Mycetoma caused by *Nocardia transvalensis*

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Abstract

Nocardia transvalensis can be a rare cause of actinomycotic mycetoma. A 40 year old man presented with his right arm showing multiple discharging sinuses, which had been present for four years. *N transvalensis* was isolated from a biopsy specimen. No other underlying disease was detected. The patient was successfully managed with surgical excision of the lesion and treatment with co-trimoxazole. This is the first case of *N transvalensis* infection to be reported from the Indian subcontinent as far as is known.

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Nocardia transvalensis was first described by Pijper and Pullinger¹ in 1927 as the cause of mycetoma pedis in an African patient. Subsequently, there have been case reports of only seven patients with infections caused by this aerobic actinomycete.² *Nocardia* spp are ubiquitous in the environment, and their natural habitat is the soil. Superficial infections with *Nocardia* spp are often the result of local trauma and soil contamination of the wound. This results in localised skin and subcutaneous tissue infection (actinomycotic mycetomas). Alternatively, inhalation of micro-organisms may lead to primary pulmonary infection, which may resolve spontaneously or progress to pneumonia. Invasive disseminated infections are particularly common in immunocompromised or debilitated hosts. These infections are frequently fatal.

With improved identification of these opportunistic micro-organisms, and concomitant use of immunosuppressive treatment, the observed incidence of *N transvalensis* infection will almost certainly increase.

Case report

A 40 year old man from Peshawar (North West Frontier Province), Pakistan, presented with his right arm showing multiple discharging sinuses, which had been present for four years (fig 1). Several papules and nodules had also recently appeared on a similar location on his left arm.

Examination showed that the lesion on his right arm was ulcerated and spreading outwards in a sporotrichoid manner. Serousanguineous fluid was oozing from the lesion. Numerous scars were observed close to the fresh lesions. The lesions were erythematous, nodular, and slightly tender on palpation. Analysis of urine, peripheral blood, and serum biochemistry showed no abnormalities. A chest x ray picture yielded normal results. An HIV antibody test was negative and there was no underlying debilitating disease.

A skin biopsy specimen was taken from the edge of the ulcer for histopathological examination and culture. On staining with haematoxylin, it showed a polymorphous infiltrate, consisting of histiocytes, plasma cells, polymorphonuclear cells and lymphocytes. Small grains were seen extracellularly and intracellularly; these were periodic acid Schiff positive. A provisional diagnosis of subcutaneous mycosis was made, and the patient was given oral ketoconazole. Aerobic culture of the biopsy material on blood agar at 35°C for 72 hours yielded chalk-white colonies, 1-2 mm in diameter (fig 2). A Gram stain of the colonies showed Gram positive, branching, filamentous bacilli. These were shown to be weakly acid fast using the modified Ziehl-Neelsen method. A provisional identification of *Nocardia* species was made, and the patient was given oral co-trimoxazole.

The isolate was sent to the Mycological Reference Laboratory of the Central Public Health Laboratory in Colindale, London, and was identified as *N transvalensis*. The organism was identified using a combination of morphological and physiological criteria. Colonies on nutrient agar were dry and pale in colour, with no diffusing pigment. The organism was acid fast, and hydrolysed hypoxanthine, aesculin and urea, but not casein, xanthine, or tyrosine. Nitrate was

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Figure 1 Multiple, ulcerated, crusted lesions on the right arm in sporotrichoid distribution.

Figure 2 Chalk-white colonies on blood agar.

reduced, but citrate was not used. Using ammonium salt media, acid production was shown from glucose, glycerol, inositol, mannitol, sorbitol, trehalose, and erythritol, but not from lactose, maltose, or rhamnose. Surgical excision of the lesion was performed, and co-trimoxazole was given for two weeks. There have been no further lesions on the right arm, and the lesions on the left arm have disappeared. An HIV antibody test performed three months later was negative.

Discussion

Nocardia spp are aerobic actinomycetes which cause rare, sporadic infections that are usually community acquired. *N. transvalensis* is a rarely encountered pathogen that seems to behave clinically like other *Nocardia* spp. First described in a case of mycetoma pedis in South Africa,¹ it has since occurred as an occasional pathogen in a range of other infections in Australia, Africa, North America, and Europe.^{1,2} Despite the low number of strains of *N. transvalensis* which have been described, the species seems to be distinct from the more common nocardiae. In a numerical taxonomic study of the group Goodfellow³ found that the type strain of this species did not cluster with any other species. The natural habitat of common pathogenic *Nocardia* spp is the soil. A soil reservoir for *N. transvalensis* would therefore be expected, but it still remains to be proved. Transmission of *Nocardia* spp to human beings occurs by inhalation or direct inoculation. The range of diseases caused by *N. transvalensis* includes mycetoma, localised ocular infections, and primary pulmonary infections. *N. transvalensis* infection may follow a puncture wound or superficial injury of the skin or, rarely, of another site (for example, the cornea), which allows the micro-organisms to gain access to underlying tissues. Injuries to the hand or foot in an outdoor setting may result in

chronic infection of an extremity (actinomycotic mycetoma). Primary inoculation was the likely method of infection in our patient. A similar case has been described in a Nigerian patient with mycetoma of the thumb⁴ and in a patient from New South Wales with an eye infection. Although contamination of a skin lesion from soil was the probable route of infection in each of these cases, only one had a history of a specific injury. The bilateral infection is difficult to explain in our patient, especially when no underlying disease was detected. It could have been due to simultaneous exposure to the pathogen during the patient's work as a labourer.

In vitro susceptibility tests suggest that *N. transvalensis* displays increased resistance to many antimicrobial agents when compared with other *Nocardia* species.⁵ Our isolate was resistant to amikacin and also to third generation cephalosporins. Co-trimoxazole was used successfully as monotherapy for the patient with mycetoma of the thumb.³ The lesion was excised in our patient and co-trimoxazole was given, but the fact that the lesions on his other arm healed completely points to the success of drug treatment alone in the initial stages of the disease. The rarity of *N. transvalensis* infection precludes definitive statements regarding antimicrobial treatment. Nevertheless, sulphonamides or co-trimoxazole should probably be regarded as first line agents for the treatment of *N. transvalensis* infection.⁶

In conclusion, we suggest that infection caused by *N. transvalensis* may pose diagnostic problems because of its clinical and histological similarities to other fungal infections. Although initial identification to genus level should not be a problem in routine laboratories, final identification of this rather uncommon species can only be carried out in reference centres. Co-trimoxazole is the treatment of choice, but in advanced cases surgical excision may also need to be done for complete recovery to be made.

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