



# Cutaneous larva migrans in a child: a case report and review of literature

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**Introduction:** Cutaneous larva migrans (CLM) is a dermatitis caused by the invasion and migration of parasitic larvae of hookworms, primarily affecting tropical and subtropical regions. This report presents a case of CLM in a Nepali child and provides an overview of the literature on this condition.

**Case report:** A 4-year-old boy from a rural area in Nepal presented with a pruritic skin lesion on his left foot, initially misdiagnosed as fungal infection. The lesion gradually expanded, forming a serpiginous erythema, and became intensely pruritic. The patient's family had poor socioeconomic conditions, and the child frequently walked barefoot in an area with many domestic and stray dogs. Diagnosis was confirmed clinically, and treatment with oral albendazole and antihistamines resulted in complete resolution of symptoms.

**Discussion:** CLM is a neglected zoonotic disease, with an underestimated burden in developing countries due to underreporting and misdiagnosis. The larvae of *Ancylostoma* spp. are common culprits, causing a localized inflammatory reaction as they migrate through the skin. Diagnosis is mainly clinical and routine investigations usually reveal no abnormality. Complications may include secondary bacterial infections, allergies, and rare migration to internal organs. Treatment options include albendazole or ivermectin, with preventive measures emphasizing hygiene, footwear use, and pet deworming.

**Conclusion:** CLM is a neglected disease that primarily affects marginalized communities in tropical regions. Raising awareness among healthcare providers, conducting observational studies, and developing treatment guidelines, especially for children, are essential steps to address this public health concern. Preventive efforts, such as promoting hygiene and footwear use, should be encouraged to reduce CLM incidence.

**Keywords:** case report, cutaneous larva migrans, neglected tropical diseases, Nepal

## Introduction

Cutaneous larva migrans is a cutaneous dermatitis caused by invasion and migration of parasitic larvae of hookworms<sup>[1]</sup>. It is a major public health problem, particularly in the developing nations located in tropical and subtropical regions<sup>[2,3]</sup>. The larva enters the dermis, causing a localized inflammatory reaction as it moves through the skin and dermal tissues<sup>[2]</sup>.

The diagnosis is mainly clinical, based on the appearance of cutaneous tracts and the patient's travel history<sup>[2,4-9]</sup>. The tracks are commonly found in parts of the body which are frequently exposed to contaminated soil such as the feet, hands, and buttocks<sup>[3,10]</sup>.

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## HIGHLIGHTS

- Cutaneous larva migrans, caused by hookworm larvae, is a major health concern in tropical regions, especially in developing countries.
- Diagnosis relies on clinical signs, travel history, and common infection sites like hands and feet.
- Intense itching is a key symptom, sometimes with eosinophilia in blood tests.
- Ivermectin or albendazole are used for treatment.
- Preventive measures include clothesline use, consistent footwear, pet deworming, and traveler education.

Intense pruritus is a common symptom which is due to a strong inflammatory reaction to hyaluronidases and other enzymes secreted by the larvae. These enzymes aid in the larvae's penetration through the skin<sup>[11-13]</sup>. Routine laboratory investigations are generally unremarkable; however, eosinophilia may be observed<sup>[13]</sup>. Treatment is usually with either albendazole or ivermectin<sup>[14]</sup>.

We present a case of cutaneous larva migrans (CLM) in a Nepali child. This is reported has been completed in line with the Surgical CAse REport (SCARE) 2023 criteria<sup>[15]</sup>.

## Case report

### History

A 4-year-old boy from Myagdi district of western Nepal presented with a 2-week history of a pruritic skin lesion on the

dorsomedial surface of his left foot, which was initially treated as a fungal infection. The lesion had been gradually increasing in size forming a serpiginous erythema and pruritus had become more intense. The patient had achieved normal developmental milestones and was vaccinated fully according to the Extended Program of Immunization (Nepal). The patient's family had a poor socioeconomic background and the child's mother mentioned that he frequently walked barefoot. Additionally, the area where they lived had a notable population of domestic and stray dogs. She denied the practice of drying clothes on the ground and insisted that she always used drying lines for this task. There was no previous personal or family history of a similar illness or any other underlying medical conditions.

### Physical examination

On general physical examination, the patient appeared to be in good general health but was dressed in dirty clothing. His vitals were stable, and there was no pallor, icterus, no palpable lymphadenopathy and no pedal edema. His weight was 17 kg (Weight for Age > 2 SD according to WHO growth standards). Examination of the chest revealed clear findings, and the cardiovascular system appeared normal. The abdomen felt soft and nontender, with no detectable organomegaly.

On local examination, a 2.4 cm serpiginous, erythematous, and palpable lesion was present on the dorsomedial surface of his right foot (Fig. 1). Minimal edema was present in the surrounding skin.

### Investigations

The peripheral blood analysis indicated the presence of anemia, while all other measured parameters remained within the expected normal ranges (TC 9400 N<sub>50</sub>L<sub>44</sub>M<sub>2</sub>E<sub>4</sub>B<sub>0</sub> Hb 12 gm% Platelets 360 000). Histopathological examination was not performed in our case due to the financial constraints.

### Diagnosis and management

The morphology and location of the skin lesion were consistent with a diagnosis of CLM. The patient was treated with oral Albendazole (400 mg/day) for 3 days. Additionally, due to severe itching, the patient was prescribed oral antihistamine levocetirizine (2.5 mg/day) for 7 days. After 7 days of treatment, the skin lesion on the right foot had dried up, the child's itching had ceased, and all symptoms had completely disappeared during the subsequent week.



**Figure 1.** Serpiginous lesion present on the dorsum of right foot.

## Discussion

Soil-transmitted helminth infections rank as some of the most widespread infections globally, afflicting over two billion people, especially from the poorest and most deprived communities<sup>[16,17]</sup>. Cutaneous larva migrans is a cutaneous dermatitis caused by invasion and migration of parasitic larvae of hookworms<sup>[1]</sup>. It is most commonly caused by parasitic species such as *Ancylostoma braziliense*, *Ancylostoma caninum*, *Necator americanus*, *Uncinaria stenocephala*, and *Strongyloides stenocephala*<sup>[2,6,18–21]</sup>. It is a major public health problem, particularly in the developing nations located in tropical and subtropical regions<sup>[2,3]</sup>. The occurrence of this dermatosis was initially documented in the 19th century<sup>[2]</sup>. In Nepal, the prevalence of soil-transmitted helminth infections varies from 3.3 to 51.5%, with primary risk factors including inadequate hand-washing with soap and walking barefoot outdoors<sup>[22]</sup>. Nepal is thought to be endemic for zoonotic intestinal helminthic infections, but insufficient data is available to quantify their health impact<sup>[23]</sup>.

Ancylostomiasis is a zoonotic disease primarily found in cats and dogs (definitive host), with humans serving as accidental hosts. Contamination of the environment with dog or cat feces containing the parasite represents a serious animal health problem for uninfected dogs or cats, and a public health problem for humans<sup>[24]</sup>. Following passage in the feces of the animal, the eggs hatch in warm and moist soil or sand releasing infective filariform larvae<sup>[25]</sup>. In a warm and humid environment, nematode larvae can remain viable and infectious for several weeks, and in some cases, even for several months. When these larvae come into direct contact with the skin of a human, they penetrate it. To facilitate their migration and penetration through the epidermis, these larvae secrete proteases and hyaluronidases<sup>[12,13]</sup>. However, their invasion is limited to the epidermis because they lack collagenase, which is necessary to breach the basement membrane<sup>[26]</sup>. Consequently, they wander in the epidermis, producing the characteristic serpiginous tracks<sup>[2,27]</sup>. The tracks are commonly found in parts of the body, which are frequently exposed to contaminated soil such as the feet, hands, and buttocks<sup>[3,10]</sup>. Less commonly affected areas include the anterior abdominal wall, breasts, chest, and the penile shaft<sup>[13,14]</sup>. In younger children, the lesions are commonly found on the buttocks, perineum, and lower abdominal region, given that they often sit, crawl, and play on dirty soil<sup>[4,13]</sup>.

Ancylostomiasis in domestic dogs is usually asymptomatic or presents as intestinal disorders, anorexia, weight loss, and developmental disorders, but in severe cases, it can even lead to death<sup>[28]</sup>. In humans, the symptoms of CLM may take several weeks to appear<sup>[29]</sup>. The primary presentation is intense pruritus, usually occurring 10–15 days after the larvae penetrate the skin<sup>[10,13,29]</sup>. It is characterized by the appearance of a single linear lesion, which is intensely itchy and grows slowly. It advances at a rate of a few millimeters to a few centimeters per day, forming a twisting, serpentine tunnel that rises above the skin's surface and can range from a few centimeters to more than 10 cm in length<sup>[19,30]</sup>. The intense pruritus is due to a strong inflammatory reaction to the hyaluronidases and other enzymes secreted by the larvae<sup>[14]</sup>. In infants, pruritus can manifest as irritability, interfering with their sleep<sup>[31]</sup>. As it gradually advances and forms itchy erythematous linear tracts, this condition is also referred to as a 'creeping eruption', often resulting in epidermal damage and secondary infections. Initially, at the site

where the parasite penetrates the skin, a red and itchy papule may be noticed, which with time rises above the skin surface<sup>[2,10,20]</sup>. As the larva migrates, a linear wandering erythema, that is demarcated from the surrounding skin appears<sup>[5,6,8,9,20,32,33]</sup>. The tunnels left by the migrating parasite eventually desiccate and are covered with a scab<sup>[20]</sup>. The nematode may survive in the skin for many months<sup>[2,8,10,19,34,35]</sup>. These tracks are sometimes multiple and pronounced, and can become a source of stigma as the parents, caregivers, or patients bearing them are usually considered unhygienic<sup>[3]</sup>. Moreover, some rural communities low literacy rates and a strong belief in superstitions often associate these tracks with witchcraft, resulting in adverse social outcomes for afflicted individuals<sup>[36,37]</sup>. Fever is an extremely rare symptom of CLM and its presence in patients with CLM might be a marker of coexisting HIV infection<sup>[38]</sup>.

The diagnosis is mainly clinical, based on the appearance of cutaneous tracts and the patient's travel history<sup>[2,4–9]</sup>. Dermoscopy is a valuable bedside tool that aides in differentiating it from the burrow of scabies, larva currens, and dracunculiasis<sup>[39]</sup>. Skin biopsy is often difficult given that the location of the migrating larva cannot be predicted by the track<sup>[29]</sup>. Larva currens, which is a faster evolving serpiginous eruption due to skin penetration by larvae of *Strongyloides stercoralis*, is a major differential diagnosis. It can be differentiated from CLM by a faster rate of migration at greater than or equal to 5 cm/h (compared to 1–2 cm per day in CLM). Other differential diagnoses include cercarial dermatitis, allergic contact dermatitis, urticaria factitia, pyoderma, scabies, cutaneous bacterial and fungal infections, photodermatitis, erythema chronicum migrans and migratory myiasis<sup>[13,40,41]</sup>. The disease is self-limiting, with the larva dying after 5–6 weeks in the human host<sup>[3,29]</sup>. Blood investigations might reveal secondary infection, eosinophilia, and high serum IgE (immunoglobulin E)<sup>[13]</sup>. Epiluminescence microscopy is a useful noninvasive technique for detecting larvae<sup>[42]</sup>, although it is seldom required.

Being alert to the possibility of atypical clinical manifestations of CLM is essential, as this awareness can help avoid misdiagnosis, which can result in inadequate or delayed treatment. Unusual clinical presentations of CLM include<sup>[2,8,20,34,43]</sup>:

1. 'Hookworm Folliculitis': Inflammation of hair follicles, most commonly found in the buttocks area.
2. Diffuse Multifocal Papulo-Vesicular Eruption: typically localized on the chest, back, and abdomen.
3. Migrating Urticaria: Episodes of hives that move from one area to another on the skin.

Complications arising from cutaneous larva migrans encompass secondary bacterial infections, local or systemic allergic reactions, and very infrequently, the migration of the parasite to internal organs<sup>[8,10,18,20,33]</sup>. Among these, secondary bacterial infection is the most prevalent, occurring in as many as 8% of cases<sup>[44]</sup>. This occurs due to the scratching of the intensely itchy lesions, leading to a superinfection of the affected skin. Such secondary infections further complicate the clinical presentation, often resulting in delayed diagnosis and effective treatment<sup>[45]</sup>. Consequently, the initial management should focus on alleviating the pruritus, eliminating the parasite, and preventing secondary bacterial infections. If there is worsening in irritability and the development of pustules, clinicians should consider the possibility of superinfection and initiate antibiotic therapy.

Effective treatment for cutaneous larva migrans typically involves oral or topical antihelminthics along with

antihistamines. The first-line treatments are ivermectin and albendazole, with ivermectin (administered orally at a dose of 200 mcg/kg once daily for 1 or 2 days) being the preferred choice<sup>[46]</sup>. A single dose of ivermectin has shown cure rates ranging from 81 to 100%<sup>[37,47]</sup> and is generally well-tolerated with minimal side effects. However, it is important to note that there is limited safety data on the use of ivermectin in infants weighing less than 15 kg<sup>[48]</sup>, and therefore, is not recommended by the WHO for treatment in this weight category. An alternative treatment is albendazole (administered orally at a dose of 400 mg with a fatty meal for 3 days), which has also demonstrated cure rates between 46 and 100%<sup>[37]</sup>. In 2002, a WHO Informal Consultation concluded that both albendazole and mebendazole are safe for children aged 12 months and older, but there is no data on their use in children under 12 months. Therefore, children under 12 months of age should not be treated (unless indicated by a physician in a clinical setting)<sup>[49]</sup>. Some guidelines suggest the use of mebendazole in children as young as 6 months<sup>[50]</sup>. A double-blind, placebo-controlled, randomized trial conducted by Motessor *et al.*<sup>[51]</sup> in 2002 involving children under 24 months did not demonstrate any statistically significant difference in the incidence of adverse effects between the treatment group receiving mebendazole (500 mg) and the control group. Thiabendazole is not recommended due to its relatively high incidence of side effects, including dizziness, nausea, vomiting, and intestinal cramps<sup>[2,5,18]</sup>. In cases where oral medications are contraindicated, ointments containing 10% albendazole or 10–15% thiabendazole can be considered<sup>[52]</sup>. Topical application of these ointments three times daily for 5–10 days on the affected skin is comparable to oral treatment for CLM<sup>[2,52]</sup>. However, topical preparations are less effective for multiple lesions or complications such as hookworm folliculitis<sup>[37]</sup>. Topical ivermectin is commonly used in managing conditions like scabies and rosacea<sup>[53,54]</sup>, but the evidence regarding its effectiveness in treating CLM is inconsistent<sup>[55,56]</sup>. In exceptional cases, physical modalities such as cryotherapy with carbon dioxide or liquid nitrogen may be considered<sup>[6,7,20,32,33]</sup>.

Preventive measures include<sup>[3,27,29]</sup>:

1. Encouraging the use of clotheslines for drying instead of laying clothes directly on grass or the ground.
2. Promoting the constant use of shoes or slippers, especially among children in rural areas, to prevent direct contact with contaminated soil.
3. Implementing deworming programs for pets to help eradicate the disease.
4. Health education focused on people traveling to areas endemic for CLM.

## Conclusion

Cutaneous larva migrans is a neglected zoonotic disease that predominantly affects impoverished and vulnerable individuals residing in rural areas. The true burden of this disease is likely underestimated in developing countries due to the underreporting of cases from frequent misdiagnosis. We recommend raising awareness of this condition among primary care physicians, who are often the first point of contact for patients. Further research is essential to develop treatment guidelines, particularly for young children who are susceptible to the disease. Preventive measures such as promoting the use of drying lines, encouraging the

consistent wearing of slippers outdoors, and implementing deworming programs for pets should also be actively promoted and supported.

### Ethical approval

Not applicable.

### Consent

Written informed consent was obtained from the patient's parents for the publication of this case report and accompanying images. A copy of written consent is available for review by the Editor-in-Chief of this journal on request.

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### Author contribution

A.S., K.K.C., and A.B.: wrote the original manuscript, reviewed, and edited the original manuscript.

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