Mycetoma due to *Nocardia Africana/Nova* Treated Successfully with Cotrimoxazole and Moxifloxacin

**Abstract**

*Nocardia africana* is a recently identified organism and has rarely been reported to cause mycetoma. Here we report the case of a 40-year-old woman who presented with discharging sinuses and nodules for the past 7 years along with few discrete axillary lymph nodes. Cultures and Maldi-TOF MS (Matrix-assisted laser desorption/ionization–time of flight mass spectrometry) method identified the causative organism as *Nocardia africana/nova*. The organism was acid-fast positive on modified Ziehl-Neelsen stain and Gram’s stain revealed branched filamentous beaded gram-positive bacilli, while histopathology showed granulation tissue along with few ill-defined epithelioid cell granulomas, with giant cells. Based on the sensitivity report, the patient was started on tablet moxifloxacin and cotrimoxazole, and has shown considerable improvement at 2.5 months of follow-up.

**Keywords:** Cutaneous nocardiosis, mycetoma, *Nocardia africana/nova*, treatment

**Case Report**

A 35-year-old-female presented with painful, skin-colored nodules on the left arm with few sinuses discharging yellowish pus intermittently for the past 7 years. [Figure 1] Seven years back, she had a single painful nodule that was operated but it reappeared after a year. Since then, there had been a gradual increase in similar nodules and sinuses. There was no history of grains, fever, systemic symptoms, trauma, or injections, however, the patient frequently fed stray cats who visited her house. Six months ago, she was treated with itraconazole 200 mg twice daily and potassium iodide 25 drops thrice daily for 1.5 months with no improvement. On cutaneous examination, an ill-defined, indurated, firm swelling was present on the left upper arm with multiple tender subcutaneous nodules of size 1–2 cm and few discharging sinuses. Few discrete, tender, mobile left medial axillary lymph nodes ranging in size from 1 × 1 cm to 2 × 2 cm were present. Systemic examination was within normal limits. Smear from pus showed acid-fast filamentous bacilli on modified Ziehl-Neelsen stain (1% sulphuric acid) [Figure 2a] and branched

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Figure 1: Multiple erythematous nodules and discharging sinuses on the arm

X-ray revealed minor bony irregularities but the non-contrast computed tomography (NCCT) showed lytic lesions in the humeral head and adjacent scapula with features of myositis and sinus tracts in the overlying skin. MRI also revealed lytic lesions with enhancing marrow edema suggestive of chronic osteomyelitis. Other investigations like 10% potassium hydroxide mount of pus, microscopy for AFB, tissue for anaerobic culture (Robertson’s cooked meat agar), tissue for fungal culture (Sabouraud’s dextrose agar) and tissue for Mycobacterium tuberculosis culture (MGIT) were negative. Repeated cultures of pus after keeping a gauze overnight over the lesions yielded chalky white colonies with musty/earthy odor of Nocardia spp on 5% sheep blood agar on the fifth day on the third attempt [Figure 2c]. The organism was identified as Nocardia sp. by Vitek2 compact system (Biomerieux). Using Matrix-assisted laser desorption/ionization–time of flight mass spectrometry (Maldi-TOF MS), the causative organism was found to be Nocardia africana/nova. On doing an antimicrobial susceptibility testing by Epsilometer test (E-strips), it was sensitive to ampicillin, meropenem, imipenem, moxifloxacin, cotrimoxazole, ceftriaxone, amikacin, and piperacillin-tazobactam, while resistance to ciprofloxacin and amoxiclav was found.

Based on the antibiotic susceptibility testing, she was started on tablet cotrimoxazole-DS (160/800) BD and tablet moxifloxacin 400 mg OD. At 2.5 months of follow-up, the...
pus has dried up, edema has decreased and the sinuses are healing with deep scarring [Figure 3]. No side effects of the treatment were seen. The patient is under follow up and we intend to treat the patient till 3 months after complete clinical and radiological recovery.

**Discussion**

*Nocardiopsis spp.* includes over 50 species, of which *N. brasiliensis*, *N. asteroides* complex, and *N. farcinica/N. nova* are commonly implicated in various human infections.[7] Majority of cutaneous nocardioses, worldwide and in India, are caused by either *N. brasiliensis* or *N. asteroides.*[5] Bone involvement such as periosteal thickening, osteolysis, and osteoporosis in longstanding cases is infrequent in nocardial mycetoma, but progressive fibrosis, mutilation, and dysfunction is rapid.[8] In our patient, bone involvement was not visualized on X-ray but was evident on NCCT and MRI highlighting the importance of higher resolution imaging. CT has the maximum sensitivity for early detection of bone involvement, while MRI is the most comprehensive method for assessment of bone and soft tissue involvement.[6] The bony lesions also provide an objective assessment for monitoring response to treatment, hence need to be repeated 6 monthly.

*N. africana/nova* identified as the aetiological agent in our case is a rare organism causing mycetoma. Species identification of *Nocardia* is done by a combination of antibiotic susceptibility patterns, molecular methods like gene sequencing of 16SrRNA and hsp65PRA patterns and Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS). MALDI-TOF MS has accurate species-level identification in 94–95.9% in *Nocardia* isolates[9,10] and 97.9% in *N. africana*. Previously, *N. africana* has been reported in several case reports to cause cauliflower-like verrucous plaque resembling squamous cell carcinoma,[11] fulminant disseminated nocardiosis leading to death in a 12-year-old immunocompetent boy,[12] feline mycetoma,[13] bovine mastitis,[14] and feline mandibular osteomyelitis.[15] Nocardiosis has been recorded to be transmitted from bites and scratches of seemingly asymptomatic animals like cats.[1] In our case, the patient had a history of feeding many stray cats who visited her house and may have acquired infection through them. Identification of subspecies of *Nocardia* is important as it adds to the epidemiology and geographical distribution; helps to correlate species to a particular clinical presentation and deciding the antibiotics for successful treatment. It is known that common cause of cutaneous nocardioses, *N. brasiliensis* is susceptible to amoxicillin-clavulanic acid whereas *N. nova/africana* which was the causative organism in our case is susceptible to ampicillin but resistant to amoxicillin-clavulanic acid. Hence, it should be attempted to narrow down speciation to the complex such as *N. nova* complex.

In conclusion, *N. africana/nova* is a rare organism causing actinomycetoma. NCCT or MRI is better for evaluating bone involvement. Multiple attempts must be made to culture the organism and identify its subspecies so that treatment can be offered according to the antibiotic susceptibility pattern.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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