



Case Report

Tungiasis, a rare case of plantar inflammatory disease, a review of travelers skin lesions for emergency providers



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ABSTRACT

Parasitic infections while common in underdeveloped nations are rarely seen in developed urban centers. We report a case of a thirty-three-year-old male with no past medical history who presented to the emergency department with a chief complaint of “eggs coming out of my foot” after returning home from Brazil. Based on clinical presentation, travel history, and appearance of the lesion, diagnosis was most consistent with tungiasis infection which was confirmed by the pathology examination. It is important to make the appropriate diagnosis when skin lesions are found in returning travelers and emergency providers should take broad differential diagnosis into consideration.

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1. Introduction

Tungiasis is a traveler skin infection caused by *Tunga penetrans* where a sand flea penetrates the skin, and remains in contact with the outside environment in order to breathe, defecate, and expel eggs, leaving an entry point for pathogenic microorganisms [1] (Fig. 1). Sand flea disease is the most common parasitic infection in many resource poor communities in tropical parts of Africa, the Caribbean, Central and South America, and India [2]. In a tropical disease clinic in Paris, of 269 French travelers who presented with dermatosis, only 6% of the cases were due to tungiasis [3]. In these countries, tungiasis infection is directly correlated with poverty, clustering in underdeveloped rural communities, secluded villages and heavily populated, economically disadvantaged urban areas. In these settings, prevalence of tungiasis infestation can be as high as 50% [4].

Known complications of persistent tungiasis infection include pain, inflammation, deformation of digits, sepsis, cellulitis, auto-amputation and gangrene [5]. This can cause considerable morbidity and loss of quality of life.

There have been reported cases of disseminated infection, but these are often seen in endemic areas, as this dissemination requires a prolonged exposure and high parasite burden and is more common in children, elderly, and immunocompromised patients [5]. We describe a case of tungiasis in a patient who recently returned from a trip to the Amazon River in Brazil with a single lesion on his left foot.

2. Case report

A thirty-three-year old male with no past medical history presented to the emergency department (ED) with the chief complaint of “eggs coming out of my foot”. The patient had returned home from travel to Brazil three weeks prior to presentation. During that time, he visited local establishments while barefoot and swam in the Amazon River in open toed shoes. Two weeks prior to presentation, he noticed a sharp pain at the base of his left big toe and a small nodule with a black center. The pain subsided and the nodule became pruritic. The patient was traveling with his partner and she noticed an identical lesion on her foot. She removed the lesion at home with a needle, and her symptoms had resolved, with almost complete healing of the skin lesion. His presentation to the ED was prompted by what he described as “small white eggs” coming out of the center of the nodule. Physical examination revealed normal vital signs, a raised 0.5 cm lesion with a dark center without surrounding erythema, tenderness, or irregular borders at the plantar surface of left big toe (Fig. 1). There was no sign of satellite lesions, surrounding cellulitis, or lymphatic spread. Complete examination of the skin did not reveal any other lesions. The patient was able to ambulate without pain. The patient denied any constitutional symptoms, including fever, chills, rash elsewhere, nausea, vomiting, diarrhea or weight loss. He had never noted a similar lesion prior to this episode.

After careful examination and preparation, the lesion was debrided and all specimens collected were sent for pathologic diagnosis (Fig. 2). The patient was discharged home and was instructed to follow up with the infectious disease clinic. Pathology report showed fragments of stratum corneum with foreign body composed of exoskeleton, digestive tract and developing eggs, morphologically consistent with parasite. The microscopic findings of the parasite are consistent with *Tunga*

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Fig. 1. Left foot Tungiasis with white eggs at the base of big toe.



Fig. 3. Healing wound 3 weeks after emergency department visit.

penetrans. Fig. 3 shows the healing wound post procedure in emergency department.

3. Discussion

The differential diagnosis for skin lesions on the foot can at first seem relatively innocuous, but it is important to keep a broad differential in mind, especially in returning travelers. Some common causes of foot lesions can include acrochordon, corns, calluses, warts, or paronychia. Diagnosis of these conditions is often based on the clinical examination and further evaluation can include biopsy if the clinician is unsure of the diagnosis [6]. For this case, wart was high on the differential given that warts affect approximately 10% of the population and can have a dark center, due to thrombosed capillaries [7]. Corn and Callus were also considered as they are common causes of painful foot lesions and are both due to hyperkeratosis from chronic pressure of friction on the skin. Management for these conditions tends to be conservative including properly fitting footwear and orthoses [6]. More rare causes of foot and subungual lesions include subungual exostosis, and early malignant melanoma. Although not present in this patient, for lesions that are more widespread, it is important to consider granulomas or infectious causes like scabies. Disseminated granulomatous lesions are often secondary to non-infectious causes like sarcoidosis or interstitial granulomatous dermatitis, but can be caused by infectious agents, like tuberculosis [8].

Skin lesions in the returning traveler can be difficult to diagnose given the potentially low incidence of disease in the area where the patient is presenting for care (Table 1). Accurate and early diagnosis is important in these scenarios in order to avoid further complications and

reduce the risk of transmission to non-endemic areas. Given the patient's travel history, we additionally considered tick bite, cutaneous myiasis, tungiasis and other parasitic infections. Cutaneous myiasis is the most common form of myiasis, which is the fourth most common travel associated disease and is caused by infestation of human tissue from larvae of flies in the order Diptera [9,10]. Cutaneous myiasis is associated with travel, symptoms include a mild "heat" sensation to severe pain, and lesions are surrounded by inflammation, which was not consistent with our patient's clinical picture [9]. Diagnosis of myiasis is based on clinical picture and travel history, but can be confirmed by ultrasound [9]. Tick bites were also considered but were less likely given the lack of systemic symptoms. African Tick Bite Fever, caused by *Rickettsia africae* which is transmitted by ticks of the *Amblyomma* genus, commonly presents with an acute flu like illness and also includes an inoculation eschar, regional lymphadenitis, and a vesicular cutaneous rash, none of which were present in this patient [11]. Given the location and the appearance of the lesion in conjunction with the expulsion of eggs and the patient's history, tungiasis was most likely (Fig. 2).

Tungiasis is a parasitic skin disease caused by *T. penetrans* which is carried by the female sand flea [4]. Penetration of the sand flea into the skin of the host causes the disease, most commonly the periungual regions of the lower extremity given the flea's limited jumping ability [2]. Closed toed shoes and socks along with daily examinations of one's feet can help prevent tungiasis infection [4]. The most vulnerable populations include return travelers, homeless persons walking with bare foot, children, and economically disadvantaged individuals. After penetration, the sand flea remains in the host for up to 5 weeks causing

Table 1

Most common rash in returned traveler.

Febrile	Localized	Eschar Maculopapular	African Trypanosomiasis, Typhus Spotted fever group Rickettsia (palm and soles)
	Diffuse	Maculopapular Nodular Petechial Ulcer	Chikungunya, Dengue, Zika Visceral Leishmaniasis Dengue, Leptospirosis, Rickettsia Tuberculosis
Non-febrile	Localized	Eschar Linear	Anthrax Cutaneous Larva Migrans, Cutaneous Leishmaniasis
		Maculopapular Migrating Furuncle Ulcer	Insect Bites, Myiasis, Tungiasis Cutaneous Larva Migrans, Loiasis, Myiasis Arthropod bite, Cutaneous Leishmaniasis,
	Diffuse	Maculopapular	Insect bites, Scabies

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Fig. 2. The actual lesion and pathology sample.

itching and pain [12]. Within 5–7 days of penetration, hypertrophy of the flea's abdomen results in hypertrophy of the hosts skin and expulsion of eggs and feces begins. Within 3 weeks after penetration, the parasite will die and eventually will be sloughed off by host epidermis [4]. The morbidity of this condition is mostly a result of persistent inflammation and possible superinfection which can cause ulceration, gangrene, necrosis of surrounding tissues, and deformation, all of which can result in physical disability [12]. The mainstay of treatment in this condition is extraction of the flea and debridement of the lesion [13]. There are no antibiotics that have been proven to have effectiveness in treatment; however, some trials have shown a possibility that ivermectin could help in management with other studies showing no improvement [14,15]. The standard treatment in a returning traveler with low parasitic load is simple debridement [12].

Author disclosure statement

No competing financial interests exist.

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