

# Not everything acid-fast is *Mycobacterium tuberculosis* - a case of *Nocardia*

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## Abstract

We report a case of a 47 year old woman who presented with a history of motor convulsions and a three month history of an increasingly painful and progressively enlarging mass on the right side of her back. Neurological examination revealed generalised wasting and a right sided hemiplegia. A biopsy of the mass was taken for microbiology which reported growing branching gram positive rods after three days of incubation. A mycological diagnosis of *Nocardia asteroides* was made. An MRI scan revealed extensive infiltration of the fungal mass into extending from the base of the skull to fifth cervical vertebra.

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## Case Reports

A 47 year old woman presented at Parirenyatwa Hospital, Harare, Zimbabwe with a history of three major motor convulsions over the previous two weeks preceding admission. She also noted a three month history of an increasingly painful and progressively enlarging mass on the right side of her neck. On examination the patient was unwell, cachectic, and febrile. There was a large inflamed, firm, tender, non-fluctuant fixed mass on the right side of the neck. This extended from the ramus of the mandible to the clavicle and extending posteriorly to the occiput. Evidence of sinus

tracking to the skin with a white exudate were also noted. Neurological examination revealed generalised wasting and a right sided hemiplegia (known to have occurred two years previously secondary to long standing hypertension).

The admission chest radiograph was unremarkable, and her laboratory values showed a normal haematological count with normal biochemistry. Blood cultures were drawn on admission, and the patient was started on intravenous (IV) ampicillin/chloramphenicol. She continued to deteriorate in spite of this therapy. A biopsy of the mass was taken for microbiology and histology and she was started on empirical anti-TB therapy.

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...e image shows clear extension of the mass  
 ...and dens of the second cervical (C2)  
 ...local destruction and widening of the pre-



...e is also extension of the mass into the  
 ...um and posterior displacement of C2  
 ...compression of the cervical cord at the  
 ...ary junction.



grew branching gram positive rods after three days incubation. A mycological diagnosis of *Nocardia asteroides* was made. Her regimen was changed to trimethoprim-sulfamethoxazole (160/800 mg every 8 h) and repeat blood cultures were drawn. Her neurological status continued to deteriorate and concerns about irreversible damage were raised. An MRI scan was performed to determine the extent of neurological infiltration and the limits of the mass (Figure 1).

Figure 1a: Sagittal T1 and T2 weighted MRI images of the cervical spine. There is a large right sided pharyngeal and pre-vertebral inflammatory collection extending from the base of the skull extending to the C5 level.



The patient continued to do poorly without any neurological response but without signs of sepsis. One week later the patient died. A *post mortem* was not performed.

### Discussion

*Nocardia asteroides* is a gram positive branching filamentous bacterium which is weakly acid fast but not acid-alcohol fast, that is it resists decolourisation with 1% (but not 3%) hydrochloric acid.<sup>1</sup> The standard microbiology ZN staining method uses 3% hydrochloric acid in 95% ethanol. The histological ZN stain used 1% hydrochloric acid in 70% ethanol as the decolourising agent. However, the use of stronger acid decolourising solutions may distort tissue sections and hence 1% hydrochloric acid in alcohol is used as standard in histology laboratories.

*Nocardia* species are widespread in the environment. Nocardial infections are often associated with some degree of immunocompromise,<sup>2</sup> although it has been recognised as occurring in patients with no evidence of such immunosuppression particularly in developing countries.<sup>3</sup> In these patients, *Nocardia* may cause invasive pulmonary infections (probably after inhalation of the organisms) or become disseminated.<sup>3</sup> In immunocompetent patients, chronic cutaneous infections following trauma are more common. Although, in our case, there was no history of trauma or accidental injury. Disseminated infections have a poor prognosis, but localised infections may be relatively easily treated.

In our case we could find no underlying cause for her Nocardial infection. Repeated blood cultures, HIV testing and other investigations for immunocompromise remained persistently negative.

This case illustrates the importance of submitting material for both histological and microbiological examination in the investigation of cases of possible tuberculosis, and of always considering the possibility of non-mycobacterial species when acid-fast organisms are observed in specimens, particularly when a modified ZN stain is used.

#### Literature Review.

**Epidemiology and risk factors:** Reports suggest a predominance of males over females in the incidence of nocardiosis. In all reports of nocardiosis, in general, males predominate over females<sup>5,6</sup> Interestingly, this predominance holds true even in animal infection by this organism.<sup>7</sup> The reasons for this distribution are unclear, but it might relate to hormonal effects on the virulence or growth of *Nocardia*.

Although *N. asteroides* is the dominant pathogen, less common species like *N. nova*, *N. caviae*, and *N. farcinica* are also found to cause pathology. *N. farcinica*, in particular, has recently been recognised for its propensity to cause disseminated disease. No cases of bacteraemic *N. brasiliensis* were found in our review. Almost all cases appeared to be community acquired. Even though nocardiosis is usually recognised as a sporadic, community-acquired infection, nosocomial transmission and temporal clustering have been reported.

The vast majority of patients with nocardiosis have the typical immunologic defects previously associated with this infection. Our literature review confirmed that systemic steroids remain a major risk for nocardial infection, since most chronically immunosuppressed patients with nocardemia in whom specific information was available were steroid recipients. Nocardiosis has been found as a complication in only 0.19% to 0.3 0% of AIDS patients reported to the Centres for Disease Control and Prevention (CDC). Most of the affected patients with AIDS had additional risk factors for bacteraemic illness, especially intravenous drug abuse.<sup>8,9</sup> Statistics on nocardial infection in HIV patients in Africa are not available. Lastly, the presence of an endovascular foreign body such as a prosthetic valve or a central venous catheter could be the underlying source of positive blood cultures for *Nocardia* spp.<sup>10</sup> Conversely, not all cases of nocardial prosthetic valve endocarditis result in documented bacteraemia.

**Clinical presentation and concurrent illness:** Our review did not find a specific clinical syndrome that was pathognomonic for bacteraemic nocardiosis. Nocardial bacteraemia was detected at varying times in relation to the systemic disease, and was either sustained or intermittent. Pneumonia, often cavitating, with or without associated empyema, and skin lesions were often seen in conjunction with the septicaemia. Two patterns were appreciated: in acute, frequently fulminant presentation associated with high mortality in which the bacteraemia was identified as a preterminal event, and a subacute course with the bacteraemia occurring relatively early and associated with a more favourable prognosis.

**Therapy and outcome:** Review of the literature shows that most treatment groups were small and heterogeneous. Information on length of therapy, sequence of use of different antibiotics and their dose, duration of follow up, and relapse is often inadequately documented in most reports, so conclusions regarding the optimal treatment of *Nocardia* cannot be made. A regimen that included a sulphonamide (or cotrimoxazole) is commonly used and response has been shown to be higher than in the groups treated with other antibiotics.<sup>11-13</sup>

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