LETTERS TO THE EDITOR

Late dehiscence of healed corneal scars

EDITOR,—The stroma comprises about 90% of the total corneal thickness and is responsible for most of the corneal tensile strength. Presumably because of its avascularity, healing of such wounds is slower than in other connective tissues. Continued histopathological changes in human corneal laceration wounds have been observed years after injury, despite meticulous local suture closure.1 The wounds appear to undergo perpetual, dynamic remodeling, a fine balance between constructive and destructive processes. We report three cases of late, full-thickness corneal wound dehiscence occurring spontaneously or after minor blunt trauma 17–56 years after the original injury. CASE REPORTS Case 1 A 61 year old man was referred for spontaneous corneal perforation right eye. At age 5, he had sustained a full thickness corneal laceration in this eye which was repaired with sutures. The patient did well with an uncorrected visual acuity of 20/50 right eye until the time of his corneal perforation 56 years later when he noted the sudden onset of eye pain and loss of vision in this eye upon awakening 2 days before referral. He denied any recent eye trauma or antecedent vigorous rubbing of the eye. He was in excellent health with no previous history of corneal melting disorders. At the time of his first visit to us, the best corrected visual acuities were light perception right eye and 20/20 left eye. There was an inferonasal, 3 mm linear, vertically oriented corneal scar in the right eye not involving the limbus. The iris was incarcerated and externalized along an inferior 1.0 mm long, 8 mm long, corneal laceration in the left eye. The resulting peripheral corneal laceration was repaired with 10-0 nylon sutures. A month later, the patient underwent spontaneous extraction of a traumatic cataract in this eye. Subsequently, the best corrected visual acuity was 20/40 with a hard contact lens and spectacle overrefraction. Seventeen years after the injury, the corneal scar dehisced spontaneously in the absence of recent trauma. A peripheral tectonic penetrating keratoplasty was performed, completely excising the dehisced corneal scar. The patient later underwent a central, 8.0 mm, optical penetrating keratoplasty, combined with implantation of a posterior chamber intraocular lens by sulcus fixation. This resulted in a best corrected visual acuity of 20/20 in this eye. COMMENT These three cases illustrate the innate structural weakness of healed corneal scars. Two of the scars dehisced without any mechanical provocation. Although corneal scars become optically dense and hypercellular, they never regain the full original preinjury tensile strength.1 Unsuited wounds, such as radial keratotomy incisions, are particularly weak.2 Even sutured full thickness wounds may not regain more than 30% of their original tensile corneal tensile strength.3 In penetrating keratoplasty, rupture after blunt trauma may occur many years after surgery and always occurs at the graft-host junction, the weakest point in the cornea.4 In full thickness corneal wounds, the discontinuity in Descemet's membrane further deprives the cornea of another important source of structural strength. Ancillary factors which may further reduce wound integrity include diabetes mellitus, poor suturing technique, incarceration of uvea or vitreous, and entrapment of epithelium.

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Case 3 While using an electric saw, a 68 year old man sustained a perforating wood chip injury of the cornea in his right eye. The resulting peripheral corneal laceration was repaired with 10-0 nylon sutures. Two weeks after surgery, the uncorrected visual acuity improved to 20/200 left eye. The RF, ANA, ANCA, ESR, CBC, and chemical profile were normal.

Transpupillary thermotherapy of choroidal melanoma with or without brachytherapy: a dilemma

EDITOR,—Transpupillary thermotherapy (TTT) is a new approach to the treatment of choroidal melanoma with heat. The early treatment results seem promising with regard to local tumour control and retained visual acuity; no early metastasis was found.1 The reported rate of complications is low.2,3 The heat treatment is performed with a temperature calculated at 56°C to 65°C, induced by an infrared diode laser (810 nm) with a large beam diameter (3 mm) and a long exposure time of 1 minute per application. These factors promote a deeper penetration into the choroidal melanoma. The result is tumour necrosis up to 3.9 mm deep and occlusion of blood vessels in the treated area as shown on histopathology.4 Depending on the pigmentation of the tumour, the energy is raised or lowered according to the desired effect occurs. The tumour is treated by overlapping applications extending beyond the margin of the tumour. The exposure time should not be shortened to less than 1 minute, as it takes 40 seconds to reach a temperature at subcoagulation level. TTT is performed as an outpatient procedure and can be easily repeated. Treatment results can be evaluated in several ways. The outcome is favourable when the choroidal melanoma develops into a scar on ophthamoscopic examination, substantial regression of the tumour thickness is seen on ultrasonography together with an increased reflectivity on the diagnostic A-scan, and hypofluorescence is visible in the treated area on the early and late phases of the fluorescein angiogram. TTT is not indicated in melanoma patients with severe media opacities, in patients with insufficient dilatation of the pupil, or in elevated, peripherally located melanomas.5,6 Simultaneous use of TTT with brachytherapy in the management of melanomas is called “sandwich therapy”. If the outcome is favourable the patient can be retreated with TTT alone. TTT is maximal at the tumour and brachytherapy efficiently treats the base of the tumour.2,4,7 Combining both treatments has several advantages. It enabled us to treat patients with tumours thinner than 5 mm, generally the maximum height for ruthenium-106 brachytherapy.8 Insufficient melanoma regression and/or recurrences after a combined treatment might be retreated with TTT alone. The combination might also lead to a decreased radiation dose of the isotope used in brachytherapy. In principle, TTT can also be applied as the sole therapy. A satisfactory local tumour control is reported in the early years after TTT as sole therapy for small choroidal melanomas.9 TTT as sole therapy seems especially attractive in treating small choroidal melanomas in and around the posterior pole. Visual outcome may be better after TTT than after brachytherapy because the laser beam, but not the radiation beam delivered by the radioactive plaque, can be focused.10 As the macular capillaries are very radiosensitive to brachytherapy, this may finally result in radiation damage.
maculopathy with a considerable loss of central vision. However, after extramacular applications of sole TTT, macular complications such as transient cystoid macular oedema may be also seen. A dense scotoma is generally produced by TTT at the time of application, whereas a scotoma after brachytherapy usually does not develop for up to a year or several years. If heat treatment is performed as sole therapy, effective treatment of the sclera over the tumour is as important as the tumour itself, because intra- and episcleral tumour invasion is present in, respectively, 55.7% and 8.2% of patients with medium and large tumours. In a group of 21 patients with enucleated small melanomas, 17 showed scleral ingrowth on histopathological examination. Intrascaleral melanoma cells surviving treatment might be a focus for tumour recurrence, which is associated with a two to threefold higher risk of metastasis. This is evident from the results after photocoagulation treatment of choroidal melanomas showing a high rate of tumour regrowth. This might be attributed to the low depth of photocoagulation penetration, insufficient to destroy the intrascaleral melanoma cells.7

In TTT as sole therapy, the question arises as to whether the effect of the heat induced by TTT in the sclera, whereas choroidal melanoma is identical to the effect of the heat to the possible melanoma cells in the sclera. In one eye, intentionally enucleated after experimental TTT, total tumour necrosis up to the sclera was visible on histopathological examination. Despite heat damage to the inner layers of the sclera which was evident from scleral oedema and necrosis of sclerocytes, a cluster of tumour cells with a viable aspect was located near the inner border of the sclera.8 A recent clinicopathological report on two cases of recurrent juxtapapillary choroidal melanoma after TTT revealed tumour cells appearing histopathologically intact and presumably viable.9 One patient was insufficiently treated with TTT because of cataract, another patient was treated with TTT and brachytherapy. Interpreting these data, we have to keep in mind that a pathologist is often unable to guess viability of melanoma cells in an enucleated eye after any treatment, especially in an under-treated eye.

Unfortunately, no sensitive clinical technique to evaluate the effect of TTT on intra- and episcleral tumour cells, their destruction, and the early development of extrascleral recurrences. To reduce the risk of insufficient treatment of the sclera and because episcleral tumour recurrences rarely develop as a late complication of brachytherapy, one may consider combining TTT with brachytherapy (the sandwich therapy).

TTT remains an investigative procedure until long term results are available. In the meantime we have to choose between TTT as sole or combined treatment for patients with choroidal melanoma.

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Asymmetric diabetic retinopathy associated with Fuchs' heterochromic cyclitis

Enfort, —Diabetic retinopathy (DR), with its complications, is the leading cause of blindness among the working population in developed countries. Asymmetric diabetic retinopathy (DR) has been defined as proliferative disease in one eye and background or no retinopathy in the fellow eye, persisting for at least 2 years.1 Previous reports have described systemic and local factors associated with the development of asymmetric disease.2 These include unilateral carotid artery stenosis, choroidal scarring, complete posterior vitreous detachment, amblyopia, unilateral elevated intraocular pressure, optic atrophy, retinal pigment epithelial atrophy, myopia >5D, anisometropia >1D, concurrent retinal vascular disease, contact extraction, vitreous loss, trauma, radiation, tumour, and unilateral recurrent panuvetis. We observed a patient with proliferative DR in the right eye and no proliferative changes in the left eye which had Fuchs' heterochromic cyclitis (FHC). In the absence of other known risk or protective factors, FHC was felt to have protected against the development of proliferative DR. The significance of this new observation and the possible mechanisms are discussed.

CASE REPORT

The patient was a 56 year old insulin treated type II diabetic. He also had systemic hypertension and was a smoker. FHC of the left eye was diagnosed on the basis of typical stellate keratic precipitates scattered over the entire corneal endothelium, chronic low grade anterior uveitis, iris heterochromia, and posterior subcapsular cataract. Pharmacological testing with 4% cocaine excluded a diagnosis of Horner's syndrome in the left eye.

He suffered widespread vascular complications of his combined diabetic and hypertensive state, including nephrotic syndrome and peripheral vascular disease culminating in left below knee amputation. These were accompanied by the development of new vessels at the disc in the right eye (Fig 1A), but no disc background changes in the left eye, although ischaemic changes were evident on fundus fluorescein angiography (Fig 1B).

At his initial assessment in the ophthalmology clinic, best corrected Snellen visual acuities were right eye 6/6; left eye 6/9. The refractive errors were right eye +1.00/+0.50×180; left eye +2.00 DS. Intraocular pressures were 16 mm Hg either eye. Retinal pigment epithelial changes were present at the left macula (Fig 1B) but there was no extensive retinal pigment epithelial atrophy or chorioretinal scar. There was neither proliferative diabetic retinopathy nor clinically significant macular oedema in either eye.

Nine months after the first examination he developed clinically significant macular oedema in the right eye. This was treated with focal argon laser with resolution of the macular oedema. Two years later new vessels at the right disc (Fig 1A) were noted and panretinal photocoagulation was performed (2707 burns in two sessions). Despite laser treatment, vitreous haemorrhage ensued. Further laser treatment to the right eye (1149 burns) led to regression of new vessels at the right disc (Fig 2A). Cataract progressed in the eye with FHC so that 5 years after his first visit to the ophthalmology department left phacoemulsification with heparin coated intraocular lens implant was required. Extracapsular cataract extraction is associated with accelerated retinopathy progression postoperatively.3 Accelerated retinopathy was defined as the development of any of the following within 6 months postoperatively: new clinically significant macular oedema, recurrent clinically significant macular oedema in eyes that had preoperative resolution of macular oedema after focal laser treatment, increased hard exudates or intraretinal haemorrhages in eyes.

Figure 1 June 1996: fundus fluorescein angiogram. (A) Right eye, late venous phase. There is ischaemia of the temporosuperior retina of the right eye. Superior panretinal laser scars and disc leakage from residual new vessels can be seen. (B) Left eye, mid venous phase. The left eye also shows some areas of capillary non-perfusion. There is hyperfluorescence at the superior aspect of the left disc but no characteristic leakage features of proliferative diabetic retinopathy. Note the small window defect inferonasal to the left fovea from an area of retinal pigment epithelial atrophy.
with clinically significant macular oedema at the baseline examination, or new onset proliferative diabetic retinopathy. No such progression occurred in this patient. Six months after left phacoemulsification with intracocular lens implantation there was no clinically significant macular oedema and best corrected visual acuity was 6/6. Despite evidence of worsening retinal ischaemia there was no progression to proliferative diabetic retinopathy (Fig 2B).

He was investigated for any evidence of local or systemic factors which may have contributed to the asymmetric retinopathy. There was no anisometropia. Intracocular pressures were equal in both eyes. There was no posterior vitreous detachment in either eye, no optic atrophy, and visual fields were full. Ultrasound of the carotids excluded haemodynamically important carotid artery stenosis and the normal arm-retina time suggest that there were no haemodynamic factors, even in the more distal branches of the internal carotid system, which contributed to the asymmetric retinopathy. In fact, pulsatile ocular blood flow in the left eye was normal (1101 μl/min), despite signs of ischaemia on fluorescein angiogram (Fig 2B). Ocular blood flow in the right eye was also normal (824 μl/min), although this was after extensive panretinal photocoagulation. Our hypothesis, therefore, is that FHC protected his left eye from progression to proliferative diabetic retinopathy.

This case suggests that FHC protected against proliferative DR but the mechanism is unclear and merits further consideration. Hopefully, this new observation will help to increase our understanding of these complex diseases and eventually affect the formulation of clinical practice.
capsular phimosis may be increased with AcrySof lenses. The risk of anterior capsular stability in AcrySof IOLs, and anterior capsular phimosis can occur with AcrySof lenses. The risk of anterior capsular phimosis may be increased with smaller capsulorhexis diameter independently of IOL biomaterial.\(^7\)


Central serous retinopathy complicated by massive bilateral subretinal haemorrhage

EDITOR,—Central serous retinopathy (CSR) is a common cause of visual disturbance in the younger age group. Spontaneous visual recovery occurs in the majority of patients. A minority of patients, however, suffer permanent visual loss commonly caused by chronic retinal pigment epithelial changes. We report a devastating complication of untreated CSR, with bilateral massive subretinal and vitreous haemorrhages.

A 43 year old Asian man presented with a 3 week history of blurred central vision and metamorphopsia affecting his left eye. Ocular examination revealed best corrected visual acuity of 6/9 in both eyes. Funduscopy revealed a neurosensory retinal detachment overlying the left fovea, with bilateral multiple retinal pigment epithelial changes. Fundus fluorescein angiography (FFA) and indocyanine green angiography (ICGA) confirmed the diagnosis of bilateral CSR (Figs 1 and 2).

The neurosensory retinal detachment in the left eye resolved spontaneously. Seven months after his initial presentation, he developed sudden loss of vision in his left eye to counting fingers at 1 metre. Ocular examination revealed a large macular subretinal haemorrhage, which progressed to a dense vitreous haemorrhage after a week. Ultrasoundography revealed no evidence of a retinal detachment.

The vitreous haemorrhage subsequently cleared spontaneously leaving an atrophic macular scar.

Figure 1 (A) Slit lamp photograph showing anterior capsular phimosis and fibrosis. (B) Appearance of anterior capsule immediately after Nd:YAG radial anterior capsulotomy. (C) Appearance of anterior capsule 3 weeks after laser.

Figure 2 (A) Fluorescein angiography of the right macula reveals multiple areas of leakage; (B) ICGA reveals more extensive disease with diffuse hyperfluorescence representing multiple areas of choroidal hyperpermeability; (C) late phase ICGA demonstrates serum retinal pigment epithelial detachments with characteristic central hyperfluorescence and hyperfluorescent staining of the surrounding ring.

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COMMENT

Massive subretinal macular haemorrhage can occur secondary to a number of causes such as choroidal neovascularisation (CNV), retinal artery macroaneurysm, idiopathic polypoidal choroidal vasculopathy, blood dyscrasia, or trauma. Histopathological analysis of patients with age related CNV complicated by massive subretinal haemorrhage may be associated with rupture of a large choroidal blood vessel.\(^1\) CNV is known to occur infrequently in patients with CSR and is reported with lenticular photoacoagulation.\(^2\) In only two previous cases has CNV developed spontaneously in patients with CSR.\(^3\) Massive subretinal haemorrhage, however, was not the feature in these two reported cases. In our case, the use of ICGA had helped to understand the mechanical events (Figs 2 and 3) but the underlying aetiology remains unclear.

The pathogenesis of CSR has been disputed. Recent studies with ICG suggest focal choroidal hyperpermeability as the possible initial event, leading to the formation of serous retinal pigment epithelial detachment. Excessive fluid accumulation then leads to pressure on the retinal pigment epithelium, resulting in either mechanical disruption or retinal pigment epithelial decompensation.\(^4\) The chronic secondary retinal pigment epithelial changes, if extensive, could predispose to the development of CNV. In our patient, the sudden onset of haemorrhage in both eyes may in part be explained by the presence of disorganised and dysfunctional choroidal blood vessels. The latter leads to an initial increase in choroidal hyperpermeability (hence the CSR) and later, the tendency to rupture suddenly resulting in massive haemorrhage (as illustrated by our case).

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Figure 3 (A) Colour fundus photograph of the right eye shows extensive macular haemorrhages. Blood is present beneath the retinal pigment epithelium and the neurosensory retinal detachment. (B) Fluorescein angiography shows masking corresponding to the extensive haemorrhage. There is a small focal area of hyperfluorescence within the haemorrhage which has not changed its size or intensity throughout the angiogram. (C) ICGA reveals a large haemorrhagic retinal pigment epithelial detachment. A focal hyperfluorescent spot (arrow) represents a mechanical disruption (a hole) of the retinal pigment epithelium and ICG streams through the defect into the subretinal layer, forming a blood level as seen in the colour fundus photograph.

Eighteen months later, he again presented with a sudden loss of vision in his right eye. Best corrected visual acuity was 6/24 in the right eye and counting fingers in the left eye. Pseudoexfoliation confirmed a massive subretinal haemorrhage in the right eye. Fluorescein angiography showed extensive masking. ICGA demonstrated the presence of a haemorrhagic retinal pigment epithelial detachment (Fig 3). His visual acuity in the right eye returned to 6/12 after 3 months. Physical examination and investigations revealed no evidence of underlying systemic disease. Full blood count and coagulation screen were normal.

Various phenotypic expressions of familial aniridia with a PAX6 mutation

EDITOR,—Aniridia is an uncommon congenital bilateral panocular disorder characterised by complete or partial absence of the iris and foveal hypoplasia. Aniridia can appear in a high penetrance form associated with other ocular anomalies such as keratopathy, foveal hypoplasia, cataract, ectopia lentis, and glaucoma.\(^1\) Recent studies showed that aniridia is caused by mutation of the PAX6 gene,\(^2\) which controls early events in cerebral and ocular formation.\(^3\) We present a pedigreed with various clinical findings of aniridia in which a mutation of the PAX6 gene was identified.

CASE REPORTS

The family tree is shown in Figure 1A. Case I-1 is a 52 year old man with visual impairment and nyctalopia. He had cataract from an early age (the detail was unknown). His vision was right eye finger counting at 0.20 cm and left eye 0.01; eye examination revealed bilateral partial aniridia, dense cataract, corneal pannus, and foveal hypoplasia (Fig 2A, B). His cataracts were removed and posterior chamber intraocular lenses were implanted at age 52. One son, II-1, is 16 years old with nyctalopia, visual acuities of right eye 0.3 and left eye 0.2, bilateral corneal pannus, iris thinning, and mild foveal hypoplasia; his lenses were clear (Fig 2 C, D). Another son, II-2, is 14 years old with nyctalopia, visual acuities of right eye 0.2 and left eye 0.2, bilateral iris thinning, corneal pannus, and mild foveal hypoplasia; his lenses were clear (Fig 2 E, F). Case II-3 is a 13 year old male with nyctalopia, visual acuities of right eye 0.3 and left eye 0.2, corneal pannus, partial aniridia, zonular cataracts, and foveal hypoplasia (Fig 2 G, H). All affected patients were normal in size for age and had normal intelligence and karyotype (46XY). We analysed genomic DNA isolated from leucocytes of patients and family members. Genomic DNA representing 14 exons for the PAX6 gene was amplified by polymerase chain reaction (PCR) and subjected to SSCP analyses.\(^4\) An abnormal pattern for exon 11 was identified indicating a heterozygous mutation in all affected patients but not in unaffected members of the immediate family or in over 100 normal individuals (Fig 1A). Sequencing analysis demonstrated a deletion of a single nucleotide at the 1434th position (in this study, the numbers of the nucleotide and amino acid were based on the sequence of GenBank Accession No M93650) (Fig 1B). No other changes in nucleotide sequence were detected.

COMMENT

The human PAX6 gene is 422 amino acids long and has paired box and homeobox DNA binding domains. These are separated by a 78 amino acid linker segment and followed by a 152 amino acid C-terminal region rich in proline, serine, and alanine residues.\(^5\) \(^6\) In our cases, the PAX6 mutation is predicted to result in amino acid substitutions from the 339th position and a truncation at the 344th position, resulting in a truncated protein product that ultimately excludes part of the PAX6 domain. Truncated proteins generally tend to be degraded, thus haploinsufficiency of PAX6 was believed to cause aniridia phenotype. However, biochemical assay recently indicated that truncation mutations in the PAX6 domain were not detected.\(^7\) The human PAX6 gene is a master control gene,\(^8\) it may control numerous downstream genes, whose expression pattern probably is slightly different among each individual. Af-
Iopidine allergy causing lower eyelid ectropion progressing to cicatricial entropion

Editor—Apraclonidine hydrochloride 1% (Iopidine) is a selective α2-adrenergic agonist used to treat glaucoma or to protect against pressure spikes before laser treatments. Up to 48% of patients taking Iopidine for over 3 weeks develop follicular conjunctivitis.1 Periocular contact dermatitis was also associated with Iopidine allergy in 62% of the cases.2 We report a case of an Iopidine allergic reaction presenting with eyelid ectropion which further progressed to cicatricial entropion.

CASE REPORT

A 64 year old man was referred with a 6–8 month history of non-resolving conjunctivitis, epiphora, and resultant left lower eyelid ectropion. The conjunctivitis was resistant to treatment with Ocuflow OS four times daily. As a result, the referring provider added Tobradex (tobramycin) and Naphcon A (naphazoline), and referred him for evaluation. His ocular history was notable for bilateral pterygium excision 2 years earlier and open angle glaucoma. The patient’s current ocular medications included Timoptic 0.5% in both eyes twice daily, Iopidine left eye twice daily, and Tobradex in left eye three times daily. Of historical note, the patient began the Iopidine approximately 2 months before developing these symptoms in the left eye. The patient had no known drug allergies. Corrected visual acuities were 20/20 right eye and 20/100 left eye. External examination revealed left upper eyelid ptosis, left lower punctal and eyelid ectropion, and diffuse left eye papillary conjunctivitis (Fig 1).

The Iopidine and the Tobradex were discontinued. The patient began prednisolone (Pred-Forte 1%) left eye every 2 hours in addition to his current regimen of Timoptic and Ocuflow. Within 3 weeks, his left eye improved dramatically. However, he developed a cicatricial entropion with symblepharon, keratinised lower eyelid margin, and persistent left upper eyelid ptosis requiring surgical correction (Fig 2). Tissue samples submitted for histological examination revealed lymphocytic infiltration, admixed with plasma cells, and foci of a haemorrhage within the conjunctiva and subepithelial stroma. Immunohistochemical preparations revealed 50% B cells and 50% T cells, leading to the diagnosis of reactive lymphoid infiltrate.
COMMENT

Our finding of reactive lymphocytic infiltrates in the conjunctival specimen is consistent with a type IV hypersensitivity reaction and the diagnosis of Iopidine allergy. To our knowledge, this is the first report of an ectropion progressing to a cicatricial entropion resulting from an Iopidine allergy response. Iopidine has been reported to cause upper eyelid retraction and entropion. Similarly, dipivefrin, another adrenergic agent and a topical antiglaucoma medication, has been reported to cause lower eyelid ectropion; however, this ectropion resolved 3 weeks after drug discontinuation. In our case, the inflammation induced by the topical medication caused the initial ectropion which progressed upon resolution and scar formation to cicatricial entropion. Iopidine induced conjunctivitis can produce both ectropion and entropion.

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