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Authors

Henckens, NFT
Rovers, JFJ
van Dommelen, L
et al.

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Can cats cause colossal contagious cutaneous carbuncles?

NFT Henckens¹, JFJ Rovers¹ MD, L van Dommelen² MD PhD, HJ Bovenschen¹ MD PhD

Affiliations: ¹Department of Dermatology, Máxima Medical Center Veldhoven, De Run 4600, 5500 MB, Veldhoven, The Netherlands, ²Department of Medical Microbiology, Stichting PAMM, De Run 6250, 5504 DL, Veldhoven, The Netherlands

Corresponding Author: HJ Bovenschen MD PhD; Department of Dermatology, Máxima Medical Center Veldhoven, De Run 4600, PO Box 7777, NL-5500 MB, Veldhoven, The Netherlands, Tel: 31-40 8888000, Fax: 31-40 8889495, Email: J.Bovenschen@mmc.nl

Abstract

Sporothrix spp. cause the most common deep fungal skin infections in Brazil and this is related to infected cats. Transmission is traditionally from organic material/plants but can also be zoonotic. Culture of a skin biopsy is the gold standard for determination. Treatment with oral itraconazole approaches up to 95% efficacy in patients with cutaneous sporotrichosis.

Keywords: animal, cat, skin infection, *Sporothrix braziliensis*, sporotrichosis

Introduction

Sporotrichosis is endemic in several South American, Asian, and African countries. Usually, transmission occurs through traumatic inoculation of soil, plants, or organic material, which are contaminated with fungal spores. Therefore, cutaneous sporotrichosis is also known as Rosebush or gardener's mycosis. Herein, we present a woman with cutaneous sporotrichosis acquired by a zoonotic transmission source in Brazil.

Case Synopsis

A 45-year-old woman presented to her physician with a large, painful, progressive inflammatory carbuncle on her upper right leg. She had no relevant medical history besides a vitamin B12 deficiency for which she took injections. One week before, the patient returned from a one-month visit in Brazil. During her visit she had been in close contact with

street cats. One of them had cutaneous skin lesions and was transferred on the patient's lap to a veterinary doctor. Initially, the ulcer was sampled using an Eswab (Copan Diagnostics, Murrietta, CA). She was given topical therapy with fusidic acid ointment and subsequently oral amoxicillin/clavulanic acid 500/125mg thrice daily but this did not result in any improvement and the patient was referred to the dermatology department.

Dermatological examination revealed a carbuncle on her right upper leg with ulceration and pus formation, surrounded by erythema (**Figure 1**). Our clinical differential diagnosis consisted of an atypical mycobacterial infection/tuberculosis, ecthyma, deep mycosis (blastomycosis, sporotrichosis), pyoderma gangrenosum, and dermatitis artefacta. A four mm skin punch biopsy was performed. Histopathology revealed a regularly differentiated hypergranulotic



Figure 1: Clinical picture: carbuncle on the right upper leg.

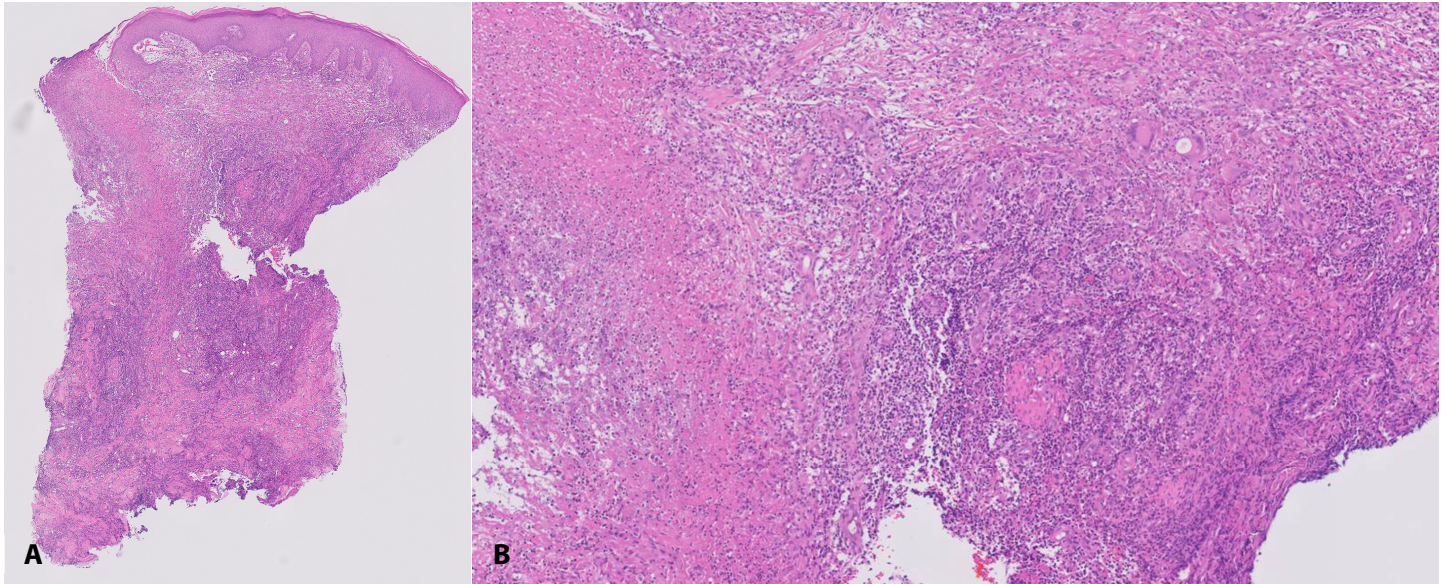


Figure 2: Biopsy histopathology: **A)** 20x magnification. Granulomatous dermatitis. **B)** 100x magnification with a good view of the necrotizing, ulceration inflammation and several multinucleated giant cells.

and hyperorthokeratotic epidermis. In the dermis, a deep ulcer with mixed inflammatory infiltrate and surrounding extensive granulomatous inflammation with presence of giant cells was observed; doubly refractile material was absent on polarization. Additional stains for micro-organisms (Gram, periodic acid Schiff-diastase, Ziehl-Neelson, Grocott) were all negative. The result was believed to be consistent with pyoderma gangrenosum or, less likely, ecthyma (**Figure 2**).

Bacterial culture from the original swab showed only commensal flora. The yeast culture, direct fungal fluorescent stain and dermatophyte PCR were negative. Fungal culture from the original swab, using Sabouraud at 28°C, was initially negative but became positive only after a prolonged period. Whole genome sequencing resulted in a *Sporothrix brasiliensis* detection. HIV serology was negative.

Treatment consisted of oral itraconazole 200mg once daily and the skin lesions disappeared after 6 weeks. Thereafter, this therapy was continued for another month.

Case Discussion

Sporothrix brasiliensis is a fungus which can cause sporotrichosis. It was first acknowledged by Benjamin Schenck in 1896 [1]. Since sporotrichosis is

not a reportable disease in most countries and exact incidence numbers are not known. After inoculation, symptoms can occur within days to a few months, with an average incubation time of three weeks [2]. Cutaneous sporotrichosis is observed in both men and women of all ages [1,2]. Transmission occurs through traumatic inoculation of soil, plants, or organic material, which are contaminated with fungal spores [1]. In these media it is found in a mycelium morphology. When it is transmitted to humans or animals it converts to the yeast morphology; the infectious condition is often described as Rosebush or gardener's mycosis [3]. Different strains occur and are especially seen in subtropical and tropical countries with high humidity, temperature around thirty degrees, and cellulose-rich soil [1,4]. *Sporothrix spp.* infection is mostly seen in the Americas (Mexico, Brazil, Uruguay, and Peru), Asia, and Africa. The clinical disease has a broad differential diagnosis (**Table 1**).

In Brazil infected cats may cause infections with *Sporothrix brasiliensis* [4]. In Rio de Janeiro, transmission by cats has been associated with an epidemic of sporotrichosis, which started at the end of the 1990s and has continued till this day [1]. Some authors say that only cats have the potential for zoonotic transmission because their lesions contain a large number of yeast cells. Some dogs also are

Table 1: Differential diagnosis of cutaneous sporotrichosis. Adapted from [8].

| Non-infectious causes | Infectious causes |
|------------------------|--|
| | Fungal |
| | Histoplasmosis |
| | Cryptococcus |
| | Blastomycosis |
| | Valley fever (<i>Coccidioides immitis</i> , <i>Coccidioides posadasii</i>) |
| | Bacterial |
| Pyoderma gangrenosum | Cutaneous anthrax (<i>Bacillus anthracis</i>) |
| Osteomyelitis | Pyodermatitis (<i>Staphylococcus</i> , <i>Streptococcus</i>) |
| Cutaneous sarcoidosis | Cutaneous tuberculosis |
| Sweet syndrome | Cat-scratch disease (<i>Bartonella henselae</i>) |
| Wegener granulomatosis | Syphilis (<i>Treponema pallidum</i>) |
| | Tularemia (<i>Francisella tularensis</i>) |
| | Non-tuberculous mycobacteria (<i>Mycobacterium avium</i> complex (MAC), <i>M. marinum</i> , <i>M. chelonae</i> and <i>M. ulcerans</i>) |
| | Cutaneous nocardiosis (<i>Nocardia brasiliensis</i>) |
| | Tertiary syphilis (<i>Treponema pallidum</i>) |
| | Parasitic |
| | Leishmaniasis (<i>Leishmania braziliensis</i>) |
| | Cutaneous amebiasis (<i>Entamoeba histolytica</i>) |

known to be affected with sporotrichosis, although they do not have the same zoonotic transmission potential [1]. Transmission from human-to-human is very rare.

The most common presentation (up to 80% of the cutaneous cases) is characterized by a nodule or ulcerative cutaneous plaque with surrounding erythema, such as in the present case. Later secondary lesions may appear in the proximal draining lymphatic regions. Mostly the ulcers or nodules appear on the extremities, because of the higher chance of traumatic inoculation on these body parts. Besides the lymphocutaneous presentation, other forms include fixed cutaneous, extracutaneous, systemic, or disseminated cutaneous forms [2,3]. Systemic involvement is rare and presentations include meningitis, sinusitis, pulmonary involvement, osteoarticular involvement, and ocular and central nervous system disease. Risk factors are a weakened immune system (in particular, HIV infection), chronic obstructive lung disease, alcohol abuse, and diabetes mellitus [1]. The present patient was not affected by these comorbidities.

In the present case, the results of the first culture swab from the referring practitioner were finally

positive, although it took two weeks to become clearly positive. It was considered negative at the time we evaluated patient in our dermatology department. In 3-5 days to two weeks the results of the fungal culture can usually be visible. To diagnose sporotrichosis and to identify the species, serological and molecular techniques can be helpful [5]. The golden standard for a diagnostic test is a fungal culture of a skin biopsy sample. In the present case, we did not send biopsy material to the microbiologist. It is possible that the simple swab sample in our patient took longer to become positive than a skin biopsy sample would have. Although initially all diagnostics to reveal infectious causes were negative, the granulomas in the histopathology triggered us to still think an infectious cause could not be ruled out. Fortunately, in the present case the simple swab was finally positive.

Zhang et al. showed that the sensitivity of culture of a biopsy, species-specific PCR, and multiplex real-time PCR to identify the *Sporothrix spp.* is 87.9%, 39.4%, and 93.9% in clinical samples, respectively. There was no significant difference between the culture and multiplex real-time PCR in positive detection rates [6]. Therefore, both skin biopsy

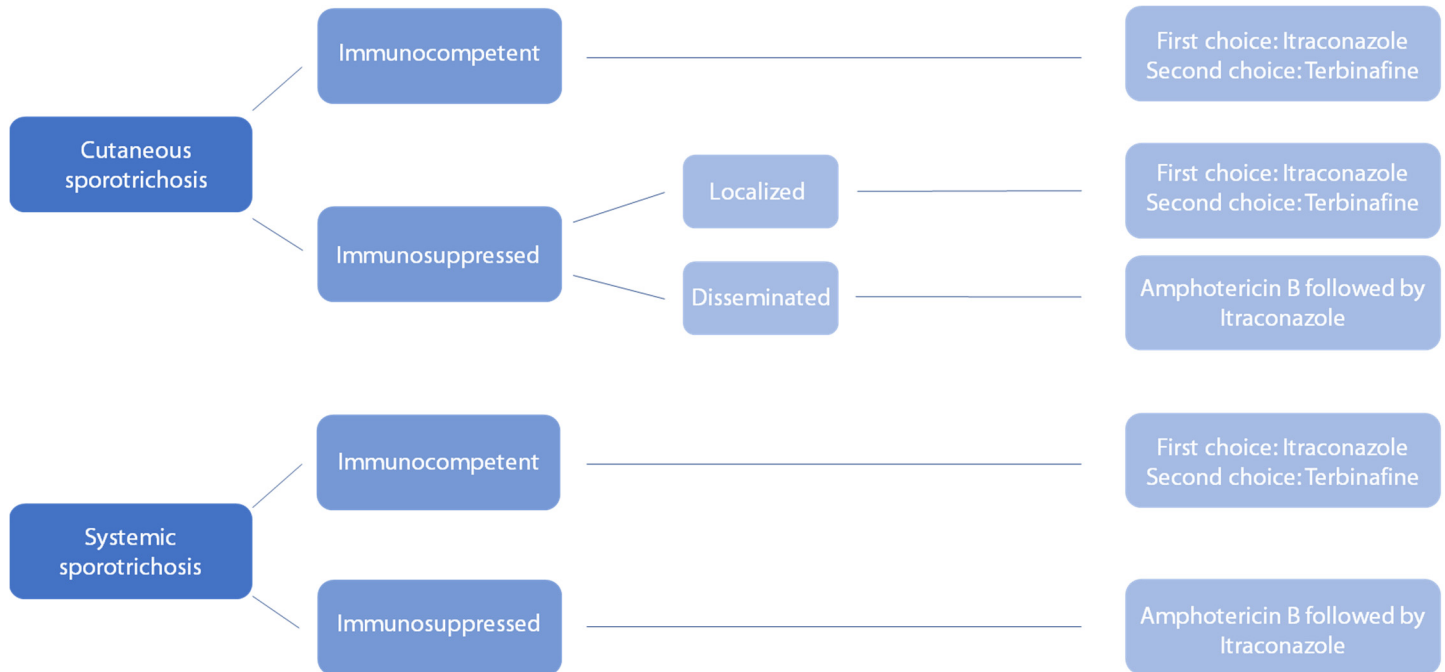


Figure 3: Algorithm for the treatment of sporotrichosis.

cultures and PCR may be used. In practice, cultures are more commonly performed because of cost and availability.

In positive cultures, filamentous hyaline cream-colored colonies develop a brown/black color in several weeks on Sabouraud agar with incubation at 25 degrees Celsius. In an enriched medium, such as brain heart infusion agar or blood agar, at 35 to 37 degrees Celsius the conversion from fungus to yeast is possible in 5 to 7 days, which aids the diagnosis. In the yeast phase a yellow-to-tan color with a creamy aspect can be observed [1,2]. *Sporothrix spp.* will grow with a temperature optimum around 30 to 37 degrees Celsius for the second plating. Above 40 degrees Celsius culture growth is prevented. Therefore, it is good to inform the microbiologist that sporotrichosis is in the differential diagnosis in order to perform cultures under the right conditions.

The first choice of treatment for cutaneous sporotrichosis is oral itraconazole, preferably in suspension form because of better absorption and biologic availability [7]. Dosage for the cutaneous forms is 100 to 200mg/day. In pulmonary forms a dose of 400mg/day is advised and for children less than 20kg a dose from 5 to 10mg/kg/day is recommended [2,7]. Treatment should be continued for minimally four to 6 weeks after remission to minimize relapse chances [2]. Cure rates up to 95%

with this treatment have been reported [1]. A treatment algorithm is provided in **Figure 3**.

In conclusion, the present case illustrates a patient with cutaneous *Sporothrix brasiliensis* infection derived from a Brazilian cat. *Sporothrix spp.* infection is the most common mycotic infection in Brazil. Although originally derived from plants and organic material this case illustrates it can be transmitted by infected cats. Whilst cutaneous sporotrichosis is very rare in Europe and North America, it has been an endemic problem the last decades in South America,



Figure 4. Brazilian cat with confirmed sporotrichosis in the nose region.

mainly in Brazil, where this infection is amongst the most common cutaneous mycotic infections in humans. The infection should be considered in recent travelers to endemic sites. Culture of a skin biopsy is the gold standard for determination. Treatment with oral itraconazole reaches up to 95% efficacy in patients with cutaneous sporotrichosis.

And finally, indeed the results of the veterinary test in Brazil returned positive as well after inquiry by the patient (**Figure 4**).

Potential conflicts of interest

The authors declare no conflicts of interest.

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