LETTERS TO THE EDITOR

Ocular signs associated with a rhodopsin mutation (Cys-167→Arg) in a family with autosomal dominant retinitis pigmentosa

Editor,—Retinitis pigmentosa (RP) comprises a group of hereditary progressive retinal degenerative conditions characterised by typical fundus alterations, loss in visual field, and severely reduced or unrecordable electroretinograms (ERG). The first reported disease related mutations in the human rhodopsin gene, described in 1990 by Dryja et al., was a heterozygous C→A transversion in the second nucleotide of codon 23. Since then many further mutations has been identified to a current total of about 90.

Here we describe, for the first time in the literature, the clinical phenotype associated with a Cys-167→Arg mutation (TGC→CGC in exon 2) in an Italian family affected by autosomal dominant retinitis pigmentosa (ADRP). The same mutation was noted by Dryja et al., but there has been no report of correlated clinical data.

Case Report
Four patients (see Fig 1) of a family from the Campania region of southern Italy, have been studied.

Patient II-1
The patient, a 45 year old woman, had central visual acuity 20/50 in both eyes with −3 −3 in right eye and −4 −2.50 in left eye. Nasent posterior subcapsular cataract and vitreous corpuscles were present. Fundus examination revealed waxy optic disc pallor, attenuated retinal vessels, atrophic retinal pigment epithelium (RPE), and bone spicules in the middle periphery on 360° (Fig 2). Goldmann kinetic visual field examination showed a concentric isopter shrinkage up to 10° in the centre in each eye (I,4 and II,4). No peripheral vision island was observed. Goldmann–Weekers adaptometry showed a high depression of the photopic and scotopic curve in both eyes. Electroretinography showed no photopic and scotopic curve. Acromatopsy was found in the colour test.

Patient III-2
This patient, a 8 year old male, had a corrected visus 20/25 in both eyes with +1.50 × 180° in the right eye and +4.50 × 180° in left eye. The fundus, Goldmann visual field and the Goldmann–Weekers adaptometry examination are similar to the patient III-1. ERG showed a microvoltage photopic graph with implicit wave periodicity of 40.60 ms and implicit b wave periodicity of 58 ms; the differential width was 3.921 µV. The scotopic ERG was extinguished in both eyes. The colour test was normal.

Patient III-3
This patient, a male patient was first examined at 16 months. Fundus examination showed atrophic RPE changes and bone spicules in mild periphery. At age 7, he was re-examined and found to have a corrected visus of 20/25 in both eyes with +1. Goldmann visual field examination showed a marked reduction in retinal sensitivity in both eyes, especially in the nasal sectors. ERG showed a microvoltage photopic graph with implicit wave time of 52.40 ms and an implicit b wave time of 53.70 ms, with a differential width of 14.7 µV. The scotopic graph was extinguished.

Comment
This study has correlated a mutation Cys-167→Arg of the rhodopsin gene with phenotypic type I in an Italian family. The mutation segregated with the clinical diagnosis, and all affected patients showed a similar phenotype. The disease has a very early onset: in the youngest subject the diagnosis was made at 16 months of age. The first symptoms in all subjects were night blindness and visual field shrinkage (restricted side vision). Examination of the fundus of the eye identified a typical RP form, with vessel narrowing and osteoblast-like pigmentation in the middle retinal peripheral area in four sectors.

Atrophic changes of the RPE in the macular region and in the middle periphery were identified only in the patient II-1. Electroretinography showed an early alteration of photopigment destruction, whereas cone function was not completely compromised until almost age 18. Clinical examination repeated yearly for up to 7 years in three subjects indicated that the disease progresses very slowly.

Furthermore, the exact mechanism involved in affecting the visual cycle is difficult to imagine. Cysteine at position 167 of the rhodopsin gene is highly conserved during the evolution of mammals, and the total or partial death of visual cells is unknown. Also, only rods express the rhodopsin gene, and the cones use different photopigments, so that it remains mysterious that both cones and rods are affected in RP. In many cases of retinal degeneration cells undergo apoptotic death; but it is not known whether apoptosis is involved in all the forms of induced or degenerative photoreceptor death. Such mechanisms are just coming under scrutiny.

The authors would like to thank the family for its contribution to these studies. The authors were also grateful to Professor G Imbucci, of ORAO association; A Terracciano for technical assistance, and to Servizio di Tecnologie Biomolecolari, Area di Ricerca CNR Naples, where the sequences were performed. This work was supported by Telethon-Italy, grant no E546 to AC and CNR grant no CTR.94.2863 to ER; MGM is a Telethon-Italy fellow.

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with metastatic involvement of the ciliary body and the iris. The eye maintained useful function until the patient’s death 1 year after the appearance of the focus in the eye.

CASE REPORT
Clinical observation
A 53 years old woman was admitted to our eye clinic for deterioration of vision in her left eye and headaches. A tumorous focus involving the ciliary body and the radical part of the iris was revealed both clinically by ultrasound and with magnetic resonance imaging (MRI). The tumour had grown laterally at the 3 o’clock position (see Fig 1A and appeared to have a solid structure. The diameter of its base was about 6 mm. The vision was 6/12 when the patient was first examined but quickly deteriorated to light perception only, because of the blood in the anterior chamber. After removal of the blood from the anterior chamber, the vision improved again to 6/12. The intraocular pressure was normal (18–20 mm Hg) at all times.

Haemangiosarcoma of the right breast treated by ablation and actinotherapy was noticed in the patient’s medical history. The original tumour had grown within the breast stroma. Its diameter was about 3–4 cm. The histological pattern varied from relatively well formed vascular channels surrounded by multilayering endothelium to poorly differentiated solid areas formed by poorly differentiated cells with frequent mitoses. Epithelioid differentiation was not noticed. Some areas were haemorrhagic. There were no risk factors for angiosarcoma such as previous radiotherapy in the patient’s history. The patient was HIV negative. Because of tumorous dissemination in the skin and brain, ocular surgery was abandoned. Removal of blood from the anterior chamber was necessary once more before the patient’s death, 1 year later; otherwise, chemotherapy remained the only suitable treatment. However, the intraocular focus stopped its macroscopical growth and even partly regressed after chemotherapy by cyclophosphamide and vincristine (compare Fig 1A and B). The eye maintained useful function with measurable vision for 1 year until the patient’s death due to haemorrhage from metastasis in the brain at the end of July 1993. Postmortem examination of the left eye confirmed histologically the haemangiosarcomatous origin of the intraocular focus.

Figure 1 (A) Patient’s left eye at the time of diagnosis of the intraocular tumorous focus. (B) The same eye removed after the patient’s death before postmortem histological processing. The arrows indicate half rounded tumorous focus within the ciliary body. Note the difference in the size of tumorous focus.

Histopathology
Gross examination of the eyeball
The enucleated left eyeball measured 23 × 23 × 22 mm with 4 mm of optic nerve. The pupil was slightly oval owing to lateral pressure on the nasal side. Transillumination and opening of the globe revealed approximately half rounded infiltrate which involved the lateral part of the ciliary body (see Figs 1B and 2A). The centre of this infiltrate was at the 3 o’clock position, its vertical diameter was 5 mm and horizontal diameter was 3.5 mm. The aqueous and vitreous were clear. The
anterior chamber was shallow but still maintained. The retina was attached and the other parts of the globe were without remarkable macroscopically apparent changes.

**Histology**

The tumorous focus seen in the figures is apparently of an angiomatous nature, and involves only the ciliary body (see Fig 2A and B). Cellular atypias, mitoses, and several haemorrhages are observable within the tumour (see Fig 2A and B). No clearly tumorous structures are present in the radical part of the iris (1 year before death there was a clinically observed and documented expansion of the tumour area). There is no marked growth of tumorous tissue from the focus within the ciliary body to the other surrounding structures of the eye. There is angle closure in the region of the tumour as a result of larger anterior synechiae (see Fig 2A). However, the angle of the anterior chamber remains narrow but without closure for the major part of the circumference of the anterior chamber. The other parts of the globe are without remarkable histological and immunohistochemical positivity for factor VIII related antigen was later revealed in both primary tumour and ocular and skin metastases (particularly in the relatively more vasointensive areas), confirming the vascular nature of the tumour.1,2

**COMMENT**

Angiomatous tumours of the iris and ciliary body, both primary and secondary foci, are reported generally as very rare. Even in the breast angiosarcoma is a relatively rare tumour.1,2 After histological examination, the angiosarcomatous nature of the described tumorous focus was confirmed. The rarity of this type of intraocular tumorous metastatic focus makes this case remarkable. The secondary intraocular foci of various carcinomas are reported more often.3 Some rules observed in cases of intraocular metastatic cancer are common with other histopathological types of malignancies. Metastatic foci in the anterior segment of the eye are reported as much more rare than in the posterior segment.1,4 On the other hand, the breast (our case) and the lung are the most frequent primary sites of the intraocular metastases.5 Median survival time of patients with metastasis to the anterior segment is only 5.4 months, which is significantly worse than with metastasis to the orbit (15.8 months) or posterior pole of the eye (7.2 months).6 The overall survival of patients with any form of angiosarcoma is very limited.7,8 Since survival of our patient was 1 year after diagnosis of the intraocular metastatic tumour, chemotherapy seems to have been relatively beneficial for our patient.8

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**Persistent pupillary membranes**

**EDITOR—**Persistent pupillary membranes (PPMs) which are large enough to interrupt the visual axis are uncommon. If left untreated they may cause stimulus deprivation amblyopia.1 There is evidence that early treatment to remove obstructions of the visual axis in infants may minimise the risk of amblyopia.2 We report a case of bilateral persistent pupillary membranes which were successfully treated surgically before the patient was 6 weeks old.

**CASE REPORT**

A healthy baby induced at 41 weeks was born by normal vaginal delivery following a normal pregnancy. He weighed 8 lb 8 oz (3.8 kg) and was noted to have an abnormal red reflex from both eyes on routine ophthalmic check by a paediatrician before discharge from hospital after birth. He appeared to fix briefly on a light but did not really look at toys. The red reflexes were significantly reduced centrally and there were peripheral spoke-like opacities. Even with dilatation only a poor fundal view was obtained. The view was particularly poor on the right eye. An ultrasound scan of the posterior pole was normal for each eye. Further examination under anaesthesia showed that the child had bilateral persistent pupillary membranes in both eyes (Fig 1). Blood could be seen flowing through the blood vessels within the membranes under the operating microscope. There were no other abnormal examination findings. Screening tests for toxoplasmosis, cytomegalovirus, rubella, and treponemal antibodies were all negative. There was no known history of substance abuse by the mother. The visual axis especially on the right side was significantly obstructed even when the pupils were dilated and consequently we thought that the risk of stimulus deprivation amblyopia was high if they were left in place. The membranes were removed from the right eye when the child was 4 weeks old and from the left eye when he was 5 weeks old.

The same operative technique was used for each eye. A small superior corneal section was made and a further side incision was made. Provics (Healon) was injected between the membrane and the lens in order to protect the lens from coming into contact with the surgical instruments. Intracapsular diathermy of the membrane vessels was attempted but this failed to have any effect. The membrane strands were cut with vitreous scissors and the freed membrane was resected with macroscopic forceps. There was a small amount of bleeding from one of the more vascularised strands of membrane but the other smaller vessels retracted without bleeding. The Provics was removed with a Simco irrigation/aspiration cannula. The corneal wounds each required a single 10/0 nylon suture which were removed under anaesthetic 3 months postoperatively.

The visual axis was clear following surgery and there was no evidence of cataract. Histology showed a thin membrane of spindle-shaped cells some of which were pigmented. A fine network of blood vessels extended through the membrane.

Follow up of the child 5 months after the operation revealed no evidence of cataract formation in either eye. The eyes were straight and visual assessment showed that he objected to occlusion of each eye equally with a binocular acuity of 6/19 using Cardiff cards.

**COMMENT**

Remnants of pupillary membranes are very common occurring in 95% of normal newborn babies.2 Early development of the crystalline lens at about the sixth week coincides with the growth of the tunica vasculosa lenticis which nourishes it. The anterior portion of this is continuous with the pupillary membrane which draws its blood supply from the capillaries which arise from the branches of the long posterior ciliary arteries and the major arterial circle.3 The pupillary membrane is fully developed by 9 weeks gestation. These blood vessels begin to undergo remodelling and regression in a process involving phagocytosis by macrophages at around 5 months gestation. Dysfunction of macrophage invasion and phagocytosis is thought to play a role in the pathogenesis of PPMs.3 PPMs are thought to be derived from the tunica vasculosa lenticis (TVL) and have normally disappeared by the 34th week of gestation.4 These membranes are often observed by neonatologists as they are frequently seen in premature babies. They can be used to identify the gestational age of a newborn infant (between 27 and 34 weeks5) and they

Figure 1 Persistent pupillary membranes shown in the right eye (A) and the left eye (B) of a 4-week-old child after dilating drops have been given.
continue to regress at the same rate as if the child had not been born prematurely. There is some more recent evidence that intrauterine stress, particularly from chronic maternal hypertension, may accelerate the disappearance of these membranes. Although not commonly associated with any other pathology there has been a previous report of positive toxoplasma serology occurring in a 30 week premature baby with PPMs. There has also been a report of PPMs occurring in an infant with congenital rubella virus. We believe that any child with a congenital abnormality of the anterior chamber should be screened for possible intrauterine infections. A series of five cases of persistent membranes associated with congenital dystrophy myotonica have been described. There have also been reports of PPMs occurring with a variety of other abnormalities of the anterior chamber which in some cases seem to be familial with autosomal dominant inheritance. But in our case there was no family history. There have been case reports of spontaneous haemorrhage occurring form PPMs but these are unusual.

When present PPMs are usually so small as to need no treatment since they shrink significantly over the first year of life. There is some evidence that not all PPMs behave in this way. Some membranes appear to become more hyperplastic with birth rather than regress. Some authors believe that hyperplastic membranes should be considered as a distinct type of PPM and that they may be less likely to regress than thinner membranes that appear simply to be persistent rather than hyperplastic although no formal study has looked at this.

Smaller membranes than the ones we report have been successfully treated with mydriatic therapy until spontaneous involution occurs. However, the smallest useful pinhole size (and presumably pupil aperture) is thought to be 1.5 mm without which normal visual development is unlikely to take place. In our patient, the visual axis, especially the right side, was significantly obstructed even though the Dilator pupillae. A year later then it may be reasonable to wait for spontaneous resolution. However, the smallest useful pinhole size of 1.5 mm was attained without which normal visual development is unlikely to take place.

Increasing anterior uveitis was treated by increasing topical prednisolone acetate 1% from 2 hourly to hourly at postoperative day 4 and adding oral prednisolone 80 mg daily at day 11. At this stage a tiny white endothelial deposit developed at the graft interface. Over 4 days this became a white plaque of 2 mm diameter (Fig 1) but remained asymptomatic. The lesion was aspirated by paracentesis; microscopy showed a yeast and subsequently Candida glabrata was cultured. Amphotericin B 5 μg in 0.1 ml was injected into the anterior chamber immediately and 3 days later, and topical amphotericin B 0.15% commenced 1 hourly. The graft remained clear and the uveitis settled. Oral steroid was withdrawn completely over 7 weeks.

Further threatened rejection with anterior uveitis was associated with severe corneal sutures occurred 5 months postoperatively. This was treated with hourly drops of prednisolone acetate 1%. Three weeks later an enlarging

Figure 1 Eleven days postoperatively: white endothelial plaque near graft-host interface.

**Candida glabrata endophthalmitis following penetrating keratoplasty**

**Editor,**—Transmission of infection by donor tissue is a well known, albeit rare, complication of corneal transplantation. We have found two reports of *Candida glabrata* endophthalmitis, one with an organ cultured cornea when systemic antifungal treatment contributed to the patient’s death.

**CASE REPORT**

A 43 year old man with keratoconus had two previous right corneal grafts. The first, in 1974, became vascularised and oedematous after several months; the second, in 1980, failed after two rejection episodes. In February 1985 he underwent further right penetrating keratoplasty using tissue typed material, stored in organ culture for 20 days and transport medium (5% dextan) for 2 days. On the first postoperative day UK Transplant Support Service Authority reported culture of a yeast from the transport medium, subsequently identified as *Candida glabrata*. Clinically the graft was satisfactory but topical econazole 1% (in arachis oil) was given prophylactically six times daily.

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white mass, initially 0.75 mm in diameter, appeared elsewhere on the host endothelium (Fig 2). A subsequent culture again confirmed Candida glabrata.

Amphotericin B 10 µg in 0.1 ml was injected into the anterior chamber, with subconjunctival injection of amphotericin B 300 µg in 0.3 ml. Topical amphotericin B 0.1% hourly and prednisolone 1% 2% hourly were given. Both injections were repeated at 3 and 20 days. The uveitis settled, topical amphotericin was discontinued, and the graft remains clear 2.5 years later on prednisolone drops once daily.

No toxic effects have been noted from intracameral or topical amphotericin B.

COMMENT

Endophthalmitis flared up twice associated with intensive topical and/ororal steroid. Candida glabrata was cultured from the transport medium and the recipient anterior chamber, implicating the donor cornea as the source of infection. Candida glabrata is a relatively resistant organism and treatment was guided by antifungal susceptibility testing of the isolate. This suggested that the isolate was resistant to fluconazole (minimum inhibitory concentration, MIC >128 mg/l) and itraconazole (MIC 16 mg/l), but was of intermediate sensitivity to econazole (MIC 1 mg/l and 4 mg/l) (Table 1). The latter may explain econazole’s failure to prevent infection becoming established. The latter may explain econazole’s failure to prevent infection becoming established. Despite use of antimicrobial agents in the medium. Over 2.5 years Bristol Eye Bank records showed four occasions, including the present incident, when corneas were grafted and the transport medium was subsequently found to be infected. Two cases developed endophthalmitis (Candida spp and glabrata), while two remained clear of infection (Pseudomonas sp and Penicillium sp). Over 4500 corneas from the Bristol Eye Bank were grafted during this time, thus the incidence of known graft transmitted endophthalmitis is 0.04%. While accepting that some cases may go unreported, this can be compared with an overall incidence of postoperative endophthalmitis in the literature of 0.1–0.8% after corneal grafting with corneas stored at 4°C, and of 0.09% following extracapsular extraction.

This patient remained asymptomatic throughout, allowing early detection and successful treatment of the infection.

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**Table 1. Antifungal susceptibility testing of initial Candida glabrata isolate**

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<th>Antifungal</th>
<th>MIC (mg/l)</th>
<th>Interpretation</th>
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<tr>
<td>Amphotericin B</td>
<td>0.25</td>
<td>sensitive</td>
</tr>
<tr>
<td>Fluconazole</td>
<td>&gt;128</td>
<td>resistant</td>
</tr>
<tr>
<td>Itraconazole</td>
<td>16</td>
<td>resistant</td>
</tr>
<tr>
<td>Econazole 1</td>
<td>4 (variously</td>
<td>intermediate</td>
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turely aged appearance. Herniae, diverticula, pulmonary emphysema, cor pulmonale, and aortic aneurysm are important complications resulting from abnormal elastic fibres. Acquired forms of cutis laxa may follow inflammatory skin disease or may be associated with hypersensitivity reactions, multiple myeloma, systemic lupus erythematosus, amyloidosis, or maternal penicillamine therapy.

Tenon’s capsule normally separates intracranal and extracranal orbital fat from sclera. Surgical or traumatic dehiscence of the capsule more than 10 mm from the limbus may allow forward prolapse of intracranal fat beneath Tenon’s capsule. In the elderly, fat prolapse may occur without such an antecedent event and is more frequently located superotemporally. Orbital fat prolapse is usually diagnosed clinically, but may be mistaken for a dermolipoma, dermoid cyst, lacrimal gland tumour, infiltration or granuloma, extraocular muscle enlargement, or an orbital lymphoid proliferation.

The largest case series of orbital fat prolapse reports 15 patients aged between 49 and 94 years (average 65 years) of whom 33% were affected bilaterally. The case we report is significantly younger. Although the occurrence bilaterally of this finding at a young age may be coincidental, it suggests that abnormal elastin in Tenon’s capsule allowed it to dehisce, creating a route between intracranal fat and the sub-Tenon’s space. This report suggests an association between cutis laxa and orbital fat prolapse.

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Ocular signs associated with a rhodopsin mutation (Cys-167 → Arg) in a family with autosomal dominant retinitis pigmentosa

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