Figure 2 B scan ultrasound left eye. Note hyperechoic area with acoustic shadowing in the posterior segment suggestive of an intraocular foreign body.

correctly diagnosed by CT scan have been described.⁶

Ultrasonography has been advocated in view of its availability, low cost, and high detection

rates. One study,³ using porcine eyes, reported an overall IOFB detection rate by ultrasound of 93% compared with 40% by plain x ray. Significantly, Bryden *et al*'s detection rate for Perspex was 96%. Localisation is, of course, less accurate and the technique may not be applicable in some acutely injured eyes.

This case emphasises the need for a combined approach using plain x ray, CT, and ultrasound in the complete assessment of a penetrating eye injury where an intraocular foreign body is suspected.

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Crystalline keratopathy from *Dieffenbachia* plant sap

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We report an unusual ocular injury caused by sap of the *Dieffenbachia* plant, in which there is acute keratoconjunctivitis associated with needle-like crystals in the cornea. Diagnosis is made from a history of contact with the sap, as well as by the presence of characteristic crystals.

Case report

A 23-year-old man was cutting bushes of *Dieffenbachia* (Fig 1) when sap squirted into his right eye. He complained of mild irritation which developed, within a few hours, into severe eye pain associated with redness and mild visual blurring. He was initially treated by his general practitioner with chloramphenicol eyedrops, and examined by us on the third day after the injury. At this time, he complained that the redness had not resolved, but he was otherwise asymptomatic.

Visual acuity in the right eye was 6/7.5. There was mild conjunctival injection and chemosis, as well as slight subconjunctival haemorrhage. The corneal epithelium was

intact at the time of examination, but fine refractile needle-like blue crystals were seen within the cornea, extending from the sub-epithelial region to the posterior stroma. These were distributed predominantly in the interpalpebral and inferior cornea (Fig 2). There was no associated corneal oedema or cellular infiltration and no inflammatory activity within the anterior chamber. No abnormality was detected in the uninjured left eye. The eye was treated with a chloramphenicol dexamethasone combination, prescribed 4 hourly.

The patient remained asymptomatic and the injection and chemosis resolved after 1 week. The corneal crystals were noted to disappear spontaneously over subsequent weeks, with no crystals visible 3 months after the injury. There was no residual corneal scarring or neovascularisation (Fig 3).

Comment

The *Dieffenbachia* is a common household plant belonging to the Araceae family. It was

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Figure 1 *Dieffenbachia sequine*.

named after the German physician and botanist, J F Dieffenbach, in 1830, but its toxicity was known as early as the seventeenth century. In fact, its common name, the dumbcane, arose as a result of the painful burning of the mouth it caused when chewed, with excessive salivation and oedematous swelling of the tongue, causing instant 'dumbness'.^{1,2} These dramatic effects made the *Dieffenbachia* a notorious means of torture in the West Indies during the era of the slave trade. It also remains a common cause of plant poisoning today.

The sap has a unique mechanism of causing tissue injury, and has been previously reported to cause severe keratoconjunctivitis.³ In a report by Ellis,⁴ an 8-year-old boy squeezed some sap into his eye and developed severe pain and injection. Needle-like crystals were found throughout the cornea which resolved 2 months after the injury. There was no residual scarring from the episode.

Ellis⁴ was able to reproduce the clinical findings in rabbits by applying a preparation of plant sap on to intact cornea. This resulted in severe conjunctivitis, with fluorescein staining of the cornea within 30 minutes. Crystals were seen in the anterior stroma within 24 hours, reaching the posterior cornea by 48 hours. Partial clearing of crystals was evident on the fifth day, with complete clearing noted after 4–8 weeks. Histological examination of rabbit cornea during the early stages revealed epithelial necrosis, with acute inflammation involving the stroma. The crystals, however, could not be demonstrated as these were dissolved by the staining process.

These crystals have been identified as raphides (needles) of calcium oxalate which are found abundantly in the stems and leaves of the *Dieffenbachia*.⁵ These raphides, measuring up to 250 µm in length, are located within ejector pods known as idioblasts which, when subjected to mild pressure, swell up rapidly

Figure 2 Slit-lamp view showing needle-like crystals in the corneal stroma.

Figure 3 Spontaneous resolution of crystals after 3 months.

and expel the crystals with explosive force. This mechanism has been compared with bullets emerging from a gun⁶ and, together with the rapier-like shape of the crystals, enables easy penetration of oral mucosa and corneal epithelium. This causes mechanical injury to tissues and disrupts the epithelial barrier, allowing penetration of free oxalic acids and plant proteins which result in further chemical injury. The ingenious combination of mechanical and chemical injury contributes to the severity of symptoms in *Dieffenbachia* poisoning, and explains the presence of crystals deep within the stroma.

To conclude, it is important to point out that other members of the plant family Araceae, such as philodendrons, also contain raphides and can cause similar forms of injury, although ocular involvement is rarely reported.

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