Sir,

Ocular lesions caused by caterpillar hairs

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Caterpillar setae are a well recognised, although uncommon cause of ocular trauma.¹ Following the entry of caterpillar setae into the eye, diverse ocular lesions occur. These include catarrhal conjunctivitis, keratoconjunctivitis, conjunctival nodules, keratitis, iridocyclitis, iris nodules, vitritis, papillitis, or chorioretinopathy.² This can occur due to the mechanical effect of the setae and their penetration or a direct toxic effect.³ Rarely, the damage is severe enough to require enucleation.^{4–6} We report our experience of the clinical features and outcome of ocular trauma caused by caterpillar hairs.

Materials and methods

Table 1 briefly describes the summary of our patients.

Results

Out of 10 patients, six were males and four were females. The age of the patients ranged from 10 to 65 years. Seven patients gave a history suggesting contact with an insect and two gave a history of dust entry. All cases were unilateral and the time of presentation ranged from 1 day to 2 months from the onset of symptoms. Diagnosis was established before referral in only two of the seven referred cases. In one patient, Herpes simplex virus keratitis was the initial diagnosis, although the patient had mentioned than an insect had fallen into that eye.

The right eye was involved in four patients and the left eye in six patients. At presentation, visual acuity was good in all except two patients, one had a vision of 20/80 and the other 20/100. The conjunctival signs included congestion in five, caterpillar hairs in the upper tarsal conjunctiva in five (Figures 1 and 2), hairs in the lower tarsal conjunctiva in one, papillary reaction in three and membrane on the upper tarsal conjunctiva in one. Superficial punctate keratopathy (SPK) was seen in seven patients. In two patients, the SPKs were linear, in three they were diffuse and in the other two, they were localised. Infiltrates were seen in three patients, caterpillar hairs in the corneal stroma were seen in eight patients, hairs that were protruding into the anterior chamber in two, and iridocyclitis or iris granuloma were seen in five patients.

Removal of superficial setae was required in seven cases, where they were present in the tarsal conjunctiva and superficial cornea. In one patient (Patient no. 8), hairs were removed four times, whenever the setae resurfaced.

Figure 1 Slit-lamp view of the upper tarsal conjunctiva showing congestion and caterpillar setae.

Figure 2 Higher magnification of the same eye showing the setae.

The medical treatment offered included topical steroids, lubricants, antibiotics, and cycloplegics. The follow-up of the patients ranged from 14 to 172 days. All patients had a visual acuity of 20/20, except one, who had corneal scar and trace posterior subcapsular cataract. At the last follow-up, conjunctival congestion was seen in eight patients, corneal scar in three patients, hairs in the deep stroma in three patients, while infiltrates persisted in one and SPKs in four patients.

Discussion

The first report of this nature caused by caterpillar setae was published by Schön in 1861.⁷ The entire spectrum of the clinical findings was designated as ophthalmia nodosa by Pagenstecher in 1883.⁸ After being variously renamed, as pseudotuberculosis (Wagenmann, 1890) and pseudotrachoma (Schmidt Rimpler, 1899), it was again renamed as ophthalmia nodosa by Saemisch (1904).⁹

Table 1 Clinical features of ocular lesions caused by caterpillar hairs in 10 patients

Age/ sex	Occupation	History	Duration of symptoms	Referral Diagnosis	Eye affected	VA	Lid involvement	Conj. signs	Corneal signs	Treatment	Follow-up	VA at LFU	Findings at last follow-up
F/32	House wife	Dust entry	15 days	—	OD	20/20	—	Congestion	SPKs Corneal setae Peripheral infiltrate. Caterpillar hairs in anterior chamber. Flare and cells +.	Topical steroid Cycloplegics	LTFU		
M/65	Construction worker	Insect fall	10 days	Iridocyclitis	OS	20/80	—	Congestion	Hairs in stroma Superficial three setae Iridocyclitis	Superficial hairs removed Steroids, lubricants, Cycloplegic	211days	20/50	Trace congestion Central corneal scarring Trace PSC
F/28	House wife	Insect fall	2 months	—	OS	20/20	Severe lid oedema	UTC papillae Congestion	2 anterior stromal setae Surrounding cellular infiltrates. Iris granuloma	Setae removed Steroids Cycloplegics	30days	20/20	Trace congestion Mild deep stromal haze Caterpillar hairs in stroma
M/22	Student	Insect entry	20 days	Viral infection on acyclovir	OD	20/20	—	Congestion	Six intrastromal setae within filtrates Iridocyclitis	Steroids, cycloplegic	34 days	20/20	Congestion, SPKs Cellular infiltrates
F/21	House wife	Insect hair entry	20 days	Foreign body	OS	20/20	—	Congestion	Five caterpillar hairs, diffuse SPKs, Hair protruding into anterior chamber AC reaction	Superficial hairs removed. Topical steroids, antibiotic, cycloplegic	572 days	20/20	Quiet eye, SPKs inferiorly Two deep stromal hairs
F/33	House wife	Caterpillar hair	2 months	Multiple corneal infiltrates	OS	20/25	—	UTC three hairs	Linear SPKs Two caterpillar hairs on cornea- anterior surface	Hairs removed Topical anti- biotic steroid	14 days	20/20	Congestion Corneal scar
M/10	Student	Photophobia	1 month	Caterpillar hair	OS	20/20	—	UTC, LTC five hairs +	Diffuse SPKs Hairs embedded in stroma	UTC/LTC Hairs removed Antibiotic, steroids Deep stromal setae could not be removed	LTFU		

Table 1 (Continued)

Age/ sex	Occupation	History	Duration of symptoms	Referral Diagnosis	Eye affected	VA	Lid involvement	Conj. signs	Corneal signs	Treatment	Follow-up	VatLFTU	Findings at last follow-up
M/25	Commando trainee	Insect fall	4 days	—	OD	20/20	—	UTC three hairs membrane in upper tarsus	Linear SPKs	Hairs removed topical steroid antibiotic Hairs removed four times	172 days	20/20	SPKs inferiorly
M/35	Business	Dust entry	1 day	—	OD	6/6P	—	Papillae +	Diffuse SPKs caterpillar hairs—three superficial, three deep in inferior cornea	Superficial hairs removed. Topical steroids, lubricant, antibiotic, cycloplegic	34 days	20/20	Congestion SPKs
M/16	Student	Caterpillar hair	3 days	Caterpillar hair	OS	20/100	—	Papillae two + UTC four hairs	Diffuse SPKs three hairs in anterior stroma	Corneal + UTC hairs removed topical steroid, antibiotic, lubricant two superficial hairs removed	14 days	20/20	Congestion SPKs superiorly Hair in stroma

OD = right, OS = left, VA = Visual acuity, UTC = upper tarsal conjunctiva, LTC = lower tarsal conjunctiva, LFTU = lost to follow-up, SPK = superficial punctate keratopathy

Histopathology of the lesions shows typical granulomatous reaction to a chemical irritant. The setae are surrounded by lymphoid cells, macrophages, and epitheloid cells surrounded by a thick fibrous capsule, hence the name.

The various types of caterpillars incriminated are representatives of *Lasiocampa/Bombyx*, *Enethocampa*, and *Liparida*.² Depending on the life cycle of the caterpillar, keratoconjunctivitis has a seasonal incidence in autumn. Contact with caterpillar setae can be through direct contact with caterpillars, contact with the larval cocoon into which setae may be shed and interwoven, contact with adult *Lepidoptera* that may carry larval setae on their bodies, direct reaction to adult setae and borne wind setae.⁸

In some cases, the hairs are unarmed, but often they are barbed and covered with imbricated cells. Scanning electron microscopy observation of removed setae revealed that each setae had spines directed towards the tip, allowing only tip-ward penetration.¹⁰ This also makes removal difficult, especially from the basal side. The deep penetration of setae is suggested to be related to the movement of the globe with versions, respiration, and pulse together with constant iris movement, which propels the spines forward; the setae themselves do not have any propulsive power.⁵ Ascher¹¹ suggested that an inflammatory exudate pushed against the broken end of the hair, allowed it to move along the path of least resistance. Another factor that determines the depth of penetration is the initial injury.³ Toxicity due to caterpillar setae depends on the presence of the setae as well as the effect of released urticating toxins.^{10,12,13}

The spectrum of ocular pathology caused by caterpillar setae was classified by Cadera *et al*¹⁴ as follows:

- Type 1 Acute toxic reaction. Exposure time of 15 min. Lasts for days to weeks. Chemosis, inflammation, epiphora, foreign-body sensation.
- Type 2 Chronic mechanical keratoconjunctivitis (hairs in bulbar/palpebral conjunctiva). Foreign body sensation is relieved by removal of hairs. Cornea shows linear scratches adjacent to the hair.
- Type 3 Grey yellow nodules (granulomas) under conjunctiva. Patient may be asymptomatic.
- Type 4 Intense iritis, sometimes with formation of iris nodules. Hairs in anterior chamber. May cause intralenticular foreign bodies.

Type 5 Vitreoretinal involvement—early or late. Can enter either through the anterior chamber – iris – lens or by transcleral migration. May cause vitritis, cystoid macular edema, papillitis, or endophthalmitis.

Majority of patients belong to type 1 or 2¹²

Based on this classification, the suggested treatment modalities include the following:

Type 1/2 Irrigation followed by meticulous removal of setae. Topical antibiotics and steroids.

Type 3 Surgical excision of nodules.

Type 4 Topical steroids ± iridectomy for nodules or operative removal of setae.

Type 5 Local ± systemic steroids. Resistant cases—vitrectomy with removal of setae.

In 1934, Villard and Dejean¹³ 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.

The present study also had a majority of patients with type 1 and 2 involvement and few with type 4 involvement, which were managed accordingly. None of the patients with setae protruding into the anterior chamber had such an intense reaction to warrant surgical intervention. Other than the recrudescences caused by intraocular presentation or surfacing of the setae, no major vision-threatening consequences were encountered. Posterior segment involvement by setae is a known complication,¹⁴ but none of our patients showed such a manifestation.

Based on this series, we feel that in patients with unilateral redness, we need to look carefully in the upper and lower tarsal conjunctiva for setae. Caterpillar hairs can cause papillary reaction and membranes. In patients with unilateral redness and associated localised or linear SPKs, the clinician should suspect the presence of a foreign body in the upper tarsal conjunctiva including caterpillar hairs. Caterpillar hairs can also cause corneal infiltrates and in patients with multiple infiltrates with no obvious cause, caterpillar hairs should be considered in the differential diagnosis. Once the superficial setae are moved, the patient should be re-evaluated, as deeper setae may resurface after the surface inflammation subside. This occurred in one patient in this series. The other interesting feature in this series is that at the last follow-up, conjunctival congestion, although mild, was seen in a majority of patients, suggesting that persistence of caterpillar hairs may

cause continued ocular inflammation. Therefore, every attempt should be made to ensure total removal of caterpillar setae.

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