LETTERS TO THE JOURNAL

Sir,

Chronic Retinal Toxicity due to Quinine in Indian Tonic Water

We describe a case of progressive visual loss following ingestion of excessive amounts of Indian tonic water in a patient unduly sensitive to quinine. Although acute quinine amblyopia is well recognised, there are no reports of chronic toxicity, and we discuss current ideas on the pathophysiology of quinine on the retina.

Case Report

A 46-year-old man noticed increasing visual deterioration and difficulty with night driving over 3 months. His visual acuity measured OD 6/24 OS 6/12 with no refractive error. Pupillary responses and tonometry were normal, but tritanomaly was apparent with the City University colour vision test. Retinal vessels were of normal calibre but each macula exhibited fine stippling shown by fluorescein angiography to be at the level of the pigment epithelium (Fig. 1).

The previous medical history included a period of alcohol abuse successfully treated with disulfiram for 3 years. The patient was non-smoker and his diet appeared satisfactory. For 12 months prior to presentation he was drinking 4 litres of tonic water each day.

Physical examination was normal as was the body mass index. Normal investigations included the following: routine haematology, ESR, autoantibody screen, vitamin B_{12} and folate studies, and routine biochemistry. A random blood alcohol level was negative and CT scanning of the orbits and anterior visual pathways was normal. ELISA testing for HIV was also conducted, and this too was negative. Plasma quinine was detected at 0.5 mg/l (therapeutic range 0.5–8.0 mg/l) 2 days after presentation.

An electrodiagnostic investigation could not be undertaken until some weeks after presentation. The electro-oculogram (EOG) and full field electroretinogram (ERG) were normal, making a generalised retinal disorder unlikely. Pattern ERG showed a normal P50 in each eye but possible diminution of N95 bilaterally. Transient visual evoked responses were abnormally delayed (Fig. 2) and no steady-state response could be obtained.

A diagnosis of quinine toxicity was made on the history and electrodiagnostic evidence for a bilateral retinal disorder. The patient was advised to stop drinking tonic water and there was a steady visual improvement. One month after presentation acuities were OD 6/18 OS 6/6 and within 6 months all visual parameters were normal. A 4 year follow-up has revealed no further episodes of blindness and good intercurrent health.

Discussion

Blindness following quinine ingestion is usually an acute event after deliberate self-poisoning[1] or treatment for chloroquine-resistant *Falciparum* malaria.[2] Visual loss from chronic ingestion of quinine at recommended doses has not previously been described, although a regular daily intake of 120 mg provoked electronystagmographic abnormalities in healthy volunteers, whilst 160 mg produced red/green dyschromatopsia.[3]

Tonic water contains 80 mg/l quinine sulphate and a daily consumption of 4 litres is equivalent to the advised daily dose of quinine for leg cramps (300 mg). Justification for quinine as a toxin relates to its regular intake at therapeutic levels and visual

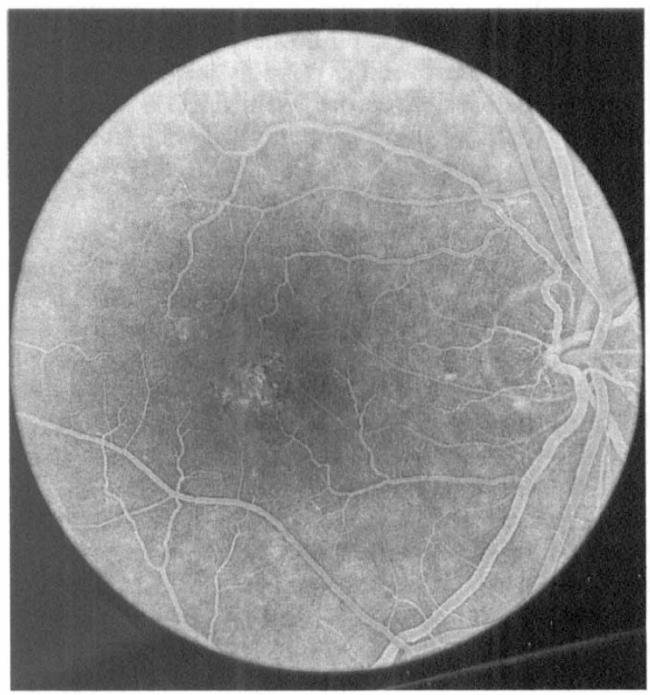

Fig. 1. *Fluorescein angiogram showing fine stippling of the macula at the level of the pigment epithelium.*

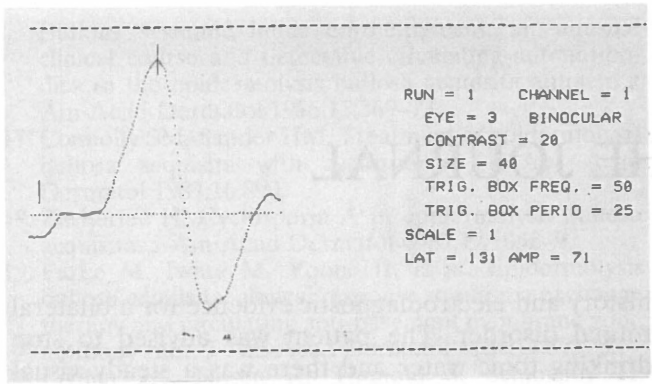

Fig. 2. *Pattern ERG showing abnormally delayed transient visual evoked responses.*

recovery following its withdrawal. There were abnormal electrodiagnostic features possibly indicating outer retinal disease, but no evidence for alcoholic or nutritional amblyopia. The macular abnormalities, possibly at the level of the retinal pigment epithelium (RPE), may represent deposition of quinine. Like chloroquine, quinine binds to uveal tissue *in vitro*[4] and Dekking[5] describes pigmentary abnormalities in a case of acute quinine poisoning.

A carefully documented case[1] of acute quinine toxicity found evidence for an acute direct effect upon the photoreceptor cell layer and outer retina. The decreased light EOG rise in acute poisoning has suggested involvement at the RPE/photoreceptor level, while the initially normal flash ERG implied damage to the ganglion cell layer. Recent case reports[6,7] which review the literature have suggested electrophysiological evidence for damage in all retinal layers. Quinine appears to have deleterious effects at both the RPE/photoreceptor interface (low EOG) and inner retina, possibly at the level of bipolar cells (decreased or absent ERG b wave). In chronic toxicity there appears to be a similar although reversible sequence of effects. We are presuming the macula to be the most sensitive to chronic toxicity as indicated by the abnormal pattern ERG N95 wave and presence of pigmentary macular features. Peripheral retina appears unaffected as shown by the normal flash ERG and EOG (whole retinal responses).

Other causes for visual loss were considered. Tobacco–alcohol amblyopia was unlikely in the absence of measurable plasma alcohol and with normal liver function. Demyelination is unusual in this age group and bilateral optic neuritis extremely rare. Additionally, we felt the time course of blindness was unusually protracted for demyelination and to date there have been no further episodes of neurological deficit.

We conclude that an investigation of blindness must include a careful dietary history and that idiosyncratic sensitivity may occur to commonly well-tolerated substances including quinine.

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Sir,

Argon and YAG Lasers in the Treatment of Ophthalmia Nodosa

We recently published a report on the management of intraocular caterpillar hairs (setae).[1] It has long been concluded that hair removal is of great importance,[2] but this may be difficult and is not without its own complications. We wished to investigate an alternative theory aimed at immobilising the hairs. Samples of the setae removed from the patient were disrupted *in vitro* with argon and YAG lasers and then examined under the electron microscope. Major alteration of the hair structure, likely to impair their continued migration, was seen after treatment with both lasers.

Method

As previously reported, a 15-year-old boy had a live