

CASE REPORT

Tungiasis: a case report

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This is a case report of a patient who developed a nodule in one foot, which upon biopsy, was diagnosed as tungiasis, a cutaneous infestation caused by a human

flea. The natural life cycle, clinical and pathological expressions are discussed.

Key words: Tungiasis.

Tungiasis is a cutaneous infestation caused by *Tunga penetrans*, a human flea. Other commonly used names include chigoe flea, sand flea, chigo, jigger, chique, nigua, pico, le bicho de pé. It is an endemic ectoparasitosis in Latin America, the Caribbean and sub-Saharan Africa. Although its prevalence has declined, it remains a serious health problem of poor communities (1). Cases of tungiasis documented in the United States are almost exclusively reported in travelers to endemic areas (2).

Case Report

We present the case of a 47 year-old woman with no known systemic illness that was seen at a private dermatology office (RV) with a persistent nodule on the left sole that had been present for several months. The lesion was asymptomatic. The patient referred having visited Mexico and the Dominican Republic three years and two years before, respectively. An excisional biopsy from the nodule was performed which revealed the characteristic exoskeleton of the flea *Tunga penetrans* as well as its internal organs and eggs (Figure 1).

The patient was asymptomatic in a follow-up visit two

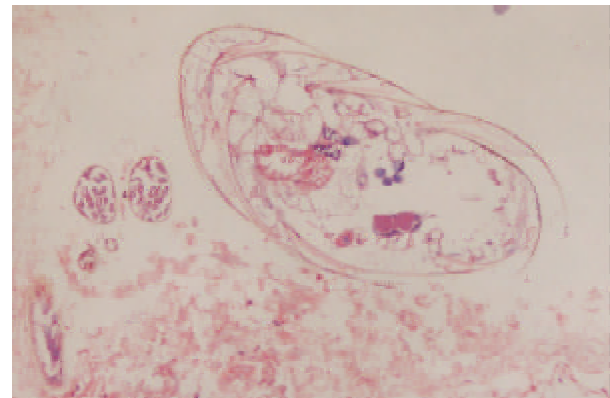


Figure 1. Vertical section through the long axis of the flea showing cross sections of the distended digestive tube, enlarged ovaries containing eggs, and tracheal rings.

weeks later.

Discussion

Tunga penetrans is the smallest flea species known with only 1mm of size. Although both males and females are blood-feeding, it is the female sand fleas that penetrate into the skin of its host, where it can grow up to 1cm as its fertilized eggs mature (3). Females lay 150-200 eggs over a period of 2 to 3 weeks and then die. Most of the eggs fall into the ground where the larvae hatch within 3 to 4 days (4). Under optimum conditions, the transition from an egg into an adult can be 18 days (4).

Larvae are found in various types of soils, but most commonly in dry and sandy ground. Hatched fleas are active in looking for their host and they usually attach to the legs of larger animals such as swine, dogs, cats, rats and pigs as well as humans (1). Areas where there is a high percentage of infected domestic animals contribute to high human attack rates.

As the flea is a poor jumper, infestation in humans is usually limited to the feet. It typically affects the periungual

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area of the toes, the heels and the soles. However, embedded sand fleas can be found almost anywhere in the body, depending on the point of contact with the sand (3). Females pierce the skin by a strong toothed barb, which is part of the mouth. Clinically, a reddish spot appears within minutes to hours. Then, approximately one to two days after penetration, parasite hypertrophy begins and a more obvious whitish nodule can be seen. The protruding rear of the flea appears as a central black dot, corresponding to the anal-genital opening (3). Two to three weeks after penetration hypertrophy is maximal and becomes macroscopically visible. At this stage, there may be expulsion of eggs and feces through the epidermis.

Lesions may be painful or pruritic and produce a sensation of foreign body. In other cases they may be completely asymptomatic. Usually there are few lesions, but severe infestations with hundreds of embedded sand flies are not rare leading to multiple lesions. Involvement of the nail matrix may lead to nail deformation or loss. Without appropriate treatment secondary infections are common. The most commonly isolated pathogens in secondary infections are *Staphylococcus aureus* and enterobacteriaceae species (5). The spread of these pathogenic bacteria may cause abscess formation, cellulitis, lymphangitis, septicemia and gangrene. Complications of tetanus have also been reported, especially among children in areas of low vaccination rate (1). In endemic areas, the diagnosis of tungiasis is usually made by macroscopic inspection of the lesions taking into account the dynamic nature of the morphology of the lesion. Patients commonly report having walked in infested places such as beaches and farms. It is said that the observation of eggs being expelled or attached to the skin and the release of brownish threads of faeces are pathognomonic signs (6). A biopsy of the lesion for histopathological examination is not indicated. Still, they are often done when travelers return from endemic areas or when lesions present atypically or in sites other than the feet altering the clinical suspicion.

Histologic diagnosis can be made by identifying the flea on a biopsy specimen. In some cases the biopsy may not contain the perfectly transected flea and 5 features of *T penetrans* have been identified for differentiation from other parasites (7). Of these, the presence of eggs of *T penetrans* in different stages of development is the most useful. The other 4 structures found consistently in biopsy specimens were the exoskeleton, hypodermal layer, trachea, and digestive tract, which further support the identification of the organism as an arthropod (7).

If left untreated, tungiasis is frequently self limited as remains of the flea will eventually be exfoliated. The standard treatment is surgical excision of the flea under

sterile conditions (3). Extraction should be performed carefully because if the flea is torn during or if some of its parts are left in the lesion, severe inflammation always follows. After extraction, topical antibiotic should be applied to prevent bacterial infection. In cases where secondary bacterial infection is identified, oral antibiotic treatment is indicated. In addition, tetanus immune status should be checked, and in cases of inadequate immunization, prophylaxis should be administered.

Successful reports of the use of oral ivermectin and thiabendazole have been anecdotal (8-9). A randomized, controlled trial trying to assess the clinical efficacy of topical ivermectin, thiabendazole and metrifonate for the treatment of tungiasis showed that each of them can significantly reduce the number of lesions caused by embedded sand flies seven days after starting treatment, as compared with the non-treated and placebo groups (10). Still, twelve days after the first treatment, there were similar results in the treatment and control groups as the fleas naturally die *in situ* after two to three weeks when oviposition comes to an end.

Tungiasis is highly prevalent in many communities in developing countries. Since travel to these countries is popular, physicians should be familiar with the characteristic clinical manifestations of tungiasis and be able to instruct patients about preventive measures, such as the use of protective footwear and repellents, to prevent infection. Early recognition and appropriate treatment can prevent potential complications from the disease.

Resumen

Éste es un informe del caso de un paciente que desarrolló un nódulo en un pie, que luego de biopsia, fue diagnosticado como tungiasis, una infestación cutánea causada por una pulga humana. Se discuten las expresiones naturales del ciclo vital, y su expresión clínica y patológica.

References

1. Heukelbach J, Sales de Olivera F, Hesse G, Feldmeier H. Tungiasis: a neglected health problem of poor communities. *Tropical Medicine and International Health*. April 2001;6(4):267-272.
2. Sanusi D, Brown E, Shepard T, Grafton W. Tungiasis: Report of one case and review of the 14 reported cases in the United States. *J Am Acad of Dermatol*. 1989;20:941-4.
3. Heukelbach J. Invited review: Tungiasis. *Rev Inst Med Trop S Paulo*. Nov-Dec 2005;47(6):307-313.
4. Leung A, Woo T, Robson W, Trotter M. A tourist with tungiasis. *CMAJ*. Aug 2007;177(4):343-44.
5. Feldmeier H, Heukelbach J, Eisele M, Queiroz Sousa A, Marilac Mireles Barbosa L, Carvalho B.M. Bacterial superinfection in

- human tungiasis. *Tropical Medicine and International Health*. July 2002;7(7):559-564.
6. Heukelbach J. Tungiasis. *Orphanet Encyclopedeia*. September 2004;1-4.
 7. Smith M, Procop G. Typical Histologic Features of *Tunga Penetrans* in Skin Biopsies. *Arch Pathol Lab Med*. June 2002;126(6):714-716.
 8. Cardoso A. Generalized tungiasis treated with Thiabendazole. *Archives of Dermatology*. 1981;117:127.
 9. Saraceno EF, Bazarra MLG, Calviello RC. Tungiasis: tratamiento de un caso con ivermectina. *Archivos Argentinos de Dermatología*. 1999;49:91-95.
 10. Heukelbach J, Eisele M, Jackson A, Feldmeier H. Topical treatment of tungiasis: a randomized, controlled trial. *Annals of Tropical Medicine & Parasitology*. 2003;97(7):743-749.
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