

Sporotrichosis

Rose Handler's Disease

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**Institute for International
Cooperation in Animal Biologies**
An OIE Collaborating Center
Iowa State University
College of Veterinary Medicine



**Center for Food
Security and Public Health**
College of Veterinary Medicine
Iowa State University
Ames, Iowa 50011
Phone: (515) 294-7189
FAX: (515) 294-8259
E-mail: cfsph@iastate.edu
Web: <http://www.cfsph.iastate.edu>

Etiology

Sporotrichosis is caused by *Sporothrix schenckii*, a dimorphic fungus in the family *Ophiostomataceae*. *S. schenckii* is a yeast in tissues or in culture at 37°C, but grows as a filamentous mold at room temperature culture or in the environment.

Geographic Distribution

S. schenckii can be found worldwide. Sporotrichosis is particularly common in the tropics, where high humidity and temperatures promote fungal growth. In the U.S., this disease is seen most often in the southern coastal regions and Missouri and Mississippi river valleys.

Transmission

S. schenckii is present in soil, wood, and plants. It grows particularly well in soils rich in organic material. In warm environments with high humidity, it can also grow in plants and tree bark. Most cases of sporotrichosis are acquired from the environment, as a result of contact between broken skin and fungal spores. Penetrating wounds from dead vegetation and other items such as wood splinters, sphagnum moss, thorns, or hay are most likely to become infected. Bites, scratches, pecks, and stings from a variety of animals, birds, and insects can also inoculate the organism into wounds, via spores carried on the surface of the body. Rarely, inhalation can result in a pulmonary form of the disease.

Sporotrichosis can also be transmitted from infected animals. In cats, skin lesions contain large numbers of organisms, which can be transmitted through cuts and abrasions. *S. schenckii* from cats may also be able to enter the body through intact or minimally damaged skin; zoonotic cases have been reported in people with no history of trauma at the inoculation site. In addition, the organisms can be found in the mouth and nasal cavity and on the nails of infected cats, facilitating transmission in bites and scratches. They also occur in the feces. Species other than cats can also spread sporotrichosis; however, the organisms are very sparse and transmission is much less likely. One case of person-to-person transmission, which occurred after frequent, close contact between a mother and her child, has been reported.

Laboratory-acquired infections can result from direct contact with *S. schenckii* in fungal cultures or tissues.

Disinfection

Sporothrix schenckii is susceptible to a variety of disinfectants including 1% sodium hypochlorite, glutaraldehyde, iodine, phenolics, and formaldehyde. Its susceptibility to 70% ethanol is questionable. In addition, this organism can be inactivated by moist heat (121°C for 15 minutes or longer).

S. schenckii survives readily outside the host. It may be found for months or years in soil, vegetation, wood, and other objects in the environment.

Infections in Humans

Incubation Period

In humans, the incubation period is 1 week to 3 months. Most infections become apparent in approximately 3 weeks.

Clinical Signs

Cutaneous forms

In humans, the most common form of sporotrichosis is the lymphocutaneous form. In this form, one or more papules appear first at the site of inoculation. These lesions can occur on any part of the body but often involve the extremities, particularly the hand or arm. The papules develop into pustules and then into slowly expanding subcutaneous nodules. The infection spreads along the lymphatics, forming a chain of subcutaneous nodules. The affected lymphatic vessels also become firm, thickened, and cordlike. As the infection progresses, the nodules become necrotic, ulcerate, and may produce gray or yellowish pustular exudate. They are not tender unless secondary bacterial infection occurs.

A fixed cutaneous form of sporotrichosis also occurs in humans. It is usually seen in geographic areas where sporotrichosis is endemic and people have a high degree of immunity. In this form, the skin lesions remain localized to one site and do not spread via the lymphatics. Most often, the lesions of the cutaneous form are found on the hands of adults and the faces of children.

General health is not usually affected in the lymphocutaneous and fixed cutaneous forms. Untreated nodules can persist for months to years; while some authors feel that they never resolve, others suggest that some do. Asymptomatic infections may occur in some people who work with plants.

Disseminated sporotrichosis and pulmonary sporotrichosis

Two rare and potentially fatal forms, pulmonary and disseminated sporotrichosis, are also seen in humans. Disseminated disease most often affects the bones and joints, but many other organs including the mouth, nose, eyes, meninges, kidneys, liver, spleen, intestines, genitalia, or large areas of skin/ subcutaneous tissues can also be involved. In some cases, *S. schenckii* disseminates from cutaneous lesions; in others, disseminated disease occurs without cutaneous signs.

Pulmonary sporotrichosis is caused by inhalation of the fungus. This form of sporotrichosis may be acute, but it is more often chronic and resembles tuberculosis. The symptoms may include cough, expectoration, dyspnea, pleuritic pain, hemoptysis, weight loss, and fatigue. The temperature may be slightly elevated.

Communicability

Open lesions contain organisms that could theoretically be transmitted to other people or animals; however, very few organisms are found in human lesions and only one case of person-to-person transmission has been reported. In the single documented case, the organism was transmitted from a lesion on a mother's arm to her child's face after frequent close contact.

Diagnostic Tests

In humans, sporotrichosis can be confirmed by fungal culture, direct visual observation of the organisms in lesions, or serology.

S. schenckii can be cultured from sterile biopsies of lesions or from exudates. Sabouraud's dextrose agar, brain-heart infusion agar, or Emmon's glucose-neopeptone agar can be used. On Sabouraud's agar at room temperature, the mold colonies are initially off-white to black and become wrinkled and fuzzy. On blood agar at 37°C degrees, the yeast colonies are smooth and whitish. Culture takes approximately 1 to 3 weeks. Sporotrichosis can also be diagnosed by animal inoculation into mice or rats.

In humans, *S. schenckii* is very difficult to detect in lesions using conventional staining methods. Immunofluorescent staining can occasionally find the organisms in biopsy samples, exudates, smears from sputum, or bronchial

lavage. *S. schenckii* is a 1-2 µm x 3-8 µm, pleomorphic, round to cigar-shaped yeast in tissues. With conventional stains, it must be differentiated from other yeasts such as *Candida* spp, *Histoplasma capsulatum*, and *Trichosporon* spp. as well as the protozoan parasite *Leishmania*.

Serologic tests used in humans include latex agglutination, immunodiffusion, and indirect immunofluorescence. Serology is more helpful in disseminated disease than in the cutaneous forms. Antibodies are not always reliably present.

Treatment

Sporotrichosis is treated with antifungal drugs including itraconazole, ketoconazole, saperconazole, amphotericin B, and flucytosine. Potassium and sodium iodide are also used for the cutaneous and lymphocutaneous forms.

Lymphocutaneous and cutaneous sporotrichosis almost always respond to treatment. Disseminated disease is more difficult to cure and requires long-term treatment. Debridement and repair may be necessary if the joints are involved. Lifelong therapy may be required in people with AIDS, to prevent recurrence. The pulmonary form is difficult to treat and, in addition to drugs, surgical resection may be attempted.

Prevention

Gloves should be worn while handling or treating affected animals, particularly cats. After the gloves are removed, the hands should be washed thoroughly and disinfected with chlorhexidine, povidone iodine, or another solution with antifungal activity.

Protective clothing such as gloves, long-sleeved shirts, and long pants can decrease the risk of infection when working with rose bushes, hay bales, wires, conifer seedlings, or other plant material that can puncture the skin. Skin contact with sphagnum moss should also be avoided, as this material has been implicated in several outbreaks of sporotrichosis.

Morbidity and Mortality

Most cases of sporotrichosis occur in people who work with plants or contact infected cats. Most human cases are sporadic but outbreaks have also been described. Some outbreaks have been linked to contaminated sphagnum moss, hay, or wood. A zoonotic outbreak affecting approximately 500 people was associated with a feline epizootic in Rio de Janeiro, Brazil in 2002 and 2003.

The most common form of sporotrichosis in humans, the lymphocutaneous form, usually remains localized to the skin and is rarely life threatening. However, scarring, disfigurement, and bacterial superinfections are possible. There is also a slight risk that the disease might become disseminated or bacterial superinfections might cause sepsis.

Disseminated sporotrichosis is a serious, potentially life-threatening disease with a grave prognosis. This form of sporotrichosis is rare; in one outbreak, it developed in only 5 of 3000 infected miners. Disseminated sporotrichosis appears to be more common in people with underlying conditions such as alcoholism, diabetes, cancer, or immunosup-

pression. Nevertheless, dissemination is uncommon even in AIDS patients.

Pulmonary sporotrichosis is also rare. This disease tends to occur in people with preexisting lung diseases or alcoholism. It has not, to date, been reported as a zoonosis. Pulmonary sporotrichosis can be chronic and fatal, and responds poorly to treatment.

Infections in Animals

Species Affected

Sporotrichosis occurs most often in horses. Cases have also been seen in cats, dogs, rodents, cattle, goats, swine, mules, camels, non-human primates, birds, and various wild animals including foxes, dolphins, and armadillos. Experimental infections have been established in many species including mice, rats, hamsters, guinea pigs, rabbits, cats, dogs, and monkeys.

Incubation Period

The incubation period in animals is probably similar to that of humans, occurring within 1 week to 3 months.

In experimentally infected mice and hamsters, erythema and swelling appear within a week of inoculation. Small nodular lesions first become visible in approximately one week but become more apparent over the next few weeks.

Clinical Signs

Three forms of sporotrichosis –lymphocutaneous, cutaneous, and disseminated – are recognized in animals. In the lymphocutaneous (cutaneous-lymphatic) form, one or more firm round nodules occur first at the site of inoculation, and then spread along the lymphatics as a chain of nodules. The nodules and regional lymph nodes may ulcerate and drain purulent or serohemorrhagic exudate, and the lymphatics may become thickened, hard, and cordlike. Systemic illness is usually absent at first, but animals with chronic sporotrichosis may be febrile, depressed, and anorexic. Similar lesions occur in the cutaneous form, but they remain localized to one area. The cutaneous and lymphocutaneous forms may eventually disseminate to various deep tissues including the lung, bone, liver, spleen, kidneys, testes, gastrointestinal tract, and central nervous system. Some species differences have been noted.

Equidae

In horses and mules, sporotrichosis occurs most often on the lower limbs, particularly the fetlocks. The lymphocutaneous form is most common. The nodules may ulcerate and drain small amounts of exudate. They may also crust or form scabs, and can develop alopecic scars after healing. The lymphatics can become hard, swollen, and cordlike, and the affected limb may swell due to lymphatic stasis. The regional lymph nodes are rarely involved in horses, and disseminated disease has not been reported.

Cats

In cats, sporotrichosis varies from an asymptomatic infection to a fatal disseminated systemic disease. The initial lesions can be found anywhere but often develop on the distal extremities, base of the tail, or head. They begin as small, draining puncture wounds but eventually become nodular. These nodules may ulcerate or suppurate. Some ulcers may cavitate, exposing large areas of underlying muscle and bone. Although *S. schenckii* can spread along the lymphatics in cats, these vessels may not be obviously involved. Cats also spread the organisms to other parts of the body by grooming. Weight loss, anorexia, fever, depression, and dyspnea can occur if the lesions are extensive. In addition, the organisms can disseminate into the internal organs. Generalized or disseminated disease can be fatal.

Dogs

In dogs, sporotrichosis is typically a multinodular disease; the nodules resemble those seen in other species. The lesions often occur on trunk and head but may also be present on the limbs. Cording of lymphatics may be seen. In some cases, the lesions are found in the bones, liver, or lungs rather than the skin.

Communicability

Sporotrichosis in cats is a contagious disease; the skin lesions usually contain large numbers of organisms. *S. schenckii* can also be found in the mouth, nasal cavity, feces, and nails of infected cats. Shedding of organisms into the environment could theoretically increase the risk of pulmonary or disseminated disease in immunocompromised human companions.

In other animal species, the lesions contain few organisms; nevertheless, all discharging lesions should be considered contagious.

Diagnostic Tests

In animals, sporotrichosis can be diagnosed by fungal culture or direct visual observation of the organisms in lesions or exudates.

S. schenckii can be grown on Sabouraud's dextrose agar, brain-heart infusion agar, or Emmon's glucose-neopeptone agar. On Sabouraud's agar at room temperature, the fungal colonies are initially off-white to black and become wrinkled and fuzzy. On blood agar at 37°C degrees, the yeast colonies are smooth and whitish. Culture takes approximately 1 to 3 weeks. Sporotrichosis can also be diagnosed by animal inoculation into mice or rats.

Cytology sometimes reveals the characteristic organisms in exudates and skin or tissue biopsies. In most species including dogs and horses, *S. schenckii* is present in very small numbers and is difficult to detect with conventional staining methods. Immunofluorescent staining may be helpful but is not always successful. In cats, the yeasts are usually abundant in lesions and can be readily found with hematoxylin and eosin, or Wright's stain. In tissues, *S. schenckii* is a

1-2 μm x 3-8 μm , pleomorphic, round to cigar-shaped yeast. With conventional staining methods, this organism must be differentiated from other yeasts such as *Candida* spp, *Histoplasma capsulatum*, and *Trichosporon* spp. as well as the protozoan parasite *Leishmania*.

Treatment

Various antifungal drugs including ketoconazole, itraconazole, and amphotericin B have been used to treat sporotrichosis in animals. Potassium or sodium iodide can be used in the cutaneous or lymphocutaneous forms. Cats are particularly sensitive to iodine and must be watched carefully for signs of toxicity when using these two drugs. In horses, single nodules are sometimes removed surgically.

Prevention

In animals, there is no practical way to prevent infections acquired from the environment. Infected animals, particularly cats, should be isolated to prevent the organism from spreading. Keeping cats indoors during feline epidemics can reduce the risk of infection; cat fights and other feline behaviors have been implicated in the spread of the disease.

Morbidity and Mortality

Sporotrichosis is most common in horses, less common in cats, and uncommon in dogs. In cats, it occurs most often in sexually intact males allowed to roam; however, cases have also been reported in indoor cats exposed only to houseplants and potting soil. Among dogs, this disease is seen most often in hunting dogs or other dogs frequently exposed to thorns and splinters. Most cases of sporotrichosis in animals are sporadic; however, an epidemic affecting more than a thousand cats was reported in Rio de Janeiro, Brazil in 2002/2003. Frequent cat fights and other feline behaviors are thought to have helped the organism spread in this epidemic. There was no association with FIV or FeLV-mediated immunosuppression.

The risk of dissemination and fatal disease varies with the species. In horses, sporotrichosis is rarely fatal and disseminated disease has not been reported. In contrast, approximately half of all experimentally infected cats develop disseminated disease. Disseminated sporotrichosis is usually fatal without treatment.

Post-Mortem Lesions

Granulomatous nodules are seen in the skin, and may occur in chains along lymphatic vessels. Exudation, ulceration, cavitation, crusting, scabbing, or scarring can occur. The lymphatics may be thickened and cordlike, and affected limbs may be edematous.

In cats, the initial histologic lesion is perivascular dermatitis. Later, there is diffuse or nodular dermatitis; it may be suppurative, pyogranulomatous, or granulomatous. Intraepidermal microabscesses and pseudocarcinomatous epidermal hyperplasia may also be seen. Numerous yeasts are found in the lesions in cats but not in other species. In addition, most necropsies in affected cats reveal evidence of lymph node

and lymphatic involvement. In cats with disseminated disease, small numbers of organisms may be found in internal organs.

Internet Resources

- Centers for Disease Control and Prevention (CDC)
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/sporotrichosis_g.htm
- Material Safety Data Sheets – Public Health Agency of Canada, Office of Laboratory Security
<http://www.phac-aspc.gc.ca/msds-ftss/index.html>
- Medical Microbiology
<http://www.gsbs.utmb.edu/microbook>
- The Merck Manual
<http://www.merck.com/pubs/mmanual/>
- The Merck Veterinary Manual
<http://www.merckvetmanual.com/mvm/index.jsp>

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