INTRAOCULAR CATERPILLAR HAIRS (SETAE): CLINICAL COURSE AND MANAGEMENT

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SUMMARY

Ophthalmia nodosa is a well-documented condition. We present a case in which a live caterpillar was rubbed into a patient's eye and, after relentless penetration of the hairs into the globe, vitrectomy was required. We discuss the differing clinical features of these injuries, the mode of penetration and the treatment options.

CASE REPORT

A 15-year-old male was referred from a general casualty department with a 2 day history of a foreign body sensation in his left eye. On examination he had multiple conjunctival, and superficial and deep corneal foreign bodies (Fig. 1). Closer questioning revealed that he had been on a school field trip at which time a live caterpillar had been rubbed into his left eye and the irritation had continued since then. On the same day, 150–250 of these caterpillar hairs (or setae) were removed under general anaesthetic; one of these setae was later examined under the electron microscope (Fig. 2).

Despite setae being removed on numerous occasions over the next month, a number remained embedded in the cornea and some gradually migrated posteriorly. Four weeks after the initial event, four setae were found in the anterior chamber and a further two were seen in the anterior vitreous. It was noted at the time that the corneal setae had a marked infiltrate around them and there was a mild but persistent iritis.

Because of continuing discomfort, the anterior chamber setae were removed via a superior corneal section 6 weeks after presentation. Initially the anterior chamber remained quiet, with visual acuity at 6/5. One month after the operation, anterior chamber activity had increased with a reduction in visual acuity to 6/9. The situation remained unchanged on topical steroids until 6 months after the injury, when marked vitreous activity was noted. Shortly afterwards one of the vitreal setae became embedded in the retina just beneath the fovea with a surrounding chorioretinitis (Fig. 3). Visual acuity dropped to 6/12 at this point.

The number of vitreous cells gradually increased over the next few months until almost 1 year after the initial event the visual acuity had dropped to 2/60. The patient underwent left pars plana vitrectomy during which numerous vitreal setae were removed, although three at the vitreous base could not be extracted. As well as the inferomacular area, three other areas of peripheral chorioretinitis were seen. Setae were sent for electron microscopic examination (Fig. 4) and some were sent for microbiological investigation (no organisms cultured). Post-operative recovery was unremarkable on topical steroids and mydriatics. The eye has since been quiet with a visual acuity of 6/12 to date.

DISCUSSION

The term ophthalmia nodosa was first used in 1904[1] to describe the granulomatous nodules formed on the conjunctiva and iris in response to caterpillar setae. Since the first report in 1861 by Shon[2] there have been over 50 cases reported; the majority have been caused by caterpillars, but other insects have been involved and even tarantula hairs.[3]

To identify the caterpillar that was the source of our setae we sent the electron micrographs to the Entomology Department of the Natural History Museum (London), which concluded that they were from the family Lymantridae. This family includes the Brown-Tail moth and Yellow-Tail moth, both of which are known to cause urticaria and ocular problems.[4,5] The clinical effects of ophthalmia nodosa vary greatly and a useful classification has been developed by Cadera *et al.*[6]

Type 1: An acute reaction to the hairs consisting of chemosis and inflammation. This begins immediately and can last for some weeks.

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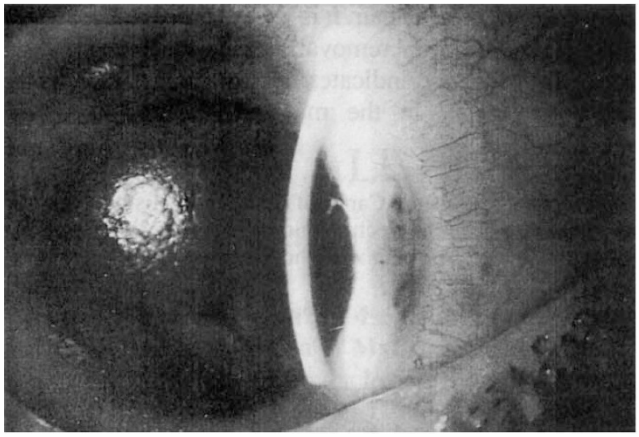

Fig. 1. *Corneal and conjunctival setae at presentation.*

Type 2: Chronic mechanical keratoconjunctivitis caused by hairs lodged in the bulbar or palpebral conjunctiva. Foreign body sensation occurs and linear corneal abrasions are seen.

Type 3: Formation of grey-yellow nodules in the conjunctiva (granulomas). Setae may be subconjunctival or intracorneal and may be asymptomatic.

Type 4: Iritis secondary to hair penetration of anterior segment.

Type 5: Vitreoretinal involvement (10–20%)[7] after hairs penetrate the posterior segment via the anterior chamber or transsclerally. This may occur some years later and effects can range from mild vitritis with or without cystoid macular oedema to a frank endophthalmitis.

Patients can develop some or all of these features[6] and in our patient the relentless progression from one stage to the next can be seen. It would seem that the problems caused

Fig. 2. *Electron micrograph of setae from Fig. 1. Note the direction of the barbs, making removal difficult and facilitating further penetration of the setae.*

Fig. 3. *Fundal picture. One year after implantation of setae, one spine is shown to have reached the retina.*

by the setae are a function of their toxicity and locomotion.[7] Toxicity itself seems to depend on the presence of a foreign body[8] and the effect of released urticating toxins.[8–10] Toxin originates in the venom gland connected to the hair shaft[7,11] and it can easily be seen from the electron micrographs how this is transferred via the hollow shaft. Recently Lamy *et al.*[12] identified the urticating protein of the Pine Processionary caterpillar as thaumetopoein, and there may be a similar protein in other urticating caterpillars.

As far as movement of the hairs is concerned, there have been a number of theories. Gunderson *et al.*[7] suggest that because the setae have no propulsive power of their own, movements of the globe with versions, respirations and pulse together with the constant iris movement propel the spines forward. It can be seen from the electron micrographs that the direction of the spines is vital in this, allowing only forward movements. Ascher[13] suggested that it

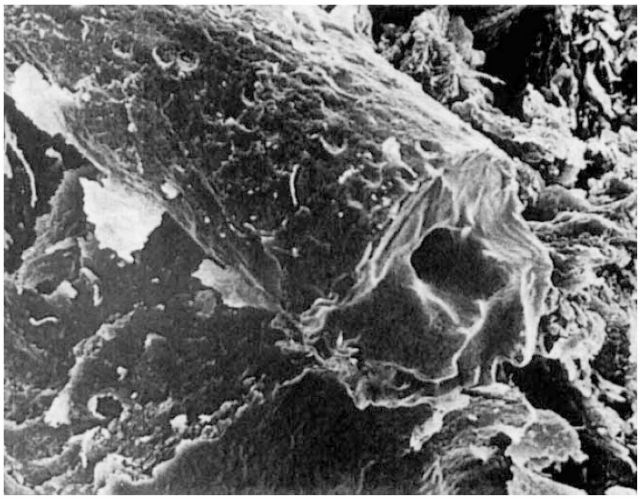

Fig. 4. *Electron micrograph of hair. Vitreal setae removed approximately 1 year after implantation. Note that little degradation has occurred.*

was the inflammatory exudate pushing against the broken end of the hair that allowed it to move along the path of least resistance.

A further factor that determines the depth of penetration is the initial injury. Intraocular involvement generally occurs when the caterpillar has hit the eye with some force, while milder and more superficial reactions usually occur with windblown hairs.[6,7] Treatment may also be based on the classification given by Cadera *et al*.[6] Types 1 and 2 need to be treated by prompt identification and meticulous removal of the setae and this, as in our case, may justify a general anaesthetic. Because of the barbed nature of the setae, excision of a small area of surrounding tissue may be required.[3] Progression to type 3 involves conjunctival granulomas and corneal penetration and this may be treated symptomatically with topical steroids and observation. However, if penetration is occurring removal is indicated: either as a cut-down on top of the hairs or via a corneal section (as in our case). This strategy has previously been shown to be successful.[4] (Penetrating or lamellar keratoplasty has also been suggested in the presence of hair movement, although there are no cases we know of when this has been attempted.) Iritis (type 4) can be treated with topical steroids;[5] free anterior chamber hairs or iris nodules can be removed, the latter using an iridectomy.[10]

Cadera *et al*.[6] suggest that type 5 reactions (vitreoretinal) should be treated with periocular and/or oral steroids depending on the vitritis. They also suggest that vitrectomy should be considered if there is no response to steroids. There have been five cases in the literature involving enucleation after damage from caterpillar hairs.[5,7,11] In our case, chorioretinitis developed around hairs that reached the retina. There was also marked vitreous activity which was successfully managed by vitrectomy. As far as we know, this is the first time that vitrectomy has been used in ophthalmic nodosa.

Prevention is always better than cure. As long ago as 1934 Villard and Dejean[15] emphasised the importance of prophylaxis both in education about the dangerous nature of such accidents, and in avoiding rubbing the eye when an accident has occurred. This undoubtedly still holds true.

In conclusion, caterpillar setae have a direct toxic effect on the eye but long-term damage results from the mechanical penetration of the hair. It is vital to prevent penetration by a meticulous initial removal, repeated as many times as necessary. Our case indicates the potential value of pars plana vitrectomy in the management of ophthalmia nodosa.

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Key words: Caterpillar setae, Chorioretinitis, Ophthalmia nodosa, Vitrectomy.

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