

Papules, pustules, and rhinoconjunctivitis in a 4-year-old



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A 4-year-old female presented with rhinitis, lower eyelid erythema, and 2 weeks of pruritic pink papules that developed throughout the day. She recently recovered from conjunctivitis of the right eye and was noted to sleep with stuffed animals in bed and a fluffy blanket over her face. Her family had no similar findings. She did not develop papules on vacation recently, yet upon returning, new papules appeared the next morning. There were several edematous pink papules, some with a central pustule, on her face and right knee (Fig 1). Examination of the patient's room by an exterminator revealed insect larvae (Figs 2 and 3).

Question 1: Based on this patient's history and presentation, what is the most likely etiology/diagnosis?

- A. Flea bites
- B. Head louse bites
- C. Mosquito bites

- D. Dermestid dermatitis
- E. Bed bug bites

Answer:

A. Flea bites – Incorrect. Flea bites typically localize to exposed areas on lower extremities. The family had no risk factors for fleas in the

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home such as indoor pets. The exterminator did not identify fleas in the home.

B. Head louse bites — Incorrect. Head lice do not have a larval stage, and lice reside on the person. Physical exam did not reveal nits or lice. The patient did not report scalp pruritus.

C. Mosquito bites — Incorrect. The presence of urticarial wheals might indicate mosquito bites, but this patient has papules and pustules. There was no known outdoor biting insect exposure, and no one else in the home was affected. The patient additionally had symptoms of rhinoconjunctivitis.

D. Dermestid dermatitis — Correct. Symptoms isolated to 1 family member point to an individual environmental exposure. The patient slept in close proximity to numerous unwashed stuffed animals that provide a nice environment for dermestid beetles. The setae (hairs) on dermestid beetle larvae can cause mucocutaneous reactions as in our patient. The patient's symptoms resolved within a few weeks once the home was treated by an exterminator for dermestid beetles and her stuffed animals removed from the bed and/or washed on a hot water cycle.

E. Bed bug bites — Incorrect. Bed bug bites do commonly present on the face of children; however, they often present in a breakfast, lunch, and dinner distribution without a central pustule. No similar symptoms were reported by other family members, and the exterminator did not find evidence of bed bugs.

Question 2: In what way(s) can dermestid exposure lead to symptoms?

A. Type 1 IgE-mediated hypersensitivity reaction to larval parts or type 4 delayed hypersensitivity reaction to larval parts

B. *Dermestidae* serve as vectors for a parasite for which humans are hosts

C. Inflammatory reaction/physical trauma from dermestid bites

D. Envenomation from stinging hairs (setae) of dermestid larvae

E. Protective dust (microscales) coating the wings of adult *dermestidae* rubs off onto contacted surfaces, for example, fingers, when handling the insects wherein it is highly irritant both on contact and with inhalation

Answer:

A. Type 1 IgE-mediated hypersensitivity reaction to larval parts or type 4 delayed hypersensitivity reaction to larval parts — Correct. Dermestid larvae have rows of easily detachable hairs called setae. It is unknown whether mechanical penetration of the skin or interactions between the human immune system and highly allergenic chitin comprising the setae are responsible for manifestations from dermestid exposure.¹ In type 1 reactions, symptoms typically occur immediately upon exposure to the allergen and often include allergic rhinitis, asthma, and urticaria. In type 2 reactions, symptoms typically occur 2 to 3 days after exposure to the allergen and often manifest as allergic contact dermatitis type eruptions.

B. Dermestidae serve as vectors for a parasite for which humans are hosts — Incorrect. *Dermestidae* do not harbor known human parasites

C. Inflammatory reaction/physical trauma from dermestid bites — Incorrect. *Dermestid* larvae and beetles do not bite humans.

D. Envenomation from stinging hairs (setae) of dermestid larvae — Incorrect. *Dermestid* larvae do not have envenomated setae.

E. Protective dust (microscales) coating the wings of adult *dermestidae* rubs off onto contacted surfaces, for example, fingers, when handling the insects wherein it is highly irritant both on contact and with inhalation — Incorrect. There is no known microscale coating on *dermestidae*.

Question 3: Which of the following is the most appropriate management for this patient?

A. High potency steroid applied as needed to lesions

B. Skin patch and/or prick testing

C. Begin daily diphenhydramine

D. Implementation of regular house cleaning measures including thorough vacuuming

E. Regular desensitization protocols using extracts prepared from adult and larval dermestid parts

Answer:

A. High potency steroid applied as needed to lesions — Incorrect. This will reduce inflammation and pruritus, but the lowest effective potency should be used for symptomatic relief.

B. Skin patch and/or prick testing – Incorrect. *Dermestid*-related cutaneous manifestations may be due to either type 1 or type 4 hypersensitivity reactions. Prick or patch testing may be performed to further confirm a hypersensitivity to *dermestidae* but is not necessary for diagnosis and treatment.^{2,3}

C. Begin daily diphenhydramine – Incorrect. Although this will help reduce pruritus and lessen the severity of extracutaneous symptoms such as allergic rhinoconjunctivitis, it is a highly sedating antihistamine. Age-appropriate second-generation antihistamines are preferred to avoid side effects such as somnolence, unnecessary sedation, dizziness, and incoordination.⁴

D. Implementation of regular house cleaning measures including thorough vacuuming – Correct. Setae may travel through airborne routes away from the infestation itself (ie, vents). Methods to decrease exposure to setae by removing their preferred substrate should be employed such as frequent vacuuming of carpets, rugs, and curtains, removing stuffed animals, use of protective pillow and mattress covers, and airtight storage of animal fibers such as wool clothing.

E. Regular desensitization protocols using extracts prepared from adult and larval dermestid parts –

Incorrect. While desensitization protocols may work to lessen an individual's hypersensitivity to certain antigens over time, this has not been documented in cases of dermestid hypersensitivity. Less invasive, logistically burdensome techniques such as thorough cleaning and antihistamine use are more pragmatic and have been proven to reduce these symptoms.

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Conflicts of interest

None disclosed.

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