LETTERS TO THE EDITOR

Sympathetic ophthalmia associated with high frequency deafness

EDITOR,—Sympathetic ophthalmia with deafness has been reported rarely. We describe one such case and explore a hypothesis whereby genetic susceptibility may be associated with cross reactivity of antigens derived from common neural crest tissue.

CASE REPORT

A 72 year old woman who had previously undergone a left trabeculectomy had a fall in which she sustained a Colles fracture and a left total hyphaema. By 14 days the blood had resolved sufficiently to reveal that she had expelled the entire left iris into the trabeculectomy bleb, with extensive dispersion of uveal pigment into the subconjunctival space. She was also found to have dislocated the lens, and had sustained a choroidal detachment (confirmed by ultrasonography). A non-granulomatous anterior uveitis was noted in the left eye at this time. The initial visual acuity was light perception in the left eye and 6/12 in the right eye.

On the 25th day after the original injury, she experienced pain and blurring of vision in her right eye, with the simultaneous onset of bilateral deafness (with an initial high frequency hearing loss of 60 dB). She was found to have a brisk anterior uveitis, with a dense vitritis in this eye, through which rubeous choroidal thickening could just be discerned. At this stage, the right visual acuity had declined to 6/24, and the left eye achieved hand movements.

A diagnosis of sympathetic ophthalmia was made. She received two infusions of intravenous methylprednisolone (1 g each) and oral prednisolone (20 mg daily) was started. Cyclosporin A was commenced, and the dose adjusted to achieve a trough level of 250 µg/l (despite a history of breast cancer in remission). In view of the severity of the injury to the left eye, a left pars plana lensectomy and vitrectomy were performed to assess the visual potential of this eye. The retina was found to be flat, and the macula healthy; therefore, enucleation was not performed. By 3 months she had regained a visual acuity of 6/6 in the sympathising eye, and 6/12 in the exciting eye (with a contact lens incorporating a pupil and an aphakic correction).

However, at 4 months post-injury, reduction of the prednisolone dose to 12.5 mg, and reduction of cyclosporin A to achieve a trough level of 70 µg/l, was followed by a flare of anterior uveitis in both the exciting and sympathising eyes. This responded to increased prednisolone (15 mg) and an increase in the dose of cyclosporin A to achieve a trough level of 140 µg/l. At this time the exciting eye began to display white choroidal lesions consistent with the appearance of Dalen Fuchs nodules (Fig 1). Prednisolone was gradually reduced to 12.5 mg without further complications and she ultimately achieved a visual acuity of 6/9 in both eyes. Despite treatment, her hearing loss gradually progressed to 90 dB; this has not recovered.

COMMENT

Sympathetic ophthalmia with features of Vogt-Koyanagi-Harada disease (VKH), was initially reported in the 19th century. More recently, Nirankari et al have reported one case of sympathetic ophthalmia with profound high frequency deafness which did not recover. Rao and Marak have performed a clinicopathological survey of 100 pathological specimens of eyes enucleated because of sympathetic ophthalmia. Four of these had VKH overlap features, of which two had hearing loss. The association of sympathetic ophthalmia and deafness is clearly rare, which raises the question of what such overlap cases can teach us about the pathogenesis of VKH. Woods attempted to explain why deafness could occur in VKH, hypothesising that pigment present in the auditory labyrinth and the eye could be common targets of autoimmune attack. The auditory labyrinth and the uvea are known to have a common embryological origin in the neural crest. Could a genetic predisposition facilitate the recognition of such shared antigens? Sugita et al have recently reported that cytotoxic T cells from three patients with VKH and one with sympathetic ophthalmia reacted against the MART-1 melanoma antigen (an antigen carried by skin and eye melanocytes), when presented in association with HLA-A2. Interestingly, two of their three VKH patients carried HLA-A2, HLA-B51, HLA-DR4, and a further VKH patient carried the HLA-A2, and HLA-DR4 antigens. Their sympathetic ophthalmia patient was also A2 positive, but was not positive for either HLA-B51 or HLA-DR4. Our patient was HLA typed and found to carry HLA-A2, HLA-B51, HLA-DR4. HLA-A2 and HLA-DR4 are common and linked antigens, occurring together in approximately 33% of the population, but HLA-B51 is less common. From 537 random transplant organ donors HLA typed over 3 years, we calculated the frequency of HLA-A2, HLA-B51, HLA-DR4 in the regional population. These specificities were present together in only seven donors, giving a frequency of 1.3%. We propose that patients carrying HLA-A2, HLA-B51, and HLA-DR4 are at increased risk of damage arising in melanocytes of diverse tissues when one tissue is injured, whether in VKH or sympathetic ophthalmia.

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Similarities in the packaging of cyanoacrylate nail glue and ophthalmic preparations: an ongoing problem

EDITOR,—We would like to raise concern over an ongoing problem—namely, the similarity between the packaging used for fingernail extension glue (cyanoacrylate “super glue”) and topical ophthalmic preparations.

These concerns were raised as long as 16 years ago and yet no action or progress has since been instituted by the manufacturers of these containers. Both nail glue and ophthalmic preparations are almost identically packaged in 5–10 ml clear, round bodied, soft plastic dropper type bottles with a white non-locking twist cap which are often manufactured in the same factory. The caps are even interchangeable.

Discrimination between these products is therefore made unnecessarily difficult, particularly for patients who need to use regular topical medication—for example, glaucoma and contact lens wearers and patients who are partially sighted or blind.
Furthermore, once superglue has been installed into the eye, it undergoes instantaneous polymerisation, so that no therapeutic window of opportunity exists to irrigate the glue from the eye.

Ocular injuries reported following superglue administration have included corneal abrasions, punctate epithelial keratopathy, eyelash loss, skin excoriation, and conjunctivitis. There is also the initial fear of blindness generated by an instant tarsorrhaphy.

CASE REPORT

There have been multiple reports of the mistaken ocular use of nail adhesive in adults. We have recently treated two paediatric patients for accidental ocular administration of nail adhesive glue, in one case a direct result of confusion about the packaging. The youngest was a baby aged 3 months, who had been prescribed chloramphenicol 0.5% eye drops for conjunctivitis. The mother confused the antibiotic eye drops with the nail adhesive drops which were mistakenly installed into the left eye, causing a partial tarsorrhaphy, eyelash clumping, and a corneal abrasion.

The second case was of a 3 year old child whose brother was receiving antibiotic eye drops for conjunctivitis. The child imitated her mother’s actions by installing drops in her own eye but used nail adhesive instead. This led to misdirection of her eyelashes and a corneal abrasion.

Both children responded well to the mechanical removal of the glued lashes and chloramphenicol 1% ointment.

COMMENT

Sixteen years have now passed since this issue was first raised, and we feel that the manufacturers of nail glue products are forced to address some remedial action, to ensure that these preparations are packaged differently from therapeutic preparations in the future.

At the very least, nail glue products should be fitted with child safety caps to prevent any further unnecessary anxiety and ocular trauma.

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Disconjugate vertical ocular movement in a patient with locked-in syndrome

Editor.—Locked-in syndrome is a rare paralytic state in which voluntary movements are affected. This uncommon de-efferent state results in quadriplegia, loss of gestural or vocal communication with a defect in horizontal eye movements. However, consciousness and vertical eye movements are spared, which enable the patient to communicate by way of ocular movement, either conjugate upward or downward.

Here, we report an unusual case of locked-in syndrome presenting disconjugate vertical and torsional ocular movement, mimicking seesaw nystagmus (SSN).

CASE REPORT

A 30 year old man was brought to the emergency room. He was unable to move his extremities and all verbal communication was not possible because he could not speak. Increased deep tendon reflex with bilateral extensor toe signs were noted. He could open his eyes. Visual acuity was uncheckable. Visual field appeared to be normal by a threatening test. Pupil size was equal and light reflex was prompt. Funduscopic examination did not show any remarkable findings.

On command, he showed tonic conjugate vertical eye movements but he could not make horizontal gaze. Instead, full conjugate horizontal leftward deviation was obtained with cold water irrigation in the left ear, but nystagmus to the opposite side was absent. Caloric stimulation on the right ear was not performed because eardrum perforation was suspected. Doll’s eye manoeuvre showed full range of horizontal eye movements except for the adduction of the left eye, presumably due to left internuclear ophthalmoplegia. Convergence near target was not possible. When the patient was asked to look to the right side, the right eye moved upward with intorsion, and at the same time, left eye moved downward and extorsion. It appeared to be a half cycle of SSN. When the patient was asked to look to the left side, the reverse half cycle of SSN was observed—the left eye moved upward with intorsion whereas right eye moved downward with extension. Horizontal gaze was limited, although there seemed to be minimal movement. The eyes that moved upward didn’t cross above the midline (Fig 1A, B).

In addition to the above findings, intermittent irregular jerky eye movements were detected. These also consisted of elevation with intorsion of one eye and synchronous depression and extorsion of the other eye. They appeared in a clustered pattern containing four to five cycles of SSN, beating at between 0.5 and 1 Hz. Whether this phenomenon was purely voluntary or involuntary was not confirmed. It had persisted for 1 month.

Brain MRI revealed an extensive infarct in the ventral pons (Fig 1C).

COMMENT

We report an unusual non-concomitant vertical and torsional eye movements with a large brainstem infarction that rendered him “locked-in.” The main finding was intermittent disconjugate vertical eye movement with rising and intorting on one side while falling and extorting on the opposite side. It appeared to be SSN but it has not been previously reported in locked-in syndrome. Unlike the previously reported SSN cases, the half cycle of SSN was also induced when the patient attempted to look to the side.

Studies on SSN have suggested that interstitial nucleus of Cajal (INC) mediate this phenomenon. The INC, a centre of integration of vertical and torsional eye movements, has extensive rostral and caudal connections. It receives ipsilateral input from the frontal cortex through the zona incerta, and contralateral input from the deep cerebellar nuclei and pretectum. The INC itself sends outputs to the ocular motor nuclei, the ipsilateral medial vestibular nucleus, and the contralateral INC. In animal experiments, stimulation near the INC or stimulation of semicircular canals produced one half cycle of SSN. The underlying mechanism for a half cycle of SSN in our patient is not known. Horizontal conjugate deviation by cold caloric stimulation or oculocoelastic reflex did not produce SSN, suggesting a vestibular mechanism may not explain SSN in this patient. Instead, we suggest that supranuclear control for horizontal gaze inappropriately sends signals to the INC, but a disturbance of neural integration in the INC may be responsible for the development of SSN.

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Conjunctival CD5+ MALT lymphoma

EDITOR,—Primary ocular non-Hodgkin’s lymphoma (NHL) may be found in the conjunctiva, eyelids, and lacrimal glands, but the majority occur in the orbit. Most primary ocular NHL are of B cell origin, either of the follicular, diffuse small, or mixed cell type. According to the Revised European American classification of lymphoid neoplasms (REAL classification) the most common ocular NHL, arising from mucosa associated lymphoid tissue (MALT) and the marginal zone of lymph follicles, is included in the group of extranodal peripheral B cell lymphomas. Histopathological features of marginal zone lymphoma (MZL) of the MALT type consists of a diffuse and paraffollicular growth pattern and the presence of lymphoepithelial lesions. The tumour cells express monotypic surface Ig (sIg) and sometimes cytoplasmic Ig (cIg) (usually IgM), moreover the pan B cell antigens CD19, CD20, CD22, and CD79a. Typically, they are negative for CD5, CD10, and CD23.

Characteristically, MZL of the MALT type affects older patients and may remain localised for years, while disseminated disease involving bone marrow and peripheral blood is rare. Localised tumours may be cured with local irradiation, whereas disseminated stages of the disease are not curable and transformation into a large cell NHL may occur. We report a case of conjunctival MZL of the MALT type with an unusual clinical appearance, an CD5+ immunophenotype, and a history of idiopathic non-specific anterior uveitis.

CASE REPORT

A 79 year old man was referred to our hospital with a 3 month history of right eye discomfort and an epibulbar mass below the upper eyelid. Ophthalmological examination of the right eye revealed a reddish palpable tumour, 1.5 cm in diameter, located in the upper conjunctiva (Fig 1C). The extraocular movements were normal. Cornea and anterior chamber appeared clear; however, cortical and nuclear opacities were noted in the crystalline lens. Posterior segment examinations showed areas of confluent drusen and retinal pigment epithelium atrophy, with a normal optic disc. The patient’s left eye had suffered from a severe anterior uveitis 30 years earlier and some recurrences, resulting in subsequent phthisis bulbi. Slit lamp examination revealed a low flare without cells in the anterior chamber, an indication of persisting vascular damage, moreover posterior synechiae. Lens opacification and age related macular degeneration were similar to the right eye. Because of the age related macular degeneration and the cataract visual acuity was “only” 20/100 for the right eye, for the phthisic left eye counting fingers/1 metre. The intraocular pressure was normal for the right eye (17 mm Hg), but hypotonic for the left eye (7 mm Hg). Because the uveitis was not related to any systemic or ocular disorder (characterised by blood chemistry tests and anterior chamber tap) it has to be diagnosed as idiopathic non-specific uveitis.

Orbital magnetic resonance imaging (MRI) showed a supraequatorial lesion that surrounded the right eyeball (Fig 1A and B). Computed tomography (CT) scans demonstrated an intact bone structure of the orbit and no abnormalities were seen in the remaining skull, body or abdomen. As extensive as possible the anterior, visible part of the epibulbar lesion was surgically resected (Fig 1C and D), formalin fixed and paraffin
embedded sent to the pathology department of Justus-Liebig-University Giessen, Germany, for immunohistological studies (Fig 2). Immunohistochemistry was done on the routinely formalin-fixed, paraffin embedded biopsy specimen after microwave pretreatment which induces mucosal tissue sections. In the absence of analysable epithelium or mucosal glands, lymphoepithelial lesions were not assessed. However, general expression of CD20 and CD79a revealed the B cell nature of the infiltrate, but it was interesting that CD5 expression in about 50% of tumour cells was positive (Fig 2D), while few intermingled reactive T lymphocytes were observed (Fig 2C). Hints for a plasma cell differentiation were only detected by VS38c and reactivity for CD10, CD23, and CD30 was negative.

General physical examination of the patient showed no abnormality. There were no lymphadenopathy or hepatosplenomegaly. Peripheral blood smears as well as bone marrow aspiration biopsy showed no signs for a disseminating lymphoma. All haematological and biochemical parameters were within the normal range with the exception of slightly elevated thyroxine kinase (8 U/l) and β2-microglobulin levels (2.9 µg/l) suggestive for intensified cell growth. In conclusion, the final diagnosis of a low malignant conjunctival MALT type was established and confirmed by the German reference centre (Prof M-L Hansmann, University of Frankfurt). The patient underwent radiotherapy (40 GY) of the right orbit (fractionated to 5 × 2 GY/week). After radiotherapy, the lesion decreased markedly. No recurrence of the orbital lesion or any systemic involvement was noted during the follow up period of 18 months.

COMMENT
The immunophenotypic profiles of low grade B cell NHL are complex and still under investigation. Especially the T cell antigen CD5 is of relevance to the prognosis of lymphomas. In our case, the CD5 expression was very low. However, we observed a conjunctival MALT type with some unusual CD5+ phenotype.

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CASE REPORTS
The index patient, a male, was born as the second child, to unrelated parents. He was born at a gestational age of 37 weeks by elective caesarean section for unexplained intrauterine growth retardation. He was severely microcephalic and had marked lymphoedema of the dorsum of both feet. Facial features were peculiar with, in addition to the microcephaly, low-set ears and retrognathia. There was a transverse palmar groove on the left side, a right sided hydrocele and cardiac examination revealed the presence of an atrial septal defect, a small ventricle septal defect, and a right aortic arch. Neurological examination revealed axial hypertonia and severe developmental delay. Axial T1 weighted MR image at 4 months showed microcephaly and microsclerencephaly. Asymmetry of the eyes was noted and the right eye had an abnormal leukocoria. Ultrasound showed a transverse palmar groove on the left side, a right sided hydrocele and cardiac examination revealed the presence of an atrial septal defect, a small ventricle septal defect, and a right aortic arch. Neurological examination revealed axial hypertonia and severe developmental delay. Axial T1 weighted MR image at 4 months showed microcephaly and microsclerencephaly. Asymmetry of the eyes was noted and the right eye had an abnormal leukocoria. Ultrasound showed a transverse palmar groove on the left side, a right sided hydrocele and cardiac examination revealed the presence of an atrial septal defect, a small ventricle septal defect, and a right aortic arch. Neurological examination revealed axial hypertonia and severe developmental delay. Axial T1 weighted MR image at 4 months showed microcephaly and microsclerencephaly. Asymmetry of the eyes was noted and the right eye had an abnormal leukocoria. 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not in his father and brother, suggesting that both conditions might belong to the same spectrum of a single genetic disorder. Microcephaly and lymphoedema (MIM152950) was first described by Leung in 1985 in five individuals in a four generation family. There was no mental retardation. Congenital lymphoedema has also been described in three other isolated cases of microcephaly-chorioretinopathy. In the present family, the microcephaly and lymphoedema of the feet in patients 1 and 2 was associated with mental retardation as well as chorioretinopathy. This suggests that the three disorders previously distinguished could be the variable expression of a single genetic condition.

Ophthalmological findings reported in the autosomal dominant syndrome of microcephaly-chorioretinal dysplasia syndrome (MIM156590) include chorioretinal dysplasia, myopic astigmatism, and retinal dystrophy. Chorioretinal dysplasia represents the most common ocular abnormality seen in all patients of this report. Microphthalmia as seen in the proband has been reported before. In the present family overlap with these three disorders. This suggests that, at least some instances, they can be the variable expression of a single genetic condition.

In the syndrome with microcephaly with chorioretinopathy variable expressivity and the presence of mental retardation as an associated feature have repeatedly been reported. Male to male transmission of microcephaly, chorioretinal dysplasia, and mental retardation has also been described. Microcephaly with microphthalmia and retinal folds (MIM180800), and microcephaly and lymphoedema (MIM152950). The features in the present family overlap with these three disorders. This suggests that, at least some instances, they can be the variable expression of a single genetic condition.

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COMMENT
In literature, three distinct conditions have been delineated—microcephaly with chorioretinopathy (MIM 156590) microcephaly with microphthalmia and retinal folds (MIM180800), and microcephaly and lymphoedema (MIM152950). The features in the present family overlap with these three disorders. This suggests that, at least some instances, they can be the variable expression of a single genetic condition.

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with BANFF 2β rejection, and given intravenous methylprednisolone 500 mg on the first day, tapered over 5 days to prednisone 30 mg/day. Creatinine level rose to 2.4 on day 35, and OKT3 (5 mg/day, intravenous) was begun.

On the fifth day of OKT3 therapy, the patient complained of right eye discomfort and redness. Over 2 days, the discomfort worsened and visual acuity fell, to 6/24– on the right and 6/9 on the left. Marked conjunctival injection, keratic precipitates, iris vessel congestion, white cells in the anterior chamber, hypopyon, and trace anterior vitreous cells were present in the right eye. Inflammation obscured fundus details, but anterior chamber paracentesis from the right eye revealed white blood cells and no organisms. Cultures of aqueous humour and conjunctival swab were negative. Topical prednisolone 1% every 2 hours and hyoscine (scopolamine) 0.25% twice daily were begun in the right eye. OKT3 was discontinued.

Three days later, acuity improved to 6/18, conjunctival injection decreased, and the hypopyon resolved. Prednisolone drops were tapered and, within 5 days, vision improved to 6/12 in both eyes, and ocular inflammation cleared. Over the next week, topical medications were tapered, then discontinued, with return of inflammation.

Anterior chamber paracentesis from the right eye revealed white blood cells and no organisms. Cultures of aqueous humour and conjunctival swab were negative. Topical prednisolone 1% every 2 hours and hyoscine (scopolamine) 0.25% twice daily were begun in the right eye. OKT3 was discontinued.

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COMMENT

OKT3 is implicated as a cause of anterior uveitis in our patient because of onset of inflammation soon after initiating OKT3 therapy, accelerated resolution of inflammation following discontinuation of OKT3, and lack of identifiable infectious aetiologies. We did not further pursue a cause and effect relation through OKT3 rechallenge because renal status had improved. It is unclear whether OKT3 acted alone or in combination to induce uveitis. This type of synergistic drug interaction is reported for rifabutin induced uveitis, which may be potentiated by concomitant administration of fluconazole.

The side effects of OKT3 include optic neuritis, abducens nerve palsies, conjunctivitis, scleritis, and blindness presumed due to B-lymphocyte intrusion. The left eye exhibited conjunctival injection without intracocular inflammation.

In conclusion, severe anterior uveitis occurred during treatment with OKT3, and resolved with OKT3 withdrawal and topical therapy.

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Figure 1 Mass on the temporal area of superior right lid.

Hypopyon uveitis in patients with acquired immunodeficiency syndrome treated for systemic Mycobacterium avium complex infection with rifabutin.


Figure 2 Left fundus showing choroidal lesion measuring approximately 1 disc diameter superior to the disc.

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Figure 1 Mass on the temporal area of superior right lid.

Hypopyon uveitis in patients with acquired immunodeficiency syndrome treated for systemic Mycobacterium avium complex infection with rifabutin.


Figure 2 Left fundus showing choroidal lesion measuring approximately 1 disc diameter superior to the disc.

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COMMENT
Classically, the AIDS associated lymphomas are of the B cell type and involve the CNS and the abdominal cavity, as opposed to the preferential ganglion involvement seen in immune competent patients. Such cases usually develop at advanced disease stage. Primary maxillary sinus lymphoma is rare, as is secondary orbital involvement. Malignant paranasal sinus tumour secondarily involves the orbit in 45% of the cases, but lymphomas are uncommon. Primary and secondary orbital lymphomas are rare, and bilateral occurrence is very unlikely. Rare cases of intraocular primary lymphomas were also previously described. Our patient had bilateral involvement of the sinuses, orbit, and intraocular structures, which was confirmed by CT scan, and although we didn’t obtain a specimen from the choroidal lesions for histological confirmation, the disappearance of the left lesion and the scarring on the right fundus just after treatment supports lymphoma as the diagnosis for the intraocular lesion. The immunohistochernistry was CD20 (L26) positive, and negative for all the other markers (CD3, CD30, Lambda, Kappa, S-100 protein, HMBS), confirming the B cell origin.

Non-Hodgkin’s lymphoma in HIV infected patients tends to be of high grade malignancy, being very aggressive most of the times, with a median survival of around 8 months. Our patient died 3 months in spite of initial good response to chemotherapy.

Lymphoma treatment is still controversial. Radiotherapy has demonstrated good results for treatment of both systemic disease and in cases of orbital and intraocular involvement. On the other hand, chemotherapy has been good for systemic disease but has not been successful used for intraocular disease. Interestingly, our patient had a significant improvement after chemotherapy, but that was shortly followed by an intense reactivation, which was probably due to the high grade of malignancy.

Intraocular primary paranasal sinus, orbital, and intraocular lymphomas are considered to be very rare tumours, and even though their incidence has decreased in the HAART era, clinicians should be aware of this potential manifestation of non-Hodgkin’s lymphoma.

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Pythium insidiosum keratitis confirmed by DNA sequence analysis

EDITOR—Pythium insidiosum is an unusual but serious ocular pathogen. Although the organism grows as a mycelium in tissue, it is not a member of the fungal kingdom and its identification can be a challenge for a routine laboratory. We report a case of Pythium keratitis in which the organism was confirmed by nucleic acid sequencing.

CASE REPORT
A 32 year old man was referred from Kuala Lumpur having suffered with intractable keratitis of the left eye for 4 weeks. He gave a history of diabetes, disposable contact lens wear, and swimming in the Kelang River. Routine microbiological investigations had been negative. At presentation to Flinders Medical Centre, he was on topical antibacterial, antifungal, and antiinflammatory medication. He had a large epithelial defect, a deep stromal infiltrate approaching the limbus, and hypopyon (Fig 1, top). His visual acuity was hand movements and there was considerable pain. The drops were stopped and corneal scrapings were taken. Gram and Giemsa stains were negative. A biopsy was performed the following day and hyphae were observed in sections. A filamentous organism appeared in cultures of the original scrapings. There was no response to continued antifungal treatment and a penetrating graft was performed 4 days after the biopsy. Postoperatively, the patient received oral itraconazole and topical natamycin. Prednisolone phosphate drops were introduced 10 days later. Twice in the first 3 weeks after surgery the patient returned to theatre for an anterior chamber washout of proliferative material invading from the peripheral cornea (Fig 1, bottom). Hyphae were seen in these specimens, but cultures were negative. The patient returned to Malaysia and, 7 months postoperatively, had a clear graft, useful vision in the eye, and no recurrence of infection.

The histopathology revealed a florid keratitis with necrotic stroma and degenerate neutrophils and monocytes. Massive numbers of hyphae were seen in silver-stained sections, particularly in the anterior stroma (Fig 2, top). Hyphae were also observed penetrating Descemet’s membrane. The organisms were not stained by the periodic acid-Schiff (PAS) method, also commonly used in suspected fungal infection, giving these sections the appearance of Swiss cheese (Fig 2, bottom).

Colonies grew rapidly on the primary fungal medium (plain Sabouraud’s agar, 28°C). They were white with a yellowish tinge, unusually flat, and difficult to cut and separate from the agar. Few septae and no spores were seen. The isolate was sent to a reference laboratory under suspicion of being a zygomycete. However, no further taxonomic clues were induced by standard measures so a molecular approach was employed. The methods have been described. Initially, a 510 base segment of the 18S ribosomal RNA gene was amplified (universal primers NS1 and NS2) and sequenced (Model 373A DNA sequence, Applied Biosystems Inc). A search of databases (GenBank, EMBL) revealed homology to oomycetes. The isolate was then incubated for 48 hours in water containing autoclaved grass. Motile zoospores were observed, indicative of P insidiosum. Other characteristics consistent with this identification were colony morphology, optimal temperature of growth (35°C), hyphal diameter (4–6 mm), and pyrrolidine group of amines.

Figure 1 Pythium insidiosum keratitis. Top, the patient at presentation. Bottom, proliferative material in the anterior chamber after corneal transplantation.

Figure 2 Histopathology of the excised cornea (×625). Top, silver stain. Bottom, PAS. The organisms have not stained with PAS; their presence is indicated by the spaces in the section.
intercalary swellings in viable hyphae, vesicles at the end of spore discharge tubes, and spores germinating by means of germ tubes.

To identify the infection, the internal transcribed spacer (ITS) region defined by primers TW81 and AB28 (incorporating ITS1, the 5.8S gene and ITS2) was amplified. The 900 base pair product was sequenced by a direct double stranded DNA cycle method using primers 1–6 as detailed except for the substitution of primer 3 with 3c (5’-GGCATGGGTTAGGCACTT-3’). The sequences were checked between complementary strands and shown to be 99.0% homologous with *P. insidiosum* reference strain CBS777.84 using CLUSTAL V software (CA Lévesque, personal communication). In comparison, the sequence was ~95% homologous with other *Pythium* species and ~90% homologous with other genera of oomycetes (BLAST database, NIH, Bethesda, MD, USA).

**COMMENT**

*P. insidiosum* is an aquatic, filamentous organism that produces heterokont, biflagellate zoospores, placing it as an oomycete in the kingdom *Chromista*. The only other human pathogen in this kingdom is *Rhinosporidium seeberi*, the agent of rhinosporidiosis. Oomycetes have a diploid genome and a cell wall consisting of cellulose compounds and glycan, features which distinguish them from the fungal groups of the kingdom Fungi. The identification of an oomycete in our patient can explain the PAS result and the lack of response to antifungals, there being no chitin or ergosterol in the cell wall, respectively. In contrast, the probable delay in identification, and the need to prevent further tissue invasion. Transplantation may be the best option.

The introduction of corticosteroids in the management of fungal keratitis and, presumably, *Pythium* infection, must be approached with great caution. We gave prednisolone in the hope of reducing inflammation in the grafted cornea without encouraging a recurrence of the disease. It was fortunate that, apparently, no infectious elements had been left in the eye.

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