnormal proliferation of pericytes. It rarely occurs in the orbit, accounting for only 1% of all orbital biopsies. Orbital haemangiopericytoma occurs as a painless, unifocal tumour often in the muscle cone. The majority of cases are recognised between the ages of 20–70 years. In most cases there is progressive proptosis. However, in our case mild proptosis but marked compression of the globe was seen. Orbital haemangiopericytoma poses a risk for recurrence and metastasis, especially when the tumour invades beyond the pseudocapsule.

Orbital haemangiopericytoma generally is a slow growing tumour that has an ocular and systemic prognosis. There is a risk for recurrence and metastasis when the pseudocapsule is breached. In one series, a 30% recurrence rate was noted with recurrences generally occurring 1 month to 7 years after surgery. Our patient may be at risk of developing orbital recurrence in the future because there was invasion of the pseudocapsule.

Orbital tumours should be included in the differential diagnosis of a solid intraocular mass. Those orbital tumours that arise in the muscle cone adjacent to the sclera may produce these confusing clinical features.

Dr Ralph C Eagle Jr performed the interpretation of the histopathology.

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MICHAEL C BRODSKY

University of Arkansas for Medical Sciences, Little Rock, Arkansas

Correspondence to: Arkansas Children’s Hospital, 800 Marshall, Little Rock, AR 72202, USA.

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Dr C Shields.

Figure 1 (A) Retinochoroidal coloboma incorporating the segmentally hypoplastic right optic disc (open arrow). The major retinal vessels delimit the lower margin of the optic disc. (B) T1 weighted coronal MR image (case 1) demonstrating hypoplasia of the right optic nerve (small arrow). The area of the right optic nerve is approximately half the size of the normal left optic nerve (large arrow).

Figure 2 Coronal T1 weighted magnetic resonance image demonstrating intracranial orbital mass compressing the globe.

Figure 3 Late venous phase of fluorescein angiography showing retinal and choroidal isofluorescence.
Delayed suprachoroidal haemorrhage following trabeculectomy bleb needling

EDITOR,—Transconjunctival needling of trabeculectomy blebs is a relatively safe, simple outpatient procedure that can successfully re-establish aqueous flow in failed trabeculectomies.1 2 We report a severe delayed suprachoroidal haemorrhage occurring secondary to this procedure in an aphakic patient receiving aspirin therapy.

CASE REPORT

Fifteen years previously a 75 year old myopic man underwent bilateral intracapsular cataract extractions. He developed secondary open angle glaucoma but was intolerant of topical β blockers because of bradycardia. He was managed on pilocarpine drops 4% four times daily but control of intraocular pressure (IOP) was inadequate with deterioration in visual fields. Twelve years after the cataract extractions he underwent bilateral trabeculectomies with postoperative 5-fluorouracil. Three years later the left visual acuity was 0/18 with an IOP of 22 mm Hg despite pilocarpine. In view of progressive cupping of the left optic disc in association with this pressure, the patient was offered needling of the left filtering bleb.

The needling was performed at the slit lamp with immediate development of a shallow bleb. The anterior chamber was well maintained with an IOP of 4 mm Hg. Subconjunctivally, 5 mg of 5-fluorouracil was administered and the patient was discharged with topical steroids and antibiotics. When he bent over 7 hours later he experienced sudden pain in his left eye with immediate reduction of vision. He presented for examination the following day when the visual acuity was noted to be reduced to hand movements with a left relative afferent pupillary defect (RAPD). There was a large subconjunctival haemorrhage, a total hyphaema, and IOP of 7 mm Hg. There was no fundal view but B scan ultrasound showed vitreous haemorrhage and a total hyphaema, and IOP of 7 mm Hg. There was no fundal view but B scan ultrasound showed vitreous haemorrhage and haemorrhagic choroidal detachments (Fig 1). Further direct questioning revealed that the patient was taking 75 mg of aspirin “for his heart” on his family doctor’s advice.

The patient was managed conservatively with serial ultrasound examinations. Despite initial subjective improvement in vision, the sight remained reduced at hand movements with a persistent RAPD and a soft eye. B scan ultrasound 4 months after needling showed an open funnel retinal detachment (Fig 2) which, in view of the poor visual prognosis, was not felt to be amenable to vitreoretinal surgery.

COMMENT

Delayed suprachoroidal haemorrhage is a well recognised but fortunately rare complication of all forms of intraocular surgery, especially filtering procedures. Pathological study of eyes enucleated within hours of the haemorrhage occurring have suggested the cause to be rupture of necrotic posterior ciliary arteries.3 A number of risk factors for delayed suprachoroidal haemorrhage have been reported including aphakia, high myopia, a large peripapillary reduction in IOP, postoperative hypotony, and systemic vascular disease.4 5 The patient reported here was myopic, aphakic, had ischaemic heart disease and additionally was on aspirin.

Two cases of haemorrhagic choroidal detachments have been reported2 after bleb needling with adjunctive mitomycin C. Precise details of these and individual cases were not supplied, however, so it is not clear if these patients had predisposing risk factors or the result of their final visual outcome. A large choroidal effusion occurring after bleb needling has also been reported in a pseudophakic patient,6 the effusion resolving after surgical reformation of the anterior chamber. Our patient was managed conservatively owing to early subjective improvement in his visual acuity. It is possible, however, that the outcome may have been improved with surgical drainage of the suprachoroidal haemorrhage at an early stage, as has been advocated by some authors.7 The contribution that aspirin played in the development or exacerbation of the haemorrhage is unknown but has not been previously reported as a risk factor. This report emphasises that, while needling of trabeculectomy blebs is usually a safe procedure, severe complications may arise and these need to be taken into consideration, especially when managing high risk patients.

LUCY J HOWE

PHILIP BLOOM

The Western Eye Hospital, Marylebone Road, London NW1 3BY

Correspondence to: Lucy Howe. Accepted for publication 22 December 1998


Spontaneous intracorneal haemorrhage

EDITOR,—Spontaneous intracorneal haemorrhage leading to corneal discoloration is an uncommon occurrence. The few such reported cases of spontaneous intracorneal haemorrhage have been due to contact lens related deep stromal neovascularisation, erosion of a vessel due to corneal ulceration, and rupture of reopened ghost vessels in a patient with interstitial keratitis and systemic hypertension. Corneal blood staining clinically represents a reddish-brown, or greenish-yellow discoloration of the cornea resulting from blunt trauma and subsequent haemorrhage with raised intraocular pressures or less commonly by intrastromal haemorrhage in the presence of corneal vascularisation.1 The term “corneal blood staining” has been used to refer to the latter in this case report—a case of spontaneous intracorneal haemorrhage related to acne rosacea associated corneal vascularisation.

CASE REPORT

A 72 year old man was seen at the eye casualty unit with a 3 week history of reduced vision and ocular discomfort in his left eye. There was no history of trauma.

His ocular history included chronic posterior blepharitis and peripheral corneal ulcers (upper cornea) in the left eye related to acne rosacea. This patient had also had an uneventful cataract surgery in the same eye some 3 years previously and had not been seen in the eye department since. Relevant medical history includes treatment for paroxysmal atrial fibrillation with sotalol. The patient had been taking...
warfarin until 2 months before the original presentation. The clinical findings were left eye visual acuity −6/60 (Sn) improving to 6/12p with a pinhole; circumpapillary congestion and an area of reddish-brown discoloration (6.0–6.5 mm) inferotemporally on the cornea, clinically resembling corneal blood staining. The intraocular pressure was within normal limits and no other ocular abnormality was detected. The other eye had a visual acuity of 6/6p with pinhole and appeared to be normal. On review, 2 months after initial presentation, he was noted to have shrinkage of the area of discoloration revealing underlying prominent superficial and deep stromal corneal vessels adjacent to the area of discoloration, and some lipid deposition close to the deeply vascularised limbus. On further follow up 5 months later, the patient had retained the same visual acuity of 6/60 (Sn) improving to 6/12p with pinhole. Though the ciliary congestion persisted, the patient was not in any discomfort. The area of discoloration had a greenish-yellow tinge now and measured 5.7–4.2 mm.

COMMENT

Deep intracorneal haemorrhage is most often seen after intraocular surgery, after direct, blunt ocular trauma, and in a vascularised cornea. The contribution of systemic factors such as diabetes or hypertension is unclear. Acne rosacea is known to cause peripheral vasoconstriction especially involving the inferonasal and inferotemporal quadrant. These vessels are known to progress in the absence of acute symptoms. In our patient, the corneal blood staining was a result of direct bleeding into the corneal stroma from the deep stromal vessels. The deep stromal vascularity appears to have developed insidiously as in similar cases reported subsequent to contact lens wear. Corneal blood staining either from persisting hyphaema or deep intracorneal haemorrhage represents deposition of haemoglobin and its breakdown products within the cornea. A histopathological analysis of blood stained corneas, most of which were associated with raised intraocular pressures, indicated a gradient of haemoglobin degradation from the posterior to the anterior corneal stroma, extracellular haemoglobin particles being concentrated more posteriorly while haemosiderin laden keratocytes predominated anteriorly. Animal model experiments in rabbits utilising total persistent hyphaema with sustained increased intraocular pressures have also revealed similar results. Endothelial degeneration accompanies corneal blood staining and keratocytes appear to be actively involved in haemoglobin degradation. Porphyrin induced photosensitivity producing cytotoxic oxygen species within the blood stained cornea have also been considered as contributing to endothelial and keratocyte degeneration. Clogging of blood staining is thought to be a result of the phagocytic action of the keratocytes and from a diffusion of haemoglobin into the conjunctival circulation and the anterior chamber. The pattern of peripheral, posterior, and anterior stromal clearing observed seems consistent with diffusion of haemoglobin breakdown products out of the cornea as the primary mechanism of clearing. In the absence of a hyphaema, therapeutic efforts are directed towards prevention of corneal blood staining—for example, treating the corneal ulcer vigorously, correction of entropion or treatment of systemic hypertension. The presence of deep stromal vascularity secondary to any cause must be watched carefully and managed as a potentially vision threatening complication especially in contact lens wearers. Once intracorneal bleeding has occurred, Giessler et al advise waiting for a spontaneous clearing, although it may take 2 or 3 years or more. In the absence of severe associated pathology, corneal blood staining has been noted to clear without permanent corneal opacity changes. Penetrating keratoplasty may be considered.

V SUDHA
Department of Ophthalmology, Princess Margaret Hospital, Swindon, Wiltshire SN1 4JU.

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Orbital haemangiopericytoma simulating an intraocular mass

WALTENIO V DINIZ, CAROL L SHIELDS, JERRY A SHIELDS, KAAN GUNDUZ and ALAN BRACKUP

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