An Indigenous Case of Cutaneous Larva Migrans

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Abstract
Cutaneous larva migrans (CLM) is an infection caused predominantly by the Ancylostoma hookworm, most commonly found in tropical and subtropical areas. The hookworm is acquired through skin contact with soil contaminated by larvae-infested dog or cat feces. Although most U.S. cases are described in patients with a travel history, a few cases of indigenous infections have been reported in patients who cohabitate with canines and felines, whose intestines may be inhabited by the nematode. Once shed into sand or soil, the ova of Ancylostoma larva require a warm and humid climate to develop into infective filariform larvae. We describe a patient with no travel history who presented to our Southern California clinic with symptoms of CLM.

Introduction
Cutaneous larva migrans (CLM) was first described by Lee in 1874 as a “creeping eruption.” The classic clinical feature of the disease is a serpiginous or linear, erythematous, elevated tract that migrates in an irregular pattern. In 1926, Kirby-Smith et al. were the first to recover nematode larvae from biopsies of patients with creeping eruptions. CLM is caused by the tropical hookworms Ancylostoma braziliense, Ancylostoma caninum, and Uncinaria stenocephala, which inhabit the intestines of domestic animals, including dogs and cats. CLM is acquired via direct contact with soil or sand contaminated with larvae of the causative organisms. The disease is endemic in developing regions, particularly in tropical areas like Central and South America, India, and Africa. Cases seen in the United States are almost always associated with recent travel to endemic regions. We describe a native case of CLM, diagnosed in a patient with no recent history of travel outside the United States.

Case Report
A 59-year-old man with a past medical history of diabetes mellitus type 2 and hypertension presented with a pruritic eruption on the hands and feet of several weeks’ duration. He denied recent travel prior to the onset of the lesions, and no other members of his household were affected. He admitted to having a cat in his home, and reported the cat was healthy.

Physical examination revealed multiple erythematous papules and serpiginous raised tracts on the patient’s feet and hands (Figure 1). Low-power histopathologic examination of a lesion on the right medial foot revealed acral skin with intraepidermal vesicles consistent with parasitic burrows (Figure 2). On higher power, variously sized burrows were noted (Figure 3). On highest power (Figure 4), the burrows were observed to contain collections of neutrophils and eosinophils. Additional features seen histologically with CLM are spongiosis, a lymphohistiocytic dermal infiltrate with eosinophils, and, occasionally, collections of eosinophils within the epidermis and hair follicles. It is unusual for parasites to be seen in the biopsy specimen. Based on the clinical presentation, a diagnosis of cutaneous larva migrans (CLM) was established. He was treated with a one-time dose of 12 mg oral ivermectin, and the eruption had resolved by his two-week follow-up appointment.

Discussion
Cutaneous larva migrans is primarily a clinical diagnosis, most often presenting in those who have traveled to tropical countries. The disease is endemic in most coastal states, including Texas and New Jersey, with the highest incidence in Florida. It is caused by the tropical hookworms Ancylostoma braziliense, Ancylostoma caninum, and Uncinaria stenocephala, which inhabit the intestines of domestic animals like dogs and cats. About 20,000 eggs may be produced per female Ancylostoma. Within 56 hours to 66 hours after being shed in the feces of dogs and felines, the eggs undergo two rhabditiform molts to develop into their infective filariform stage. Upon direct contact, the larvae penetrate skin, most commonly of the feet, legs, buttocks or back. Due to their inability to produce the collagenase enzyme essential to invade the basement membrane of the epidermis, the larvae remain limited to the epidermis. Humans serve as dead-end hosts for the larvae. As the larvae migrate through the skin, the host inflammatory response produces an intense pruritic and serpiginous, threadlike reaction that marks the tract as a dead-end host for the larvae. As the larvae migrate through the skin, the host inflammatory response produces an intense pruritic and serpiginous, threadlike reaction that marks the tract as a dead-end host for the larvae.
labeled's tracks, typically 2 mm to 4 mm wide and 15 cm to 20 cm long.\textsuperscript{10} Hookworm folliculitis is a less common presentation of the disease marked by papules and vesicles resembling folliculitis.\textsuperscript{7} 

_Ancylostoma_ ova and larvae require moist, warm soil to mature. In the United States, sporadic indigenous cases of cutaneous larva migrans have been described and are commonly associated with unusual climatic conditions, such as protracted periods of humid weather or rainfall.\textsuperscript{8} When individuals live in close contact with their pets, infections can also occur in the winter season.\textsuperscript{9} In states with hot climates, such as in the southern United States, hookworm-related cutaneous larva migrans occurs sporadically or in small epidemics. In 1966, Fuller\textsuperscript{11} described a small outbreak of cutaneous larva migrans in nine workmen who worked in a 3-foot-high crawl space under a new hospital in Florida.\textsuperscript{5} The soil in the crawl space was "light, moist, sandy loam, completely shaded by the concrete floor of the building…with little ventilation," coupled with a temperature of 86°F, close to the mean August temperature.

A study conducted between 2007 and 2011 looked at 30 GeoSentinel sites and more than 42,000 travelers who returned to the United States with an illness. The researchers found that 19.5% of the conditions were dermatologic.\textsuperscript{11} Eight percent were hookworm-related cutaneous larva migrans, with the highest prevalence of the condition in those returning from Caribbean destinations, followed by Southeast Asia and Central America. Just 1.6% of patients (675 persons) had traveled only within the United States, supporting the rarity of acquiring cutaneous larvae migrans from North American soil. Several hypotheses have been proposed to explain the isolated epidemics of domestic cutaneous larva migrans. One study in Florida between 1998 and 2000 found that 20 (33%) of 60 feral cats were infected with _A. braziliense_.\textsuperscript{12} There is also genetic evidence that _Puma concolor_, which was introduced into southern Florida between 1956 and 1966 from Central and South America, carried several _Ancylostoma_ species.\textsuperscript{13} The introduction of foreign animals from tropical countries into the United States may spearhead the growing prevalence of autochthonous cutaneous larva migrans cases.

The differential diagnosis for CLM includes, but is not limited to, tinea pedis, human scabies, ancylostomiasis, migratory myiasis, and larva currens. Larva currens is caused by _Strongyloides stercoralis_ and distinguished by its single or multiple, pruritic tracks on the buttocks, abdomen, or upper thigh regions that advance much faster than CLM. Migratory myiasis is a self-limited, cutaneous eruption caused by larvae from the adult flies _Hypoderma bovis_ or _Gasterophilus intestinalis_, characterized by the painful subcutaneous nodules that develop as they migrate at 1 cm/hour. They eventually die within the tissue or exit via furuncle-like lesions. Ankylostomiasis is caused by _Ancylostoma duodenale_ and _Necator americanus_, the dissemination of which leads to iron deficiency anemia, GI and pulmonary symptoms, and malnutrition. Human scabies, caused by _Sarcoptes scabiei_, is characterized by erythematous papules and linear burrows in hand creases, finger webs, axillae and genitalia. Tinea pedis, a dermatophyte infection, causes a circular, erythematous plaque with a scaling border and central clearing.\textsuperscript{14}

While CLM is a self-limited disease, with humans as the dead-end hosts, the associated eruption can be distressing to the patient and may last several months. Treatment results in shortening the course of the disease. Treatment options include a single, 400 mg dose of albendazole in adults and children older than two years of age, or 400 mg/day to 800 mg/day (10 mg/kg/day to 15 mg/kg/day in children) for three to five days; a single, 12 mg dose of ivermectin (150 mcg/kg in children); or thiabendazole 10% to 15% solution or ointment applied topically three times daily for at least 15 days.

**Conclusion**

CLM is one of the most frequent helminthic infections diagnosed in travelers returning from areas where the _Ancylostoma_ hookworm is endemic, including the Caribbean, Southeast Asia, Central America and Africa. Autochthonous cases of CLM are rare, and the few reported cases describe human skin contacting infected soil, which was likely contaminated with feline or canine feces and then exposed to the humidity and warmth that allow the ova to develop into infective larvae. Despite the rare occurrence of CLM in the United States, doctors must keep the differential in mind when examining patients exhibiting CLM-like symptoms and cutaneous lesions, even without a history of recent travel. These patients should be educated about wearing protective clothing, including shoes, when outside. Their pets should also be screened and treated for intestinal worms.

**References**


