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Corneal Inflammation From Pine Processionary Caterpillar Hairs

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Purpose: Hairs from the caterpillar of the pine processionary moth, *Thaumetopoea pityocampa*, located in the pine forests of southern Europe and elsewhere, can become embedded in the cornea and conjunctiva. Disorders produced by the urticating hairs can be classified into a broad spectrum of severity from mild keratoconjunctivitis to anaphylactic shock. This report presents 3 cases that illustrate the range of corneal responses to embedded hairs of the processionary moth caterpillar.

Methods: Case series and review of the literature.

Results: A 51-year-old man (case 1), a 46-year-old woman (case 2), and a 67-year-old man (case 3) presented different manifestations as a result of contact with pine processionary caterpillar hairs. Case 1 had an acute keratitis with decreased vision. He was treated with a corneal depot steroid 4 times daily for 3 months. After 4 months, he was asymptomatic. Case 2 had an acute keratitis without vision symptoms. She was released without treatment, and 1 month later she was asymptomatic. Case 3 experienced dry gritty sensations, probably because of blepharitis, but also presented asymptomatic caterpillar hairs embedded in the corneal stroma. He was instructed regarding lid hygiene for his blepharitis, and after 3 months the embedded caterpillar hairs had disappeared.

Conclusions: The most common ocular presentation of embedded hairs from the pine processionary moth caterpillar is keratitis. The urticating hairs can cause corneal infiltrates that disappear progressively over time. Steroid eye drops accelerate the resorption of these infiltrates.

Key Words: keratitis, pine processionary, *Thaumetopoea pityocampa* (Cornea 2012;0:1–4)

The pine processionary moth (*Thaumetopoea pityocampa*), especially the caterpillar stage, is one of the best known of all processionary lepidopterans. It is widely distributed in

pine forests of warmer regions in southern Europe, the Near East, and North Africa.¹ It can also be found in other locations, such as roadside plantings, housing estates, or gardens, and wherever pine trees are present. The term “processionary” refers to the behavior by which the caterpillar travels over the ground in long head-to-tail processions. It has been described as one of the most destructive of forest insects, capable of defoliating vast tract of pines during its episodic population surges. The caterpillar has a unique defense mechanism that consists of multiple urticating hairs surrounding its body. Contact with the hairs causes skin rashes and ocular complaints associated with a broad spectrum of disorders.^{2,3} Of the 11,000 emergency patients seen each year at our hospital, approximately 50 (0.45%) patients have some kind of ocular involvement because of the pine processionary caterpillar. Of these ocular presentations, 3 are the most common: keratitis with and without visual impairment and isolated caterpillar hair embedded in the corneal stroma.

The aim of this study was to describe the ocular involvement associated with pine processionary caterpillar hairs and the more common presentations. For that, we present 3 case studies that represent each of these representative conditions.

MATERIAL AND METHODS

Three representative patients with ocular responses to pine processionary caterpillar exposure seen at the Emergency Service of the Hospital Clínico Universitario de Valladolid, Valladolid, Spain between September and November 2010 were included. Each patient signed an informed consent to be included in this study, and each was treated following the tenets of the Declaration of Helsinki.

RESULTS

Case 1

A 51-year-old male pinecone harvester was transported to the Hospital Clínico Universitario de Valladolid because of a sudden foreign body sensation in both eyes (OU). The patient presented decreased visual acuity (right eye 20/40 and left eye 20/30), red eyes, itching, and urticarial periocular dermatitis OU. Slit-lamp examination revealed a keratitis and stromal affection secondary to caterpillar hairs embedded in both corneas (Fig. 1). He was treated with topical fluorometholone 0.1% (FML; Allergan, Inc, Irvine, CA) 4 times daily for 3 months. Four months after starting treatment, the patient was asymptomatic and without any sign of the keratitis.

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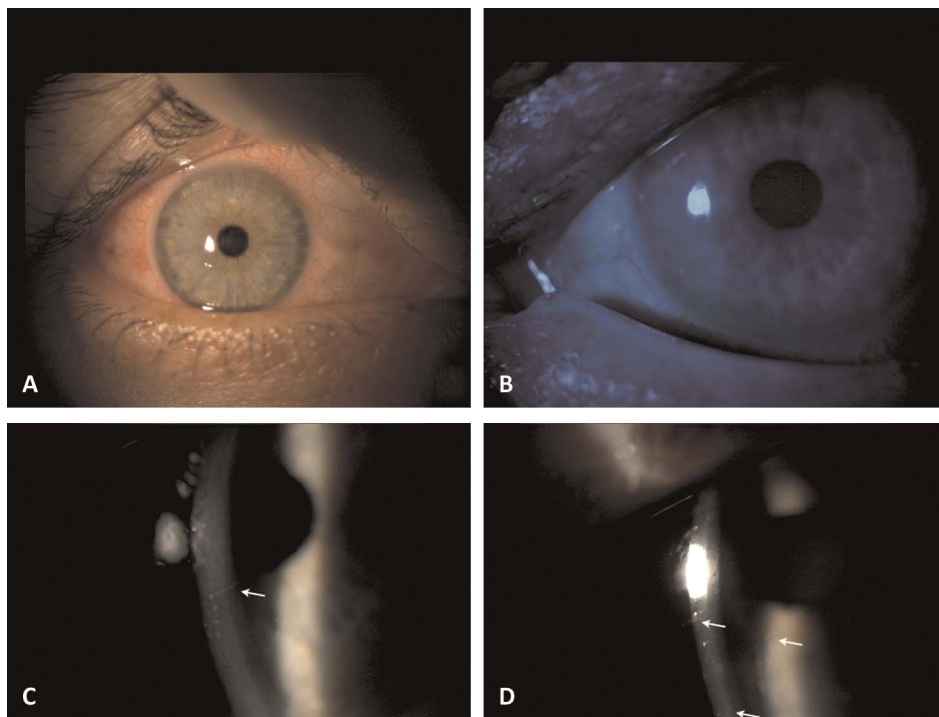


FIGURE 1. Case 1. A, Right eye showing perikeratic injection. B, Left eye showing inferior superficial punctate keratitis with positive fluorescein staining. C and D, Higher magnification, slit-lamp images of the cornea, showing the caterpillar hairs (white arrows).

Case 2

A 46-year-old female office worker felt grittiness OU after experiencing a gust of wind while walking near a pinewood forest. Although visual acuity was OU 20/20, there was a mild peripheral epithelial keratitis OU. As observed by slit-lamp microscopy, presumed pine processionary caterpillar hairs were observed embedded in the stromal areas of both eyes. Inflammatory infiltrates were associated with the hairs (Fig. 2). She was released without treatment, and 1 month later she was asymptomatic.

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through a pinewood area recently, but acknowledged to have been harvesting pinecones 5 months preceding the emergency room visit. At that time he was without any ocular symptoms. The patient was advised to begin standard blepharitis treatment, including lid hygiene. After 3 months, the hairs were no longer present.

For each of these 3 patients, we did not find any evidence of intraocular penetration of the caterpillar hairs. In all of these cases, the disease was limited to ocular surface. No side effects secondary to the treatments were observed in any patient.

Case 3

A 67-year-old retired man went to the emergency service because of grittiness and dryness sensations in his right eye. Examination did not reveal redness or visual involvement. However, there was a seborrheic blepharitis OU, and several presumed caterpillar hairs were embedded in the corneal stroma OU (Fig. 3). The patient denied having been around or

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DISCUSSION

There are several stages within the life cycle of the pine processionary moth, but only during the caterpillar phase is it dangerous for humans.¹ The caterpillars with the defensive urticant hairs appear around September and progressively increase in numbers through January to May, depending on

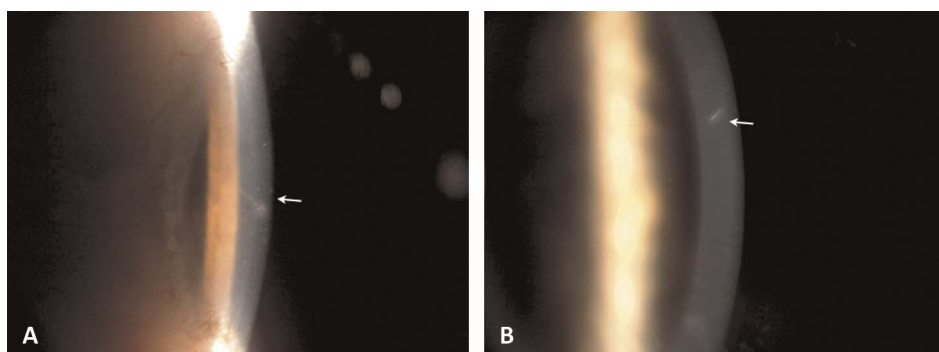
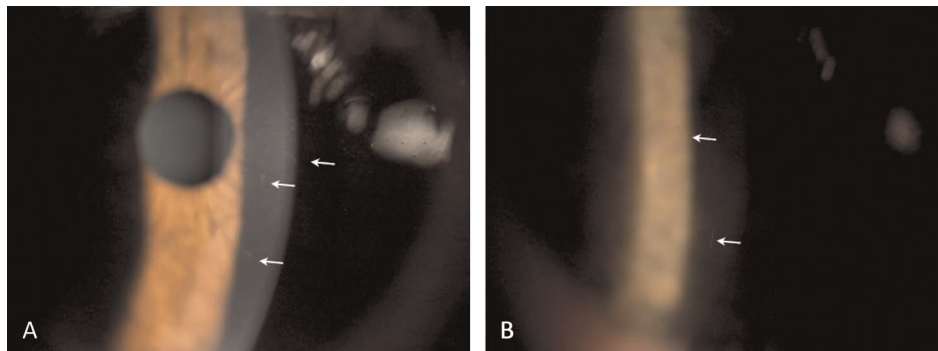


FIGURE 2. Case 2. Presumed caterpillar hairs (arrows) with inflammatory infiltrates were present in the stroma: (A) right eye; (B) left eye.

FIGURE 3. Case 3. Presumed caterpillar hairs (white arrows) without stromal infiltrates. A, Right eye; B, left eye.



the climatic conditions of the area.⁴ Each caterpillar may develop up to 1 million of these hairs. The hairs can become airborne and be detected on pollen collectors.^{5,6} Microscopically, the hair is characterized by multiple small spines directed outward, able to prick the ocular surface, including the corneal stroma, and they are capable of penetrating into the eye. The hairs may produce different acute disorders such as allergic keratoconjunctivitis or, in the extreme case, even anaphylactic shock.⁷ However, it may also be responsible for insidious disorders such as keratitis secondary to embedment in the cornea or vitritis due to endophthalmitis.⁸

From the first descriptions by Reaumur in 1736 and later by Fabre⁹ in 1900,⁹ the symptomatology was thought to be caused by only a toxic irritating mechanism of the urticant hairs. However, some authors demonstrated the existence of an allergic hypersensitivity mechanism mediated by immunoglobulin E (IgE) in a high percentage of reactions.^{4,7,10} Several proteins, most with molecular weights of 13, 15, and 17 kDa are responsible for the allergic reaction.

Pinecone or resin harvesters, farmers, woodcutters, and stockbreeders are the most frequently and seriously affected workers because of a very heavy exposure to the caterpillar. Direct contact may produce several conditions that can manifest as either an immediate hypersensitivity or a delayed hypersensitivity of either the ocular adnexa or the skin.^{11–13} The setae or hairs of other caterpillars^{14–17} and spiders^{18,19} can also become embedded in the cornea. These foreign bodies can cause allergic reactions resulting in the formation of conjunctival or iridial granulomatous nodules referred to as “ophthalmia nodosa.” The absence of the granulomatous nodules in response to embedded pine processionary caterpillar hairs can provide the key to differential diagnosis.

Ocular involvement may or may not be accompanied by dermatological involvement. The caterpillar hairs can produce an acute IgE-mediated contact urticaria, especially on the body extremities. Moreover, the embedded hairs can induce delayed cutaneous reactions that produce small infiltrated papules, papulovesicles, or pustules because of a toxic irritant mechanism that is not mediated by IgE.^{20–22}

The ophthalmological symptomatology can also be separated into immediate IgE-dependent and delayed hypersensitivity processes. The IgE-mediated process generally produces red eye, punctuate keratitis, and itchiness on the ocular surface. As with the skin, the delayed corneal reactions are produced in response to the embedded caterpillar hairs.

The reaction appears as stromal infiltrates around the hairs days after contact. These infiltrates are similar to subepithelial infiltrates characteristic of viral keratoconjunctivitis. They surround the hairs progressively causing the patient to have different symptoms depending on the corneal area involved. Central corneal involvement causes worsening visual symptoms and/or photophobia.²³ However, with only a peripheral involvement, the patient does not usually state any visual complaint.

The acute allergic process can be controlled by anti-allergic drugs such as eye drops or systemic medication depending on the grade of systemic involvement. In our experience, the patients admitted to the Ophthalmology Department do not usually need systemic treatment, but we keep in mind the possibility of more serious consequences secondary to an acute reaction. The form of ocular presentation most frequently seen is keratitis secondary to caterpillar hair embedded within the cornea. These urticating hairs cause corneal infiltrates that disappear progressively over time. During that process, steroids may be used for speeding up the resorption of these infiltrates to relieve visual symptoms that interfere with daily life. Steroid eye drops with a corneal depot effect may be most effective. Obviously, the patient must be monitored closely during treatment to avoid possible side effects.

More severe intraocular sequelae associated with pine processionary caterpillar hairs have been reported. Intravitreal inflammation and retinochoroiditis cases have been treated successfully with intravitreal triamcinolone acetonide injections,²⁴ oral steroids,²⁴ or vitrectomy in severe cases.^{8,25,26} Removal of hairs has been proposed in anterior chamber inflammation.²³ Some authors report that the removal of intra-corneal hairs significantly reduces the risk of intraocular penetration,²⁴ and in some cases this has been achieved with Nd:Yag or Argon laser treatment.²⁷ However, we have not found any case of intraocular penetration of urticating hairs over the past 30 years, and all our patients healed successfully with or without medication. For this reason and because physical removal of the small hairs risks inducing mechanical trauma to the cornea, we do not recommend removal of the intra-corneal hairs.

In summary, urticating hairs of the pine processionary caterpillar can become embedded in the peripheral or central cornea and cause symptoms ranging from discomfort and redness to reduced vision, depending upon the location of the

hairs. Because of the minute size of the hairs, efforts to physically remove them are likely to do more harm than good. When necessary, because of the loss of visual acuity, topical corneal depot steroids can be applied. Antiallergic medication may provide relief from periocular edemas or skin urticating lesions. The condition tends to be self-resolving over a period of weeks or months, with symptoms becoming reduced over time. We have initiated a consecutive case-controlled study to compare steroid-treated patients with placebo medication.

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