ASIDE Case Reports

Case Report

Rare Case of Disseminated Nocardiosis with Simultaneous Lung, Brain, and Spinal Cord Involvement in a Patient with Sarcoidosis

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ABSTRACT

Nocardiosis is an uncommon opportunistic infection commonly affecting the lungs in immunocompromised individuals. We present an unusual case of disseminated nocardiosis involving the spinal cord and brain in a patient previously diagnosed with sarcoidosis and treated with glucocorticoids. We are presenting the case of a 46-year-old Caucasian male with sarcoidosis who develops pulmonary nocardiosis, with chest X-ray (CXR) revealing left lower lobe infiltrates diagnosed as community-acquired pneumonia usually caused by Nocardia, confirmed by excisional biopsy. A few days later, the disease progressed to the spinal cord, leading to an epidural abscess, and disseminated to the brain, leading to multiple ring-enhancing lesions confirmed by MR. Timely surgical intervention, such as abscess drainage, is crucial in the management of abscesses to prevent life-threatening complications and preserve neurological function. Clinicians should maintain a broad differential diagnosis when evaluating new pulmonary infiltrates in patients with sarcoidosis. Early CNS imaging should be considered in cases of severe pulmonary nocardiosis to prevent catastrophic complications.

1. Introduction

Nocardiosis is a rare opportunistic infection caused by aerobic, gram-positive bacteria with a filamentous and branched appearance, partially acid-alcohol resistant, belonging to the genus Nocardia [1]. It affects approximately 500–1000 individuals annually in the United States, according to the Centers for Disease Control and Prevention [2]. Nocardiosis manifests in localized or disseminated forms, with pulmonary nocardiosis being the most common presentation. This typically includes pneumonia, lung abscesses, endobronchial masses, or cavitary lesions [3]. Disseminated nocardiosis, particularly central nervous system (CNS) involvement, represents a life-threatening associated with high mortality and relapse rates, especially among immuno-compromised individuals [4]. Although Nocardia can infect both immunocompetent and immunocompromised individuals, the disseminated disease is more common in immunocompromised individuals, particularly in sarcoidosis patients on long-term corticosteroid therapy. While corticosteroids are effective in managing sarcoidosis symptoms, their prolonged use leads to side effects such as weight gain, insulin resistance, and increased susceptibility to infections. This report highlights a unique case of pulmonary nocardiosis in a sarcoidosis patient, with no prior cases documented simultaneous lung, brain, and spinal cord involvement in such patients. The report aims to concisely review this rare and challenging condition's clinical, pathogenetic, and diagnostic features.

2. Case Presentation

A 46-year-old Caucasian male with a significant past medical history of chronic obstructive pulmonary disease (COPD), gastroesophageal reflux disease (GERD), hypothyroidism, and sarcoidosis presented to the emergency department with a three-day history of cough and fever. His current medications included Advair, Proventil, prednisone (50 mg daily for two months), Synthroid, Nasacort, and Prilosec.

2.1. Initial Presentation and Evaluation

On admission, vital signs were notable for a body temperature of 99.6°F, a pulse rate of 68 beats per minute, respiratory rate of 18 breaths per minute, and blood pressure of 128/76 mmHg. Laboratory findings were as follows: White Blood Cell Count (WBC): 27,300 cells/mm³ (84]% granulocytes, 4% lymphocytes), Electrolytes: Sodium 140 mmol/L, Potassium 4.7 mmol/L, Chloride 99 mmol/L, Bicarbonate 30 mmol/L, Renal Function: Blood Urea Nitrogen (BUN) 21 mg/dL, Creatinine 1.0 mg/dL, Blood Glucose: 104 mg/dL. A chest X-ray (CXR) demonstrated infiltrates in the left lower lobe.

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2.2. Initial Management

The patient was empirically treated for community-acquired pneumonia with intravenous ceftriaxone and azithromycin. Blood, sputum, and urine cultures were obtained but were negative for microbial growth. The patient was discharged with oral cefpodoxime and azithromycin.

2.3. Readmission (Day 6)

On the sixth day following discharge, the patient returned with worsening symptoms, including increased cough, sputum production, shortness of breath, and left-sided chest pain. Imaging studies revealed the progression of left lower lobe consolidation. Further investigations, including an excisional biopsy, confirmed a diagnosis of nocardiosis. The patient was discharged with oral trimethoprim-sulfamethoxazole (Bactrim).

2.4. Second Readmission (Day 13)

On the thirteenth day after initial discharge, the patient presented with severe back pain, paraparesis, and urinary retention. Magnetic Resonance Imaging (MRI) of the spine identified an epidural abscess at the T4-T5 levels. MRI of the brain further revealed multiple ring-enhancing lesions consistent with brain abscesses. A surgical procedure was performed to drain the brain abscess.

2.5. Outcome and Follow-Up

Following the surgical intervention, the patient was discharged to a rehabilitation facility to continue care with intravenous antibiotic therapy targeting nocardiosis.

3. Discussion

Nocardia spp are gram-positive bacilli that form branching hyphae, non-spore-forming, and weakly acid-fast bacteria. Nocardia is a rare opportunistic infection that occurs mainly in patients with low immunity, such as chronic corticosteroid users, organ transplant recipients, and HIV/AIDS patients; however, it may also occur in immunocompetent patients. Infection with Nocardia can occur due to inhalation, which is the most common route, presenting with pneumonia, lung abscess, and cavitary lesions) or through direct inoculation of the skin, which causes cutaneous nocardiosis-cellulitis and ulcers, alongside the infection may then spread to the bones, joints, heart, kidneys, brain, and eyes [3]. Disseminated Nocardia is a life-threatening condition that mainly occurs in severely immunocompromised patients with a mortality rate of up to 85%. It begins as pulmonary Nocardiosis, then involves other organs, which, like our patient, starts as left pneumonia and then disseminates to the brain as multiple abscesses and the spinal cord as an epidural abscess at T4-T5 [5]. A few case reports describe sarcoidosis with disseminated nocardiosis on long-term corticosteroids [6, 7, 8, 9, 10, 11, 12]. Our patient is unique as no cases have documented simultaneous involvement of the lungs, brain, and spinal cord in such patients. Patients who have underlying structural lung illness are more likely to develop pulmonary nocardiosis [13]. Our patient, reported in this case, has a history of sarcoidosis, which probably contributed to him being more vulnerable to primary pulmonary nocardiosis. He was also immunocompromised on chronic prednisone therapy, which rendered him more susceptible to the illness spreading to his brain and spinal cord through the bloodstream. Our patient presented nonspecific symptoms such as cough and fever, which occur with other respiratory organisms. This led to the initial diagnosis of community-acquired pneumonia without suspicion of pulmonary nocardiosis. The clinical manifestations of a Nocardia spp. Pulmonary infections are similar to those of pulmonary tuberculosis (fever, cough, chest pain, night sweats, weight loss, and pneumonia); therefore, the nonspecific feature of the clinical symptoms, as well as the challenge of isolating the organisms in the laboratory, lead to delayed of diagnosis of nocardiosis [3]. Early diagnosis and treatment are essential in patients with nocardiosis. Diagnosis typically requires the organisms to be detectable in smears or sections examined under a microscope, and their isolation and identification are done through microbiologic culture. Sputum smear results are frequently negative. Nocardia species are identified using a modified acid-fast stain containing 1% sulfuric acid, where the bacilli appear as pink filament branching hyphae [3, 5]. Mass spectrometry and other modern molecular biology technologies, especially PCR and 16S rDNA sequencing, could accurately and rapidly identify Nocardia species [3]. In our case, the blood, sputum, and urine cultures were negative when present on admission. On the 6 days of discharge, the patient's symptoms increased and presented with worsening cough, sputum production, shortness of breath, and left-sided chest pain, which led us to do an excisional biopsy to confirm the diagnosis and proper management of the patient. On the 13 days of discharge, the patient presented with severe back pain, paraparesis, and urinary retention, which demonstrated the significance of doing a brain MRI on every patient diagnosed with nocardiosis as most of the patients with CNS nocardiosis had no neurological symptoms [11]. The severity of this case highlights that they need prophylaxis against nocardiosis. Some studies suggest prescribing Trimethoprim-sulfamethoxazole as prophylaxis in patients with immunocompromised [14]. The patient, in this case, was receiving prednisone (50 mg daily for two months, which made him need prophylaxis. For the treatment of nocardiosis, trimethoprim/sulfamethoxazole (TMP/SMX) is the drug of choice [15]. However, the Treatment of Nocardia should be guided by Nocardia speciation and susceptibility testing. Non-severe pulmonary nocardiosis and cutaneous infections can be treated with TMP/SMX monotherapy. In the case of sulfa allergy or resistance, another drug like amikacin, imipenem, meropenem, ceftriaxone, cefotaxime, minocycline, moxifloxacin, levofloxacin, linezolid, tigecycline, and amoxicillin-clavulanic acid can be used. The choice of alternative antibiotics should be guided by in vitro susceptibility data in case of immunocompromised patients or those with disseminated disease or CNS involvement; it is recommended that TMP/SMX be administered together with meropenem, imipenem or amikacin. Initial combination therapy is better than TMP/SMX alone as it showed that antibiotic susceptibility patterns of Nocardia spp isolated from the United States of America revealed that more than 50% of isolates were resistant to TMP/SMX. Duration of therapy depends on the patient's immune state and the lesion's location; it is recommended for at least 4 to 6 months in pulmonary nocardiosis, 3M in a skin lesion, and 12m in CNS involvement [3, 15, 16]. Our case was first treated with ceftriaxone and azithromycin when cough and fever were present. After confirmation of diagnosis with Nocardia, the treatment was changed to TMP/SMX. However, the Nocardia disseminates to the brain and spinal cord; the treatment changed to IV antibiotic therapy. This case underscores the importance of considering Nocardia infection in immunocompromised patients and those with pre-existing structural lung disease. Brain imaging should be performed in suspected or confirmed nocardiosis cases, as many patients with CNS involvement lack neurological symptoms. Prompt diagnosis and treatment are crucial to avoid severe complications.

4. Conclusions

This is the first reported case of Nocardia affecting the lungs, brain, and spinal cord simultaneously. Clinicians should maintain a broad

differential diagnosis when assessing new pulmonary infiltrates in sarcoidosis patients. Additionally, early CNS imaging is advisable in severe pulmonary nocardiosis to prevent devastating outcomes.

Conflicts of Interest

The authors declare that they have no competing interests that could have influenced the objectivity or outcome of this investigation.

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Informed consent

Verbal consent was obtained from the patient and family to publish this case report. All relevant information and confidentiality rights were explained, and identifying details have been anonymized.

Large Language Model

None

Authors Contribution

All authors contributed equally to this work.

Data Availability

All the data is available with the corresponding Author upon request.

References

1. Lerner PI. Nocardiosis;22(6):891-903; quiz 904-5. Lerner, P I eng Review 1996/06/01 Clin Infect Dis. 1996 Jun;22(6):891-903; quiz 904-5. doi: 10.1093/clinids/22.6.891. [PMCID: PMCID, https://doi.org/10.1093/clinids/22.6.891].
2. Fatahi-Bafghi M. Nocardiosis from 1888 to 2017;114:369-84. Fatahi-Bafghi, Mehdi eng Historical Article Review England 2017/11/18 Microb Pathog. 2018 Jan;114:369-384. doi: 10.1016/j.micpath.2017.11.012. Epub 2017 Nov 13. [https://doi.org/10.1016/j.micpath.2017.11.012].
3. Kandi V. Human Nocardia Infections: A Review of Pulmonary Nocardiosis;7(8):e304. Kandi, Venkataramana eng Review 2015/10/03 Cureus. 2015 Aug 15;7(8):e304. doi: 10.7759/cureus.304. [PMCID: PMC4571773, https://doi.org/10.7759/cureus.304].
4. Meena DS, Kumar D, Bohra GK, Midha N, Garg MK. Clinical Characteristics and Treatment Outcome of Central Nervous System Nocardiosis: A Systematic Review of Reported Cases;31(4):333-41. Meena, Durga Shankar Kumar, Deepak Bohra, Gopal Krishana Midha, Naresh Garg, Mahendra Kumar eng Systematic Review Switzerland 2022/06/15 Med Princ Pract. 2022;31(4):333-341. doi: 10.1159/000525509. Epub 2022 Jun 14. [PMCID: PMC9485982, https://doi.org/10.1159/000525509].
5. Dave BR, Samal P, Shah B, Krishnan A. Disseminated nocardiosis: A rare presentation with surgical emergency;8(3):87-91. [https://doi.org/10.1016/j.ijt.2014.08.003].
6. Rajagopala S, Dangeti G. Disseminated nocardiosis in a patient with sarcoidosis;143(1):118-9. Rajagopala, Srinivas Dangeti, Gurukiran eng Case Reports India 2016/03/22 Indian J Med Res. 2016 Jan;143(1):118-9. doi: 10.4103/0971-5916.178625. [PMCID: PMC4822357, https://doi.org/10.4103/0971-5916.178625].
7. Zachary K, Jun P, Nicholas J. Disseminated Nocardiosis in an Immunosuppressed Patient with Sarcoidosis;6(10):289. [https://doi.org/10.23937/2378-3656/1410289].
8. Mohammedi I, Vedrinne JM, Floccard B, Reverdy ME, Duperret S, Motin J. Disseminated Rhodococcus equi and Nocardia farcinica infection in a patient with sarcoidosis;36(1):134-5. Mohammedi, I Vedrinne, J M Floccard, B Reverdy, M E Duperret, S Motin, J eng Case Reports Letter England 1998/11/20 J Infect. 1998 Jan;36(1):134-5. doi: 10.1016/s0163-4453(98)93954-8. [https://doi.org/10.1016/s0163-4453(98)93954-8].
9. Laurent F, Rodriguez-Villalobos H, Cornu O, Vandercam B, Yombi JC. Nocardia prosthetic knee infection successfully treated by one-stage exchange: case report and review;70(4):287-90. Laurent, F Rodriguez-Villalobos, H Cornu, O Vandercam, B Yombi, J C eng Case Reports England 2015/01/07 Acta Clin Belg. 2015 Aug;70(4):287-90. doi: 10.1179/2295333714Y.0000000109. Epub 2015 Jan 6. [https://doi.org/10.1179/2295333714Y.0000000109].
10. Overkamp D, Waldmann B, Lins T, Lingenfelser T, Petersen D, Eggstein M. Successful treatment of brain abscess caused by Nocardia in an immunocompromised patient after failure of co-trimoxazole;20(6):365-6. Overkamp, D Waldmann, B Lins, T Lingenfelser, T Petersen, D Eggstein, M eng Case Reports Germany 1992/11/01 Infection. 1992 Nov-Dec;20(6):365-6. doi: 10.1007/BF01710686. [https://doi.org/10.1007/BF01710686].
11. Stellern JJ, Plaisted J, Welles C. Disseminated nocardiosis with persistent neurological disease;17(1). Stellern, Jordan J Plaisted, Jacob Welles, Christine eng Case Reports England 2024/01/10 BMJ Case Rep. 2024 Jan 9;17(1):e257935. doi: 10.1136/bcr-2023-257935. [PMCID: PMC10806866, https://doi.org/10.1136/bcr-2023-257935].
12. Sana M, Mahmood Butt F, Hasan MIU, Amir A. A Rare Case of Chest Wall Abscess by Nocardia in a Patient With Sarcoidosis;14(7):e26769. Sana, Mahreen Mahmood Butt, Faheem Hasan, Muhammad Imran Ul Amir, Adnan eng Case Reports 2022/08/16 Cureus. 2022 Jul 12;14(7):e26769. doi: 10.7759/cureus.26769. eCollection 2022 Jul. [PMCID: PMC9366025, https://doi.org/10.7759/cureus.26769].
13. Steinbrink J, Leavens J, Kauffman CA, Miceli MH. Manifestations and outcomes of nocardia infections: Comparison of immunocompromised and nonimmunocompromised adult patients;97(40):e12436. Steinbrink, Julie Leavens, Joan Kauffman, Carol A Miceli, Marisa H eng Comparative Study 2018/10/07 Medicine (Baltimore). 2018 Oct;97(40):e12436. doi: 10.1097/MD.0000000000012436. [PMCID: PMC6200467, https://doi.org/10.1097/MD.0000000000012436].
14. Yetmar ZA, Chesdachai S, Duffy D, Smith BH, Challener DW, Seville MT, et al. Risk factors and prophylaxis for nocardiosis in solid organ transplant recipients: A nested case-control study;37(9):e15016. Yetmar, Zachary A Chesdachai, Supavit Duffy, Dustin Smith, Byron H Challener, Douglas W Seville, Maria Teresa Bosch, Wendelyn Beam, Elena eng UL1 TR002377/TR/NCATS NIH HHS/ Multicenter Study Research Support, N.I.H., Extramural Denmark 2023/05/12 Clin Transplant. 2023 Sep;37(9):e15016. doi: 10.1111/ctr.15016. Epub 2023 May 11. [https://doi.org/10.1111/ctr.15016].
15. Margalit I, Lebeaux D, Tish O, Goldberg E, Bishara J, Yahav D, et al. How do I manage nocardiosis?;27(4):550-8. Margalit, Ili Lebeaux, David Tishler, Ori Goldberg, Elad Bishara, Jihad Yahav, Dafna Coussement, Julien eng Systematic Review England 2021/01/09 Clin Microbiol Infect. 2021 Apr;27(4):550-558. doi: 10.1016/j.cmi.2020.12.019. Epub 2021 Jan 5. [https://doi.org/10.1016/j.cmi.2020.12.019].
16. Lafont E, Conan PL, Rodriguez-Nava V, Lebeaux D. Invasive Nocardiosis: Disease Presentation, Diagnosis and Treatment - Old Questions, New Answers?;13:4601-13. Lafont, Emmanuel Conan, Pierre-Louis Rodriguez-Nava, Veronica Lebeaux, David eng Review New Zealand 2020/12/31 Infect Drug Resist. 2020 Dec 22;13:4601-4613. doi: 10.2147/IDR.S249761. eCollection 2020. [PMCID: PMC7764858, https://doi.org/10.2147/IDR.S249761].