pupillary defect. Anterior segment examination was normal. Fundoscopy revealed multiple white emboli in branches of the right inferotemporal retinal artery with superficial retinal haemorrhage and macular oedema (Fig 1). There were also smaller emboli in the left inferonasal, inferotemporal, and superonasal retinal arteries (Fig 2). Vitreous cells 1+ were noted in both eyes. This appearance was consistent with bilateral septic retinal emboli.

Fluorescein angiography showed hypofluorescence at and distal to the right inferotemporal emboli with normal choroidal fluorescence and a normal angiogram appearance in the left eye. The white blood cell count was 10.3 with a normal differential and his erythrocyte sedimentation rate was 2 mm in the first hour. Serial blood cultures produced no growth and a gingival swab produced normal flora.

Electrocardiography, transthoracic echocardiography, and a carotid duplex scan were normal. Fasting total cholesterol and triglycerides were mildly elevated at 6.1 and 2.89 mmol/l (upper limits of normal 5.8 and 1.8 mmol/l) respectively. Coagulation studies and plasma viscosity were normal. Values for anti-nuclear antibody, anticardiolipin antibodies, activated protein C resistance, antithrombin III, protein C, and protein S were all normal. No other infective source was found and he was started empirically on cefuroxime 750 mg intravenously three times daily, metronidazole 500 mg intravenously three times daily, hydrocortisone 100 mg intravenously four times daily, and aspirin 300 mg orally daily. There was no change in the fundal appearance over the next few days but visual acuity remained good at 6/5 in both eyes.

On discharge, on the fourth day, he was converted to oral antibiotics and steroids for a further 2 weeks. At a 1 week follow up visit, there was reduced vitreous activity which resolved at 2 weeks and the emboli appeared a little smaller. Two months later, he underwent extraction of his previously abscessed tooth under periapical local anaesthetic having started oral amoxicillin/clavulanic acid and metronidazole for the emboli for 1 week.

Three weeks afterwards, he presented with fresh bilateral white intra-arterial septic retinal emboli and bilateral vitreous cells 2+. Blood cultures were negative and there was no clinical evidence of infective endocarditis. Repeat haematological investigations were normal. CD4 count was normal and cytomegalovirus titres were negative. His symptoms settled and the emboli reduced in size after 5 days of cefuroxime 750 mg intravenously three times daily and metronidazole 500 mg intravenously three times daily, which was continued orally for a further 2 weeks. Oral aspirin therapy was commenced. He presented 1 month later, while on aspirin, with renewed vitreous activity and right inferotemporal and superotemporal retinal emboli. He was given intravenous cefuroxime and metronidazole for 7 days converting to oral therapy for a further 2 weeks. Oral anticoagulants were started and he had no further episodes. Seven months later, visual acuity remained at 6/5 in both eyes but small vitreous cells persisted with distal luminal narrowing and pallor.

**COMMENT**

Focal metastatic endophthalmitis with discrete retinal septic emboli is a very rare complication of dental surgery. The clinical appearance in this patient and subsequent partial resolution following intravenous antibiotic therapy is consistent with septic retinal emboli. The dental origin of sepsis in this patient was presumed as each episode occurred within 1, 2, and 7 weeks of dental surgery on an infected tooth and no other focus was found. The initial episode may have been due to an initial transient bacteremia or possibly paradoxical embolism but the subsequent delayed episodes may have been of cardiac origin. A normal transthoracic echocardiogram cannot completely rule out the possibility of an intracardiac communication allowing right to left shunting and paradoxical embolism.

The third episode of acute septic emboli occurred 7 weeks after dental extraction and may be due to subclinical infective endocarditis despite negative episodes. Each episode was treated with 1 week or less of intravenous antibiotics which may have been insufficient. Transient bacteremia following dental surgery has been reported to occur in 15–55% of cases, the most common organism being viridans streptococci. Amoxicillin is regarded as the most appropriate antibiotic prophylaxis for patients at risk for infective endocarditis after dental surgery. However, prophylactic administration of amoxicillin does not reduce the incidence of postextraction bacteremia and may not affect bacterial cardiac adherence.

Despite amoxicillin prophylaxis in this otherwise healthy patient, septic retinal emboli developed 3 weeks after the dental procedure. Focal metastatic endophthalmitis, if treated with appropriate antibiotics, has an excellent prognosis with a minor permanent ocular changes. Our patient maintained an excellent visual acuity of 6/5 in both eyes but scotoma persisted corresponding to ischaemic retina distal to these emboli despite appropriate antibiotic therapy. Despite the lack of supporting evidence, the possibility of subclinical infective endocarditis cannot be excluded to account for recurrent septic retinal emboli following dental surgery in this patient.

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An unusual corneal injury

**EDITOR—**Most thermal injuries to the cornea are superficial and tend to heal rapidly but deeper sight-threatening burns may occur when energy is directed between the heat source and the cornea occurs. New methods of demolition using an exothermic chemical reaction to crack stone and reinforced concrete are becoming increasingly popular. We present a man who sustained severe bilateral thermal corneal burns following exposure to such a chemical.

**CASE PRESENTATION**

Mr JP presented with bilateral corneal injuries and hand movement vision in both eyes. One hour earlier a tube of 'Betanomit' had exploded into his face.

Betanomit, a 'non-explosive' cracking agent is a mixture of calcium oxide, silicon oxide, aluminium oxide, magnesium oxide, which when hydrated forms calcium hydroxide in an exothermic reaction. During normal use it is mixed with water and poured into drill holes of specific diameter and meter. The mixture then expands and pressures of up to 9000 tonnes/m² develop, fracturing the surrounding concrete/stone.

The patient had dense white corneal opacities in both eyes and the corneal endothelium was intact (Fig 1). Similarly, there were multiple patches of pale conjunctiva. The face and lids were unharmed. He immediately underwent bilateral anterior vitrectomy and the plastic material was removed from the fornices. The pH was not lowered; nevertheless, the initial clinical impression was of severe bilateral
alkali injuries with the expected poor prognosis. The patient was therefore started on intensive antibiotic, citrate, dexamethasone, with regular antibiotics and mydriatics.

On re-examination 24 hours later the corneal opacities had enlarged slightly but subsequently remained unchanged. The cornea re-epithelialised over the following week (Fig 1), and 1 month later, when the eye was stable he underwent a successful left penetrating keratoplasty (Fig 3). Histology demonstrated a deep stromal scar consistent with an exothermic reaction (Fig 4).

In our case fragments of Betonamit penetrated into the corneal stroma leading to full thickness scarring. The patient was looking down to examine the drill hole, in this way the upper and central cornea in each eye were most affected by the explosion.

The discrete pattern of corneal damage suggested that thermal damage was the main cause of corneal damage. Particulate matter penetrated the cornea and remained in contact during the exothermic reaction. Alkali injuries tend to produce a diffuse corneal reaction with delays in corneal epithelialisation as a result of permanent metabolic changes in the limbal epithelium. Although the alkalinity of the powder may have contributed to the corneal damage, it was interesting to note that where there was little fluid (such as on the eyelids) there was little tissue damage.

This case illustrates the hazards of using these novel cranking agents, but also the relatively benign course that combined thermal and alkali corneal injuries follow.

**COMMENT**

Vaijapee et al. looked at 59 patients presenting with thermal corneal burns and found that 90% of these injuries occurred at home and involved boiling fluids, matches, or fireworks. In 89% the burn was limited to the epithelial layer and only two needed penetrating keratoplasty. During prolonged exposure to heat (for example, during molten metal injuries), full thickness burns are produced.

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