A Nonhealing Ulcer With Secondary Enlarging Nodules in a Linear Distribution

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A 19-year-old man on active military duty presented with a nonhealing ulcer on his dorsal right hand accompanied by enlarging nodules in a linear distribution on his right arm and forearm (**Figure 1**). Approximately 1 year prior to the onset of symptoms, the patient's right hand had been struck by a shovel while he had been conducting field exercises in the Southwestern United States. This wound had evolved into a painless ulcerated nodule (**Figure 2**). Subsequently, nodules had developed on the dorsal aspect of his right wrist and had progressed in a linear pattern to include his dorsal forearm and arm. He denied fevers, chills, weight loss, or other constitutional symptoms. He had no relevant medical history and no known animal exposures or bites.

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What is the cause of this patient's symptoms?

A. Cutaneous sarcoidosis
B. Nodular lymphangitis
C. Cutaneous tumor metastasis
D. Cat-scratch disease
E. Cellulitis

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Answer: Nodular Lymphangitis (Sporotrichoid Spread)

A nonhealing ulcer on the patient's dorsal right hand accompanied by enlarging nodules in a linear distribution on the right arm. Nodules are distinguished by black ink from a skin marker.

A nonhealing , painless, ulcerated nodule on the patient's dorsal right hand.

The patient was diagnosed with nodular lymphangitis, suspected to be secondary to *S aureus* infection.

Test results for *Histoplasma*, *Blastomyces*, and *Coccidioides* antibodies were negative, and results of an interferon-γ release assay were negative for *Mycobacterium tuberculosis*. Two punch biopsies were performed, the findings of which were significant for focal abscesses within the epidermis and granulomas within the dermis. Tissue stains and cultures were found to be negative for acid-fast bacilli (AFB). Fungal culture of the tissue was positive for *Paecilomyces* species, a ubiquitous organism and frequent contaminant. Bacterial culture of one of the tissue samples was positive for *Staphylococcus epidermidis*, which was interpreted as a likely contaminant. Bacterial culture of the second tissue sample was positive for *Staphylococcus aureus*.

The patient was subsequently diagnosed with nodular lymphangitis, suspected to be secondary to *S aureus* infection. He was prescribed minocycline, 100 mg twice daily for 28 days.

On a follow-up visit 3 months later, the patient had had near complete resolution of the skin lesions with residual scarring.

DISCUSSION

Nodular lymphangitis, commonly known as sporotrichoid spread, is the progressive development of cutaneous nodules along the dermal and subcutaneous lymphatic vessels in a linear distribution.[1] The distinct pattern radiates from the primary lesion, which often presents as a firm erythematous nodule that is prone to ulceration.[2,3]

The differential diagnosis of nodular lymphangitis includes cutaneous sarcoidosis, cutaneous tumor metastasis, cat-scratch disease, and cellulitis. The similarities between these conditions are notable in the physical examination findings, but certain features of nodular lymphangitis make it distinct.

Cutaneous sarcoidosis can present without systemic symptoms but does not display the distal-to-proximal development of linear nodules. The more defining lesions of cutaneous sarcoidosis are clustered papules or plaques,[4] which were not seen in this patient.

Cutaneous tumor metastasis would be less likely in a 19-year-old person with lesions that are not characteristic in appearance for a primary cutaneous tumor, such as melanoma. Histopatho-

Table. Diagnosis, Characteristic Exposures, and Treatment of Common Causes of Nodular Lymphangitis.[1-3,9-11]

Organism	Characteristic Exposures	Diagnosis	Treatment Regimen
Sporothrix schenckii	Gardening, soil	Fungal culture of biopsy, positive PAS or GMS stain of tissue	Itraconazole, 200 mg daily, for 2 months after symptom resolution
Nocardia brasiliensis	Soil, wood debris	Acid-fast culture of biopsy, positive Ziehl-Neelsen stain of tissue	TMP-SMX, 2 double-strength tablets 3 times daily for 3 months
Mycobacterium marinum	Freshwater or saltwater aquariums	Acid-fast culture of biopsy, positive Ziehl-Neelsen stain of tissue	Rifampin, 15 mg/kg daily, and ethambutol, 25 mg/kg daily
Leishmania braziliensis	Travel to endemic areas of Central and South America, Africa, Asia, Middle East, and Southern Texas	Culture of biopsy, positive Giemsa stain of tissue	Stibogluconate sodium, 20 mg/kg daily for 20 days
Staphylococcus aureus	Many	Culture of biopsy	Antibiotics (commonly β-lactams)

Abbreviations: GMS, Grocott methenamine silver; PAS, periodic acid–Schiff; TMP-SMX, trimethoprim-sulfamethoxazole.

The differential diagnosis includes cutaneous sarcoidosis, cutaneous tumor metastasis, cat-scratch disease, and cellulitis.

logical examination would assuredly rule out a primary cutaneous tumor in this case.[5]

Cat-scratch disease is often accompanied by systemic symptoms of fever, headache, or fatigue and presents with regional nodular lymphadenopathy rather than linear lymphadenopathy. The patient in this case had had no recent exposure to cats, decreasing the likelihood of *Bartonella henselae* inoculation.[6,7]

Cellulitis can present with ascending lymphangitis. The patient in this case had developed the primary lesion a year prior, which had maintained a stable surface area without treatment. Cellulitis would be expected not only to increase in the surface area of the primary site, but also to present as exceptionally tender. A patient with cellulitis for a year's duration would likely have experienced systemic symptoms.[8]

The diagnosis of nodular lymphangitis is often made based on its characteristic appearance and then confirmed with identification of the infectious agent. Common causative agents of nodular lymphangitis include *Sporothrix schenckii*, *Nocardia brasiliensis*, *Mycobacterium marinum*, *Leishmania braziliensis* and *S aureus*, although many others have been described. In order to determine the causative organism and the treatment approach, a number of procedures should be performed. Based on clinical suspicion, exposures, and geographical region, these procedures may include a tissue biopsy, special stains for fungus and AFB, fungal cultures, AFB cultures, and bacterial cultures of the tissue. Histopathology results without stain will likely be nonspecific, with granuloma and abscess identification in most of the common etiologies.[1-3]

The accompanying **Table** offers a brief summary of characteristic features for organisms that are commonly associated with nodular lymphangitis and their treatment regimens. ■

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