CASE REPORTS

Nocardia transvalensis/wallacei hindfoot actinomycetoma

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Received: April 24, 2016 **Accepted:** June 26, 2016 **Online Published:** July 3, 2016
DOI: 10.5430/ijdi.v3n2p65 **URL:** http://dx.doi.org/10.5430/ijdi.v3n2p65

Abstract

Mycetoma is a chronic granulomatous infection that manifests with a triad of tumefaction, sinus tracts, and granular discharge. We report a case of hindfoot infection due to Nocardia transvalensis/wallacei in a farmer.

Keywords

Nocardia transvalensis/wallacei, Foot, Mycetoma

1 Introduction

Nocardia transvalensis usually causes pulmonary manifestations; however seldomly it can affect other organs like the musculoskeletal system, as in our case of hindfoot actinomycetoma. It is of great importance to accurately diagnose any foot infection to provide patients with optimal treatment and prevent unnecessary debilitating complications. On imaging of advanced stages of musculoskeletal Nocardia infection, findings are variable like lytic bone lesions.

2 Case report

Our patient is a 48-year-old Yemeni farmer who worked on a field in Al-Qasim, Saudi Arabia on his bare feet. According to the patient he had multiple draining sinuses spanning over a duration of 18 months. The discharge was dark red from the lateral foot then a few months later medial foot discharge was also seen with dark red and yellowish green granules. He went to several hospitals and did not improve when treated with multiple courses of antibiotics that names were not mentioned in the medical records. Multiple debridments were performed. He did not have any past medical illness and was not on any medication. No history of trauma was present. He was referred to King Fahad Medical City to establish a diagnosis. His ESR on admission was 106 compared to 24 at the time he was discharged. A gram stain was performed from the sinus discharge that showed branching, beaded filamentous bacilli. The pus culture was sent to Mayo Clinic laboratories and was confirmed by gene sequencing to be Nocardia Transvalensis/Wallacei. The isolate was sensitive to trimethoprim, sulfamethoxazole, ceftriaxone and ciprofloxacin. It was resistant to amikacin and intermediate to doxycycline.

An X-ray of the foot was ordered to assess disease extent and it demonstrated diffuse osteopenia with permeative lytic appearance. There was diffuse soft tissue swelling with obliteration of the Kager's fat pad (see Figure 1). The normal right foot is included for comparison (see Figure 2). Then an MRI of the foot was done to rule out osteomyelitis. MRI showed numerous tiny scattered soft tissue microabscesses (see Figure 3). Loss of normal bone marrow T1 signal intensity was noted in the calcaneus with bone marrow edema and enhancement post contrast indicating osteomyelitis (see Figures 4-6).

Figure 1. Lateral view of the left foot. Diffuse osteopenia with permeative lytic appearance (arrows). Diffuse soft tissue swelling with obliteration of the Kager's fat pad (circle)

Figure 2. Lateral view of the normal right foot

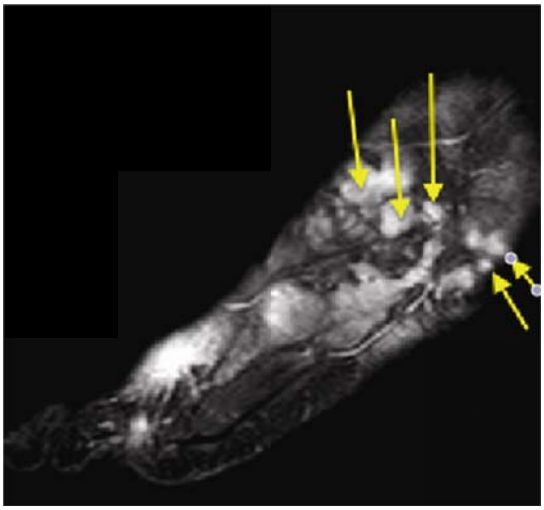

Figure 3. Sagittal short tau inversion recovery (STIR) sequence shows numerous tiny scattered soft tissue microabscesses

The patient was treated by parenteral medication for 3 months. The first month he received intravenous (IV) co-trimoxazole followed by 2 months of IV ceftriaxone and co-trimoxazole. On discharge, the patient was stable and all

ISSN 2331-5857 E-ISSN 2331-5865

his foot sinuses healed. The soft tissue foot swelling decreased and he was ambulating comfortably. The patient was discharged on oral co-trimoxazole and ciprofloxacin for a year.

Figure 4. Sagittal T1-weighted image shows loss of normal bone marrow T1 signal intensity in the calcaneus (arrow)

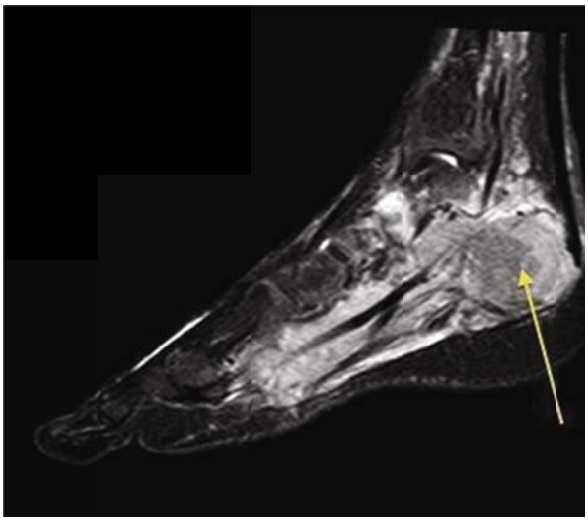

Figure 5. Sagittal STIR, calcaneus bone marrow edema (arrow)

Figure 6. Sagittal contrast-enhanced fat-saturated T1-weighted image shows enhancement of the calcaneus indicating osteomyelitis

3 Discussion

Mycetoma is a chronic and progressively destructive skin infection, that may affect subcutaneous tissues, fascia, muscle, and bone after localized trauma, usually but not invariably to the foot, leg, arm, or hand [1, 2]. Injury could either introduce fungi (eumycetoma) or aerobic actinomycetes (actinomycetoma). It produces localized swelling and contains suppurative granulomas with multiple sinus tracts extruding macroscopic colored granules. In nocardiosis, mycetoma is the only clinical form that is associated with granules [3].

Nocardia species are aerobic actinomycetes mostly happening in immunocompromised patients. However, up to one-third of patients with nocardiosis are immunocompetent [4]. N. transvalensis (Nocardia transvalensis) is a rare pathogen that appears to behave clinically like other Nocardia species [5]. Diseases that are caused by N. transvalensis include mycetomas, localized ocular infections, and primary pulmonary infection. N. transvalensis is now understood to cause life-threatening, invasive, and disseminated infections in severely immunocompromised patients [6]. Primary cutaneous disease usually occurs in immunocompetent hosts unlike other forms of nocardiosis. After skin inoculation, a superficial abscess or localized cellulitis can occur. The infection may spread to the regional lymph nodes and production of a single or linear chain of nodular lesions is seen. The deep infection has a chronic course, with granulomatous and fibrosing evolution, that leads to multiple sinus tracts formation, overlaid by hypertrophic verrucous skin. Later, progressive destruction of subcutaneous tissues, fascia, and muscles, causing deformation and functional impairment develops [7, 8]. Soil is the likely reservoir; however no environmental source has been identified. Potential route of entry is puncture or other contaminated traumatic inoculums, such as thorn. Occupations such as farming, shepherding, gardening, and history of rural background or barefoot walking can assist in typical pedal mycetoma [2, 9].

Osteomyelitis is a common complication, and plain X-ray assessment or CT scan is advisable to demonstrate bony osteolytic areas and eventual periosteal reaction [10, 11]. The initial radiographic changes include periosteal reaction, new bone formation, and cortical erosions. This then progresses to remarkable sclerosis, lytic lesions (geodes), and osteopenia secondary to disuse. [12, 13] The “dot-in-circle” sign has been considered to be a highly specific early sign of mycetoma on magnetic resonance imaging (MRI) [10, 11]. Pijper *et al*. reported the first case of N. transvalensis infection in 1927 as a pathogen of foot mycetoma in a South African patient. It has since been reported in a range of other infections in Australia, Africa, North America, Europe and Thailand [8, 14] with a few reported in Japan [15] and Saudi Arabia [16].

Our patient was a farmer and we believe transmission of N. transvalensis may have occurred by a puncture wound or superficial injury while working barefoot on the field. Although contamination of a skin lesion from soil was the probable route of infection in our case, he denied any history of a specific injury. His infection was chronically progressive, involving the subcutaneous tissue leading to multiple sinus tracts formation, finally with bone dissemination as confirmed by MRI finding. In vitro susceptibility tests suggest that N. transvalensis displays increased resistance to many antimicrobial agents when compared with other Nocardia species [17]. Our patient isolate was sensitive to trimethoprim, sulfamethoxazole, ceftriaxone and ciprofloxacin while resistant to amikacin and intermediate to doxycycline.

Newer molecular technologies promise to supply rapid and accurate identification of the organism. Clinical relevance has been determined for N. transvalensis by conventional hydrolysis pattern [18-20].

Treatment of N. transvalensis infections is currently difficult, because clinical isolates of this rare organism often show an unusually high level of resistance to aminoglycosides and amikacin. PCR-based methodologies have been shown to offer clear-cut advantages over traditional methods for the isolation of N. transvalensis complex that are difficult to recognize by conventional methods and present potential chemotherapeutic complications arising from their inherent resistance to aminoglycosides and amikacin in particular [6, 21-23]. Patients will benefit from optimal drug selection, particularly when primary drug resistance is noted and an alternative drug therapy is needed [24].

 ISSN 2331-5857 E-ISSN 2331-5865

In our patient IV co-trimoxazole for one month followed by a combination of IV co-trimoxazole with ceftriaxone were administered parenterally for a total of 2 months. His soft tissue foot swelling decreased and all his sinuses healed. He was discharged on oral co-trimoxazole and ciprofloxacin for a year. Optimal duration of therapy is uncertain, but long-term therapy is the rule since infections tend to relapse (6-12 months or longer); most recommendations are empirical. In one study of the efficacy of co-trimoxazole, relapse happened rarely when patients received therapy for more than 3 months [25]. Ichinomiya *et al*. described a patient with elbow N. transvalensis mycetoma that was treated on the span of 25 years by several approaches of medication like minocycline and levofloxacin as well as incision [26]. In 1994, Mirza SH *et al*. reported a patient with right arm involvement of N. transvalensis that was managed successfully by surgical excision of the lesion and treatment with co-trimoxazole [5]. Another case of mycetoma N. transvalensis of the thumb in a farmer was described by Gugnani HC that was successfully treated by oral co-trimoxazole and like our case had microabscesses [27]. Both cases similarly had history of discharging sinuses. The lack of controlled prospective clinical studies hinders the general recommendation for treatment of nocardiosis limited [28]. The recent therapies of choice for nocardiosis are the folate pathway antagonists sulphadiazine, sulphamethoxazole or a combination of trimethoprim and sulfamethoxazole [29-31].

4 Conclusion

The therapeutic outcome of N. transvalensis mycetoma depends on early identification of the bacteria, antimicrobial susceptibility, and the extension of infection by appropriate radiological imaging is important. This infection must be treated with co-trimoxazole alone or in combination with other available antibiotics according to susceptibility testing. Parenteral therapy does not need to be continued beyond a period of 3-6 weeks, as determined by response in each individual patient. With improving clinical status and evidence of healing sinuses, most patients can be safely switched to therapy with an oral preparation of co-trimoxazole in combination with quinolone. Long-term therapy should be considered in osteomyelitis. The decision to stop therapy is determined by complete sinus healing and radiologic resolution of signs of osteomyelitis by MRI.

Conflicts of interest disclosure

The authors have declared no conflicts of interest.

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