Nocardiosis incognito: Primary cutaneous nocardiosis with extension to myositis and pleural infection

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INTRODUCTION

Primary cutaneous nocardiosis has a diverse variety of clinical presentations; thus, a high degree of clinical suspicion is essential in making the diagnosis and avoiding inappropriate treatment or surgery. We present the case of a patient with mycetoma on the back with contiguous extension to the cervicothoracolumbar musculature and pleura caused by *Nocardia brasiliensis* acquired by sleeping on the ground.

Abbreviation used:

TMP-SMX: trimethoprim-sulfamethoxazole

CASE REPORT

A 33-year-old, immunocompetent woman came to the dermatology clinic at Metropolitan Hospital Center, New York, New York, for evaluation of a 16-year history of an insidious eruption on her back. She was otherwise asymptomatic with an unremarkable medical history. Previous treatments included combinations of clindamycin, rifampin, and adalimumab for a prior misdiagnosis of hidradenitis suppurativa. Five months before presentation, she improved on treatment with clindamycin and rifampin, and after 2 months of this therapy, clindamycin was discontinued and adalimumab was started at the Food and Drug Administration–approved dosage for hidradenitis suppurativa. About 2 months before presentation, adalimumab was discontinued because of increased purulence, and she was reverted to the combination treatment with clindamycin and rifampin, with gradual improvement. Previous wound cultures were negative.

The patient had several discrete, minimally tender, firm, skin-colored to erythematous, dome-shaped papulonodules, some with central serosanguinous crusts, along with numerous atrophic, ovoid-stellate scars with open sinus tracts and seropurulent crusts (Fig 1, *A*). There were several focal areas of irregular, dyspigmented, hypertrophic scars and induration, all within a remarkably rectangular distribution on her upper back and posterior neck. The remainder of the skin exam, including intertriginous areas, was clear. On further questioning, the patient disclosed she was a corn farmer from Guerrero, Mexico. She had no history of trauma or carrying agricultural equipment on her back, but she used to sleep on the ground at the farm. A clinical diagnosis of primary cutaneous nocardiosis mycetoma type was made.

Although partially treated, confirmation of the clinical diagnosis was pursued. Multiple biopsies, touch preparations, and stains (hematoxylin-eosin, periodic acid-Schiff, Gram, acid-fast, and Grocott methenamine silver) showed nonspecific neutrophilic microabscesses, suggestive of a chronic suppurative process, but failed to reveal any grains or organisms. Multiple tissue, wound, and drainage cultures held for 3 weeks with attention to isolate *Nocardia* species were negative. A high degree of clinical suspicion for primary cutaneous nocardiosis was maintained, and additional cultures eventually grew branching Gram-positive rods, later identified as *N. brasiliensis* (Fig 2). The patient was started on oral trimethoprim-sulfamethoxazole (TMP-SMX).

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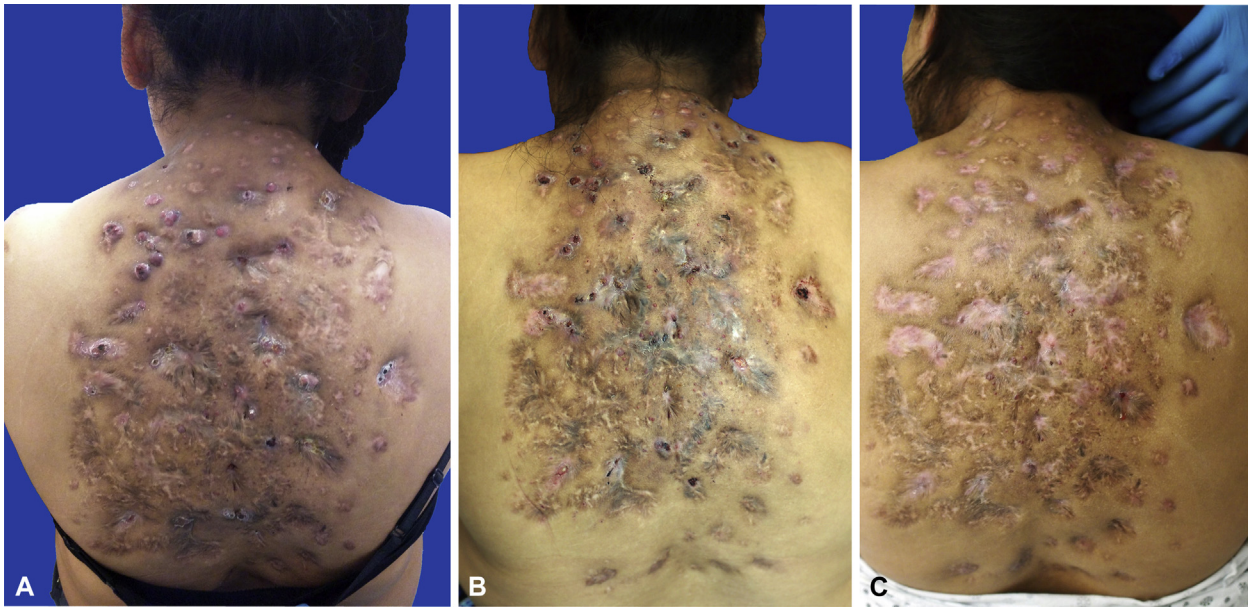

Fig 1. Primary cutaneous nocardiosis mycetoma type at the initial visit (**A**), at admission (**B**), and after 6 weeks of combination intravenous antibiotic treatment (**C**).

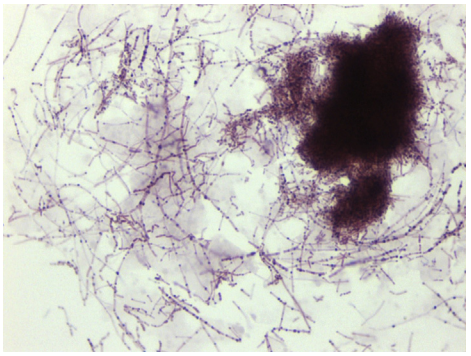

Fig 2. *Nocardia brasiliensis* obtained from culture, displaying partially acid-fast, beaded, branching, filamentous bacilli. (Original magnification: ×1000.)

The next week on close follow-up, a continued review of systems revealed new-onset right shoulder pain and increased tumefaction at her posterior neck (Fig 1, *B*). This presentation prompted a rushed computed tomography scan to rule out the presence of an epidural abscess. No epidural abscess, bone involvement, or lymphadenopathy was present, but a contiguous myositis involving her dorsal cervicothoracolumbar musculature extending from the level of C2 to T10 and right chest wall muscles was discovered. The corresponding subcutaneous tissue was replaced by ill-defined heterogeneous structures, with extension to the posterior aspect of the right upper lobe pleura. The patient was admitted to begin combination antibiotic treatment with intravenous TMP-SMX and amikacin.

On admission, the patient was afebrile with normal vital signs and a white blood cell count of 17.2×10^9/L with 90.0% neutrophils. After 3 weeks of combination intravenous antibiotic therapy, her white blood cell count normalized and her right shoulder pain resolved. At 6 weeks of treatment, the last sinus draining serosanguinous fluid resolved, and there was marked resolution of the tumefaction at her posterior neck (Fig 1, *C*). Magnetic resonance imaging confirmed the absence of neurologic involvement, and follow-up computed tomography scans showed improvement of the disease process. She continually improved after 2 months of treatment, with the skin exam only showing residual dyspigmented, atrophic, ovoid-stellate scars. She was then transitioned to a prolonged course of oral TMP-SMX, 2 double-strength tablets twice daily, with a planned treatment duration of at least 12 months.

DISCUSSION

Primary cutaneous nocardiosis most commonly presents as mycetoma. It is a disfiguring, chronic, typically painless, granulomatous infection involving cutaneous and subcutaneous tissue and can progress to involve viscera and bone. Mycetoma is classically characterized by a triad of tumefaction, multiple draining sinuses, and the presence of grains comprising the causative organism, which can either be bacteria (actinomycetoma) or fungi (eumycetoma). Other clinical presentations of primary cutaneous nocardiosis include lymphocutaneous or sporotrichoid infection and superficial skin

infection, such as an abscess or cellulitis. Affected individuals are typically immunocompetent with predisposing risk factors, such as an occupation in agriculture and local traumatic inoculation of soil saprophytes. Secondary cutaneous nocardiosis might occur in the setting of disseminated disease, such as that from late-stage primary pulmonary nocardiosis in immunocompromised patients or from a distant site of primary cutaneous nocardiosis. Of note, the central nervous system is the most common site of involvement in disseminated nocardiosis.[1]

Mycetoma is recognized by the World Health Organization as a neglected tropical disease with worldwide distribution found primarily along hot, arid areas of Africa, Latin America, and Asia.[2-4] The highest prevalence of actinomycetoma is observed in Mexico, where the predominant causative organism is *N. brasiliensis*.[3,4] Worldwide, the foot is the most common body site affected. In Mexico, the second most common body site affected is the back, owing to agricultural or rural workers habitually carrying wood or other equipment and materials on their backs.[3-6] Direct extension of an infection from the back to the spinal cord can result in neurologic symptoms, such as weakness and paraplegia.[1,4,5] The differential diagnosis of actinomycetoma is broad and includes tuberculosis, coccidioidomycosis, sporotrichosis, actinomycosis, botryomycosis, phaeohyphomycosis, eumycetoma and other fungal infections, osteomyelitis, and malignancies.[5] Thus, the clinical history and consideration of epidemiology are essential in elucidating the most likely diagnosis.

Combination treatment with TMP-SMX and amikacin has been a successful regimen in most patients with severe actinomycetoma.[6] The patient had incidentally completed 4 months of rifampin before arriving at our clinic. Considering the duration and severity of the infection, the need for patient adherence, and treatment in an inpatient setting, we treated our patient with a continuous combination therapy of intravenous TMP-SMX and amikacin for 8 weeks. With complete clinical resolution of active lesions, we transitioned the treatment to a planned prolonged course of at least 12 months of oral TMP-SMX to minimize the risk of recurrence.

This case highlights the requirement of a high degree of clinical suspicion to diagnose primary cutaneous nocardiosis, especially when patients with involvement of unusual body sites seek treatment in areas not endemic with nocardiosis. In addition, our patient was incidentally and partially treated before seeking treatment at our clinic; thus, a persistent microbiologic work-up was essential in confirming the diagnosis. Culturing should be continued for at least 2-4 weeks because *N. brasiliensis* is a slow-growing organism.[1,3] Clinicians should be alert to the possibility of contamination and overgrowth with more common, faster-growing bacteria. Early imaging studies are indispensable in delineating the degree of involvement, which might be underestimated by the clinical appearance.[6,7]

Increased awareness of the potential challenges of recognizing nocardial mycetoma and a high index of clinical suspicion can assist in improving the overall outcome of this globally burdensome infection. Because this case of nocardiosis was insidious, elusive, and histologically silent, we referred to this as a presentation of nocardiosis incognito.

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