Nocardia Spinal Epidural Abscess: 14-year Follow-up

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abstract

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This article describes an immunocompetent patient with a spinal abscess that developed from Nocardia asteroides. Nocardia is a rare etiology for spinal abscesses, especially in immunocompetent patients. Nocardia usually affects the lungs and brain of immunocompromised individuals. Few reports of Nocardia involving bones or the spine have been published.

The patient had a history of chronic back pain and had several procedures to alleviate the pain. In August 1997, the patient had an epidural block and a subsequent infection that was treated with antibiotics. In October 1997, she developed increasing back pain greater than her baseline chronic low back pain. Additional presenting symptoms were fever, chills, and nausea. On admission, magnetic resonance imaging (MRI) revealed an epidural abscess. The patient underwent irrigation and debridement. Postoperatively, the patient was initially placed on broad-spectrum antibiotics. After 38 days, the culture was identified as N asteroides, and the patient was placed on appropriate antibiotics. The patient has been followed with MRI prior to the discovery of the abscess and annually since the abscess due to her baseline chronic low back pain. No residual abscess was discovered.

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Spinal abscesses from \textit{Nocardia asteroides} are rare. \textit{Nocardia asteroides} is a Gram-positive bacteria that usually affects the lungs and brain of immunocompromised hosts. Less often, it causes a cutaneous disease. The pathology shows branching and filamentous cells. It can be transmitted by direct inoculation or inhalation of dust particles. The bacteria are ubiquitous and are found in soil. \textit{Nocardia asteroides} is diagnosed on growth media, but it is slow growing and may need several weeks to show results. It is weakly acid-fast positive. A modified Ziehl-Neelsen stain or Thayer-Martin agar can be used.

Sulfonamides are the preferred treatment, requiring an extended period of treatment (6 months to 1 year). Other combinations involving sulfonamides are being evaluated to determine efficacy due to the development of some resistant strains.

Few reports of \textit{N. asteroides} affecting the bones, specifically the spine, have been published. Graat et al\textsuperscript{1} reported a case of spinal osteomyelitis caused by \textit{Nocardia farcinica}. They reported 11 cases of spinal osteomyelitis in the previous 40 years.\textsuperscript{2-4}

Few reports discussing \textit{N. asteroides} as a cause of epidural abscess exist in the literature. We present a case of \textit{N. asteroides} as the cause of epidural abscess. Our patient had a 20-year follow-up in the spine center with subsequent magnetic resonance imaging (MRI) due to her underlying chronic low back pain.

**CASE REPORT**

A 70-year-old woman was diagnosed with an epidural abscess in 1997. She was initially diagnosed with degenerative disk disease. Her initial MRI was performed in 1989. The patient was managed with nonsurgical treatment for her back complaints. Over the years, she was treated with physical therapy and nonsteroidal anti-inflammatory drugs. In August 1996, her leg pain worsened. Electromyography was performed, which confirmed an L5 radiculopathy. Magnetic resonance imaging showed increasing spondylosis of the lumbar spine, with some stenosis. In the following months, the patient underwent thermal coagulation of posterior rami at L4-S1, neuroplasty at L5, and facet injections.

In August 1997, MRI showed degenerative disk disease and some apophyseal degenerative disease. Subsequently, she had another epidural block with a questionable infection. A month later, she had a viral illness. These episodes were treated with antibiotics. She reported no subsequent increased back pain.

In October 1997, the patient developed constant and surging back pain more severe than her baseline chronic back pain and reported fever, shaking chills, and nausea. On hospital admission, MRI showed an epidural abscess (Figures 1, 2). Her physical examination was unremarkable, except for positive tension sign with straight leg raise. She had no sensory or motor deficits. Laboratory work indicated an erythrocyte sedimentation rate of 55 mm per hour (normal range, 0-30 mm per hour), and a white blood cell count of 10.4 K/uL (normal range, 4-10 K/uL). Two blood cultures were taken, and no growth was evident after 6 days. Reports were finalized at that time. She underwent formal irrigation and debridement, consisting of a left L5 laminotomy. Frank pus was found on exploration of the lumbar area. Further exploration revealed the presence of granulation tissue, likely representing a chronicity to the infection. The surgical incision was primarily closed in layers.

The patient improved dramatically after the initial irrigation and debridement, eliminating the need for subsequent procedures. She was started on cefazolin and gentamicin broad-spectrum intravenous antibiotics. Although cultures were still pending. Infectious Disease recommended switching her to 2 g of ceftriaxone daily at discharge 3 days later.

After 22 days, the preliminary report identified a \textit{Nocardia} species. \textit{Nocardia asteroides} was confirmed via the final report at 38 days. The patient was continued on antibiotics while in the hospital and on discharge. After culture identification, the patient’s antibiotics were tailored appropriately based on the sensitivity. She had an unremarkable course on discharge but also had continued, baseline, chronic low back pain and routine annual postoperative MRIs due to the chronic low back pain. No residual epidural abscesses were noted.
in the follow-up imaging studies (Figures 3-5).

**DISCUSSION**

*Nocardia* is a rare cause of infection, usually only affecting immunocompromised patients. It is most commonly found in soil, decaying vegetable matter, and aquatic environments. *Nocardia* is typically transmitted via inhalation of dust particles or direct contact penetrating past the natural human protective barriers. The most common *Nocardia* infection is usually caused by one of the variants of the *N. asteroides* complex, which consists of *N. asteroides sensu stricto*, *N. farcinica*, and *N. nova*. The 3 main types of disease caused by *Nocardia* (nocardiosis) are cutaneous disease, pulmonary disease, and disseminated disease. *Nocardia farcinica* is the most virulent form and is more frequently found to cause disseminated disease.

Disseminated disease is also more prevalent in immunocompromised patients. *Nocardia brasiliensis* is the most common to cause cutaneous disease, often leading to the development of a mycetoma over months to years. The presentation in our patient is unknown. The patient’s only recollection of a potential source was an epidural pain block that she received approximately 2 months prior to identification of the abscess.

When a patient presents with back pain, a spinal epidural abscess is a rare cause and not likely to be in the initial differential diagnosis. An indicator that an abscess could be present is when a patient presents with the classic triad of fever, spinal pain, and neurologic deficit. Fever often leads clinicians to include a spinal epidural abscess in the differential diagnosis because it is typically absent in the more common presentations of back pain.

Once a spinal epidural abscess is determined as the cause, the contaminants in order of likelihood range from *Staphylococcus aureus* (approximately two-thirds of the total cases), Gram-negative bacilli, *streptococci*, coagulase-negative *staphylococci* (mostly in patients with previous spinal instrumentation), and anaerobes. *Nocardia* is another potential cause of epidural abscesses.

The likelihood of infection with this type of bacteria is minimal but should be considered. Increased concerns for nocardiosis typically involves patients with depressed cellular immunity or humorally immunocompromised patients, such as those with acquired immune deficiency syndrome, hematologic and solid organ malignancies, prolonged systemic steroid therapy, and transplant recipients. However, immunocompetent individuals are still capable of developing an infection. The overall incidence of nocardiosis is often not reported in literature, with the most frequently cited study in the United States reporting 500 to 1000 new cases per year between 1972 and 1974. These numbers have likely increased since then due to the increase in immunocompromised individuals and likely lack reporting in the initial count because it is not a reportable disease. Although the incidence is limited, it should remain in the differential diagnosis, especially when cultures are still negative after a few days and the clinical suspicion of infection is high.

It is difficult to diagnose *Nocardia* because of its long incubation period. The typical time frame for growth can be as early as 4 days, but it can take several weeks for the colonies to develop. In our case, it took 22 days for the colonies to grow, with a final report at 38 days. Correspondence with the laboratory is vital when *Nocardia* is being considered to ensure that cultures are kept long enough to allow for ample growth periods.
**Nocardia** is grown in the laboratory using common fungal (ie, Sabouraud dextrose agar) or mycobacterial isolation media (ie, Middlebrook synthetic agar and Lowenstein-Jensen medium). Selective media, such as Thayer-Martin agar, can be used to increase the yield. The stains that are used to differentiate *Nocardia* from *Actinomyces* are the Kinyoun acid-fast stain or a Ziehl-Neelsen acid-fast stain. The Lysozyme test can also be used to identify *Nocardia* species that is beneficial for those species which are not acid fast. *Nocardia* is identified as weakly acid-fast positive vs its counterpart, *Actinomyces*, which is an acid-fast negative. The property that causes the differentiation of *Nocardia* is the varying amounts of mycolic acid within its cell wall causing the acid-fast staining. Antibiotics are the treatment of choice, except when surgery is initially indicated, with antibiotics still given postoperatively. Sulfonamides have been the preferred antibiotic used for treatment for many years. Due to resistance developing to sulfonamides in many variants of *Nocardia*, a combination therapy is often given, especially in severe or disseminated disease. To ensure coverage of all isolates of *Nocardia* in severe cases, a 3-drug regimen of trimethoprim-sulfamethoxazole, amikacin, and either ceftriaxone or imipenem should be started because no resistance has been reported to this combination. In milder cases, treatment with trimethoprim-sulfamethoxazole, minocycline, or ceftriaxone have been shown to be effective. Treatment with trimethoprim-sulfamethoxazole in combination with a fluoroquinolone has also been effective, but only in mild cases.

*Nocardia farcinica* is the 1 type of *Nocardia* that should be of concern when treating empirically with a fluoroquinolone because most patients are resistant to it. *Nocardia farcinica* has also shown resistance to third-generation cephalosporins. Linezolid has demonstrated effective in vitro activity against most species and strains, but clinical data are limited. It has promising results as a potential option in the replacement of the current treatment regimens when resistance is a concern. Once sensitivities are obtained, the focus of the treatment should be narrowed appropriately. Intravenous therapy treatment must be continued for several weeks with an eventual transition to oral therapy. Duration of treatment is dependent on type of disease and organ involvement.

Few reports of patients with *Nocardia* infections have been published. This article presents a long-term follow-up of a patient who was diagnosed with a *N. asteroides* spinal epidural abscess treated successfully with irrigation and debridement and intraoperative antibiotics. She had MRIs on a consistent basis both pre- and postoperatively for >20 years. When treating patients with a possible spine infection, one should include *Nocardia* in the differential diagnosis. This patient had her first MRI in 1989, but she was not diagnosed with the infection until 1997. Since the infection and subsequent irrigation and debridement, the patient has had several MRIs. Early postoperative MRIs show no accumulation of abscess. This trend continued with the remainder of the MRIs.

**REFERENCES:**