A Painful, Draining Black Lesion on the Right Heel
(See pages 65–6 for the Photo Quiz)

Diagnosis: tungiasis.

The biopsy revealed exoskeleton and internal parts, including ova, of the sand flea *Tunga penetrans* surrounded by an inflammatory infiltrate composed of lymphocytes, plasma cells, and eosinophils (figures 1 and 2). Tungiasis is caused by the sand flea (or “chigger”) *T. penetrans*, which is an ectoparasite endemic to Africa, India, the Caribbean, and South America [1] (figure 3). Untreated, these lesions may become secondarily infected with pathogenic bacteria, which may result in serious morbidities, such as lymphatic edema, sepsis, autoamputation of digits, gangrene, cellulitis, and tetanus in nonvaccinated individuals [3]. Typically, the lesions present as blackish nodules, ranging in size from 0.5–1 cm in diameter, in areas such as the hands, legs, trunk, and, most commonly, feet [3]. The latter is the preferred site, because *T. penetrans* is not known to jump high [3]. The female of the species *T. penetrans* typically burrows under the epidermis and remains ensconced there for a period of up to 5 weeks [4]. During that time, it matures, lays
Figure 2. Higher-power micrograph of a hematoxylin-eosin stain of the skin biopsy specimen demonstrating *Tunga penetrans* chitinous exoskeleton with internal structures, including digestive tract (short arrows) and eggs (long arrows), surrounded by an inflammatory infiltrate embedded within the corneal layer (original magnification, ×400).

eggs, and finally dies. Thus, there is a ~5-week time span, on average, from initial infestation until the death of the sand flea, during which period symptoms may manifest themselves. Symptoms may remain for an indefinite amount of time, depending on various factors, such as host immune status and severity of accompanying complications.

A presumptive diagnosis of tungiasis often may be made for typical-appearing lesions in patients in areas of endemicity. A history of travel to areas of endemicity may give a helpful clue. Gross characteristics that may be considered diagnostic for tungiasis include a small, dark, itching spot in the epidermis with a diameter of 1–2 mm, with visible posterior parts of the parasite and with or without local pain; a white patch with a diameter of 3–10 mm with a central black dot, representing the posterior segments of the parasite; a circular brownish-black crust with or without surrounding necrosis of the epidermis (indicative of a dead flea); and circular residues punched out of the keratin layer [5]. On microscopic examination, one should see several key structures to make the definitive diagnosis of tungiasis. An exoskeleton, hypodermal layer, digestive tract, and, most importantly, developing eggs contained within the skin are most useful in making a definitive diagnosis [6]. The presence of a trachea is often helpful in differentiating infestations due to *Tunga* species from helminth infestations [6]. Thus, one does not need to see an entire flea in cross-section for definitive diagnosis [6].

Other differential diagnoses to consider include myiasis, *Sarcoptes scabiei* infestation, tick bite, *Pulex irritans* bite, dracunculiasis, and creeping eruption [7]. *S. scabiei* are mites that have dorsal spines, eggs, and scybala and form burrows, rather than the circular lesions typical of *T. penetrans*. *P. irritans* rarely becomes embedded in the skin. At most, the chitinous part of the mouth may be found within the lesion. *Dracunculus medinensis* (a round worm) and *Ancylostoma* species (creeping eruption) are both distinctly different types of parasites and result in different clinical and pathological entities that are easily distinguishable from the typical lesions associated with *T. penetrans*.

Definitive treatment typically consists of complete excision of the parasite via excisional biopsy. The remaining cavity is
Figure 3. Adult female of the species Tunga penetrans surgically removed from a patient with a similar case. From the top of the head to the base of the thorax is 0.57 mm. Reprinted with permission from [2].

often cauterized to eliminate any possible remaining nidus for subsequent inflammatory reactions. In cases of multiple parasitic infestations, antiparasitics, such as thiabendazole, are often used [1]. The patient in the current case has since been seen by her primary care physician for an annual checkup and reports no additional problems with her right foot.

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