Tungiasis in a Beach Volleyball Player
A Case Report

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Tungiasis is an infestation caused by penetration of the skin by the gravid female of the flea *Tunga penetrans* Linnaeus 1758 (Insecta, Siphonaptera: Tungidae). *Tunga penetrans* is currently found in Central and South America, sub-Saharan Africa, and Central Asia. Prevalence is very high in Brazil. We present a case of tungiasis in an Italian beach volleyball player who acquired the infestation in Brazil. (J Am Podiatr Med Assoc 101(4): 353-355, 2011)

Case Report

A 33-year-old beach volleyball player was admitted to our department because of a pigmented nodule located on the second toe of the right foot. The patient stated that he was in good general health, that he was not on any therapy, and that he had returned 2 weeks earlier from a tour in Brazil where he played in three different city beaches (Maceió, Recife and Fortaleza, Northeastern Brazil).

Dermatological examination revealed the presence of a pigmented nodule. It was roundish, with a diameter of 1.2 cm and with a smooth surface (Fig. 1). The patient complained of severe pain. General physical examination did not reveal anything of a pathologic nature.

Laboratory examinations were within normal ranges or negative. Dermoscopy was negative for nevi or melanoma. A clinical diagnosis of tungiasis was made, and the lesion was excised surgically.

Histopathological examination revealed hyperkeratosis, parakeratosis, and acanthosis. In the epidermis and upper dermis a pseudocystic cavity was observed (Fig. 2). Inside the cavity, it was possible to observe parts of the body of a flea, and in particular: a) the exoskeleton, made up of a chitinous eosinophilic cuticle; b) the so-called hypodermic layer, which covered the internal surface of the exoskeleton; c) the striated musculature; d) elliptic, roundish, or oval tracheal rings; e) digestive organs, and f) ovaries, rich in eggs in different maturation stage (Fig. 3). Eggs were oval or round, with a thickened wall and a pale center. A perilesional inflammatory infiltrate mainly consisting of lymphocytes, neutrophils, and numerous eosinophils was also present. On the basis of these morphological features, a diagnosis of tungiasis attributable to *Tunga penetrans* was made. No other treatment was given, except for tetanus prophylaxis. A 7-month follow-up was negative.

Discussion

The natural habitat of *Tunga penetrans* is represented by sandy and warm soil of deserts and beaches; furthermore, the flea lives in breedings, stables, and pigsties. Tungiasis is very common among dogs, cats, and rats.[1] Humans are accidental hosts. Both the male and female are hematophagous. The life cycle of tunga lasts about 4 weeks and consists of four stages: eggs, larva, pupa, and adult. After copulation, the male dies. The gravid female penetrates the skin. The mechanisms by which the flea penetrates are unknown: it was suggested that the flea releases keratolytic enzymes. In the skin, *Tunga penetrans* burrows a cavity with the head turned toward the upper dermis, in order to feed on the host's blood, by means of a well-developed buccal apparatus. Only the end portion of the abdomen extrudes. Soon after penetration in the skin, the flea begins to produce eggs. The abdomen enlarges markedly ("physiogastry"); the gravid

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Figure 1. Hyperpigmented nodular lesion on the second toe of the right foot.

female can reach a diameter of 1 cm (the male and the nongravid female are about 1 mm long). Ovaries can contain up to 200 eggs. Eggs and feces are released outside through an opening in the epidermis, in proximity of the insect's anal opening; this opening also allows the respiration. Eggs fall on the soil, where they hatch in 3 to 4 days, releasing larvae, whereupon the gravid female dies. Ten to 15 days later, larvae develop into pupae, which, 1 to 2 weeks later, become adults.[2]

Typical localizations of tungiasis are toes, peri- and subungual folds, interdigital folds, the sole and the heel. These localizations can induce, because of pain, marked limitation in walking.[3, 4] Other sites are less commonly involved.

Tungiasis is characterized clinically by a papular or nodular lesion, white, gray, or yellowish in color, with a brown-black central opening, corresponding to the posterior portion of the abdomen of the flea. Some cases with dozens, sometimes even hundreds of lesions were described. Furthermore, less common clinical varieties were described: plantar wart-like lesions, as well as crusted, bullous, pustular and ulcerative lesions.

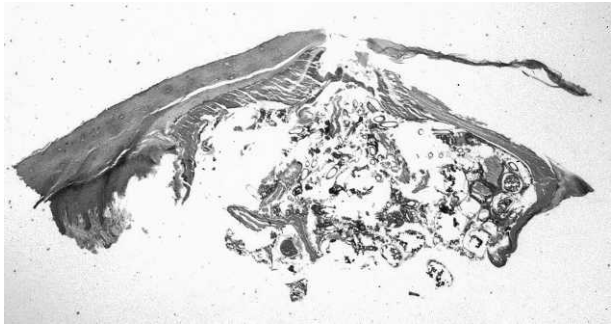


Figure 2. Pseudocystic cavity in the epidermis and upper dermis (H&E, x 40).

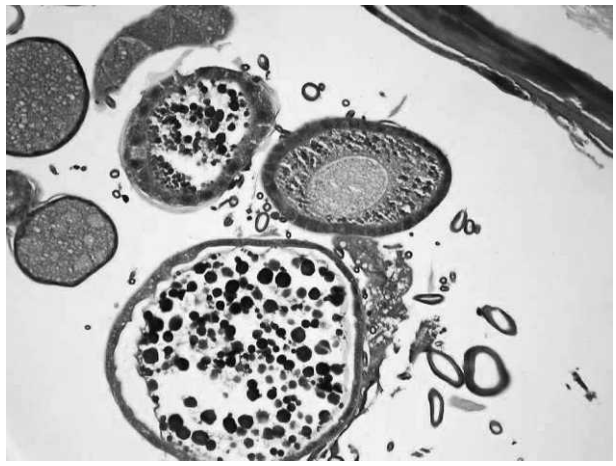


Figure 3. Ovaries of the *Tunga penetrans* with numerous eggs (H&E, x 120).

The penetration of tunga is asymptomatic[5, 6]: only when the insect increases in size, inflammatory phenomena develop, leading to pain[4, 6-9] or pruritus.[6, 8, 9] Bacterial superinfections are the most frequent complications: *Staphylococcus aureus* is found in more than 35% of specimens, followed by enterococci (approximately 30%).[10] Anaerobic superinfections caused by *Peptostreptococcus* sp. and *Clostridium* sp. are not rare.[11] Rare cases of lymphangitis, lymphadenitis,[9] cellulitis,[6, 12] osteomyelitis,[12] gangrene, loss of nails,[4, 12] spontaneous amputation of the toes,[6] and sepsis[13] were reported. The risk of tetanus should also be remembered.[6]

Diagnosis of tungiasis is based on the presence of papular or nodular lesions, either single or multiple, white, gray, or yellowish in color, with a brown-black central opening, usually localized to the feet, in a patient who recently visited an endemic area for tungiasis. Tungiasis should be differentiated from viral warts,[9, 14] foreign body granulomas,[9] bacterial infections (furuncle,[9] abscess,[7, 9] paronichia[9]), nevi, and tumors (melanoma).[9]

The treatment of choice is the complete surgical excision of the insect and perilesional tissues.[7, 10] The flea may also be removed by enlarging the orifice of the lesion by means of a needle or the tip of a scalpel and exerting pressure at the sides.[6, 7, 9, 10] The residual cavity should then undergo surgical debridement.[1, 15] Thereafter, it is necessary to apply a topical antibiotic. Systemic antibiotics are necessary when numerous or pustular lesions are present. Tetanus prophylaxis is recommended.[7] Fairly good results were also reported with electrodessication and cryotherapy.[2]

Prophylaxis consists of avoiding walking barefoot in endemic areas and using insecticides.

As previously mentioned, the case we have described is the first report of tungiasis in a beach volleyball player. This is rather surprising considering the high prevalence of tungiasis in northeastern Brazil and the fact that beach volleyball is very popular in this country. It is therefore possible that tungiasis is underestimated.

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