Draining Skin Lesion Following Insect Bite

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Case Presentation

The patient is a 19-year-old male who presented to his pediatrician for evaluation of an insect bite received during a Costa Rican cruise approximately 3 weeks prior. He denied any trauma during the trip, but did notice a small reddened area in his left mid calf several hours following a zip-line tour while on shore. On physical examination, there was a small area of erythema with a small open area centrally which was spontaneously draining serous fluid. A wound culture was performed at his initial office visit, and the patient was placed on a 10-day course of cefdinir. Repeat examination after the full course of antibiotics demonstrated no change to the appearance of the lesion. A repeat culture was performed, and the patient was referred to the Infectious Disease Department at our hospital. Three days following his second visit and before his appointment with the Infectious Disease specialist, the patient experienced severe pain at the site, prompting a visit to a local Emergency Department. A third wound culture was performed, and the patient was again placed on cefdinir. Two days later, the patient presented to a different Emergency Department again with the complaint of severe pain, where plain radiographs demonstrated a small, linear foreign body per the patient’s mother. The patient was placed on a third course of antibiotics, this time DS TMP/SMX, with no change in his symptoms.

The Infectious Disease specialist referred the patient for an ultrasound (Fig.) to evaluate for abscess or retained soft tissue foreign body. Of note, the patient had no other symptoms other than pain at the site.

Figure. Longitudinal US images (A and B) demonstrate a highly echogenic lesion (A) which causes dense posterior shadowing. There is a characteristic contour with a hypoechoic tract leading towards the skin surface (B). Transverse image (C) again shows the contour and echogenicity of the lesion and posterior shadowing. Doppler image (D) shows intense flow centrally.
Key Clinical Finding(s)
Draining skin lesion after insect bite

Key Imaging Finding(s)
Superficial lesion with a dermal tract

Differential Diagnoses
Abscess
Foreign body reaction
Lymphadenopathy
Furunculosis
Furuncular myiasis
Ruptured epidermoid cyst

Diagnosis
Furuncular myiasis

Discussion
The most common cause of a superficial inflammatory lesion with drainage to the skin is an infection, described as abscess, boil, furuncle or carbuncle depending on the location and origin of the lesion. However, other causes should be considered in the differential diagnosis of a superficial lesion with a dermal tract, which include foreign body with surrounding inflammatory changes, ruptured epidermoid cyst and parasitic infestation.

Abscess. An abscess is a localized tissue infection comprised of a collection of pus surrounded by inflamed tissue. Skin abscesses are often polymicrobial from normal regional skin flora as well as organisms from adjacent mucous membranes. S. aureus is present in superficial cutaneous abscesses as the only organism in approximately 25% of cases. On ultrasound, abscesses appear as hypoechoic fluid collections with internal debris. There is often a relatively thick capsule with hyperemia. Adjacent inflammatory changes are seen within the surrounding soft tissues.

Foreign body reaction. The most common soft tissue foreign bodies are wood, glass, metal and plastic. On ultrasound, foreign bodies are typically echogenic. Smooth foreign bodies will cause dirty shadowing or reverberation artifact, while those foreign bodies with more irregular surfaces will produce clean posterior shadowing. Some foreign bodies will produce both clean and dirty shadowing. When a foreign body is present for greater than 24 hours, an inflammatory reaction can develop, manifested as a hypoechoic rim on ultrasound.

Lymphadenopathy. Normal and reactive lymph nodes typically have an oval shape and are hypoechoic to adjacent muscles on sonography. They have an echogenic central fatty hilum. With superimposed infection, the normal nodal architecture becomes distorted and phlegmonatous changes and frank abscess formation can be seen.

Furunculosis. A furuncle, also known as a boil, is an infection involving the hair follicle. These infections are most often caused by S. aureus. They can occur anywhere on hair-covered skin. The infection extends into the subcutaneous tissues through the dermis. The lesion is an inflammatory nodule that forms a pustule through which the hair emerges. When more than one follicle is involved, the infection coalesces, and the lesion is then termed a carbuncle.

Furuncular myiasis. Cutaneous infestation by dipterous (2-winged) larvae is known as myiasis. Furunculoid myiasis is caused by the human botfly Dermatobia hominis. Despite the name, this entity does not represent a true furuncle. The human botfly is endemic in tropical regions of Central and South America and Mexico. Other insects which can cause a similar type of lesion as the botfly include the African tumbu fly and the horse botfly.

The gravid botfly female captures a hemotophageous insect, usually a mosquito or fly, and deposits her eggs onto this insect. This vector insect then transfers the eggs of the botfly onto the host as it takes its blood meal. The increased temperature of the host stimulates the eggs to hatch, and the newly hatched, 1mm (stage 1) botfly larvae then will penetrate the human host’s skin either through the bite site or through a hair follicle within minutes. The botfly larvae will molt...
twice over the subsequent 4-18 weeks. The infestation site will begin to enlarge and will appear as a small boil or abscess, with a small central opening which allows the maggot access to air. As the larva matures into its second and third stages, the human host will often complain of pain and itching, and may be able to feel the larvae as it moves, usually at night.\(^4\)

The cephalic end of the larva has two hooks, which are able to extend and retract, enabling the insect to feed as it tears the surrounding tissue. The larva attaches itself to the host's tissues through the concentric, parallel hooks which are found throughout its body. The anterior end of the insect is thicker than the posterior end, and the posterior end also has two additional hooks which keep the skin open to allow the insect to breathe.\(^5\) Because the deeper (anterior) portion of the larva is thicker than the smaller more superficial (posterior) end, extraction without treatment is difficult.\(^6\)

Treatment options include occluding the larval air hole, which can be accomplished by applying adhesive tape, occlusive membranes, petroleum jelly, and even bacon. Once the larva begins to emerge, it can be extracted. The larva can also be surgically excised, or can be allowed to complete its growth cycle and naturally exit the host's skin when mature (less well accepted by the patient than the previously described treatments).\(^4\)

**Ruptured epidermoid cyst.** An epidermal inclusion cyst is a slow growing subcutaneous or intradermal lesion. They are most often found in the hair-bearing portions of the body which include the scalp, face, neck, trunk and back. Less than 10% of these lesions occur in the extremities. These cysts are filled with keratin debris, and are frequently asymptomatic. They can become symptomatic when infected or rupture into the surrounding soft tissues.\(^7\) On ultrasound, unruptured epidermoid cysts tend to be circumscribed and hypoechoic with small hyperechoic foci centrally. When ruptured, the margins may be lobulated with adjacent vascularity.

**Summary**
A superficial subcutaneous abscess is the most common cause of an inflammatory lesion with a drainage tract to the skin's surface. However, other entities can appear clinically very similar to an abscess and should be included in the differential diagnosis, especially in those lesions that do not demonstrate the expected response to therapy.

Furunculoid myiasis is an unusual infestation in the U.S., but should be considered in the differential diagnosis of any non-healing lesion/insect bite in any patient with history of travel to endemic regions. The ultrasound findings of a very echogenic soft tissue foreign body with marked internal signal on color Doppler is highly suggestive of this diagnosis.

**References**