

Transmission of Coccidioidomycosis to a Human via a Cat Bite[∇]

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We report an unusual case of coccidioidomycosis in the arm of a veterinary assistant without pulmonary symptoms. The patient had been bitten on the hand by a cat which was later diagnosed with disseminated disease. The patient responded to fluconazole therapy and remained asymptomatic at 2 months after cessation of therapy.

CASE REPORT

A 37-year-old veterinary technical assistant presented to an emergency department within the Phoenix, AZ, metropolitan area, complaining of an initial right thumb swelling. The assistant had been bitten in the area that developed the swelling by a skinny, stray cat she was examining at an animal clinic approximately 2 weeks previously. The bite wound at first formed only a small eschar but then progressed to increased erythema, swelling, and tenderness. The patient had originally been started on doxycycline as an outpatient, but her symptoms continued to progress. The patient now presented with erythema involving her whole right hand and with tender erythematous streaking extending to her right axilla. She denied any other significant medical history, except for allergy to penicillin and to trimethoprim-sulfamethoxazole, manifested by severe rash.

Physical examination revealed an afebrile female in no acute distress; her heart rate and blood pressure were both within normal limits. Her lungs were clear according to auscultation. Her physical examination was remarkable only for erythema and swelling of the right hand, lymphangitis of the right upper extremity, extending from the hand to the axilla, and tender lymphadenopathy in the right axilla. She had a white cell count of $7.7 \times 10^3/\text{mm}^3$, a hemoglobin level of 11 g/dl, a platelet count of $218 \times 10^3/\text{mm}^3$, and a creatinine level of 0.9 mg/dl. She was admitted for further diagnostic workup.

The patient was taken to the operating room shortly after admission for evaluation by a hand surgeon. Magnetic resonance imaging studies showed no osteomyelitis of the right upper extremity. Exploratory surgery revealed extreme swelling of the right arm but minimal purulence. Separate tissue specimens representative of the inflamed area were submitted to the infectious diseases laboratory for bacterial, mycobacterial, and fungal cultures and staining and to histopathology for microscopic examination of stained preparations.

The initial stained preparations (Gram stain for bacteria, Kinyoun stain for mycobacteria, and calcofluor white stain for fungi) did not reveal any organisms. Histopathology showed only superficial and deep perivascular dermatitis with mixed inflammatory cells, including scattered eosinophils. Granulomatous inflammation was absent. The patient was started on vancomycin (1 g administered intravenously every 12 h) and ceftriaxone (2 g administered intravenously daily) immediately after surgery.

The patient's condition did not improve with therapy, and tenderness, swelling, and erythema of the right hand continued to progress. The patient was taken back to surgery, but only the same atypical swelling was noted. Bacterial and mycobacterial cultures from the first surgery did not isolate any bacteria, but a waxy mold morphologically resembling a *Coccidioides* species was recognized on the fifth day after submission of the tissue specimens. The isolate was identified the next day as a *Coccidioides* sp. by using a genus-specific ribosomal probe (Accuprobe; GenProbe, San Diego, CA) directly on the isolate. Two separate tissue specimens yielded the same isolate.

The antibacterial antibiotics were discontinued, and the patient was started on fluconazole (400 mg daily). The patient's condition improved dramatically, and she was discharged from the hospital on the sixth day postadmission. Serum enzyme immunoassay serology results for *Coccidioides* immunoglobulin M and G antibodies were negative at discharge and at 6 weeks. The patient remained symptom free and was taken off fluconazole therapy after 2 months.

On history, the cat had died shortly after having bitten the patient. A necropsy was performed, and splenic masses were evaluated by histopathology. The veterinary pathologist noted numerous "pyogranulomas" with massive numbers of spherules present. The final diagnosis was multifocal granulomatous splenitis and disseminated disease, with *Coccidioides* spp. as the etiologic organisms. No additional studies were performed with the cat.

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Coccidioidomycosis results from infection by fungus species endemic in the arid areas of the southwestern United States, as well as parts of Mexico and South America (3, 9). The etiologic

agents are now considered two separate species in the genus *Coccidioides*, *Coccidioides immitis* (previously, the California strains) and *Coccidioides posadasii* (previously, the non-California strains) (2). The two species are difficult to separate phenotypically. Both species are dimorphic in that they produce mycelia with interspersed heavy-walled arthroconidia in the environment (soil) and in cultures and round, variably sized, structures called spherules with endospores in animal host tissue.

Infection is most commonly acquired via inhalation of the easily aerosolized arthroconidia, although traumatic percutaneous implantation can occur rarely (12). Transmission of coccidioidomycosis to humans from inanimate objects has been reported in a limited number of cases (11). Fomites implicated in transmission have included bales of cotton, hay, grain, fruit, animal products, and Native American relics originating in areas where *Coccidioides* spp. are endemic. Except in rare cases, coccidioidomycosis is not thought to spread from person to person in its tissue spherule-endospore phase (5). There have been only a few reports of transmission of coccidioidomycosis by tissue transplantation to recipients from donors harboring the organism and one report of intrauterine transmission during pregnancy (1, 6).

Coccidioides spp. may infect a wide variety of mammals (dogs, cats, cattle, sheep, swine, equine animals, armadillos, sea lions, and dolphins), as well as some reptiles, although they have not been shown to infect birds (6, 10). Transmission of coccidioidomycosis from animals to humans has almost never been reported. There was a single report of possible acquisition of coccidioidomycosis via inhalation of tissue-phase organisms due to manipulation and aerosolization of endospores during necropsy of a horse with disseminated disease (4). To our knowledge, there have been no reports of transmission of coccidioidomycosis directly from nonhumans to humans via bites, and in a recent review of the microbiology of animal bites, *Coccidioides* spp. were not listed (7). Our case seems to be unique in the mode of transmission of coccidioidomycosis

from a cat to a human. As endospores have been shown to be as virulent as arthroconidia in animal experiments, we postulate that transmission occurred through the bite of the cat with a documented florid disseminated disease which probably had spherules and/or endospores present in its saliva or other oral or respiratory secretions (8).

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