Primary brain abscess with Nocardia otitidiscaviarum in an intravenous drug abuser

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A primary brain abscess with Nocardia otitidiscaviarum in an intravenous drug abuser is reported. Nocardia brain abscesses have been reported infrequently and normally only in immunocompromised patients. The lungs are the most common primary focus, but brain abscess may also occur following direct cutaneous inoculation. In this case the clinical presentation was first diagnosed as an astrocytoma. However, N. otitidiscaviarum was isolated from the lesion after emergency craniotomy. In contrast to five cases described previously the patient survived after surgical removal and antibiotic treatment with imipenem and trimethoprim-sulphamethoxazole.

Introduction

Nocardiosis is an acute or chronic infection caused by aerobic, soil-inhabiting actinomycetes of the genus Nocardia. Patients are generally debilitated by other underlying diseases such as cancer, pulmonary tuberculosis, haematological malignancies, immunosuppressive therapy or HIV infection. However, nocardiosis may also occur in patients without definable predisposing conditions [1]. Despite the relative rarity of Nocardia spp. as a cause of cerebral infection [2, 3], the brain is the most frequent non-pulmonary site involved in disseminated nocardiosis. About 90% of isolates causing infection are N. asteroides; N. brasiliensis and N. otitidiscaviarum are involved less frequently [4]. This report describes a primary cerebral abscess due to N. otitidiscaviarum in a young, previously healthy, intravenous drug abuser.

Patient and results

A 21-year-old man with a 5-year history of intravenous drug use and undergoing methadone treatment presented with loss of consciousness and general tonic seizures. Two months earlier he had had a tooth extracted. His neurological examination was unremarkable and he was discharged. Ten days later he returned with generalised confusion, diplopia, left asomatognosia and apraxic movements.

The patient’s white blood cell count was 11.9 × 10⁹/L with 11.9% eosinophilic leukocytes; the Westergren sedimentation rate was 28 mm/h. Test for HIV antibodies and hepatitis B surface antigen were negative and T-cell profile was normal. Chest radiograph was normal. Brain computed tomography (CT) and magnetic resonance (MR) scanning demonstrated an upper-posterior parietal right-sided cystic mass which was considered to be an astrocytoma. Despite treatment with phenytoin and dexamethasone the patient deteriorated; a left hemiparesis developed 6 days after admission to the Neurology Department. CT examination showed an increase in oedema around the mass, suggesting a brain abscess, and the patient was treated empirically with ceftriaxone 2 g/day for 20 days. On repeat brain CT and MR scan, the lesion had increased in size. A craniotomy revealed a multiloculated, capsulated abscess which was excised and treatment commenced with cefotaxime (12 g/day), metronidazole (1.5 g/day), dexamethasone and anticonvulsants.

Microscopy of aspirated pus showed numerous polymorphonuclear leukocytes and filamentous-branched gram-positive rods which stained positive by a modified acid-fast stain. Culture showed dry, irregular, adherent, white colonies after aerobic incubation for 48 h at 37°C. The isolate was initially identified as N. otitidiscaviarum based on typical colonial appearance, positive Gram’s stain, positive catalase test, growth in nutrient broth with lysozyme, reduction of nitrate, hydrolysis of xanthine, hypoxanthine and urea, and the inability to hydrolyse casein and tyrosine [5]. The enzymic profile obtained by API ZYM (bioMérieux, Marcy l’Etoile, France) showed negative reactions to...
valine arylamidase, N-acetyl-β-glucosaminidase and α-mannosidase. The organism was confirmed as *N. otitidiscaviarum* at the Institut Pasteur (Paris, France). The organism was resistant to penicillins, second- and third-generation cephalosporins, erythromycin and vancomycin, but sensitive to aminoglycosides, trimethoprim-sulphamethoxazole and ciprofloxacin. Sensitivity to ipimem and minocycline was intermediate.

Antibiotic treatment was changed to ipimem (500 mg/6 h) and trimethoprim-sulphamethoxazole (trimethoprim 1600 mg/day and sulphamethoxazole 320 mg/day) for 45 days. Symptomatically the patient showed marked improvement and neurological symptoms disappeared. A repeat CT showed a small hypodense area. The patient was discharged on oral trimethoprim-sulphamethoxazole (trimethoprim 160 mg/day and sulphamethoxazole 800 mg/day) to complete 6-month treatment.

**Discussion**

*N. otitidiscaviarum* was first described by Snijders in 1924 [6] and was considered to be a soil saprophyte until the first systemic infections in man were reported in 1974 [7]. Infection by *N. otitidiscaviarum* is considered relatively uncommon; in one large series of nocardial infections only 10 (2.9%) of 347 cases were caused by this species [8]. The low incidence of *N. otitidiscaviarum* infections may be attributed to reduced pathogenicity or its lower prevalence in soil compared with other *Nocardia* species, or both [9]. *N. otitidiscaviarum* was shown to have the same pathogenic potential as *N. asteroides* in a murine model of infection [10]. Nocardial brain abscesses are uncommon – <2% in one large series [3]. However, brain involvement was recorded in 15.4% of patients with nocardiosis in the USA [8] and in 10.4% of European cases [4]. To date, only five cases of central system nervous infection by *N. otitidiscaviarum* have been reported in the literature [7, 11–14].

Brain abscess usually results from haematogenous spread from a primary lung infection [2]. Absence of any apparent extracranial focus of infection has been reported in 7% of nocardial brain abscesses [8]. In the patient described here, brain was the only demonstrable site of nocardial infection. He had no skin lesions and his chest X-ray was normal, as were four of the five cases described previously [7, 11, 13, 14]. Direct parenticentral inoculation appears to be the most likely cause in this patient. Reports of nocardial brain abscesses in parentral drug abusers are uncommon and are limited mostly to *N. asteroides* infections [15, 16]. However, Pérez reported a case of an HIV parenteral drug addict who died from a primary cerebral infection with *N. otitidiscaviarum* [14].

Nocardial infections are seen usually in patients with immunological dysfunction. In the present study the immune status of the patient was normal, although heroin addiction has been shown to cause abnormalities in both humoral and cellular immunity [17]. Two of the patients with cerebral *N. otitidiscaviarum* infection reported previously had no underlying disease and were not immunocompromised [12, 13]. The patient described above was discharged after surgery and treatment with ipimem and trimethoprim-sulphamethoxazole. The isolate showed antibiotic susceptibility similar to those reported previously [18]. The overall mortality rate for nocardial brain abscess is 47.8% for *N. asteroides* infection [19]; in all reported cases of *N. otitidiscaviarum* brain abscess the patients died despite surgical and antibiotic therapy [7, 11–14], probably related to the late institution of therapy, their underlying conditions and disseminated infection.

Prompt surgery and the appropriate antibiotic treatment are important in the treatment of nocardia brain abscesses. However, diagnosis may be delayed because nocardial infections mimic other neurological diseases and early recognition is dependent on microbiological investigation. Nocardial brain abscess should be considered as a cause of neurological disease in intravenous drug abusers.

**References**


