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Case Report

A Primary Cutaneous Nocardiosis of the Hand

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Abstract

BACKGROUND: Nocardiosis is caused by an aerobic actinomycete, most commonly introduced through the respiratory tract. The *Nocardiae* are gram-positive, partially acid-fast bacteria. Primary cutaneous nocardiosis infections are rare and caused by the traumatic introduction of organisms percutaneously. The manifestation is usually an opportunistic infection. Cutaneous involvement may develop as one of four types: mycetoma, lymphocutaneous infection, superficial skin infection, or systemic disease with cutaneous involvement. Diagnosis and evaluation of appropriate specimens are principally by culture.

CASE PRESENTATION: A 55-year-old female patient with diabetes type II presented with chronic skin lesions on the hand. Otherwise, her medical history was unremarkable. There were no signs of systemic disease. Direct examination of swabs demonstrated gramme bacteria and culture on Sabouraud agar was positive for *Nocardia spp*. The specimen of nocardiae was not identified. The patient was treated during nine months with sulfamethoxazole plus trimethoprim. There was an important clinical improvement of the cutaneous aspect of the lesions in hand. Some scars and fibrosis remained after nocardiosis.

CONCLUSIONS: Primary cutaneous nocardiosis of the hand is a rare condition. The clinical diagnosis is difficult, and culture is mandatory.

Introduction

The genus *Nocardia* has widely distributed a group of bacteria found in soil, organic matter, fresh and salt water. *Nocardia* and *Rhodococcus* belong to the family *Nocardiaceae* of the suborder of so-called aerobic actinomycetes that includes *Mycobacterium*, *Corynebacterium*, *Gordona*, and *Tsukamurella*. *Nocardia* includes more than 50 different species, but *N. asteroids complex* is responsible for most of the human infections [1]

Nocardia is aerobic, filamentous gram-positive, atypical acid-fast bacteria that can cause localised or systemic infections mostly in immunocompromised patients, i.e. post-transplantation, in renal insufficiency, chronic lung disease, human immunodeficiency, cancer and lymphoma or HIV/AIDS. Infections occur either by inhalation or direct skin inoculation [1]

Primary cutaneous nocardiosis, however, is a rare disease characterised by nodules, subcutaneous abscess formation, ulcerations, pyoderma or cellulitis. In contrast to systemic nocardiosis, mostly immunocompetent patients get affected. The most frequently isolated species is *N. brasilensis. N asteroides* and *Nocardia otitidiscaviarum* and some other species have only occasionally been isolated [1, 2]

The major differential diagnoses of primary cutaneous nocardiosis are bacterial soft tissue infections caused by *Staphylococcus aureus* or *Streptococci spp.*, but nocardiosis tends to be more indolent. An untreated infection can develop into lymphocutaneous nocardiosis with sporotrichosis and ulceroglandular tularemia as important differential diagnoses. Nocardia bacteriemia is uncommon [3, 4]

Case Report

A 55-year-old female patient from Brazil presented with a chronic skin lesion on the hand. She suffered from diabetes mellitus type II but had no other risk factors in her medical history.

On examination, we observed an erythematous lesion on her right hand with plaque-like thickening and superimposed partly ulcerated nodules (Fig. 1 a, b). The lesion was moderately painful. There was no lymphadenopathy. Ultrasound investigations remained unremarkable.

Figure 1: Nodardiosis of the hand (Mycetoma). Initial presentation with inflammatory plaques and nodules of the hand partially ulcerated (a, b). Complete remission with scarring after nine months of antibiosis (c, d)

Direct microbiological examination demonstrated gram-positive bacteria. After ten day-culture on Sabouraud dextrose agar at 35 degrees, Celsius colonies with a chalky appearance and purple or white colour could be identified. The texture was smooth or heaped. Microscopy of the colonies revealed gram-positive branching filaments of 0.8 µm diameter characteristic for *Nocardia spp* (Fig. 2). Unfortunately, molecular techniques for *Nocardiae spp* were not available.

A biopsy was taken for histology which found pustules and fragments of granulation tissue were seen with neutrophilic infiltration. Granulomatous alterations were absent. Intense neutrophilic infiltrates with a pustule and abscess formation is characteristic for cutaneous infection by *Nocardia spp.* The diagnosis of primary cutaneous nocardiosis was confirmed.

The patient was treated during nine months with 160 mg trimethoprim- 800 mg sulfamethoxazole twice daily. There was an important clinical improvement of the cutaneous aspect of the lesions in hand. Some scars and fibrosis remained after nocardiosis (Fig. 1 c, d).

Figure 2: Nocardia spp. on Sabauroud agar. Upper part – view from above, lower part – view from below

Discussion

Nocardia species are Gram-positive, weakly acid-fast with Kinyoun stain, and non-acid-fast with the Ziehl-Neelsen stain, and develop branching filaments only in aerobic culture. *Nocardia spp.* can be grown on Sabouraud agar, which is a selective medium for these bacteria. Colony morphology and

smell are other characteristics used for their identification [1, 5].

In a specialized laboratory analysis, 16S rDNA, multilocus sequence typing (MLST) using housekeeping genes for genotyping, or matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) is employed for species identification [6-9]. Unfortunately, molecular assays were not available in our case.

In Brazil, pulmonary disease is the most common nocardiosis [7]. *N. farcinica* and *N. asiatica* have been isolated from rare cases of primary cutaneous nocardiosis in Brazil [8]. Cutaneous involvement may develop as one of four types: superficial skin infection, mycetoma, lymphocutaneous infection, or systemic disease with cutaneous involvement [1]. Our patient can be classified into the first group. We treated the patient successfully with trimethoprim-sulfamethoxazole what is the most commonly used sulfonamide preparation. Some species are often resistant to this combined drug [8, 10]. Therefore, we can exclude *N. otitidiscaviarum*, *N. nova* and *N. farcinica* as responsible species for the primary cutaneous nocardiosis we observed.

Primary cutaneous nocardiosis of the hand, as in our patient, raises possible differential diagnoses, like staphylococcal or streptococcal soft tissue infections, ulceroglandular tularemia, or sporotrichosis [1]. Epitheloid cell sarcoma is another important differential diagnosis confirmed by histopathology [11]. In the case of mycetoma of the hand, the differential diagnosis confirmed by culture could be either eumycetoma or actinomycetoma. *Nocardia spp., Actinomadura spp.,* and *Streptomyces spp.* cause actinomycetoma, while eumycetoma is due to infection with *Madurella mycetomatis, Leptosphaeriae spp.,* and related species [12]. Mycetoma of the hand can lead to severe soft tissue and bone destruction [12]. In patients with the immunocompromising disease, primary cutaneous nocardiosis of the hand my lead to severe complications such as cellulitis-like nocardiosis [13], sporotrichoid nocardiosis [14] or necrotizing nocardiosis – an emergency [15].

In conclusion, nocardiosis should be considered even in immunocompetent patients with rather indolent infections of the hands. Rapid identification *Nocardia spp.*, early and sufficient antibiotic treatment ensure a good prognosis.

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