Cutaneous larva migrans in the northeastern US

Michael Johanis[1] BS, Karan S Cheema[2] BA, Peter A Young[3,4] MPAS, Saisindhu Narala[4] MD, Atif Saleem[4] DO, Roberto A Novoa MD[4], Gordon H Bae[4] MD

Affiliations: [1]Department of Dermatology, University of California San Francisco, San Francisco, California, USA, [2]School of Public Health, Brown University, Providence, Rhode Island, USA, [3]Department of Dermatology, The Permanente Medical Group, Sacramento, California, USA, [4]Department of Dermatology, Stanford University School of Medicine, Redwood City, California, USA

Corresponding Author: Gordon H Bae MD, 450 Broadway Street, Redwood City, CA 94063, Tel: 650-723-6316, Email: GBae@Stanford.edu

Abstract

Cutaneous larva migrans (CLM) is a dermo-epidermal parasitic infection with a disproportionate incidence in developing countries, particularly in, and near tropical areas. It is characterized by erythematous, twisting, and linear plaques that can migrate to adjacent skin. Herein, we present an otherwise healthy 45-year-old woman who acquired a pruritic, erythematous, and serpiginous rash localized to her right medial ankle during a trip to New England. Oral ivermectin, the preferred first-line treatment for cutaneous larva migrans, was administered in combination with triamcinolone. This was followed by removal of the papular area via punch biopsy; treatment was successful with a one-week recovery. Although cutaneous larva migrans has traditionally been considered a tropical disease, clinicians should be cognizant of its expanding geographic spread.

Keywords: Ancylostoma braziliense, creeping eruption, cutaneous, dog and cat, hookworms, larva migrans, Necator americanus

Introduction

Cutaneous larva migrans (CLM) is a parasitic infection by a burrowing hookworm larva that has impacted millions of individuals in developing countries, particularly in and near the tropics. It is commonly caused by filariform larvae, which may be found in dog or cat feces [1]. The diagnosis is usually made clinically based on the morphology of CLM lesions, which are characteristically erythematous, curvilinear plaques that can migrate or spread to adjacent skin. The condition is generally self-limiting but can be treated via oral ivermectin as the first-line treatment option [2]. The geographic spread of CLM may include non-tropical regions [3]. Clinicians should be cognizant of this shift, especially when evaluating patients who work with or have recently been in contact with soil, sand, or animal feces.

Herein we describe an exemplary case of a woman infected with cutaneous hookworm larvae while vacationing near New England.

Case Synopsis

A 45-year-old healthy woman presented with a pruritic, erythematous eruption of one week's duration, localized to her right medial ankle. Physical examination showed an erythematous, narrow, curvilinear plaque (**Figure 1A**). She recently returned from a trip to New England. Her only risk factor was

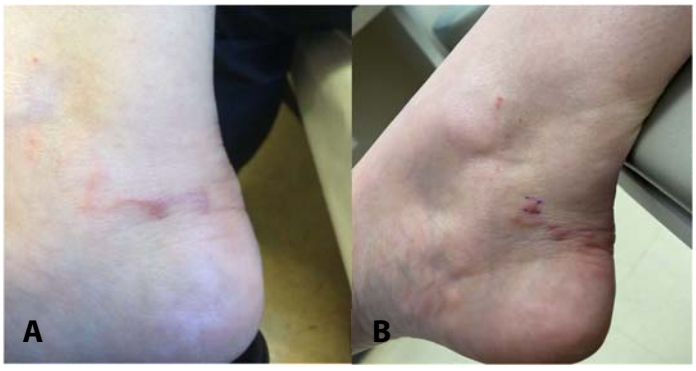

Figure 1. ***A)*** *Erythematous, serpiginous plaque and adjacent 1-2 mm papules on the right medial ankle.* ***B)*** *Biopsy site demarcated by blue dots during dermatology visit.*

that she was exposed to a dog at the house in which she was staying. She denied walking around soil during her stay and denied travel to the Southeast U.S. prior to the trip. A clinical diagnosis of CLM was made and the patient was prescribed two standard doses of oral ivermectin 200µg/kg oral ivermectin, taken one week apart. Topical triamcinolone 0.1% ointment was given for pruritus. In addition to topical treatment, a punch biopsy from the leading edge was performed to remove the papular area (**Figure 1B**). The patient's symptoms resolved within one week.

Histology revealed an epidermis with mild spongiosis overlying a perivascular mononuclear inflammatory infiltrate and an admixture of eosinophils in the underlying dermis (**Figure 2A**). On higher power, a structure was seen within the stratum corneum, characterized by round eosinophilic cross-striated cuticle and gut epithelium, thus providing histological confirmation of a hookworm cross-section (**Figure 2B**).

Case Discussion

Cutaneous larva migrans is a cutaneous hookworm infection that generally occurs in endemic tropical regions including the Southeast U.S., Latin America, the Caribbean, Southeast Asia, and Africa; the parasite's association with these regions is related to its preference for particular weather conditions, including warmer temperature and rainfall [1,3]. However, CLM infections do occur in other regions, as shown by our patient, who seemingly acquired the condition in the Northeast U.S. Possibly related to changes in climate, there has been geographic spread of CLM: in one retrospective review of 22 CLM cases from Turkey, weather patterns analyzed for over 50 years showcased steep increases in temperature attributed to global warming; these changes coincided with the locations and time periods of the CLM cases [3].

Several different hookworms may cause CLM, with species varying by geography. In the Northern and Southeastern U.S., the most common organisms are *Necator americanus* and *Ancylostoma braziliense*, respectively [4,5]. Dog and cat feces are sources of hookworm eggs, which spread by direct contact with host skin. After contact with a human host (most often on the feet, thighs, or buttocks), larvae enter the skin, resulting in localized erythematous pruritic macules and papules. These may be bilateral and urticarial in appearance, progressing into twisting, winding, narrow linear plaques that spread locally. Because the causative hookworms do not produce the collagenase needed for basement membrane penetration (unlike *Strongyloides stercoralis*, which may progress to systemic involvement), infections are generally self-limited and confined to the skin [5,6]. Folliculitis or vesiculobullous lesions are also possible [5]. It is unclear where our patient was exposed to the hookworm; her only risk factor was exposure to a dog, but no other family members were affected. The patient confirmed that the dog was not inspected for hookworm but received all required vaccinations. As seen in this case, symptoms typically progress into twisting, winding, narrow linear plaques that spread locally.

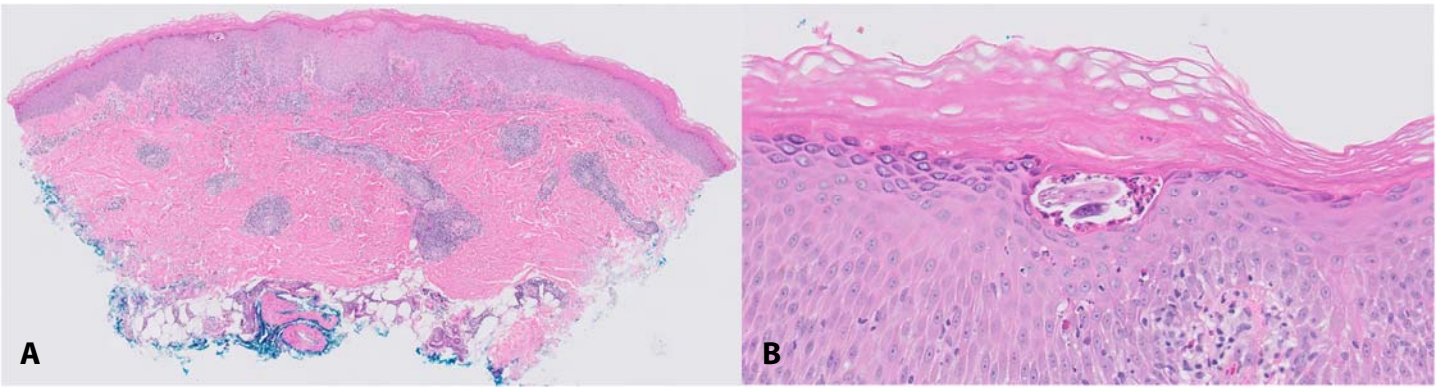

Figure 2. *H&E histopathology.* ***A)*** *Mild epidermal spongiosis with an underlying dermal mixed infiltrate with eosinophils is evident, 5×.* ***B)*** *On high power, an organism with a round eosinophilic cross-striated cuticle and gut epithelium is present within the stratum corneum, 40×.*

Histological examination of CLM may show eosinophilic larvae within the epidermis or dermis [7]. The roundworm itself has a ridged cuticle and characteristic twists, which appear in cross sections as hooks – the reason for the organism's name [5].

Cutaneous larva migrans, though generally self-limiting, may progress to involve hair follicles (CLM folliculitis), resulting in recalcitrance for up to two years. Chronic CLM and severe generalized infections have also been reported [9,10]. Treatment is often initiated to prevent these complications and mitigate the duration or severity of pruritus. Our patient opted for the first-line treatment for CLM: two doses of oral ivermectin, taken one week apart, which typically confers cure within weeks [2].

Currently, the first-line treatment for CLM is either oral ivermectin or oral albendazole. Ivermectin is the preferred first-line treatment and a single dose can be prescribed: 12mg in adults or 150-200µg/kg for pediatric patients. If no improvements are noticed following the first dose, a repeat course of ivermectin should cure the patient's CLM. Among four large cohort studies, single-dose oral ivermectin demonstrated a cure rate between 94% to 100% in all but one series; the lowest cure rate was 81% [7-10].

With respect to albendazole, a third-generation anthelmintic drug, a typical prescription is 400mg, twice daily, for 3-7 days. The efficacy of albendazole is inferior to that of ivermectin, with cure rates ranging from 45% to 100% [8]. Nevertheless, albendazole can be effective alone and should be used when ivermectin fails [10]. It is also indicated in patients with CLM characterized by multiple and/or extensive lesions; one retrospective study on 78 patients yielded a 100% cure rate in such patients when 400mg/day albendazole was prescribed for one week [11]. Importantly, albendazole is contraindicated during pregnancy, in breastfeeding mothers, and in patients with hepatic disease.

Cryotherapy with liquid nitrogen is not recommended. Freezing tends to be ineffective, given that larvae can survive in temperatures as low as -21°C for more than five minutes. Furthermore, the larvae can migrate randomly before their tracks are visible. Topical or oral thiabendazole is not recommended either, due to its relative ineffectiveness following a single dose, along with its limited worldwide availability [8].

Less established, yet promising treatments against CLM may be on the rise. One case report demonstrated symptomatic resolution via the use of topical permethrin (5%) in a 1.5-year-old [12]. More data are needed to establish the efficacy and safety of permethrin and other novel therapeutics.

Conclusion

In summary, early recognition and appropriate treatment of CLM optimizes patient outcomes and limits potential complications. Diagnostic indicators may include characteristic morphology, histology, and recent contact with soil, sand, or the excrement of a dog or cat. Although CLM has traditionally been a tropical disease, clinicians should be privy to its expanding geographic spread.

Potential conflicts of interest

The authors declare no conflicts of interest.

References

1. Leung AKC, Barankin B, Hon KLE. Cutaneous larva migrans. *Recent Pat Inflamm Allergy Drug Discov*. 2017;11:2-11. [PMID: 28078983].
2. Bouchaud O, Houzé S, Schiemann R, et al. Cutaneous larva migrans in travelers: a prospective study, with assessment of therapy with ivermectin. *Clin Infect Dis*. 2000;31:493-498. [PMID: 10987711].
3. Can İ, Yürekli A. Effect of global warming on dermatology practice: the increase in cases of cutaneous larva migrans in the eastern black sea region of turkey. *J Cosmet Dermatol*. 2022;21:3929-3933. [PMID: 35634686].
4. Georgiev VS. Necatoriasis: treatment and developmental therapeutics. *Expert Opin Investig Drugs*. 2000;9:1065-1078. [PMID: 11060728].
5. Bowman DD, Montgomery SP, Zajac AM, Eberhard ML, Kazacos KR. Hookworms of dogs and cats as agents of cutaneous larva migrans. *Trends Parasitol*. 2010;26:162-167. [PMID: 20189454].
6. Kudrewicz K, Crittenden KN, Himes A. A case of cutaneous larva migrans presenting in a pregnant patient. *Dermatol Online J*. 2015;21:1-5. [PMID 25612130].
7. Balfour E, Zalka A, Lazova R. Cutaneous larva migrans with parts

of the larva in the epidermis. *Cutis*. 2002;69:368-370. [PMID: 12041816].

8. Caumes E. Treatment of cutaneous larva migrans. *Clin Infectious Dis*. 2000;30:811–814. [PMID: 10816151].
9. Veraldi S, Persico MC, Francia C, Schianchi R. Chronic hookworm-related cutaneous larva migrans. *Int J Infect Dis*. 2013;17:277-279. [PMID: 23218549].
10. Vanhaecke C, Perignon A, Monsel G, et al. The efficacy of single dose ivermectin in the treatment of hookworm related cutaneous larva migrans varies depending on the clinical presentation. *J Eur Acad Dermatol Venereol*. 2014;28:655-657. [PMID: 23368818].
11. Veraldi S, Bottini S, Rizzitelli G, Persico MC. One-week therapy with oral albendazole in hookworm-related cutaneous larva migrans: a retrospective study on 78 patients. *J Dermatolog Treat*. 2012;23:189-91. [PMID: 21294643].
12. Tan ST, Firmansyah Y. New approachment of creeping eruption management. *J. Dermatol Res Ther*. 2020;6. [DOI: 10.23937/2469-5750/1510088].