



Case Report

Iatrogenic *Nocardia otitidiscaviarum* after PICC line placementSteven Douedi^{a,*}, Mustafa Fadhel^b, Swapnil Patel^a^a Department of Internal Medicine, Jersey Shore University Medical Center, Hackensack Meridian Health, Neptune, NJ, 07753, USA^b Department of Pulmonary and Critical Care, Jersey Shore University Medical Center, Hackensack Meridian Health, Neptune, NJ, 07753, USA

ARTICLE INFO

Article history:

Received 9 July 2020

Received in revised form 6 October 2020

Accepted 6 October 2020

Keywords:

Nocardia otitidiscaviarum

Central line

PICC

Infection

Abscess

ABSTRACT

Background: *Nocardia otitidiscaviarum* is an aerobic, gram positive bacteria with low virulence and incidence. Despite being uncommon, *N. otitidiscaviarum* has been associated with skin, lung, and disseminated infections.

Case report: A 56-year-old male with past medical history of type 2 diabetes mellitus and recent travel to the Bahamas presented to the emergency room with complains of abdominal pain, nausea, vomiting, and non-bloody diarrhea for four days. He ultimately required a PICC line for total parenteral nutrition. 2 days after line placement, he developed high fevers and severe right arm pain. Diagnostic imaging revealed venous thrombosis of cephalic vein and abscess formation within the soft tissue of right axilla with cultures ultimately growing *Nocardia otitidiscaviarum*. He underwent surgical incision and drainage of the abscess followed up with complete excision of the right cephalic vein and antecubital vein as well as sharp excisional debridement of skin, subcutaneous tissue and muscle fascia and was treated with trimethoprim-sulfamethoxazole for 3 months.

Conclusion: *Nocardia otitidiscaviarum* treatment of cutaneous disease consists of trimethoprim-sulfamethoxazole for three to six months. While guidelines for surgical intervention for cutaneous infection are not specified, our patient required surgical incision and drainage of abscess, along with excision of vein due to necrosis in addition to antibiotic treatment for 3 months with successful outcomes.

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Introduction

Nocardiaceae are aerobic, gram positive bacteria that are usually found in soil, decomposing vegetation, and fresh and saltwater [1]. Under microscopy, Nocardiaceae appear filamentous with branching hyphae [1]. Commonly defined as an opportunistic infection, nocardiosis is usually seen in immunocompromised patients, however, has been identified in up to 15 % of immunocompetent patients [1]. Infection is usually transmitted with inhalation of spores, ingestion of contaminated food, or direct inoculation of organisms and primarily involves lungs, skin, and central nervous system [2]. We present a case of a middle-aged male who developed iatrogenic nocardiosis of the cephalic vein after peripherally inserted central catheter (PICC) line insertion.

Case presentation

A 56-year-old male with past medical history of type 2 diabetes mellitus, with a hemoglobin A1c of 9.6 % on admission, and recent

travel 3 months prior to admission to the Bahamas presented to the emergency room with complains of abdominal pain, nausea, vomiting, and non-bloody diarrhea for four days. He reported eating salted fish rice four days prior to admission when the symptoms began. Vital signs on presentation revealed temperature of 100.6 degrees Fahrenheit, blood pressure of 96/53 mm Hg and heart rate of 90 beats per minute. Physical exam was remarkable for tenderness to palpation in left lower quadrant of the abdomen with associated rebound tenderness. Laboratory data showed leukocytosis of $13.6 \times 10^3/\mu\text{L}$ (normal range: 4.5–11.0 $\times 10^3/\mu\text{L}$) and mildly elevated lactic acid of 2.3 mmol/L (normal range: 0.5–2.0 mmol/L). Computed tomography (CT) scan of abdomen and pelvis showed dilated loops of bowel suggestive of possible inflammatory etiology. Patient was started on ciprofloxacin and metronidazole for possible gastrointestinal infection. On day 5, due to persistent symptoms of abdominal pain and diarrhea, a repeat CT scan of the abdomen and pelvis was performed, which was suggestive of small bowel obstruction at the location of the distal jejunum and again appreciated multiple dilated loops of bowel. Nasogastric tube was inserted for gastric decompression and the patient was placed strict nothing by mouth diet. On day 8, an obstructive series revealed persistent obstruction and patient underwent surgical exploratory laparotomy which was unremarkable. On day 10, due

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to lack of adequate nutrition, a PICC line was placed in right arm, and the patient was started on total parenteral nutrition for 2 days.

On day 12, the patient complained of pain and erythema of the right arm. Physical exam revealed fever of 103 degrees Fahrenheit and an ulceration with drainage at dorsum of right thumb as well as fluctuate abscess formation in the antecubital area that was noted that day. Diagnostic doppler imaging revealed venous thrombosis of cephalic vein at the level of the antecubital fossa and proximal forearm and ultrasound revealed a $0.86 \times 0.28 \times 0.69$ cm abscess formation within the soft tissue of right axilla. The patient underwent surgical incision and drainage of the abscess followed up with complete excision of the right cephalic vein and antecubital vein as well as sharp excisional debridement of skin, subcutaneous tissue and muscle fascia. The PICC line was also promptly removed due to being a suspected source of infection. The veins appeared to be completely liquefied by suppurative process. Cultures from the abscess drainage grew positive for *Nocardia otitidiscaviarum*. Susceptibilities from the microbiology lab reported resistance to ceftriaxone and penicillin and sensitivity to trimethoprim-sulfamethoxazole (TMP-SMX), minocycline, imipenem, and linezolid. The patient was started on trimethoprim-sulfamethoxazole for a 3-month course leading to resolution of symptoms and infection.

Discussion

Nocardiosis typically causes severe lung or skin infections in immunocompromised patients and is known for its abscess formation [1,2]. *Nocardia otitidiscaviarum* is far less common, even in immunocompromised patients, accounting for less than 5 % of all *Nocardia* associated infections [2–4]. This significantly decreased incidence has been attributed to a lower virulence and decreased growth in soil samples [5,6]. *N. otitidiscaviarum* can be differentiated from other *Nocardia* species due to the ability to hydrolyze both hypoxanthine and xanthine [6]. Despite decreased pathogenicity, *N. otitidiscaviarum* has been associated with severe and disseminated infections [5]. Jiang et al. reported 23 cases of *N. otitidiscaviarum* infection, 17 % of which resulted in disseminated infections [5]. Of the 23 cases, 39 % were immunocompetent, similar to our patient presented, and 30 % of those had cutaneous skin infections with a history of trauma [5].

Typical presentation of primary cutaneous nocardiosis includes cellulitis with ulceration and abscess formation [1]. These forms of cutaneous disease can appear similar to *Staphylococcus aureus* or *Streptococcus* skin infections, making identification of organisms from cultures imperative [1]. Our patient presented as primary cutaneous nocardiosis, with seeding of organism likely happening during central venous catheter placement without bacteremia. *Nocardia* species have been shown to form heavy biofilm on the surfaces of polyurethane and silicone central venous catheters [6]. This affinity surface of material in central venous catheters predisposes patients to nocardia infection with local inoculation. Due to infection after placement of the PICC line, and week into hospital stay, our patient likely had an iatrogenic source of infection and thus the PICC line was promptly removed.

Primary antimicrobial agent used to treat nocardiosis is trimethoprim-sulfamethoxazole (TMP-SMX) with relatively low reported resistance [1,3,5,7]. Other agents that can be used for

treatment include amikacin, imipenem, and third generation cephalosporins (ceftriaxone and cefotaxime) [5,7]. Duration of treatment of cutaneous disease is three to six months of antibiotic therapy, patients with mycetoma, central nervous system infection, or those are immunocompromised require treatment for at least 12 months [1]. Guidelines for surgical intervention for cutaneous infection are not specified, however our patient required surgical incision and drainage of abscess with debridement, along with excision of vein due to necrosis in addition to antibiotic treatment.

Declaration of Competing Interest

The authors report no declarations of interest.

Sources of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Consent

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.

Author contribution

S.D., M.F., and S.P. contributed to visualization and writing—original draft, review, and editing. All authors have read and agreed to the published version of the manuscript.

Acknowledgments

Not applicable.

References

- [1] Wilson JW. Nocardiosis: updates and clinical overview. *Mayo Clin Proc* 2012;87(4):403–7, doi:http://dx.doi.org/10.1016/j.mayocp.2011.11.016.
- [2] Kandi V. Human *Nocardia* infections: a review of pulmonary nocardiosis. *Cureus* 2015;7(8):e304, doi:http://dx.doi.org/10.7759/cureus.304.
- [3] Brown-Elliott BA, Brown JM, Conville PS, Wallace Jr. RJ. Clinical and laboratory features of the *Nocardia* spp. based on current molecular taxonomy. *Clin Microbiol Rev* 2006;19(2):259–82, doi:http://dx.doi.org/10.1128/CMR.19.2.259-282.2006.
- [4] Liu C, Feng M, Zhu J, Tao Y, Kang M, Chen L. Severe pneumonia due to *Nocardia otitidiscaviarum* identified by mass spectroscopy in a cotton farmer: a case report and literature review. *Medicine (Baltimore)* 2017;96(13):e6526, doi:http://dx.doi.org/10.1097/MD.00000000000006526.
- [5] Jiang Y, Huang A, Fang Q. Disseminated nocardiosis caused by *Nocardia otitidiscaviarum* in an immunocompetent host: a case report and literature review. *Exp Ther Med* 2016;12(5):3339–46, doi:http://dx.doi.org/10.3892/etm.2016.3755.
- [6] Al Akhrass F, Hachem R, Mohamed JA, et al. Central venous catheter-associated *Nocardia* bacteremia in cancer patients. *Emerg Infect Dis* 2011;17(9):1651–8, doi:http://dx.doi.org/10.3201/eid1709.101810.
- [7] Steinbrink J, Leavens J, Kauffman CA, Miceli MH. Manifestations and outcomes of *Nocardia* infections: comparison of immunocompromised and nonimmunocompromised adult patients. *Medicine (Baltimore)* 2018;97(40):e12436, doi:http://dx.doi.org/10.1097/MD.00000000000012436.