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CASE REPORT

Disseminated nocardiosis with thyroid involvement: A case report

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Received 3 July 2009; received in revised form 28 October 2009; accepted 2 March 2010

KEYWORDS

Immunocompromised;
Nocardia;
Nocardiosis;
Steroid;
Thyroiditis

Nocardiosis is a life-threatening infection that affects the lungs, skin, and central nervous system, particularly in immune-compromised patients. We report a case of disseminated nocardiosis with pneumonia, brain abscesses, meningitis, and thyroiditis, for an individual with recent steroid therapy. Recovery was uneventful with a 4-month course of sulfamethoxazole–trimethoprim.

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Introduction

Nocardiae are aerobic, branching, filamentous, Gram-positive actinomycetes that are ubiquitous saprophytes. They are important parts of the normal microflora of soils worldwide. Nocardiosis can occur as a localized or disseminated infection¹ and is commonly introduced through the respiratory tract. Nocardiosis occurs in many animals, such as cats, dogs, swines, and guinea pigs.

However, there is no evidence of respiratory spread from infected animals to humans or of person-to-person spread.²

In immune-compromised patients, nocardiae are opportunistic pathogens. During the past three decades, 30–85% of *Nocardia* infections involved immune-compromised patients.^{1,5} The incidence of infection has increased recently, probably related to the increasing numbers of moderately or severely immune-compromised patients because of human immunodeficiency virus infection or organ transplantation. Other conditions that are notably associated with *Nocardia* infection include lymphoreticular neoplasm, solid tumors, chronic alcoholism, diabetic mellitus, systemic lupus erythematosus, chronic granulomatous disease, and intravenous drug abuse.^{2,6} However, *Nocardia* infection can occur in patients without concurrent disease or immunosuppressive therapy.

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Although many *Nocardia* species are known, not all of them are capable of causing diseases in humans.³ In humans, the most frequently encountered species are *Nocardia asteroides* complex (including its subtypes *Nocardia nova* and *Nocardia farcinica*); *Nocardia brasiliensis*; and *Nocardia otitidiscaviarum*.⁴ Pulmonary infection occurs most frequently, although extrapulmonary infections may occur, especially in the central nervous system (CNS) and soft tissues. The thyroid gland is a rare location for *Nocardia* infection.

Case report

A 70-year-old female retired farmer was hospitalized because of a 3-day history of fever and chills. She had been well until 1 month previously when she was admitted to a medical center for treatment of chronic obstructive pulmonary disease with secondary infection and acute exacerbation. During the intervening time, she received oral prednisolone (15 mg daily). Three days before the current admission, she developed fever, chills, headache, cough with yellow sputum, and nausea. No obvious wound or history of animal contact was evident.

At admission, a chest X-ray showed an increased patchy density over the left lower lung. Laboratory tests disclosed leukocytosis (white blood count of 17,500). She was admitted under an impression of chronic obstructive pulmonary disease with pneumonia. Empirical antibiotics were used, including beta-lactams [cefazolin (stazolin), amoxicillin–clavulanate (Augmentin), or ceftazidime (Fortum)] and gentamycin. Her fever, headache, and cough persisted.

A brain computed tomography scan revealed edematous foci in the bilateral cerebellar hemispheres and corona radiata. A lumbar puncture was performed, and examination of the cerebrospinal fluid (CSF) revealed erythrocytic pleocytosis (4,300/mm³) and neutrophilic pleocytosis (leukocytes = 950/mm³ with 73% neutrophils). Normal open and closing cardiac pressures of 65 mmH₂O and 73 mmH₂O,

respectively, were noted. Gram and acid-fast stains of CSF did not detect bacteria. A chest computed tomography scan revealed a lobulate mass with central necrosis in the left lingual segment and a nodular goiter in the right lobe of the thyroid. Bacterial cultures of blood, CSF, and sputum were sterile. Using sonography-guided aspiration, pus was obtained, from which *N. asteroides* was cultured. Thereafter, trimethoprim–sulfamethoxazole (TMP–SMX (Barktar); 15 mg/kg/d) was given. The patient's history failed to disclose any symptoms or signs related to thyroid disease. In addition, no anterior neck trauma was noted.

Brain magnetic resonance imaging (Fig. 1A) disclosed multiple infra- and supratentorial abscesses with basal meningitis. Although the patient was lethargic initially, she was well response to TMP–SMX therapy and regained normal consciousness. She was discharged after a month of antibiotic treatment. Three months later, a second brain magnetic resonance imaging confirmed resolution of the abscesses (Fig. 1B), and a second chest X-ray showed the absence of pulmonary infiltration. Follow-up sonography of the thyroid revealed the absence of the abscess. Antimicrobial therapy with TMP–SMX was maintained for 4 more months.

Discussion

Primary *Nocardia* infections that initially involve the lung, skin, or soft tissue may invade into blood vessels and spread hematogenously. The presence of lesions in two or more organs defines systemic or disseminated disease, which is characterized by widespread abscess formation. The commonly reported sites include the CNS, eye (particularly the retina), skin and subcutaneous tissues, kidneys, joints, bones, and heart.^{2,6,7,9} The CNS is involved in about one-third of the cases of disseminated nocardiosis.⁸ The most common clinical manifestation of CNS nocardiosis is brain abscess, most often presenting as multiloculated lesions; this was noted in the present case. Meningitis occurs less

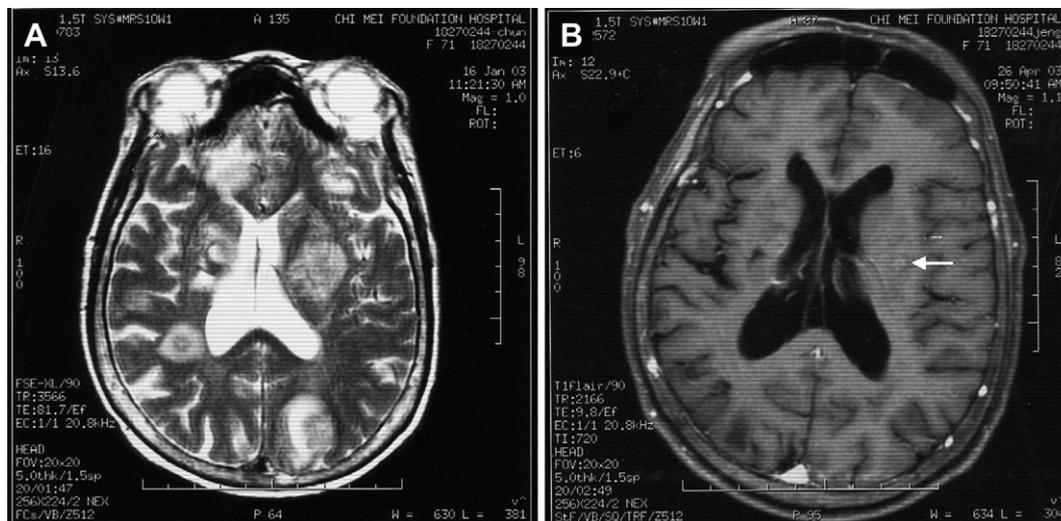


Figure 1. Brain MRI revealing multiple high T2 nodular lesions of bilateral basal ganglia and cerebra. (A) Original MRI obtained before TMP–SMX therapy. (B) After 4 months' TMP–SMX therapy, regression of brain abscesses was evident, with some remaining residual infective foci over bilateral basal ganglia (arrow). MRI = magnetic resonance imaging; TMP–SMX = trimethoprim–sulfamethoxazole.

frequently and is not always associated with brain abscess. *Nocardia asteroides* complex is the major causative pathogen of CNS nocardiosis.⁸

Clinical experience has shown that successful nocardiosis therapy requires the use of antimicrobial drugs in combination with appropriate surgical debridement or drainage, if necessary.⁴ Of note, antimicrobial drugs are the mainstay of therapy. Because TMP-SMX has good tissue penetration and is available in an oral form, it is the drug of choice for most of the *Nocardia* infections.^{10,11} Other alternative antimicrobial drugs include imipenem, amikacin, minocycline, quinolone, some third-generation cephalosporins, or a β -lactam/ β -lactamase inhibitor combination.^{4,12}

Clinical improvement is usually evident within 3–5 days,¹³ and at least 3 months' therapy is generally recommended. For compromised patients with disseminated or CNS nocardiosis, 6–12 months or longer of such therapy may be necessary.^{4,12} However, it is suggested that *in vitro* susceptibility tests for *Nocardia* isolates should be done, especially when the response to antimicrobial therapy is poor or when *Nocardia* species are isolated. The rationale for the latter is that *N. farcinica* has a high degree of resistance to cefotaxime, cefamandole, and tobramycin, and *N. otitidiscaviarum* has inconsistent susceptibility to sulfonamides.⁴ Although our patient received a relatively shorter course of antibiotic treatment than the recommended duration, a good clinical response and radiological resolution of brain abscesses resulted. This result may be, at least in part, because of her minimally or moderately immune-compromised condition resulting from short-term steroid therapy.

The thyroid gland is often resistant to infection because of its encapsulation, high iodide content, rich blood supply, and extensive lymphatic drainage.¹⁴ More than two-thirds of women and 50% of men with suppurative thyroiditis have pre-existing thyroid diseases.¹⁵ Other risk factors include congenital anomalies, especially pyriform sinus fistula, immune suppression, old age, or debilitating illness.¹⁶ Suppurative thyroiditis is often characterized by fever; local inflammatory signs; and symptoms of dysphagia, dysphonia, or hoarseness. The painless thyroid abscess noted in the present case was unusual.

This case indicated that nocardiae should be considered as etiological pathogens of thyroiditis, and that the thyroid

gland could become involved because of disseminated nocardiosis.

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