Dermoscopic Documentation of a No-see-um Bite

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PRACTICE **POINTS**

- Biting midges, commonly known as no-see-ums, are extremely small flies whose bites can cause a burning sensation, mild pain, and reactions ranging from small wheals to intensely pruritic papules.
- Medical management of no-see-um bites is based on the severity of the skin reaction.

Biting midges, commonly known as no-see-ums, are year-round pests found in Florida and the southeastern United States that cause disruption of outdoor activities and tourism. Despite their frustrating bites and impact on skin health, dermatology literature on no-see-ums is scarce. We present a case report and dermoscopic description of a no-see-um bite and review its management.

Biting midges, commonly known as no-see-ums, are true flies (order Diptera) and members of the Ceratopogonidae family. Regionally, they are known as punkies in the Northeast, pinyon gnats in the Southwest, moose flies in Canada, and sand gnats in Georgia, among other names.[1] There are 6206 species found worldwide except for Antarctica.[2] The 3 genera of greatest importance to human and livestock health in the United States are *Culicoides*, *Leptoconops*, and *Forcipomyia*.[1] Forty-seven species of the genus *Culicoides* are known to be present in Florida.[3] Species belonging to the genus *Leptoconops* also are present in coastal areas of southeast Florida as well as in the tropics, subtropics, and Caribbean.[3] In the United States, biting midges primarily are a nuisance; the major medical issue associated with *Culicoides* insects are allergic reactions to their bites. Even though no-see-ums are not known to transmit disease in humans, they have an impact on other animal species in the United States as biting pests and vectors of disease-causing pathogens.[1] Biting midges pose quite a nuisance for the proper enjoyment of outdoor spaces in the southeastern United States.

Characteristics

Morphologically, no-see-ums are gray flies measuring 1 to 3 mm in length (eFigure 1). Adults have 2 wings with distinctive patterns, large compound eyes, a thorax that extends slightly over the head, an abdomen with 9 segments, and antennae with 15 segments (eFigure 2).[1,3,4] Females have modified mouth parts including mandibles that lacerate the skin during feeding, which is mainly on blood from vertebrate hosts (primarily mammals but also birds, reptiles, and amphibians).[1,4] They also can feed on invertebrate hosts. Both male and female no-see-ums feed on nectar, but adult females require a blood meal to develop their eggs.[2] Their life cycle progresses in stages from egg to larva to pupa to adult. Larval habitats include salt marshes, swamps, shores of streams and ponds, water-holding plants, rotting fruit, and saturated wood- and manure-enriched soil. Adults can live 2 to 7 weeks. They are weak fliers, particularly in windy conditions.[1]

In Florida, no-see-ums are more active during the rainy months of May to October but are active year-round in the southeastern United States and the Gulf Coast from Florida to West Texas. They are active throughout the United States in the warmer months of June and July.[5] Their peak feeding activity occurs at dawn and dusk, but different species of biting midges such as *Leptoconops* and *Culicoides* also can feed during daylight hours and at night, respectively.[1,6,7]

Case Report

One of the authors (M.J.S.), a healthy 54-year-old man with no remarkable medical history or current use of medications, documented the natural progression of a

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no-see-um bite by sitting in an outdoor Florida space at 8:00 AM armed with a dermatoscope and a smartphone camera. The initial sensation of the bite felt like a sting that progressed over a few minutes to itchiness; however, the culprit was not readily identifiable. Upon closer inspection, pinpoint black dots could be correlated with the location of discomfort on the exposed upper extremities. Upon dermoscopic examination, 2 biting midges were identified as well as multiple wheals at the bite sites, and they seemed unbothered by the polarized light of the dermatoscope while feeding (eFigure 3). They flew away after a few minutes of feeding. The site of the bite wound was readily identifiable on dermoscopy as a wheal with a pinpoint red dot at the center (eFigure 4). The wheal started to form during the act of feeding and lasted up to 2 hours before fading (eFigure 5). The itch quickly resolved within the hour if hydrocortisone 1% was used. If untreated and scratched, itching rarely could last longer than a day.

Clinical Manifestations

Although no-see-ums are not known to transmit disease in the United States, they are important biting pests that can affect tourism and prevent enjoyment of outdoor spaces and activities.[2] The bite reactions on the host can range from wheal-like lesions to papules measuring 2 to 3 mm (at times with overlying vesicles) to nodules up to 1 cm in diameter.[8] In our reported case, the small wheals disappeared within hours, but pruritic papules have been described to last from weeks to months. Published histopathologic correlation of biopsied indurated papules within 3 days of bite occurrence have revealed a superficial infiltrate composed of lymphocytes and histiocytes, while eosinophils were found in the deeper dermis and subcutaneous fat. Within 2 weeks, as the lesions aged, the infiltrate contained a smaller percentage of eosinophils and predominantly was present in only the superficial dermis.[8] Delayed-type hypersensitivity reactions including pustules and bullous lesions also have been described.[9,10] Host immune reaction to the saliva introduced during the bite dictates the severity of the response, and lesions may become secondarily infected due to scratching.[11]

Management Recommendations

Management consists of cleaning the bite site with soap and water to prevent infection, applying cold compresses or ice packs to relieve the intense itch, and avoiding scratching.[11] Application of over-the-counter calamine lotion or hydrocortisone cream can relieve itch, and mid- to high-potency topical corticosteroids also can be prescribed for 1 to 2 weeks for more intense bite reactions in conjunction with oral antihistamines. Topical or oral antibiotics may be indicated if redness and swelling progress at the bite site or if breaks in the skin become secondarily infected.

Final Thoughts

Because of the wide-ranging habitats of no-see-ums, eradication programs using insecticides have been inefficient or environmentally suboptimal. Emptying all standing water in outdoor spaces will reduce the number of no-see-ums. Avoidance of the outdoors at dawn and dusk when no-see-ums are most active is helpful, as well as protecting exposed skin by wearing long-sleeved shirts and long pants when outside. Insect repellents containing DEET (N-N-diethyl-meta-toluamide) or picaridin can offer additional protection on the remaining exposed skin. Oil of lemon eucalyptus, or active compound p-menthane-3,8-diol, has been shown to be effective against no-see-ums. Use of DEET should be avoided in children younger than 2 years and p-menthane-3,8-diol in those younger than 3 years. Picaridin is safe for use in children.[12] Citronella oil is ineffective. Installing window and patio screens with a mesh size less than 16 can prevent no-see-ums from passing through the netting but will restrict air flow.[3] Turning off porch lights also is helpful, as no-see-ums are attracted to light sources.[6] Since no-see-ums are weak flyers, setting ceiling or window fans at high speeds can minimize exposure; similarly, being outdoors on a windy day may decrease the likelihood of being bitten. Ultimately, the best remedy for a bite is to prevent them from happening.

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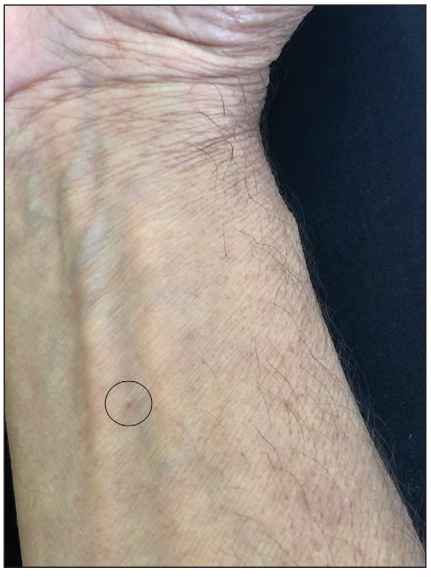
APPENDIX

eFIGURE 1. Size comparison of a no-see-um vs copper penny and pencil lead.

eFIGURE 2. Light micrograph of a no-see-um (*Culicoides* specimen).

eFIGURE 3. Dermoscopic image of no-see-um and newly forming bite wheal on the right forearm.

eFIGURE 4. Dermoscopy of no-see-um bite wheal with central laceration on the right forearm.



eFIGURE 5. A no-see-um bite site (circle) on the forearm fading within 2 hours with limited hypersensitivity.