LETTERS TO THE EDITOR

Xeroderma pigmentosum in three consecutive siblings of a Nigerian family: observations on oculocutaneous manifestations in black African children

CASE REPORTS
Case 1
The proband, a 9 year old girl, was first seen at Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto (13.02° N, 9.14° E), Nigeria, in February 1999 with a history of development of photophobia into dark lesions with blistering. This was followed by the development of erythematous skin lesions associated with intolerance of sunshine, and the difficulties in the management of XP patients with advanced disease and limited access to facilities in an environment where avoidance of skin exposure to intense ultraviolet rays is problematic. We believe the patients we have described constitute the first series on XP in black children in the west African subregion.

Case 2
This 7 year old boy, the brother of the proband, presented with milder symptoms of XP; with slower progression. Thus, the initial generalised erythematos rash associated with exposure to sunshine became obvious from the age of 3 months; worsening of vision developed from the age of 4 years. The cutaneous lesions were compatible with xeroderma pigmentosum. Note the scaly nature of the surrounding facial skin with actinic keratoses. The facveal skin demonstrates actinic keratotic lesions typical of xeroderma pigmentosum.

Case 3
This was the 5 year old sister of the proband. The onset of the disease and its severity took a middle course between that of the index case (case 1) and the second patient. The onset of erythematos skin lesions and freckles following exposure to sunshine was at age 6 weeks. Hypopigmented and hyperpigmented macules become evident by the age of 2½ years. The ocular examination revealed marked blepharospasm in the right eye, the conjunctiva was generally fleshy, vascular, with a tendency to bleed and covered the cornea in both its nasal half and inferotemporal quadrant. Other corneal areas were covered by a fibrovascular epithelial membrane (Fig 2). Biopsy of the conjunctival mass revealed moderately differentiated squamous cell carcinoma. In the left eye there was total loss of lashes of the lower lid, and a vascular fleshy overgrowth of the nasolabial fold. The entire skin was dry (with the exception of the soles and palms) covered with a mixture of mottled, atrophic roundish and oval macules, giving the entire skin a chequered appearance, associated with generalised actinic keratoses (manifesting on black skin as palpable, rough, blackish spots covered with adherent scales). The keratotic lesions were more numerous on the face. A large reddish ulcerated plaque (2 x 2 cm) with raised, dark, keratotic, sharply demarcated borders was seen on the right cheek and crusted ulceration on the nasal bridge was also noted. Biopsy of the ulcer on the cheek showed well differentiated squamous cell carcinoma. The following lesions were noted in the right eye. The skin of the lids was covered by similar lesions as elsewhere on the skin. The lower lid margin was ulcerated. A conjunctival mass 0.5 x 0.75 cm extended from the medial canthus to and covered the 2–5 o’clock of the limbus. The rest of the limbus was obliterated by a dark, flat lesion. The cornea was hazy because of a fibrovascular membrane on its epithelial surface making it impossible to view structures deeper to it. The left eye also showed loss of all eyelashes of the lower lid and most of those in the upper lid. A large nodular conjunctival lesion (1.5 cm x 1 cm) occupied the whole of the temporal conjunctiva and two thirds of the adjacent cornea. This lesion was pink, firm but friable (see Fig 1). The visual acuity (VA) was perception of light (PL), in the right eye and nil perception of light (NPL), in the left. Biopsy of the conjunctival mass LE showed a moderately differentiated squamous cell carcinoma. On the basis of the characteristic cutaneous and ocular lesions associated with sunshine hypersensitivity and histologically proved squamous cell carcinoma of both the skin and conjunctiva, the diagnosis in the proband was xeroderma pigmentosum in its final phase, the cancerous period.

Figure 1 Left eye of the proband demonstrating the large pink, friable conjunctival lesion, a biopsy of which showed moderately differentiated squamous cell carcinoma. Note the scaly nature of the surrounding facial skin with actinic keratotic lesions, hypopigmented and hyperpigmented areas and crusted ulceration of the nasal bridge, all typical cutaneous lesions in xeroderma pigmentosum.

Figure 2 Case 3, right eye showing vascular, fleshy conjunctival tissues, a biopsy of which revealed features consistent with moderately differentiated squamous cell carcinoma. The facial skin demonstrates actinic keratotic lesions typical of xeroderma pigmentosum.

CASE REPORTS

Case 1
The proband was the fifth in birth rank, in a monogamous family consisting of nine children aged between 5 months and 19 years. Two other siblings following the proband in birth sequence, the 6th and 7th, a 7 year old boy and a 5 year old girl, respectively, were also afflicted with a similar disease process involving the skin and eyes. Both parents were unaffected. On examination, the entire skin was dry (with the exception of the soles and palms) covered with a mixture of mottled, hyperpigmented and hypopigmented, atrophic roundish and oval macules, giving the entire skin a chequered appearance, associated with generalised actinic keratoses (manifesting on black skin as palpable, rough, blackish spots covered with adherent scales). The keratotic lesions were more numerous on the face. A large reddish ulcerated plaque...
conjunction with the whole of the nasal area.

The VA in the left eye was limited to hand

movement only at 2 metres while in the right
eye it was PL only. The severity of actinic
keratitis lesions was midway between that of
the proband and case 2. Although there were
crusty skin ulcers of the upper lip, there were
no obvious cutaneous tumours. On the basis
of these ocular cutaneous lesions, a diagnosis
of xeroderma pigmentosum was not in doubt. The disease in this patient had also advanced to the
cancerous phase.

COMMENT

XP is generally regarded as a very serious
disease in the tropics because of its pronounced
sensitivity to sunlight.

There was some degree of variation in the severity and rate of
progression of the disease in our patients despite their first degree relationship and the
common environment characterised by high
sunshine. The assertion that the severity of the skin and eye lesions relates more to the
degree of skin exposure may not explain, entirely, this variation since all the affected children live in a common environment of
high sunshine. A recent Japanese study has
demonstrated correlation of the clinical manifestations and gene mutations even among patients of the same complementation
group. We had no facilities in Nigeria to
determine the complementation group of our
patients and the individual gene mutations of
these children. There are many obstacles in
Nigeria to the proper management of XP patients in general and the three siblings we
have described in particular. Firstly, an elabo-
rate system of photoprotection from birth
could not be carried out since there were no facilities for prenatal diagnosis of XP. Sec-
dondly, sun exposure could not be altogether avoided and only some measure of protection
again the sun was provided—special glasses,
clothes, and sunscreen creams. Unfortu-
ately, the management of our patients was limited to these only. Surgical intervention
could not be carried out mainly because the
cost was too exorbitant for the poor parents.
For these patients with advanced disease, limited access to facilities, in an environment of
high sunshine, the prognosis is indeed gloomy.

HAMIDU AHMED
Department of Paediatrics, Usman Danfodiyo
University, Teaching Hospital, PMB 2370, Sokoto,
Nigeria

RAHMATU Y HASSAN
UDUTH, Sokoto, Nigeria

UMAR H PINDIGA
University of Maiduguri Teaching Hospital, Maiduguri,
Nigeria

Correspondence to: Dr Ahmed
Accepted for publication 22 May 2000

5 Lowenthal LJ, Trowell A. Xeroderma pigmento-
sum in African negroes. Br J Dermatol 1938;50:
66.

6 Canizares O. Genetic disorders of the skin. In: Canizares O. A manual of dermatology for
developing countries. 2nd ed. Oxford: Oxford

7 Jones KL. Xeroderma pigmentosum syndrome.
In: Jones KL, ed. Smith’s recognizable patterns of
human malformations. 4th ed. Philadelphia: W.B.
Saunders; 1998:489.

8 Konodeh M, Usda M, Ichihashi M. Correlation of
the clinical manifestations and gene mutations of
Japanese xeroderma pigmentosum group A

Multifocal electroretinographic and
angiographic changes in pre-eclampsia

EYTON,—Pre-eclampsia is characterised by hypertension, proteinuria and generalised
oedema developed after 20 weeks’ gestation.
We report serial changes in multifocal elec-
etroretinography (MERG), fluorescein angi-
ography (FA), and indocyanine green angi-
ography (ICGA) in a patient with pre-
eclampsia who developed choroidal ischaemia and serous retinal detachment.

CASE REPORT

A 28 year old Chinese woman, gravida II, para
I, was hospitalised at 31 weeks’ gestation with
blood pressure of 178/98 mm Hg, 4+ proteinuria and pretibial oedema. At 34
weeks’ gestation, emergency caesarean section
was performed because of uncontrolled pre-
eclampsia. Two days post partum, she com-
plained of blurring of vision in the right eye. On
examination, her visual acuity was right:
20/30, left eye: 20/15. There was no affer-
tent pupillary defect. Anterior segment and
intraocular pressure was normal. Fundal
examination revealed bilateral greyish-yellow
lesions at the level of retinal pigment epithe-
lum. Stimulation used was the 103 hexagons
m-sequence with VERIS system (Electro Diag-
nostic Imaging, Inc, San Mateo, CA, USA).

Three dimensional topography and trace
array of the MERG showed decreased re-
response amplitudes in both nasal macula and
the right fovea. There was also delayed N1
and P1 implicit times and diminished re-
response density of the nasal macula compared
with the temporal macula in both eyes (Fig 2).

Five weeks post partum, her visual acuity improved to 20/15 in both eyes. RPE changes corresponding to areas of delayed filling and
leakage were found. FA and ICGA performed
3 months post partum were unremarkable.
However, MERG showed persistent bilateral
mild decrease in amplitude of the nasal
macula compared with the temporal macula,

despite full recovery of the right foveal peak.
Visual field assessment was not performed.

COMMENT

In our patient, the area of decreased response amplitude and delayed latencies in MERG
corresponded with the area of choroidal ischaemia detected by FA and ICGA. Addi-
tionally, it detected abnormal area in the right
fovea that did not show up with FA or ICGA.

When repeat FA and ICGA were unremark-
able 3 months later, MERG still showed
persistent abnormality in both nasal maculae.

The partial recovery of MERG in our case
supports the current concept of transient
vasospasm in choroidal circulation in pre-
eclampsia. However, the damage may not be
completely reversible as previously reported.

Figure 1 Right eye at 2 weeks post partum. (Top) Fluorescein angiogram shows delayed filling of chorio-
capillaries in the early phase and leakage with staining in the late phase. (Bottom) Similar changes in indocyanine green angiogram.

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1 Jung EG. Xeroderma pigmentosum. Int J Derma-

2 Goya JL, Rao VA, Srinivasan R, et al. Ocularcuta-
neasoum manifestations in xeroderma pigmento-

3 Kraemer KH, Lee M, Scotto J. Xeroderma
pigmentosum—cutaneous, ocular and neuro-
logic abnormalities in 830 published cases. Arch

4 Wade WH Ploppick H. Xeroderma pigmento-
sum and squamous cell carcinoma of the tongue: identification of two black patients as members of the complementation group C. J Am Acad
The signals of MERG are thought to be derived from the outer retinal layers of cones and also the inner retinal layer including the bipolar and Muller cells. The retinal response may be impaired secondary to RPE dysfunction and choroidal ischaemia. Similar MERG findings in central serous choriretinoopathy were reported, in which the RPE abnormality is thought to be secondary to the underlying choroidal vascular disease. MERG has the advantage of being non-invasive and, risk of breastfeeding after angiography can be avoided. It is more sensitive than FA and ICG in the evaluation of macular choroidal ischaemia. Bilateral MERG abnormalities.

Signet ring cell carcinoma of the eccrine sweat gland in the eyelid, treated by radiotherapy alone

Editor.—The signet ring cell carcinoma of the eccrine sweat gland is a very rare tumour of the eyelid. Only six cases have been published up to now. There is a preponderance of males; only one woman was affected. The patients' ages ranged from 47 to 78 years. This tumour shares some histological features with breast carcinoma, the metastasis of which represents the most important differential diagnosis—Indian file formations, signet ring cells, and expression of oestrogen, as well as progesterone, receptors. One significant difference is that the positive staining for those hormone receptors is found mainly in the cytoplasm and nucleus of breast carcinoma cells.

Different treatment modalities have been applied in cases of eccrine sweat gland carcinoma. Our case demonstrates that tumour control can be achieved with radiotherapy alone despite extensive orbital involvement.

CASE REPORT

An 87 year old male patient was seen initially in our department in July 1998. He had noticed swelling of his right lower eyelid. We saw a diffuse thickening and induration of the right eyelids at initial presentation in our hospital. An magnetic resonance image (MRI) showed a tumour that had infiltrated the upper (Fig 1) as well as the lower eyelid, the eyebrow, and the perioral muscles. The optic nerve was also surrounded by tumour. Two biopsies revealed an infiltrating tumour with Indian file formations; some of the tumour cells had a signet ring appearance with nuclei located peripherally as a result of intracytoplasmic vacuoles. The latter possessed microvilli, as could be demonstrated by electron microscopy. The cytoplasm stained positive with periodic acid Schiff (Fig 2) and with antibodies against oestrogen and progesterone receptors as well as human milk fat globulin. No hormone receptor expression was found in the nuclei. The growth fraction was 5%, determined with MIB1.

Systemic examination did not reveal any other tumour, especially no breast carcinoma and no adenoacarcinoma of the gastrointestinal tract. Two treatment modalities were discussed—orbital exenteration and radiotherapy. Since the patient refused orbital exenteration radiotherapy was started in September and October 1998, and performed over 6 weeks, with a total dosage of 56 Gy. Two months later the cornea showed erosions which were treated with lubricants; the ocular motility was heavily impaired. Fourteen months after radiotherapy the lid skin was soft again without any evidence of tumour recurrence, the cornea only showed irregular epithelium, and the eye motility had returned to almost normal. Unfortunately, because of optic nerve damage by glaucoma and radiotherapy, the right eye went blind.

COMMENT

In most cases of signet ring cell carcinoma described in the literature, upper and lower lids of one eye were involved. Three patients were initially treated by excision alone, all of them had a period of survival of at least 6 years. One of these patients...
developed a recurrence after 10 years, with preauricular lymph node metastasis, as a result of which he was treated with radiotherapy (50 Gy). He had at least 18 months of remission thereafter, but showed subclinical liver metastasis at necropsy; his death was not tumour related. Another patient was found to have pulmonary metastases from which he finally died.

Radiotherapy alone (35 Gy), as in our case, was applied in another patient. He showed infiltration of the lids and the anterior orbit, and had at least 6 years of remission. The only patient treated by orbital exenteration, radiotherapy, and tamoxifen died as a result of liver metastases within a period of less than 6 years after initial diagnosis. His pretreatment status, showing extensive orbital infiltration, was quite similar to that of the patient we are presenting here.

From the cases reported in the literature, we conclude that this tumour possesses a low to intermediate grade of malignancy. To date, 14 months after radiotherapy, our patient still shows remission. Thus, for elderly patients with extensiv infiltration of orbital and adnexal tissue by an eccrine sweat gland carcinoma, we consider this conservative treatment sufficient to achieve local control.

We thank Dr T Rudolph for providing clinical data, Dr T Wenendahl for contributing histological sections, and Professor Dr H Witschel and Dr J-P Alexander for reading the manuscript.

CLAUDIA AUW-HAEDRICH
Department of Ophthalmology, University of Freiburg, D-79106 Freiburg, Germany

NORBERT BOEHM
Department of Pathology

CHRISTIAN WEISSENBERGER
Department of Radiology

Correspondence to: Dr Auw-Haedrich
auw@aug.ukl.uni-freiburg.de

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Endonasal endoscopic dacryocystorrhinostomy for dacryocystocoele in a 4 month old infant

EDITOR.—Canalisation of the nasolacrimal apparatus usually occurs at the same time throughout its length. However, its distal end has been shown to be occluded by a membrane in 73% of otherwise normal stillborn fetuses at term.

For typical dacryocystocoeles, a regimen of warm compresses and massage, with regular ophthalmological review to check for the first signs of dacryocystitis, seems to be reasonable. Should dacryocystitis supervene, the child should be admitted to hospital for the intravenous administration of antibiotics and probing of the nasolacrimal apparatus. Should the dacryocystocele recur or epithora ensue, and repeated probing does not give the result, it may be necessary to intubate the nasolacrimal apparatus or perform a dacryocystorhinostomy.

1 In 1893, Caldwel described the first case of an endonasal operative approach to the lacrimal system. This technique was later modified by West and supported by Mosher in 1921.

2 In spite of these attempts, the external dacryocystorhinostomy (DCR) — the technique inaugurated by Toti in 1904 — was, for a long time, the most accepted procedure for lacrimal sac surgery. The reason for this was presumably limited transnasal visualisation caused by bleeding during endonasal dacryocystorhinostomy.

3 In 1974, Johnson and Karsius revived the endonasal approach.11 Heereman and Neues used a microscope for a transnasal approach to the lacrimal sac,12 whereas McDonough and Meiring were the first to advocate endonasal dacryocystorhinostomy (EEDCR), in 1989.13

4 Using new instrumentation and techniques for endonasal sinus surgery in general, many authors have proved that EEDCR can be performed with lower morbidity in adults and with success rates equal to those achieved with the traditional external approach.14 15

CASE REPORT

A 4 month old girl presented with huge recurrent abscesses in the left medial canthal region (Fig 1) and a huge epiphora. Initially she was managed by conservative methods (warm compresses and massage over the swollen lacrimal sac), but the clinical appearance did not show any change. She underwent several incisions wherever the abscess severely exacerbated, threatening to perforate spontaneously. Attempts to probe the nasolacrimal canal were performed in the “silent” phases of the disease, but the probe did not pass deeper than the bottom of the lacrimal sac, suggesting the absence of the canal. Attempts to irrigate the lacrimal canals were not successful either. A lacrimal sac massage resulted in a certain amount of mucus bursting out from the nasolacrimal apparatus, but the clinical appearance did not resolve spontaneously or after conservative treatment, we performed an endonasal dacryocystorhinostomy.

5 As far as we know, this was the youngest child ever operated by means of EEDCR. The small anatomical dimensions of the infant nose posed a technical challenge in performing EEDCR: during the use of Richard’s otological drill for bone removal, there was some difficulty in concomitant endoscopic visualisation and potential damage to the nasal mucosa from rotation of the drill shaft. We also performed a lacrimal opening of 6 mm with angled endoscopic biopsy forceps (the usual opening is about 5 mm) and obtained a sufficient amount of turbid tears mixed with mucopurulent discharge was obtained.

A 6 cm long nasal thin gauze ribbon package with antibiotic ointment was placed in the operated region for 3 days. After 5 days, there was no sign of dacryocystocoele or dacryocystitis on the girl’s face (Fig 2). Eight months after the surgery, she is feeling fine.

COMMENT

Since, after 16 weeks of life, the nasolacrimal duct obstruction and dacryocystocoele did not resolve spontaneously or after conservative treatment, we performed an endonasal endoscopic dacryocystorhinostomy. As far as we know, this was the youngest child ever operated by means of EEDCR. The small anatomical dimensions of the infant nose posed a technical challenge in performing EEDCR: during the use of Richard’s otological drill for bone removal, there was some difficulty in concomitant endoscopic visualisation and potential damage to the nasal mucosa from rotation of the drill shaft. We also performed a lacrimal opening of 6 mm with angled endoscopic biopsy forceps (the usual opening is about 5 mm) and obtained a sufficient amount of turbid tears mixed with mucopurulent discharge was obtained.

Figure 1 The appearance of the girl before the surgery.

Figure 2 The appearance on fifth day after the operation.
EBDR, even in such a small infant, can be a good therapeutic choice in cases refractory to conservative treatment (warm compresses, massage, propping) because of its non-invasive performance and a very fast postoperative rehabilitation.

RANKO MLADINA
ORL Department, University Hospital Salata, Zagreb, Croatia

Letters

CASE REPORT
In 1997 a 32 year old homosexual man presented for the first time to the University Eye Hospital, Tübingen. For 4 weeks he had suffered from an acute retinal necrosis of the left eye. His right eye was not affected. The visual acuity of the left eye was 0.1. The anterior segment of the eye showed corneal precipitates but no cells in the anterior chamber. Owing to massive cell infiltration in the vitreous the lower part of the fundus was not visible. There was a large necrotic area with bleeding and occlusive vasculitis in the upper nasal periphery (Fig 1). The patient claimed to be healthy, apart from an EBV infection with pericarditis which had occurred when he was 17 years old. Tests for HIV and syphilis were repeatedly negative, also for Lyme disease, toxoplasmosis, hepatitis B, HSV, and VZV. There were increased titres for EBV-IgA (1.128), EBV-IgG (1.1512), EBV nuclear antigen, and EBV early antigen (1:64), a constellation typical for an acute EBV infection. After therapy with aciclovir 5 × 400 mg, prednisolone 60 mg, acetylsalicylic acid (200 mg), and topical prednisolone acetate the symptoms decreased.

After 8 weeks his visual acuity increased up to 0.5 but dropped to 0.2 after 5 months as a result of vitreous haemorrhages because of neovascularisation. After clearance of the bleeding and peripheral laser coagulation the neovascularisations resolved. The fundus showed scars but no holes in the area of the necrotic retina (Fig 2). After 25 months the visual acuity was 0.2. The anterior parts showed mild cataracta complicata. Vitreous cell infiltration still persisted and the central part of the fundus was not clearly seen. The patient showed an absolute central scotoma and atrophy of the optic nerve, without treatment.

COMMENT
The role of EBV in ocular diseases is still not clear, because approximately 95% of adults are positive for EBV antigen and only a few suffer from ocular disease. Previously described cases of “EBV retinitis” only described inflammation of the posterior pole without scarring, which is not typical for viral retinitis. Proving an acute EBV infection usually is done with increased EBV titres. Such a constellation was found in our patient. The titre decreased during the following 12 weeks suggesting that EBV may play a part in this man’s retinitis. The reported patient showed all criteria of the American Uveitis Society for ARN. However, it is not possible to rule out that other herpesviruses have caused the retinitis. This probably could only have been proved with a diagnostic vitrectomy or anterior chamber tap which was refused because of improvement with treatment. Serological findings showed no signs of other herpes infections.

SUSANNE KRAMER
Katharinenhospital Stuttgart, Königbergstrasse 60, 70174 Stuttgart, Germany

CHRISTOF BRUMMER
MANIFRED ZIERHUT
University Eye Hospital, Department I, Schlöchterstrasse 12, D-72076 Tübingen, Germany

Correspondence to: Dr Manfred Zierhut, University Eye Hospital, Schlöchterstrasse 12, D-72076 Tubingen, Germany

manfred.zierhut@med.uni-tuebingen.de

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Intrascleral recurrence of uveal melanoma after transretinal “endoresection”

EDITOR,—Conservation of the eye and vision in patients with juxtapapillary choroidal melanoma is still a challenge. Both plaque radiotherapy and proton beam radiotherapy tend to cause optic neuropathy, which is associated with disc and iris neovascularisation, vitreous haemorrhage, and neovascular glaucoma. These complications can occur after photocoagulation, which is less effective than radiotherapy at destroying the deeper parts of the tumour. Transcleral local resection of posterior tumours is especially difficult with tumours extending close to the optic disc and is associated with an increased incidence of local tumour recurrence. For these reasons, techniques have been developed for removing posterior choroidal melanomas transretinally, using standard vitrectomy equipment. In a previous report, eight out of 52 cases received secondary photocoagulation for possible tumour recurrence at the margins of the surgical coboloma and one enucleated eye was found to have microscopic tumour depos-

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Transretinal “endoresection” was performed in July 1994. The procedure involved three port vitrectomy, retinectomy over the tumour, endodiathermy to bleeding points, endolaser photocoagulation applied to the margins and the bed of surgical coloboma and fluid-gas-silicone exchange. Histological examination showed the melanoma to be of mixed, spindle, and epithelioid cell type. In September 1994, the eye was settling well, except for an amelanotic choroidal swelling, which was noted adjacent to the inferotemporal margin of the coloboma. This was believed to consist of a bubble of silicone oil in the suprachoroidal space although the possibility of recurrent melanoma could not be excluded clinically. There was also a localised retinal detachment caused by vitreous bands.

Vitreoretinal surgery was performed, with release of the vitreous traction and excision of the retina and choroid over the swelling. This procedure confirmed that the tumour consisted of a bubble of silicone oil beneath the choroid. The procedure also included endolaser photocoagulation and silicone-gas exchange. The eye nevertheless developed retinal detachment with proliferative vitreoretinopathy and cataract. In December 1994, further surgery was performed, which consisted of phacoemulsification, removal of epiretinal membrane, 180 degree retinectomy, endolaser photocoagulation, and silicone oil fill.

In April 1995, the retina was flat with an epiretinal membrane covering the inferior margin of the coloboma and a fibrovascular scar partially obscuring the optic disc. It was decided that the silicone oil should be left in place because of the high risk of retinal detachment. When reviewed in February 1999, the vision was 6/4 with each eye. The tumour was pigmented and located inferiorly, extending to within two disc diameters of the fovea and optic disc margin (Fig 1). Approximately 40% of the retina was detached. On ultrasonography, the tumour had basal dimensions of 12.0 mm by 11.7 mm and a thickness of 4.8 mm (Fig 2). The left eye was healthy. Full systemic assessment revealed no other disease.

COMMENT
To our knowledge, this is the first report of intrascleral recurrence of choroidal melanoma after transretinal endoresection. The tumour probably survived the surgery and photocoagulation because it had invaded a scleral canal adjacent to the optic nerve.

It is known that intrascleral tumour deposits can survive after photocoagulation or transscleral local resection of choroidal melanoma. In the present case, however, this would probably have caused optic neuropathy.

Recurrent tumour after transscleral local resection is associated with an adverse prognosis for survival. It is not known, however, whether the recurrence is the source of metastasis or merely an indicator of tumour aggression.

Further follow up studies are required to determine the incidence of intrascleral tumour recurrence after endoresection of choroidal melanoma.

Figure 1 Fundus photographs (A) preoperatively, showing an inferior choroidal melanoma extending close to optic disc and fovea, and (B) 2 months postoperatively, showing surgical coloboma.

Figure 2 Light micrographs of the enucleated eye. (A) Low power view showing intrascleral tumour recurrence close to optic disc and (B) high power view showing a ciliary nerve within the tumour.
and B-scan) showed an acoustically hollow, pedunculated mass in the ciliary body region measuring 10 mm in thickness. Ciliary body melanoma was diagnosed and the eye was enucleated.

Histopathological examination revealed a heavily pigmented multilobulated tumour arising from the pars plana (Fig 1B). The highly cellular tumour was composed of a mixture of spindle and epithelioid cells with a predominance of epithelioid cells. About 15-20% of the tumour was composed of melanophages within extensive areas of necrosis (Fig 2). No mitotic figures were identified. The cataractous lens was partially encased and dislocated by tumour. Parts of the iris, ciliary body, and choroid were heavily pigmented and dendritic melanocytes were observed within the sclera and on the episcleral surface, especially near the optic nerve. These findings were consistent with sector ocular melanocytosis. The histopathological diagnosis was ciliary body melanoma and sector ocular melanocytosis.

The patient has been followed for 10 years and has no evidence of local or systemic metastases.

COMMENT

Uveal melanoma is very rare in children and adolescents. Shields and associates reported that approximately 1% of all uveal melanoma patients are 20 years of age or younger at diagnosis. In no case has any of these young patients presented with leucocoria.

Ciliary body melanoma in both children and adults is usually asymptomatic and can attain a large size before it is recognised clinically. The most common presenting manifestations of ciliary body melanoma include dilated episcleral vessels in the quadrant of tumour, secondary hypotony or glaucoma, and subluxation of lens with visual aberration. Cataract rarely develops in eyes with retinoblastoma. Leucocoria generally is not present because the patient usually seeks consultation before dense cataract or leucocoria develops. In children leucocoria is an important sign reflecting cataract, retinal detachment, ocular inflammation, or retinoblastoma. Cataract rarely develops in eyes with retinoblastoma despite the presence of a large tumour. Therefore, leucocoria from cataract is an unusual presenting sign of an intraocular tumour in a child, especially ciliary body melanoma and we are unaware of any previous report of this occurrence.

One condition associated with the development of uveal melanoma is ocular melanocytosis. Ocular melanocytosis generally presents as excessive pigmentation in the subcutaneous periorbital skin, episclera, uvea, orbit, and meninges. The lifetime risk for uveal melanoma in a patient with ocular melanocytosis is approximately 0.25%. Verdauger found that four of seven young patients under age 20 years with uveal melanoma had ocular melanocytosis. It is possible that sector melanocytosis may have predisposed to the development of melanoma in this case.

The prognosis for large uveal melanoma generally is poor. Barr and associates reported that the 15 year survival for posterior uveal melanoma in children and adolescents was 75%, suggesting that it does not differ from its adult counterparts. They found that a large tumour size of 10 mm or greater and extracocular extension were poor prognostic features. Shields and associates also found that large tumour size was an important predictive factor of metastatic disease in children with uveal melanoma. Despite the large size of the tumour in our patient, no mitotic activity was found on histopathological examination. This may explain the continued survival of our patient.

In conclusion, we report a case of ciliary body melanoma in a 9 year old child who presented initially with a tumour induced cataract. A unilateral cataract in a child deserves an evaluation for common and rare conditions such as ciliary body melanoma.

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HAKAN DEMIRCI
CAROL L SHIELDS
JERRY A SHIELDS
SANTOSH G HONAVAR

Oncology Service, Wills Eye Hospital, Thomas Jefferson University, Philadelphia, PA, USA

RALPH C EAGLE, JR
Pathology Department

Correspondence to: Dr Carol L Shields, Oncology Service, Wills Eye Hospital, 900 Walnut Street, Philadelphia, PA 19107, USA

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Spontaneous extrusion of subconjunctival cysticercus cellulosae

EDITOR,—Cysticercus cellulosae, the larval form of Taenia solium (tapeworm), often affects the human eye. Human infection occurs on eating raw or inadequately cooked infected pork, consuming food or water contaminated with faecal matter containing the ova, or as a result of autoinfection. Sommering first reported a case of ocular cysticercosis. The parasite’s most favoured site is the vitreous and subretinal space followed by the subconjunctival space. Grunow reported a case of subconjunctival cysticercosis in which there occurred spontaneous extrusion.

Spontaneous extrusion

A young 7 year boy presented with redness and swelling in the right eye. General physical and systemic examination revealed no abnormality. The right eye had a smooth, pinkish, hemispherical, subconjunctival, cystic swelling of approximately 8×5 mm size near the inner canthus (Fig 1). It was loosely adherent to the eyeball, non-reducible, and was mildly tender. The conjunctival vessels over and around it were mildly congested. The left eye was normal. An ultrasound of the right eye done with a waterbath revealed a subconjunctival...
Cyst with a central echogenic nodule suggestive of a cysticercus cellulosae (Fig 2). Excision of the cyst was planned, but the patient reported a week later with history of spontaneous expulsion of a small balloon-like translucent structure from the eye after which the swelling subsided. Repeat slit lamp examination did not show any swelling in the eye though there was redness and a conjunctival rent close to the inner canthus. An ultrasound examination was normal and the cyst seen earlier was not present.

COMMENT
Cysticercosis has a global distribution particularly in countries where there is increased incidence of pork eating. Ocular dissemination of cysticercus cellulosae is well known and is evident from several reports in the literature. The most favoured site is the vitreous and subretinal space followed by subconjunctival and subretinal space. Since 1970 only six cases of spontaneous extrusion of a subconjunctival cysticercus in the present case was subconjunctival and there was spontaneous expulsion.

Massive basal cell carcinoma in a schizophrenic patient: treatment options and constraints

Editor,—Basal cell carcinoma (BCC) is the most common malignant tumour of the eyelids and face. Factors which increase the chance of orbital invasion include a medial canthal location, slow indolent growth, mpheiform growth pattern, surgical recurrence, advanced presentation, and neglect. Orbital invasion predisposes to intracranial involvement by direct or perineural spread. Management of orbital invasion is difficult and requires a multidisciplinary team approach for radical surgery and/or radiotherapy.

We present a 76 year old Ukranian man with a neglected tumour on his forehead which had spread over several years to involve the upper eyelids, anterior orbits, and ethmoid sinuses.

CASE REPORT
A 76 year old man with a long history of untreated forehead BCC complained of deteriorating vision in his right eye and ocular discharge. He had been admitted by the care of the elderly unit, for social reasons. He was a schizophrenic patient: treatment options and constraints

The patient underwent a thorough mental status examination, which confirmed well controlled schizophrenia. We were not empowered to detain him for treatment against his will. He discharged himself from hospital with an untreated fungating BCC.

Investigations included a computed tomography (CT) scan to evaluate the extent of tumour invasion and an incisional biopsy for histopathological diagnosis. The CT scan showed extensive soft tissue destruction, loss of the nasal bone, frontal sinuses, and bilateral anterior ethmoid, and extracranial orbital invasion (Fig 2). Histopathology confirmed extensive solid basal cell carcinoma.

He received symptomatic care with lid cleansing and topical chloramphenicol. A low visual aid assessment was arranged. Palliative treatment with radiotherapy was recommended but he refused all treatment including the low vision assessment.

The patient underwent a thorough mental status examination, which confirmed well controlled schizophrenia. We were not empowered to detain him for treatment against his will. He discharged himself from hospital with an untreated fungating BCC.

COMMENT
This patient had a neglected BCC which had caused destruction of soft tissue and bone, with orbital invasion and was threatening the vision in his remaining eye.

Where advanced scalp cancer displays deep invasion, radical excision and reconstruction are indicated.

Some authors suggest that aggressive surgical management of advanced skin neoplasia is the only treatment to produce long term survival.

In malignant cutaneous tumours involving the anterior skull base, invasion of the dura mater significantly affects survival. In particular, spread along the medial orbital wall can lead to meningeal infiltration by direct invasion. As with squamous cell carcinoma, large basal cell carcinomas can invade the central nervous system by

Figure 1
Oblique view of massive basal cell carcinoma of the forehead, nasal bridge, and upper eyelids showing right upper eyelid involvement, superomedial ulceration, and lower eyelid ectropion.

Figure 2
Computed tomograph scan shows destruction of the left nasal bone, frontal sinus, and bilateral anterior ethmoid involvement, bilateral anterior orbital extracranial involvement, as well as extensive soft tissue destruction.
perineural spread. Our patient risks spread of the tumour along the supraorbital and supra-trochlear nerves.

When local surgical therapy fails to prevent recurrence or definitive surgical resection is not possible, as in this case, alternative thera
cies must be considered. Opinions vary on the role and efficacy of radiotherapy and chemotherapy for extensive lesions. Cisplatin and doxorubicin have been reported to achieve complete remission of recurrent invasive BCC of the medial canthus and orbit at 5 years. Using additive radiotherapy, large BCCs of the head showed partial to complete response but no cures achieved. A complete response was defined as disappearance of all measurable lesions (but cancer cells are still present microscopically) and a partial re-
response was 50% reduction in all lesions.

Patients with large or aggressive skin cancer are fortunately uncommon and management should be individualised following discussion with both the patient and his/her family. The options include a combination of surgery, radiotherapy, and chemotherapy with every effort made to preserve vision.

Our elderly, schizophrenic patient declined treatment and in these circumstances symp-
tems that can be offered. Legal issues prevent forced treatment.

Informed consent includes providing ade-
quate information about the treatment to make a reasoned decision. Obtaining consent must be free of coercion or threats, which would affect the patient’s decision. The patient must be presumed competent unless shown otherwise. Psychiatric assessment con-
cirmed that this patient was competent to make his own decisions. Exceptions include if immediate need is needed and the patient is unable to provide it (in coma or insufficient time to obtain it), the patient is legally incompetent to make a treatment deci-
sion, or decides to waiver the right to be fully informed.

Untreated, the outlook for this patient is grim.

MOHAMMED MUHTASEB
JANE M OLIVER
Eye Department, Charing Cross Hospital, Fulham Palace Road, London W6 8RF UK
SHARON CONSTANTINE
Pathology Department
Correspondence to: Jane M Olver
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1 Glover TA, Grove AS. Orbital invasion by malign-
2 Fitzpatrick PJ, Thompson GA, Easterbrook WA, et al. Basal and squamous cell carcinoma of the eyelids and their treatment by radio-
4 Thomas WO, Harper LL, Wong SG, et al. Surgi-
7 Robinson JK. Use of a combination of chemo-
therapy and radiation therapy in the manage-

Spontaneous resolution of eyeball displacement caused by maxillary sinusitis

EDITOR,—Spontaneous displacement of the eyeball caused by maxillary sinusitis is rare but is well documented.1,2 Different treat-
ments have been suggested but all are surgical. Spontaneous enophthalmos due to maxillary sinusitis was first described by Montgomer3; there have since been a series of reports describing this condition. The mechanism appears to arise from obstruction of the osteomeatal complex which impairs sinus ventilation. The resorption of retained secretions within the sinus produces a nega-
tive pressure which results in erosion of the thin orbital floor.1 In the absence of trauma the triad of obstructive sinus disease, dimin-
ished antral volume, and enophthalmos has been thought to be caused by inflammatory resorption and inferior displacement of the orbital floor.4 The globe is also displaced downwards and backwards such that the patient will have a narrow palpebral fissure and a deep superior sulcus above the eye.5

CASE REPORT

A 29 year old white male presented to the ophthalmology clinic having noticed that his right eye had been at a lower level than left one for the previous 2 years. There was no history of trauma. There were no nasal com-
plaints or past history of sinusitis. On examination, the right globe was displaced inferiorly by 5–6 mm. Ophthalmic examina-
tion, including a visual acuity cover test and ocular movements were otherwise normal. A computed tomograph (CT) scan showed an opague right maxillary antrum which was hypoplastic. The floor of the orbit was eroded and the right eyeball had sunk into the antrum (Fig 1). He was seen in the ENT clinic and listed for an endoscopic middle meatal antrostomy and repair of the orbital floor. The patient changed his address and we were unable to contact him. Three years later, he contacted the ENT department to inquire about his appointment. We advised him that a further review might be beneficial. When reviewed the right eye was noted to be in a normal position. A repeat scan was undertaken which showed a well aerated right maxillary sinus which was larger than on the previous CT scan. The right orbital floor appeared well ossified and at a higher level than before (Fig 2). In view of these findings, it was decided that no further management was required.

Figure 2 CT scan showing hypoplastic opaque right maxillary antrum, eroded right orbital floor, and sunken right eyeball.

Familial thrombophilia and normal tension glaucoma

EDITOR,—The aetiology of normal tension glaucoma (NTG) is still debatable. Abnormal blood flow, systemic hypertension, abnormal blood coagulability, and other factors associ-
ated with cerebrovascular disease may have a causative role in NTG.6 A study was designed to look at the prevalence of familial throm-
ophilia in cases of NTG.

CASE REPORT
Seventy two patients were identified from ophthalmological database records with the diagnosis of NTG (defined as intraocular pressure <21 mm Hg, open drainage angle on gonioscopy, absence of any secondary cause pressure <21 mm Hg, open drainage angle on diagnosis of NTG (defined as intraocular ophthalmological database records with the Seventy two patients were identified from

Letters

COMMENT
In trying to discover the aetiology of NTG, some studies have suggested that these patients may have altered rheology producing a greater tendency to thrombosis. There is also evidence of activation of the coagulation cascade and fibrinolytic pathway but there is no conclusive evidence of a general vascular aetiology in the causation of NTG.

The factor V Leiden mutation is a common hereditary abnormality with a 1–8% prevalence of heterozygous carriers depending on geographic location and accounts for the majority of activated protein C resistance. It is known that familial thrombophilia greatly increases the risk of venous thrombosis but it must be stressed that the most people with the Leiden mutation will not experience a thrombotic event. The prothrombin G20210A variant is another common abnormality with a carrier prevalence of 1–4% being more common in southern Europe and, like the Leiden mutation, rare in people from Asian or African descent. An association of the prothrombin variant and the factor V Leiden mutation with arterial disease has not been demonstrated convincingly and this therefore questions the role of these prothrombotic factors in the causation of ocular conditions suggested, in part, to be due to poor arterial supply. With this in mind, and the non-significant prevalence of factor V Leiden between the patient and control groups, it led us to conclude that the heterozygous state of factor V Leiden in patient 23 did not have a causative role in her glaucoma though may have contributed to her deep vein thrombosis.

Retinal artery and vein occlusions have been documented with hyperhomocysteinemia. A raised homocysteine level has many causes and the haematological and vascular abnormalities associated with hyperhomocysteinemia lead to a proatherogenic and prothrombotic metabolic environment. Levels can be easily reduced with dietary folate acid supplementation, with or without vitamin B12, but it is unknown if this reduces the risk of vascular disease. It is also unknown if the strong link of hyperhomocysteinemia and cardiovascular events is actually causal. Both patients in the study with hyperhomocysteinemia were commenced on folic acid and subsequent levels of homocysteine were in the normal range.

Other hereditary thrombophilic conditions, such as protein C and protein S deficiency, and antiphospholipid antibodies have been reported in association with ocular vascular pathology and a combination of these factors may further increase the risk of hypercoagulability. The low levels of antithrombin in most cases, as seen in patient 20, are thought not to be prothrombotic.

It is unlikely that familial thrombophilia plays a significant aetiological role with NTG. Further larger study is needed to confirm our findings.

On the available evidence, thrombophilia screening in patients with NTG is not indicated.

Previous poster presentation at the Royal College of Ophthalmologists’ annual congress, Harrogate 2000.

O C BACKHOUSE
M J MENAGE
B A MCERREY

Leeds Teaching Hospitals NHS Trust, Leeds, UK
Correspondence to: O Backhouse, Department of Ophthalmology, Leeds General Infirmary, Leeds LS1 3EX, UK
obackhouse@hotmail.com

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Table 1  Patient details

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DVT = deep vein thrombosis; MI = myocardial infarction; CVA = cerebrovascular accident.

The wide field multifocal ERG reveals a retinal defect caused by vigabatrin toxicity?

EDITOR,—Vigabatrin is an effective drug for controlling chronic epilepsy and is taken more commonly in conjunction with additional antiepileptic drugs. There has been increasing subjective evidence that this drug may be associated with visual field defects. We report here the interesting results we found from wide field multifocal ERGs performed on a patient taking vigabatrin.

CASE REPORT
A 52 year old white man was referred to the eye clinic with a 6 month history of bumping into objects. His optician reported a bilateral inferonasal and nasal field defect. On examination his visual acuity was 6/6, N5 with correction, Ishihara 17/17 in each eye and intraocular pressures were 19 mm Hg. He had a full range of ocular movements and pupil reactions were normal. There was a mild pallor to both optic nerves.

discs and a spontaneous venous pulsation was present. Both maculae were healthy. Humphrey central 30-2 threshold visual fields recorded peripheral constriction within 10° of fixation. Blood pressure was 162/88 and urinalysis was negative. There was no significant family history nor did he have any history of night blindness. His medical history included epilepsy, for which he commenced anticonvulsant treatment in 1966. Despite a variety of drug regimens he never had adequate control of his symptoms until February 1999, when 1000 mg twice daily of vigabatrin was added to a regimen of carbamazepine 300 mg three times daily and sodium valproate 500 mg three times daily. Attempts were made to replace vigabatrin with gabapentin and then lamotrigine but neither proved to be successful; therefore, he returned to using vigabatrin.

At the time of examination treatment included vigabatrin, carbamazepine, sodium valproate, and propranolol. Although the patient has been informed of the associated risk of visual field loss; he has elected to remain on vigabatrin treatment.

In November 1999 he was referred for conventional electrophysiological investigations, including electro-oculogram (EOG), visual evoked cortical potentials (VECP), and electroretinograms (ERG). All tests were performed in accordance with current ISCEV international standards. Findings were similar to other reports in that VEPs were normal, his EOGs were deemed to be equivocal in that the Arden index was >1.7 but <1.9. There was a small reduction in cone and maximal response of the left eye in the ERG and a significant reduction of oscillatory potentials in both eyes (Table 1).

**Table 1 Conventional electrophysiology findings**

<table>
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<th>Normal range</th>
<th>Right</th>
<th>Left</th>
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<tr>
<td>EOG (µV)</td>
<td>1.7</td>
<td>1.75</td>
</tr>
<tr>
<td>VEP (ms)</td>
<td>&gt;1.7</td>
<td>&lt;1.9</td>
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<td>Rod response</td>
<td>72–367</td>
<td>109</td>
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<td>Maximal response</td>
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<td>Oscillatory potentials</td>
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<tr>
<td>Cone response</td>
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<td>75</td>
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<tr>
<td>30 Hz flicker</td>
<td>25–150</td>
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The wide field multifocal ERG technique is the only objective tool for assessing the effect of vigabatrin toxicity on the peripheral retina. Currently, a larger clinical study utilising this technique is under way. We are confident that this technique will help to answer many of the unresolved issues associated with this form of treatment.

**Figure 1** Left eye wide field multifocal ERG results from patient taking vigabatrin shown against results from a normal patient with no ocular pathology. (A) Multifocal waveforms show reduction in peripheral field retinal function, note areas of reduced b-wave amplitudes. (B) Normal multifocal waveforms. (C, D) Topographical maps of retinal function. (E, F) Plan view topographical maps.