

The history holds the key in this gardener with a skin infection

Staphylococci and streptococci are the most common causes of skin infections—but when the patient is immunocompromised, keep other causative organisms in mind as well.

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CASE

The patient is a 75-year-old retired white male with a 3-day history of a papular abscess on and cellulitis of the ulnar aspect of the fifth digit on the right hand. He had presented to the emergency department (ED) and was referred to orthopedic surgery for consultation. At the consultation, the patient reported increased redness, streaking, and moderate pain associated with the papule. He denied nausea, vomiting, diarrhea, vertigo, diaphoresis, dyspnea, fever, or chills. He also denied any neuropathy of the affected hand or any use of topical or oral medications for the current problem. The patient stated he was unaware of any recent trauma to the area. On further inquiry, the patient described himself as an avid gardener and said that he had been working in the garden. His medical history was significant for hypertension, acid reflux disease, and diet-controlled diabetes mellitus.

Physical examination of the right hand revealed erythema along the ulnar aspect of the fifth digit surrounding the papule. Metacarpal-phalangeal flexion was limited as a result of the swelling. The rest of the examination was within normal limits, with no apparent lymphadenopathy. Three-view radiographs were obtained, and these showed no foreign body and no acute bony abnormalities. The WBC count was normal on the CBC at $9.1 \times 10^9/L$, but the neutrophil percentage was mildly increased at 68.9%. A chest film demonstrated a questionable left infrahilar peribronchitic infiltrate.

IV vancomycin had been started in the ED, with a differential diagnosis that included infection with methicillin-resistant *Staphylococcus aureus*, methicillin-sensitive *S aureus*, *Sporothrix schenckii*, and *Nocardia* species. At the orthopedic consultation, vancomycin was discontinued and IV cefazolin was initiated.

After a discussion with the orthopedic surgeon, the patient agreed to surgical incision, inspection, and debridement of the wound. During the procedure, the wound was debrided to the level of the tendon; the tendon remained

intact, with no noteworthy communication to the tendon sheath. Cultures were taken, and the wound was left open and packed with iodoform gauze. The wet-to-dry dressings were changed 3 times a day, and treatment with cefazolin was continued. The cultures revealed rare leukocytes, as well as a coagulase-negative *Staphylococcus* species. Diphtheroid bacilli and *Nocardia* species were also identified. Repeat postoperative three-view radiographs did not contribute any relevant information.

Three days after surgery, lymphangitic streaking was noted along the proximal aspect of the patient's right arm. In addition, there was inflammation and redness over the fourth metacarpal and dorsum of the right hand (see Figure 1). The patient was taken back to the operating room for a second incision and drainage procedure. The wound was debrided of necrotic tissue, and cultures were repeated. These cultures confirmed infection with *Nocardia*. IV cefazolin was discontinued, and IV trimethoprim-sulfamethoxazole (TMP-SMX) was started. CT of the chest was obtained to rule out pulmonary involvement or dissemination. Aside from interstitial



FIGURE 1. Infection spreads to the dorsum of the hand.

CASE REPORT | Cutaneous nocardiosis

fibrosis and scarring, which had been seen on a CT scan obtained 3 years previously, no significant lymphadenopathy or lesions were noted.

The patient was discharged home on a regimen of oral TMP-SMX and given a follow-up appointment with the surgeon in 5 days. The wounds were open but clean, with granulation tissue present. No erythema was present, and there was no sign of abscess. Flexion of the metacarpal-phalangeal joint was about 50%. Delayed primary closure was scheduled and completed without incident. Follow-up was continued with an infectious disease specialist. One month after surgical debridement and antibiotic therapy, the patient was in good condition with no apparent continuance of infection.

DISCUSSION

Skin infections have multiple causes, and the history and physical examination often help to narrow the differential diagnosis, as occurred in this case. Our patient was immunocompromised as a consequence of diabetes mellitus. During the history, he also revealed that he was an avid gardener. This vital information led us to include *Nocardia* infection in our differential diagnosis.

“Cutaneous nocardiosis causes cellulitis, ulcerations, pyoderma and subcutaneous abscess, and nodular lymphangitis.”

***Nocardia* are gram-positive bacteria** produced by aerobic actinomycetes; the organism is an environmental saprophyte that occurs in soil, water, and organic matter^{1,2} (see Figure 2). Streptococci and staphylococci are more predominant as causative agents in cutaneous infection; however, the clinician should maintain a high index of suspicion for *Nocardia* infection when dealing with immunocompromised patients who have localized trauma that involves wound contact with soil, water, or organic matter.³ The diagnosis of *Nocardia* infection is made via culture.

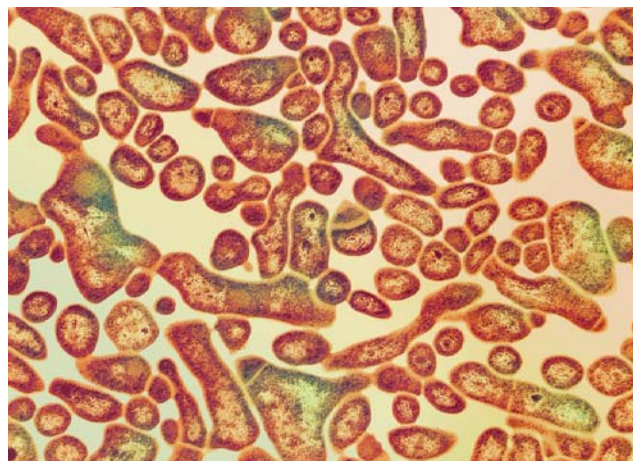


FIGURE 2. *Nocardia asteroides*

Nocardiosis can manifest in many forms, with pulmonary infection being the most common.⁴ Pulmonary nocardiosis usually occurs secondary to inhalation. Nocardiosis can also be classified as extrapulmonary, CNS, or cutaneous.^{5,6} The risk of this infection is increased in immunocompromised patients, such as those with a history of diabetes mellitus or malignancy, those taking corticosteroids, transplant recipients, and those with tuberculosis or HIV disease.⁷

Cutaneous nocardiosis can manifest in the following clinical subtypes: primary cutaneous, lymphocutaneous, cutaneous involvement from a disseminated focus, and mycetoma.⁵ The patient in this case presented with primary cutaneous nocardiosis secondary to gardening, resulting in the direct inoculation of the organism.⁷ The cutaneous form of nocardiosis causes cellulitis, ulcerations, pyoderma, subcutaneous abscess, skin pustules, and nodular lymphangitis.^{5,8} Since *Nocardia* infections manifest similarly to streptococcal and staphylococcal infections, they may be treated empirically with antibiotics and incised and drained without cultures ever being taken; thus, *Nocardia* infections may be underreported.³ Because 2% of people with disseminated nocardiosis present with skin lesions, it is imperative to rule out systemic disease.⁷ Chest radiography is the primary test used to rule out pulmonary involvement.

TEACHING POINTS

- Streptococci and staphylococci are more predominant than *Nocardia* species as causative agents in cutaneous infection; however, the clinician should maintain a high index of suspicion for *Nocardia* infection when dealing with immunocompromised patients who have localized trauma that involves wound contact with soil, water, or organic matter.
- Nocardiosis can be classified as pulmonary, extrapulmonary, CNS, or cutaneous. The cutaneous form of nocardiosis causes cellulitis, ulcerations, pyoderma, subcutaneous abscess, skin pustules, and nodular lymphangitis.
- Primary cutaneous nocardiosis can resolve spontaneously or may require antibiotic treatment. Sulfonamides have been the preferred agent since the 1940s, and TMP-SMX has been proven effective against *Nocardia* organisms. Surgical incision and drainage is an effective concomitant treatment measure.

COMPETENCIES

- Medical knowledge
- Interpersonal & communication skills
- Patient care
- Professionalism
- Practice-based learning and improvement
- Systems-based practice

“Clinicians should note that the cure rates for *Nocardia* infections involving the skin and soft tissue are almost 100 percent.”

Primary cutaneous nocardiosis can resolve spontaneously or may require antibiotic treatment.⁷ Sulfonamides have been the preferred treatment for this infection since the 1940s,² and TMP-SMX has been proven to be effective against *Nocardia* organisms.

For patients with primary cutaneous nocardiosis, a 1- to 3-month course of antibiotic therapy can be curative,² with the duration of therapy ranging from 6 weeks for minor infection to as long as 1 year for severe infection.³ Surgical incision and drainage is also an effective concomitant treatment measure.

Clinicians should note that cure rates for nocardiosis involving the skin and soft tissue are almost 100%; nevertheless, the outcome of treatment for this infection depends on the health of the host (particularly on whether the patient is immunocompromised), the extent of disease, and the site of infection.²

CONCLUSION

Clinicians often find that determining the cause of a skin infection is challenging. The history and physical examination can provide relevant information. In most cases, culture is required for a definitive diagnosis and optimal treatment. Nocardiosis should be kept strongly in mind when an immunocompromised patient presents with a skin infection. **JAAPA**

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REFERENCES

1. Kontoyiannis DP, Ruoff K, Hooper DC. Nocardia bacteremia: report of 4 cases and review of the literature. *Medicine* (Baltimore). 1998;77(4):255-267.
2. Sorrell TC, Mitchell DH, Iredell JR. *Nocardia* species. In: Mandell G, Dennett J, Dolin R, eds. *Principles and Practices of Infectious Diseases*. Philadelphia, PA: Elsevier; 2005:2916-2913.
3. Shook B, Rapini RP. Nocardiosis. Updated June 6, 2007. eMedicine Web site. <http://www.emedicine.com/derm/topic297.htm>. Accessed August 1, 2008.
4. Beaman BL, Beaman L. *Nocardia* species: host-parasite relationships. *Clin Microbiol Rev*. 1994; 7(2):213-264.
5. Lerner PI. Nocardiosis. *Clin Infect Dis*. 1996; 22(6):891-905.
6. Lederman ER, Crum NF. A case series and focused review of nocardiosis: clinical and microbiologic aspects. *Medicine* (Baltimore). 2004;83(5):300-313.
7. Kofteridis D, Mantadakis E, Mixaki I, et al. Primary cutaneous nocardiosis in 2 patients on immunosuppressants. *Scand J Infect Dis*. 2005;37(6-7):507-510.
8. Threlkeld SC, Hooper DC. Update on management of patients with *Nocardia* infection. *Curr Clin Top Infect Dis*. 1997;17:1-23.