

## ***Nocardia brasiliensis* primary pulmonary nocardiosis with subcutaneous involvement in an immunocompetent patient**

This is a report of an unusual case of *Nocardia brasiliensis* causing primary pulmonary nocardiosis with disseminated subcutaneous lesions in an immunocompetent patient. This case highlights the importance of considering nocardiosis as a differential diagnosis in patients with pulmonary and cutaneous lesions and the need for vigorous management for complete cure.

**Key words:** Immunocompetent, *Nocardia brasiliensis*, pulmonary

### **Introduction**

Infections caused by *Nocardia species* are infrequent but challenging to the clinicians. They cause a wide variety of diseases in both the normal and immunocompromised patients.<sup>[1]</sup> The pulmonary involvement requires a differential diagnosis with other pulmonary diseases such as tuberculosis. In a country like Nepal, where agriculture is the main occupation of the majority of the populace, infections by soil saprophytes must always be considered.

### **Case Report**

A 26-year-old previously healthy lady from a farming background developed cough and dyspnoea followed one month later by swelling of the right hand and draining sinus in the right axilla. She had multiple surgical drainages of the swellings at a district hospital but without clinical cure. She presented to the medicine outpatient department one year after the symptoms started with complaints of increasing dyspnoea and new painful swellings over the dorsum of the right hand [Figure 1], right supraclavicular region and the left deltoid region. There was no history of fever, trauma, and thorn prick. She had no known exposure to patients with pulmonary tuberculosis. On examination, she was afebrile, slightly anaemic, breathing comfortably on room air. Local examination of her arms revealed grossly swollen right hand

with healed scars from previous incisions. Discharging sinus with serosanguinous discharge with no visible granules was present at the right axilla. Fluctuant, tender swellings were present at the right supraclavicular and left deltoid regions. Chest radiographs revealed diffuse opacity of the entire left lung and upper lobe apical opacity of the right lung [Figure 2]. Other organ systems were not involved.

A provisional diagnosis of nocardiosis and soft tissue tumour was made and trimethoprim-sulfamethoxazole was started. Meanwhile pus and tissue from the swellings and sputum were sent for microbiological investigations. Gram stain revealed polymorphonuclear leukocytes and Gram-positive bacilli in chains and fine branching filaments with tendency to fragment into coccoid and bacillary forms. Branching acid-fast bacilli were seen in modified acid-fast staining [Figure 1]. Since the findings were characteristic of nocardiosis, trimethoprim-sulfamethoxazole was continued. The patient also underwent drainage and debridement of the abscess. She showed marked improvement in the next two weeks of treatment. The microorganism involved was later confirmed to be *Nocardia brasiliensis* by culture and conventional biochemical tests.

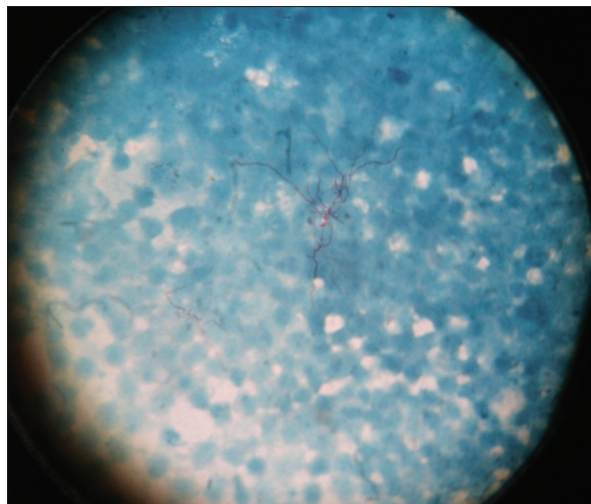
### **Discussion**

*Nocardia species* are ubiquitous in the environment as saprophytic components in water, soil, dust, decaying vegetation and faecal matter.<sup>[2]</sup> The incidence of nocardiosis in Nepal is unknown with no reported cases so far. However, since the majority of the population lives in rural areas with farming as the primary occupation underreporting and misdiagnosis are more likely.

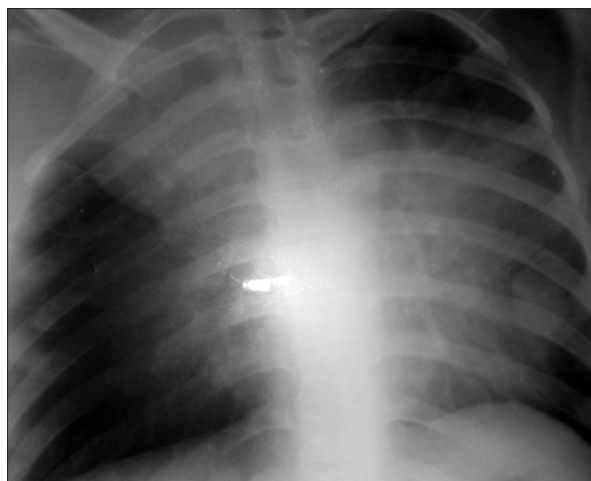
Nocardiosis is caused by a variety of species falling



**Figure 1:** Swelling on the dorsum of hand



**Figure 2:** Plenty of pus cells and branching acid-fast bacilli in modified acid-fast stain of pus in  $\times 100$  magnification



**Figure 3:** Chest X-ray

under the genus *Nocardia* in the family Nocardaceae, suborder Corynebacteriaceae and order Actinomycetales.

*Nocardia brasiliensis* differs from all other recognized *Nocardia species* in that it has been most often associated with primary cutaneous infections. These infections usually occur in normal hosts.<sup>[3]</sup> It is rarely implicated in pulmonary and disseminated infections in immunocompromised patients.<sup>[4]</sup> The most common manifestation of nocardial disease is pulmonary nocardiosis, occurring most frequently in immunocompromised patients.<sup>[4,5]</sup> The patient in this case was pregnant when the symptoms started, otherwise she was immunocompetent and not on any drugs. Half of all cases of pulmonary nocardiosis also involve infections in areas outside the lungs and approximately 20% of patients with disseminated disease present solely with extra-pulmonary disease, which usually has spread haematogenously from an asymptomatic or healed pulmonary site.<sup>[3]</sup> The infection is also known to spread through breach of skin or as a primary cutaneous nocardiosis.

The laboratory evaluation of nocardiosis begins with macroscopic and microscopic examination of the specimen. Macroscopic examination should include the examination for granules. Microscopy involves Gram staining and modified acid-fast staining of specimen, or granules crushed between slides. *Nocardia species* appear as beaded Gram-positive thin, branching, filamentous organisms. Gram staining is the most sensitive method by which to visualize and recognize *Nocardia species* in clinical samples.<sup>[4]</sup> In modified acid-fast stain they usually appear as partially acid-fast filamentous bacilli. Use of modified acid-fast stain in direct clinical specimen is unreliable due to variable acid-fastness and should be used only to confirm the acid-fastness of organisms detected by Gram stain.<sup>[4]</sup> *Nocardia species* grow readily on most nonselective laboratory media routinely used for the isolation of bacteria, fungi, and mycobacterium but colonies may take two to 14 days to appear.<sup>[1,4]</sup> Various selective media may be necessary to enhance recovery of *Nocardia species* and minimize the growth of contaminating organisms. Traditionally, the Nocardiae is identified to species level using a battery of biochemical tests. However, because of the generally nonreactive nature of most species in these tests, and because of the increasing number of described species, assignment using biochemical tests alone does not provide reliable identification of currently recognized species.<sup>[6]</sup> The API system and other commercially available systems are being evaluated for their utility in identifying the Nocardiae. Methods like whole cell hydrolysates examined for specific carbohydrates, gas liquid chromatography of short chain fatty acids etc. give good results if these can be afforded. Serological tests are shown to be nonspecific.<sup>[4,6]</sup> Molecular testing by hsp65 PCR and 16S restriction enzyme analysis appears to be an improvement and recognizes >90% of currently recognized clinical species.<sup>[6]</sup>

In 2003, CLSI published the standard for antimicrobial susceptibility testing by broth microdilution for *Nocardia species*.<sup>[7]</sup>

Successful therapy requires the use of antimicrobial drugs in combination with appropriate surgical drainage. Antimicrobial susceptibility testing is recommended when there is failure to respond to initial therapy; use of sulfonamides is contraindicated or in cases of infection with resistant strains like *N. farcinica* and *N. otitidiscaviarum*.<sup>[4,8,9]</sup> Sulfonamides have been the antibiotics of choice either alone or in combination with other antimicrobials.<sup>[2,10]</sup> The duration of therapy is uncertain but it should be protracted because of the occurrence of a considerable number of relapses after short courses of treatment.<sup>[10]</sup> Surgical management depends on the site and extent of the infection. In extra-neural disease, indications for aspiration drainage or excision of abscesses are similar to those for other bacterial infections.<sup>[1]</sup>

In a tuberculosis-endemic country like Nepal, nocardiosis is often misdiagnosed as tuberculosis. Lack of laboratory support or failure to communicate the clinical suspicion of nocardiosis to the microbiology laboratory could be other reasons for the under-diagnosis of this condition. This case exemplifies the need to know the clinico-epidemiological profile of the nocardial diseases and the importance of correct microbiological diagnosis for the appropriate treatment of the condition.

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