

Systemic Allergic Reaction to Tree Processionary Caterpillar in Children

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Abstract: Contact with the tree processionary caterpillar or ingestion/inhalation of its airborne toxin-containing hairs and spines may cause a direct histamine-releasing or IgE-mediated allergic reaction in humans. The most common manifestations are urticaria and dermatitis; systemic manifestations such as respiratory involvement and anaphylaxis have been reported mainly in foresters. We describe a 12-year-old child who was presented to the emergency department with systemic allergic reaction (pruritic rash, conjunctival hyperemia, dyspnea, and wheezing), which eventually proved to be due to exposure to the pine tree processionary caterpillar. The diagnosis was made only after the child's repeated exposure to the caterpillar. Tree processionary caterpillar should be added to the list of causes of systemic allergic reactions in children, especially in endemic areas, and medical staff should be alerted the range of clinical manifestations to ensure prompt diagnosis and treatment.

Key Words: caterpillar, allergy

Caterpillars are the wormlike, larval forms of butterflies and moths of the insect order Lepidoptera. Most are herbivores, and they are among the most common insects found grazing on plants. There are more than 165,000 species of caterpillars worldwide, from more than 80 families. Although most caterpillars are dangerous-looking and often brightly colored, they pose very little threat to humans. Caterpillars from only approximately 12 families throughout the world are capable of inflicting serious human injuries.¹

Caterpillars have evolved unique systems of protection from predation, including mimicry, foul scent-producing glands, and proteolytic and histaminergic venoms. Caterpillar venoms are produced by hypodermal, glandular, and epithelial cells, circulated in the hemolymph, and stored in the external tegument, tubercles or scoli, and urticating hairs or spines.²

Processionary tree caterpillars (subfamily: Thaumetopoeidae) are communal deforesters of acacia, eucalyptus, oak, pine, fruit, and ornamental tree forests. They are aptly named because they queue and meander single-file, head to tail, often following a trailing silk thread, and moving in concert like a freight train.¹ Exposure to processionary tree caterpillars can cause an allergic reaction in humans. Contact urticaria and

contact dermatitis are the most common manifestations.^{3,4} Systemic reactions due to inhalation/ingestion of the caterpillar's airborne toxin-containing hair and spines occur less frequently and have been reported mainly in foresters.^{5,6}

We describe a child who was presented at our emergency department with a systemic allergic reaction that later proved to be due to exposure to pine tree caterpillar. The literature on systemic allergic reactions to the processionary caterpillar in children is reviewed. We emphasize the importance of the recognition of this often unfamiliar medical entity by clinicians in the emergency department.

CASE

A healthy 12-year-old boy was presented during springtime with a pruritic rash on the face and neck accompanied by tightness and itching of the throat and conjunctival hyperemia. He had no history of allergic diseases and denied drug intake or insect sting. Vital signs, oxygen saturation, and chest radiograph findings were normal. The rash was alleviated with systemic corticosteroid and antihistamine treatment. The discharge diagnosis was acute allergic reaction, cause unknown.

The next day, the patient returned with a reappearance of the rash and swelling, this time over his entire body, in addition to dyspnea and wheezing on auscultation. At this point, he recalled that both times, his symptoms occurred soon after his attempt to extract a caterpillar nest from a pine tree. Treatment with bronchodilators, systemic corticosteroids, and antihistamines led to gradual improvement. The boy was discharged with instructions to continue treatment at home and to avoid contact with pine trees.

Follow-up at the allergy clinic revealed mild eosinophilia (800/mm³) but normal serum IgE level (52 IU/mL) and no evidence of specific IgE antibodies against various aeroallergens including pine tree pollen and food allergens. Fiber-optic examination, performed because of persistent inspiratory dyspnea despite normal lung function findings, showed mild vocal cord edema. The dyspnea resolved with inhaled steroid treatment.

Two other boys exposed during the same episode had only a mild pruritic rash.

DISCUSSION

Processionary pine caterpillar envenoming may occur throughout the year but mainly during late winter and spring.¹ Our review of the reported systemic reactions in children from Europe, Turkey, and Israel (Table 1)⁷⁻¹² revealed diverse clinical manifestations involving the skin (dermatitis, urticaria, and angioedema) and the respiratory (rhinitis, pharyngitis, cough, wheezing, dyspnea, and bronchoconstriction), ophthalmic (conjunctivitis), and gastrointestinal (vomiting and abdominal pain) systems. Some authors also described anaphylaxis in some cases,¹⁰ and 1 patient required intubation because of severe facial edema.¹² The

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TABLE 1. Review of Systemic Reactions to Processionary Caterpillars in Children

Year (Reference)	Geographic Area	No. Patients	Age	Clinical Symptoms	Treatment	Remarks
1988 (Finkelstein et al ⁷)	Israel	1	4 years old	Intermittent vomiting for 7 hours; painful, swollen, and itching palms; facial flush (described as erucism)	Antihistamines	Exposure: contact with pine <i>Thaumetopoea wilkinsoni</i> caterpillar
1999 (Kozier et al ⁸)	Israel	3	10 to 16 years old	Pain and swelling of limbs, papular and urticarial rash, and crampy abdominal pain	Oral antihistamines (hydroxyzine)	Exposure: playing with <i>T. wilkinsoni</i> caterpillars in pine woods
2003 (Maier et al ⁹)	Western suburbs of Vienna (Austria)	57	Young children	Pruritus, dermatitis, conjunctivitis, pharyngitis, and respiratory distress		Conclusion: lepidopterism caused by oak <i>Thaumetopoea processionea</i> is a public health problem in certain areas
2006 (Fuentes Aparicio et al ¹⁰)	Spain	16	6 to 15 years old	Urticaria, angioedema, dyspnea, dry cough, rhinitis, wheezing, and anaphylaxis		Specific IgE antibodies to pine caterpillar extract were found in all patients
2006 (Gottschling and Meyer ¹¹)	Southwest Germany	5	Young children	Itching, rash, Quincke edema, dyspnea bronchoconstriction, cough, and wheezing	Antihistamines, topical/systemic steroids	Playing with oak caterpillar
2006 (Inal et al ¹²)	Turkey	1	15 months old	Facial and tongue swelling and respiratory distress	Tracheal intubation	Pine caterpillar was found on his tongue while sleeping under a pine tree
2006 (present study)	Israel	1	12 years old	Rash, angioedema, conjunctivitis, dyspnea, and wheezing	Antihistamines, bronchodilators, and systemic corticosteroids	Exposure: contact with pine caterpillar

various clinical manifestations often overlapped or appeared in combination.

In our patient, the respiratory symptoms was probably attributable to repeated exposure because of the delayed diagnosis.

Reactions to processionary pine caterpillars may be caused by direct contact or by ingestion and inhalation of airborne urticating hairs or spines.¹ Their pathophysiology was considered to be mediated by a toxic protein contained in the caterpillar hairs, namely thaumetopoein, which induces the release of histamine in a direct non-IgE-mediated mechanism of action.¹³ Several authors have identified the presence of a specific IgE directed to an 18-kDa allergen and to a protein of molecular weight more than 45 kDa.¹⁴ Recently, a 15-kDa IgE-binding protein was isolated from crude larval extract of *Thaumetopoea pityocampa*, which may be a subunit protein of thaumetopoein.¹⁵

Evidence for an IgE-mediated reaction was documented in 16 children who experienced allergic reactions after exposure to pine processionary caterpillar. All the patients had positive reactions on skin prick tests with the caterpillar extract. Western blot analysis showed several IgE-binding bands with molecular mass values ranging from 17.5 to 168 kDa.¹⁰

In the present patient, skin prick test with caterpillar extract was not performed, but there was a clear history of exposure to pine tree caterpillar shortly before symptoms began (twice), and no other allergic causes could be identified clinically or by skin prick tests.

The treatment of reactions to pine tree caterpillar is entirely supportive.¹ The area should be immediately washed with water to remove toxic hemolymph and any loose urticating hairs, and let to air-dry or dried with a hair dryer (no-touch). If the toxin persists in the eye, it may ultimately lead to uveitis and reduced visual acuity.¹⁶ The site is then stripped with cellophane or, preferably, adhesive duct tape, swabbed with isopropyl alcohol or ammonia, and covered with an ice pack. Topical or oral antihistamines or corticosteroids may be administered; if the reaction is severe or prolonged, their intramuscular injection may be indicated. In individuals who react with systemic allergic reaction including bronchospasm and wheezing on exposure to aerosols containing urticating hairs from processionary caterpillars, the treatment consists of intramuscular epinephrine, nebulized bronchodilators, and oxygen supplementation.¹

In conclusion, the tree processionary caterpillar should be added to the list of causes of acute systemic allergic reaction in children, especially during springtime and in

endemic areas. Medical staff should be alerted to the range of clinical manifestations to ensure prompt diagnosis and treatment, and patients should be instructed to avoid reexposure. Better education of the public could reduce morbidity.

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