IDCases 6 (2016) 9–12

Contents lists available at ScienceDirect

IDCases

journal homepage: www.elsevier.com/locate/idcr

Case report

Disseminated *Nocardia farcinica* in an immunocompetent patient

H. Boamah, MD[a,*], P. Puranam, MD[a], R.M. Sandre, MD[a,b]

[a] Northern Ontario School of Medicine, Laurentian University, Sudbury,Ontario, Canada
[b] Health Sciences North Infectious Prevention and Control, Sudbury, Ontario, Canada

ARTICLE INFO

Article history:
Received 21 May 2016
Received in revised form 27 July 2016
Accepted 11 August 2016

Keywords:
Nocardia farcinica
Immunocompetent
Disseminated brain abscess

ABSTRACT

Nocardia farcinica is a gram-positive, partially acid-fast, methenamine silver-positive aerobic actinomycete that is infrequently associated with nocardiosis. The relative frequency of *Nocardia farcinica* isolates in nocardiosis is unknown but thought to be under diagnosis. It is increasingly been recognized in immunocompetent patients.

We report a case of disseminated *Nocardia farcinica* causing brain abscess in 55 year old immunocompetent man who was successfully treated with long term antibiotics.

The present report illustrates that early detection and treatment of disseminated *Nocardia farcinica* can lead to a good outcome.

Introduction

Disseminated Nocardiosis is an opportunistic infection that is usually seen in immunocompromised hosts. *Nocardia farcinica* is a rare cause of nocardiosis but is increasingly been recognized as a potentially lethal infection in immunocompetent patients (1–3). This report describes a patient with disseminated infection due to *Nocardia farcinica*.

Case presentation

A 55-year-old man presented to the emergency room with a three week history of throbbing and persistent right occipital headaches radiating to his frontal region. The headaches were not associated with any aura, photophobia, nausea or vomiting. The patient also had recurrent complaints of fevers and nocturnal diaphoresis. After presenting to a walk-in clinic and diagnosed with a presumptive viral infection. No antibiotic medication was prescribed.

His past medical history included smoking and gastro-esophageal reflux disease. There was no history of any prior headaches, tuberculosis or exposure, positive tubercullin skin tests, syphilis, gonorrhea, chlamydia, human immunodeficiency virus (HIV), malignancies, hepatitis, recent surgeries, workplace exposure or recent travel.

His physical examination showed a healthy appearing man, hemodynamically stable with a high grade fever of 39.5 °C. His neurological exam, cardiac exam, respiratory exam and abdominal exam were all normal.

Investigations revealed white blood cell count of 13.1×10^9/L (with 87% polymorphonuclear cells, 4% monocytes, and 9% lymphocytes), hemoglobin 136 g/L, platelet count 367×10^9/L and a normal serum chemistry panel including transaminases. His absolute CD4 count was 449×10 (6)/L and his HIV serology was non-reactive. Chest radiograph however revealed wedge-shaped nodular opacity measuring 3.1×3.25 cm in the left upper lobe adjacent to the pleura (Fig. 1). A lumbar puncture showed 3065×10^6/L of white blood cells (normal $0–5 \times 10^6$/L), 1.1 mmol/L of glucose (normal 2.2–3.9 mmol/L) and 1.90 g/L of total protein (normal 0.12–0.6 mmol/L). Preliminary CSF cultures did not grow any organism. The patient was then started on ceftriaxone, vancomycin and ampicillin.

A computed tomography (CT) of the chest and abdomen with intravenous contrast revealed a large spiculated $2.8 \times 4.5 \times 3.7$ cm subpleural mass in the lateral aspect of the left upper lung lobe and a smaller spiculated and eccentrically cavitary 1.4 cm nodule in the posterior and subpleural aspect of the left lower lobe (Fig. 2). There was no hilar or mediastinal lymphadenopathy. Initial computed tomography of the head was normal but a follow up Multisequence Multiplanar Unenhanced Magnetic Resonance Image (MRI) of the head with gadolinium showed a T2 hypointense lesion involving the left head of the caudate nucleus with perifocal edema suspicious for a fungal abscess (Fig. 3).

The patient's headaches and fever continued to persist so a computed tomographic guided biopsy of the large spiculated

* Corresponding author at: Northern Ontario School of Medicine Laurentian University 935 Ramsey Lake Road Sudbury, Ontario P3E 2C6, Canada.
E-mail address: hboamah@nosm.ca (H. Boamah).

http://dx.doi.org/10.1016/j.idcr.2016.08.003

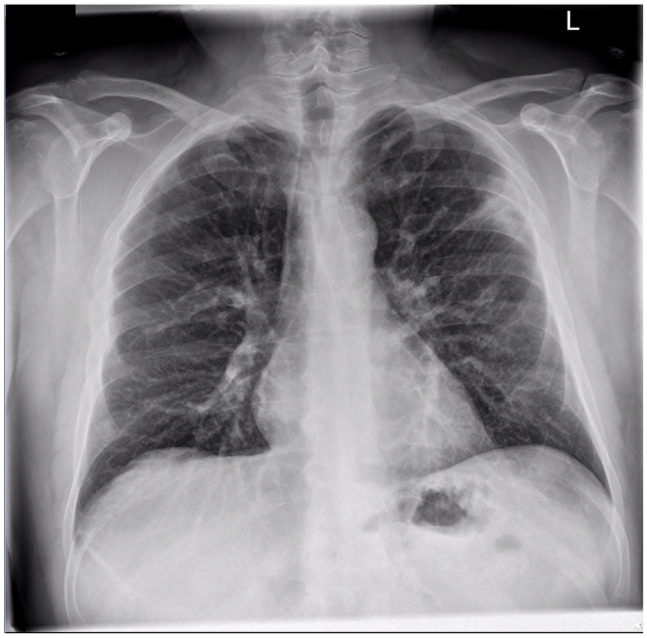

Fig. 1. Chest radiograph showing a wedge-shaped nodular opacity measuring 3.1 × 3.25 cm in the left upper lobe adjacent to the pleura.

subpleural mass of the left upper lobe was performed as well as repeat lumbar puncture. Both the lung tissue biopsy and the repeated CSF fluid cultures grew beaded branching gram positive bacill. Molecular studies using the Multi-Locus sequence analysis (MLSA) identified the species as *Nocarida farcinica.* Further susceptibility testing showed the organism was susceptible to amoxicillin/clavulanic acid, imipenem, linezolid, moxifloxacin and trimethoprim/sulfamethoxazole (TMP-SMX) but resistant to ceftriaxone (Fig. 4).

Ceftriaxone, vancomycin and ampicillin were discontinued and the patient was treated initially with imipenem for six weeks followed by TMP-SMX for one year.

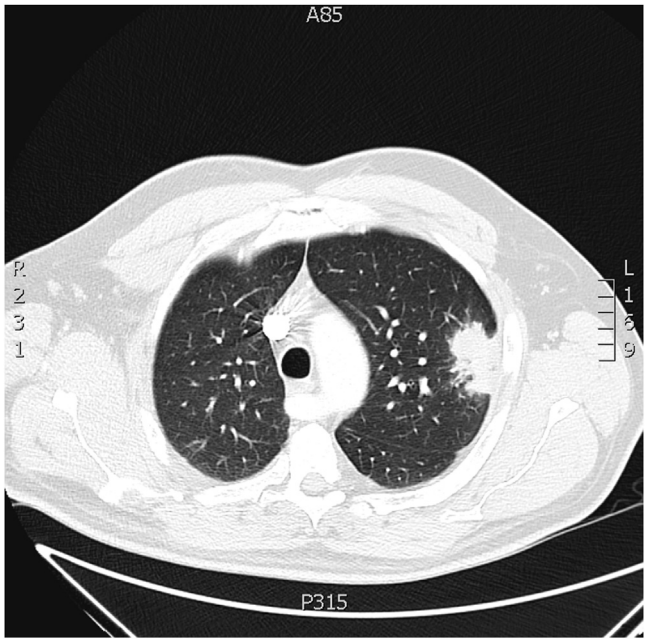

Fig. 2. Chest CT scan showing subpleural mass in the lateral aspect of the left upper lung lobe and a smaller spiculated and eccentrically cavitary 1.4 cm nodule in the posterior and subpleural aspect of the left lower lobe.

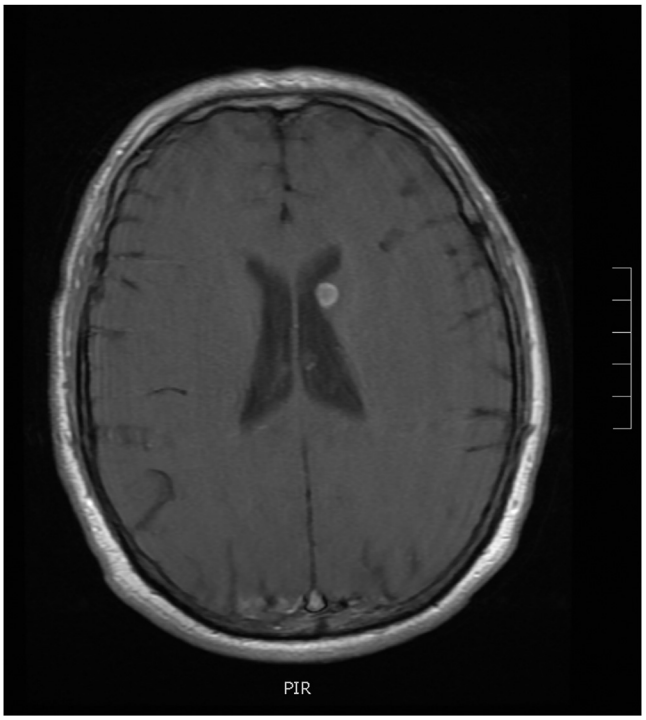

Fig. 3. MRI of the head with gadolinium shows a T2 hypointense lesion involving the left head of the caudate nucleus with perifocal edema suspicious for a fungal abscess.

Discussion

We present a rare case of disseminated *Nocardia farcinica* originating from the lungs and causing a brain abscess in an immunocompetent patient.

Nocardiosis is an opportunistic infection causing localized or disseminated disease and caused by the soil-dwelling, weakly gram-positive aerobic actinomycete Nocardia. It predominately presents as an acute, subacute or chronic pulmonary disease in immunocompromised hosts that can disseminate to any organ, forming abscesses [1]. *Nocardia asteroides* and *Nocardia brasiliensis* are the two species most frequently involved in human disease [2].

Nocardia farcinica is a gram-positive, partially acid-fast, methenamine silver-positive aerobic actinomycete infrequently

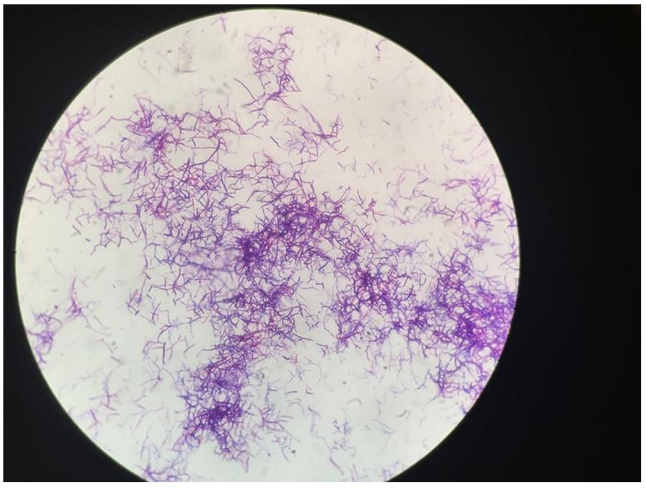

Fig. 4. CSF culture showing beaded branching gram positive bacilli.

Table 1
Reported cases of disseminated *Nocardia farcinica* in immunocompetent host, treatments and outcomes.

Cases of Disseminated *Nocardia farcinica* in immunocompetent host	Treatments	Outcomes
Budzik et al. [1]	Monotherapy with TMP-SMX	The patient dead after 11 days of admission
Singh et al. [11]	Co-trimoxazole and amikacin	Responded to treatment and survived
Tachezy et al. [12]	Imipenem/Cilastatin, amikacin and TMP-SMX for six weeks followed by TMX-SMX for twelve months	The patient's neurological status improved. Repeated MRI six month later showed that the brain abscess had become smaller or completely disappeared.

Table 2
Nocardia farcinica brain abscess in immunocompetent host, treatments and outcomes.

Cases of *Nocardia farcinica* Brain abscess in immunocompetent host	Treatments	Outcomes
Malincarne et al. [10]	Amikacin, meropenem, TMP-SMX and cranitomy with drainage of the abscess	Clinical and radiographic improvement after 35 days of treatment
Kim et al. [13]	Imipenem initially then switched to meropenem, ciprofloxacin, TMP-SMX and craniotomy with stereotactic aspiration of the abscess	Improvement in the patient's symptoms. Repeated CT scan of the head on three month follow-up showed resolution of the brain abscess
Izawa et al. [14]	Case 1: Pazufloxacin, ciprofloxacin and craniotomy and burr hole drainage	Case 1: Good response to treatment
2 case reports	Case 2: Pazufloxacin, meropenem, amikacin, minocycline, linezolid, TMP-SMX and craniotomy and burr hole drainage	Case 2: Brain abscess alleviated but the patient's general condition worsened leading to death
Kandasamy et al. [15]	Co-trimoxazole and moxifloxacin and craniotomy and abscess drainage	Excellent response to treatment
Fellows et al. [16]	Moxifloxacin and surgery	Responded to treatment

associated with nocardiosis [3]. However it can cause clinically aggressive and potentially lethal disseminated infections in immunocompromised patients. It is also known to be resistant to multiple antimicrobial agents. It is rarely reported as a cause of nocardiosis in immunocompetent hosts [4]. The relative frequency of *Nocardia farcinica* isolates in nocardiosis is unknown but thought to be underdiagnosed and is increasingly been recognized in immunocompetent patients [2].

The diagnosis of *Nocardia farcinica* requires the isolation and identification of the organism from tissue, culture specimen or both [3]. Since nocardia is a slow growing organism it may be difficult to detect the organism on hematoxylin and eosin (H & E) stain and acid-fast stain [5]. Usually gram and methenamine silver (GMS) stain is positive. Cultures of nocardia species can take up to five days or more to grow and PCR identification of the16S ribosomal RNA of the organisms is rapid but not always available in all laboratories [6].

Nocardia Farcinica has specific drug susceptibility patterns. *Nocardia Farcinica* is resistant to most beta-lactam antibiotics, aminoglycosides but susceptible to amikacin [7,8]. Nocardiosis is treated usually with combinations of TMP-SMX, imipenem-cilastatin, moxifloxacin, amikacin, linezolid, minocycline or ciprofloxacin for a duration of six to twelve months depending on central nervous system involvement. The most commonly used antibiotic reported is TMP-SMX [9,10].

A literature search revealed very few reported cases of disseminated *Nocardia farcinica* in immunocompetent host, their treatment with antibiotics and outcomes (Table 1). Other cases of *Nocardia farcinica* brain abscess in immunocompetent patients have been reported in the literature [10,13–16]. Table 2 shows their treatments and outcomes.

After a year of treatment, the patient had complete resolution of his symptoms of headache, fever and night sweats. A repeated MRI of his head showed almost complete resolution of the left caudate nucleus abscess and a repeat CT scan of his chest showed an interval improvement in the size of his left upper lobe mass.

Conclusion

Nocardia farcinica is infrequently associated with nocardiosis especially in immunocompetent patients. It is however associated with very aggressive and lethal disseminated infections in immunocompromised patients. Early detection and treatment can lead to a successful patient outcome.

Consent section

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Conflict of interest

Authors have no conflict of interest to report.

Acknowledgments

Health Sciences North Department of Microbiology, Health Sciences North Library.

References

[1] Budzik JM, Hosseini M, Mackinnon Jr. AC, Taxy JB. Disseminated *Nocardia farcinica*: literature review and fatal outcome in an immunocompetent patient. Surg Infect (Larchmt) 2012;13(June (3)):163–70.
[2] Beaman BL, Burnside J, Edwards B, Causey W. Nocardial infections in the United States, 1972–1974. J Infect Dis 1976;134:286–9.
[3] Lerner PI. Nocardiosis. Clin Infect Dis 1996;22:891–903.
[4] Anil KV, Deepthi A, Dilip P, Aswathy N, Kavitha RD, Shamsul K, Rosamma P. Nocardia farcinica *Brain Abscess*: Epidemiology pathophysiology, and literature review. Surg Infect 2014;15(October (5)):640–6.
[5] Torres OH, Domingo P, Pericas R, et al. Infection caused by *Nocardia farcinica*: Case report and review. Eur J Clin Microbiol Infect Dis 2000;19:205–12.
[6] Angeles RM, Lasala RP, Fanning CV. Disseminated subcutaneous nocardiosis caused by *Nocardia farcinica* diagnosed by FNA biopsy and 16S ribosomal gene sequencing. Diagn Cytopathol 2008;36:266–9.

[7] Brown-Elliot BA, Brown JM, Conville PS, Wallace Jr. RJ. Clinical and laboratory features of nocardia spp based on current molecular taxonomy. Clin Microbiol Rev 2006;19(April (2)):259–82.
[8] McTaggart LR, Doucet J, Witkowska M, Richardson SE. Antimicrobial susceptibility among clinical *Nocardia* Species identified by multilocus sequencing analysis. Antimicrob Agents Chemother 2015;59(January (1)):269–75.
[9] Mamelak AN, Obana WG, Flaherty JF, Rosenblum ML. Nocardial brain abscess: treatment strategies and factors influencing outcome. Neurosurgery 1994;35:622–31.
[10] Malincarne L, Marroni M, Farina C, Camanni G, Valente M, Belfiori B, et al. Primary brain abscess with Nocardia farcinica in an immunocompetent patient. Clin Neurol Neurosurg 2002;104(May (2)):132–5.
[11] Singh NP, Goyal R, Manchanda V, Gupta P. Disseminated nocardiosis in an immunocompetent child. Ann Top Paediatr 2003;23(March (1)):75–8.
[12] Tachezy M, Simon P, Hehmann C, Vashist YK, Izbicki JR, Gaward KA. Abscess of adrenal gland caused by disseminated subacute Nocardia farcinica pneumonia. A case report and min-review of the literature. BMC Inf Dis 2009;9 (December (2)):194.
[13] Kim S, Lee KL, Lee DM, Jeong JH, Moon SM, Seo YH, Yoo CJ, Yang D, Cho YK, Park YS. Nocardia brain abscess in an immunocompetent patient. Infect Chemother 2014;46(March (1)):45–9.
[14] Izawa D, Sakano K, Okumura H, Kuwata T, Tsuji N. Two cases of Nocardia farcinica brain abscess. No Shinkei Geka 2011;39(12):1167–72.
[15] Kandasamy J, Iqbal HJ, Cooke RP, Eldridge PR. Primary Nocardia farcinica brain abscess with secondary meningitis and ventriculitis in an immunocompetent patient, successfully treated with moxifloxacin. Acta Neurochir (Wien) 2008;150(May (5)):505–6.
[16] Fellows GA, Kalsi PS, Martin AJ. Nocardia farcinica brain abscess in a patient without immunocompromise. Br J Neurosurg 2007;21(June (3)):301–3.