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ID TEACHING CASES

Peripherally Inserted Central Catheter-Associated *Nocardia nova* Endocarditis in a Patient Receiving Intravenous Antibiotics for Chronic Lyme Disease

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Long-term antibiotics are not effective for the therapy of patients with persistent symptoms and a history of Lyme disease. However, some clinicians still prescribe these therapies. We present a case of peripherally inserted central catheter-associated *Nocardia nova* endocarditis in a patient who had been receiving intravenous antibiotics for the management of chronic Lyme disease. This case highlights an important risk associated with the unscientific use of indwelling peripheral catheters and intravenous antibiotics for the management of such patients.

Keywords. *Nocardia nova* endocarditis; Peripherally Inserted Central Catheter-Associated infection; Persistent symptoms and a diagnosis of Lyme Disease.

PRESENTATION OF CASE

A 34-year-old female from New England presented with a 1-month history of daily low-grade fevers, dry cough, loss of appetite, and a 5-pound weight loss. She received 2 separate 5-day courses of azithromycin as an outpatient with no improvement in her symptoms. Ten years before presentation, the patient was diagnosed with Lyme disease. A Western blot for *Borrelia burgdorferi*-specific immunoglobulin IgM antibodies detected 2 of 3 bands and was interpreted as positive, but a Western blot for IgG antibodies was negative. She was treated with doxycycline for 3 weeks. The patient continued to have polyarthralgia and fatigue and reported that she was diagnosed with chronic Lyme disease 5 years before presentation. She had an indwelling peripherally inserted central catheter (PICC) in place for the previous 22 months for the administration of intravenous (IV) antibiotics that were prescribed to treat chronic Lyme disease. She received a 10-month course of IV ceftriaxone and then a 6-month course of IV doxycycline. She was also prescribed intermittent courses of other agents, such as oral disulfuram and oral doxycycline, for the treatment of chronic Lyme disease. The patient has a history of Ehlers-Danlos syndrome, gastrointestinal malabsorption, which necessitates enteral feeding through a nasogastric tube, postural orthostatic tachycardia syndrome, and psychogenic nonepileptic seizures. She reported that the administration of sulfa drugs caused hives when she was a child. On the day of presentation, the patient had a temperature of 38.1°C and a heart rate of 103 beats per minute. A PICC line was in place in the right arm. The rest of her physical exam was normal. Kidney function, serum glucose, a complete blood count with differential, and liver enzyme tests were all within the normal range. Tests for SARS-CoV-2 and human immunodeficiency virus were negative. A chest x-ray was normal. A chest computed tomography (CT) scan showed multiple scattered pulmonary nodules concerning for emboli (Figure 1). Branching, Gram-positive bacilli grew in 4 of 4 blood cultures bottles taken on the day of her admission to the hospital (Figure 2). The organism stained with a modified acid-fast bacilli stain and was identified as *Nocardia nova* (Figure 3). The multiple, bilateral small nodular opacities seen on CT scan of the chest were consistent with septic pulmonary emboli. A transthoracic echocardiogram was normal, but transesophageal echocardiogram showed a 3-mm × 1-mm mobile vegetation on the mitral valve. A magnetic resonance image of the brain was normal. Thus, this patient was diagnosed with PICC-associated *N nova* septic pulmonary emboli and endocarditis.

PATIENT CONSENT

Consent to publish to this case report was obtained from the patient. The article type ("ID Teaching Cases") does not require formal approval by an ethics committee.

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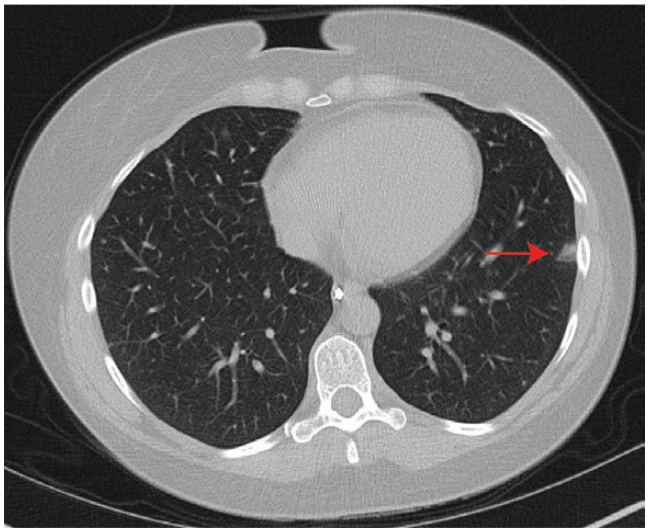

Figure 1. Computed tomography of the patient's chest. Multiple scattered nodules in the periphery of the lungs (arrow) were identified.

DISCUSSION

In this study, we present the case of a patient with a severe complication associated with the unscientific use of IV antibiotics for management of persistent symptoms and a diagnosis of Lyme disease. Several randomized controlled trials have compared long-term antibiotics with placebo for the treatment of these patients [1–4]. In each of these studies, longer term antibiotic treatment did not improve symptoms in patients compared with placebo. However, complications of long-term antibiotic treatment for Lyme disease include PICC-line associated bacteremia, which can be life threatening [5]. Despite these data and a recommendation from the Infectious Diseases Society of America against the use of extended courses of antibiotics in this setting [6], some clinicians still prescribe such therapies [7, 8].

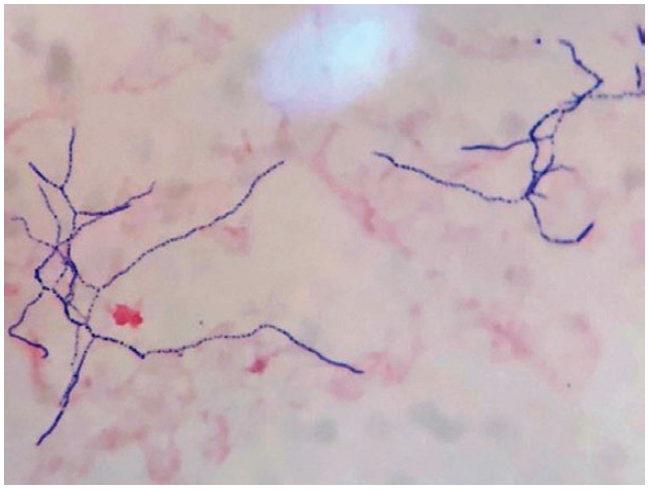

Figure 2. Gram stain of the organism growing in blood culture.

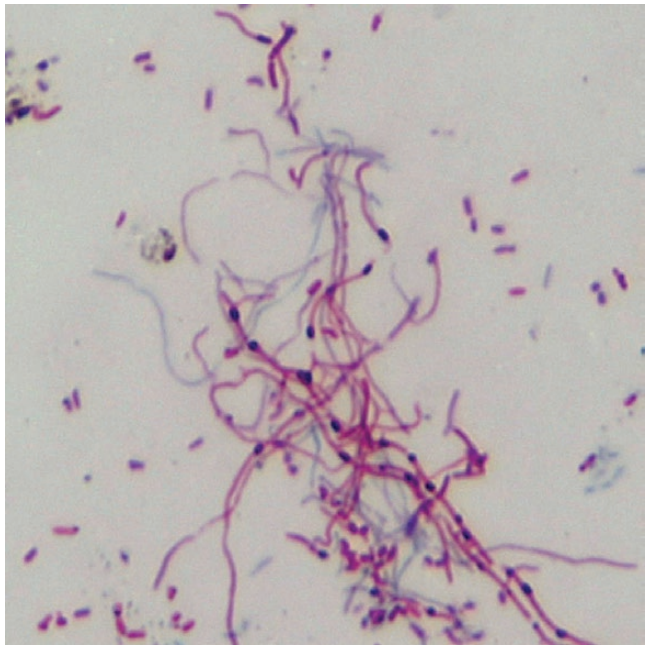

Figure 3. A modified acid-fast bacilli stain of the organism growing in blood culture.

The patient was initially diagnosed with Lyme disease when an immunoblot for *B burgdorferi*-specific IgM antibodies was positive; however, the immunoblot for IgG antibodies was negative. *Borrelia burgdorferi* IgM immunoblots have poor specificity, particularly when the IgG test is negative, and can lead to the misdiagnosis of Lyme disease [9]. Thus, an isolated positive *B burgdorferi* IgM immunoblot should not be used to diagnose Lyme disease in patients who have had symptoms for more than 6 weeks.

Nocardia sp are Gram-positive, beaded, weakly acid-fast, branching bacilli that are uncommon causes of bacteremia and endocarditis [10]. It is interesting to note that *N nova* was the most common pathogen in a case series of patients with *Nocardia* sp bacteremia and an underlying cancer, recovered in 6 of 17 cases [11]. Ten of 17 patients in this study had central catheter-associated bacteremia, and the authors found that *Nocardia* sp promoted biofilm formation on central venous catheters in vitro [11]. Patients with central venous catheter-associated *Nocardia* sp bacteremia responded well to catheter removal and antibiotic therapy [11].

Data from randomized controlled trials are not available to guide treatment for nocardiosis. Based on cumulative clinical experience, trimethoprim-sulfamethoxazole is the mainstay of therapy for patients with nocardiosis. Patients who are allergic to trimethoprim-sulfamethoxazole should be desensitized to enable treatment with this agent. Most authorities recommend that severe infection with *Nocardia* sp, such as endocarditis in this patient, be managed with combination therapy. For severe disease outside the central nervous system, the combination

of trimethoprim-sulfamethoxazole and amikacin for initial therapy is recommended until antimicrobial susceptibility data are available. The combination of imipenem and amikacin is also used in this setting. The optimal duration of therapy for patients with nocardiosis is not known. Shorter antibiotic courses for *Nocardia* sp infection are associated with a high risk of relapse, even in immunocompetent hosts. Thus, most infectious disease clinicians recommend that patients with severe nocardiosis be treated with antibiotics for 6 to 12 months.

FOLLOW-UP

The patient's PICC line was removed and she was started on imipenem, given her history of a severe allergy to trimethoprim-sulfamethoxazole. On the second hospital day, the patient's fever resolved, and her symptoms improved markedly. During her hospital stay, she was desensitized to trimethoprim-sulfamethoxazole. She was discharged on trimethoprim-sulfamethoxazole and amikacin while awaiting the identification and susceptibility of the *Nocardia* sp. Ten days into therapy, the patient developed a diffuse maculopapular drug rash. The trimethoprim-sulfamethoxazole was discontinued, imipenem was restarted, and the amikacin therapy continued. Her rash resolved. After 4 weeks of empiric antibiotic treatment, the organism was identified as *N nova* that was sensitive to trimethoprim-sulfamethoxazole, amikacin, ceftriaxone, imipenem, and linezolid, but resistant to tetracyclines, fluoroquinolones, and amoxicillin/clavulanate. Imipenem and amikacin were discontinued, and the patient was started on ceftriaxone, given her history of malabsorption and inability to tolerate oral antibiotics. A 6-month course of ceftriaxone is planned for this patient, after which a CT scan of the chest will be obtained to ensure resolution of the septic emboli. The PICC line used to administer ceftriaxone will then be removed.

Acknowledgments

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