



# Canine Sporotrichosis: Clinic, Epidemiology, Diagnosis and Treatment

Vanderson Ângelo Zager, Laís Araújo dos Santos, Ana Clara Santana Malegoni, Laíz Zaché Roque, Tayná Bolsam da Silva, Fabíola Bigati Risso, Jéssica Miranda Cota, Clairton Marcolongo Pereira\*

Faculty of Veterinary Medicine, Centro Universitário do Espírito Santo (UNESC), Colatina, Brazil  
Email: \*clairton.marcolongo@terra.com.br

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## Abstract

Sporotrichosis is an infectious disease caused by fungi belonging to the genus *Sporotrix*. In dogs the disease is uncommon, and the infection occurs through lesions caused by vegetation that is contaminated with fungi or when in contact with contaminated cats, by scratching, biting or exudates from the lesions. Thus, the objectives of the present study were to describe the epidemiological, clinical, laboratory and therapeutic aspects of canine sporotrichosis.

## Subject Areas

Veterinary Medicine

## Keywords

Sporotrichosis, Dogs, Dermatopathy, Diagnosis

## 1. Introduction

Sporotrichosis is an infectious disease caused by fungi belonging to the genus *Sporotrix*. The disease affects humans and animals, being described in several species, including felines, canines, horses, pigs, cattle, camels, and primates [1].

Sporotrichosis was initially described by Schenck in 1898, in the United States of America (USA), in a 36-year-old human patient with an abscess in the finger and nodular lymphangitis in the forearm. The isolated fungus was studied by the mycologist Erwin F. Smith, who concluded that it belongs to the genus *Sporotrichum* [2]. However, it was only in 1962, by morphological differentiation, that Carmichael determined that the correct agent nomenclature was *Sporothrix chenckii*, and in 2007, after phenotypic and genotypic analysis of several isolates

obtained in different countries, a division of the agent *Sporothrix chenckii* was proposed in a complex, composed of different pathogenic species [3] [4].

Canine sporotrichosis is an uncommon disease and current knowledge is derived from a few case reports and case series [5]. Some canine cases have been documented in Italy [6], the USA [7], and Brazil [8] [9]. Thus, the objectives of the present study were to describe the epidemiological, clinical, laboratory and therapeutic aspects of canine sporotrichosis.

## 2. Etiology and Epidemiology

The species of the *Sporothrix chenckii* complex belong to the Fungi Kingdom, Ascomycota Division, Class Pyrenomycetes, Order Ophiostomatales, Family Ophiostomataceae [10]. They are dimorphic fungi, which in the saprophyte phase, at 25°C have filamentous colonies and in parasitism at 35°C - 37°C they present colonies in the form of oval single-celled yeasts [11]. The *Sporothrix chenckii* complex is composed of six species: *S. chenckii sensu strictu*, *S. globosa*, *S. brasiliensis*, *S. mexicana*, *S. luriei* [4].

Several factors have been associated with the development of sporotrichosis in humans and animals: 1) the ability of fungi of the genus *Sporothrix* to support and grow at the body temperature of the hosts (thermotolerance); 2) activity of several proteolytic enzymes that facilitate the adhesion and penetration of fungi in the cells and tissues of the host; 3) alkalization of the microenvironment; 4) ability to adhere to endothelial and epithelial cells, as well as to the components of the extracellular matrix; 5) production of ergosterol peroxide; and 6) production of melanin [11] [12].

Fungi of the genus *Sporothrix* live in the soil, along plant edges and in regions with favorable climatic conditions, such as regions of temperate and humid tropical climates [13]. Infection can occur through injuries caused by vegetation that are contaminated with fungi or when in contact with contaminated cats, by scratching, biting or exudates from the lesions. Infection by cats is the most common form of transmission of sporotrichosis to dogs. The disease can affect animals of all ages and usually occurs as isolated cases [8].

In Brazil, cases of canine sporotrichosis are more frequent in the southeastern region of the country, mainly in the city of Rio de Janeiro associated with feline sporotrichosis. The disease in cats is considered epidemic in Rio de Janeiro [14].

## 3. Clinical and Laboratory Findings

Canines infected with fungi of the genus *Sporothrix* usually have ulcerated or nodular skin lesions, which can drain purulent or seropurulent material. The lesions are usually located on the head, ear, chest, and limb, but any region of the body can be affected [8].

A rare and widespread form of osteoarticular sporotrichosis has been mentioned in the literature [8].

In addition to cutaneous signs, some animals may also present systemic clini-

cal signs such as: lethargy, immunosuppression, depression, prostration, hypertension, anorexia, vomiting, weight loss, dyspnea, nasal discharge, generalized lymphadenomegaly and sneezing [1] [8] [9].

The main laboratory changes in dogs with sporotrichosis are shown in **Figure 1** [8] [15].

In general, no changes in the biochemical profile and urinalysis of dogs with sporotrichosis are observed [15].

#### 4. Diagnostic

The diagnosis of sporotrichosis is usually made by isolating *Sporothrix* spp. from aspirated material, swabs or biopsy specimens obtained from active lesions. Occasionally, the diagnosis is obtained by the demonstration of suggestive fungal elements in cytological or histological sections [8] [16].

Cytologic findings are usually low, and it can be observed degenerate neutrophils, macrophages, small mature lymphocytes, and eosinophils. Low numbers of intracellular (within neutrophils and macrophages) and extracellular, pleomorphic, cigar-to-ovoid shaped organisms (approximately  $3 \times 9 \mu\text{m}$ ) consistent with *Sporothrix* may be observed [17].

Histologic examination may reveal foci of granulomatous inflammation and rare pleomorphic PAS-staining organisms [18].

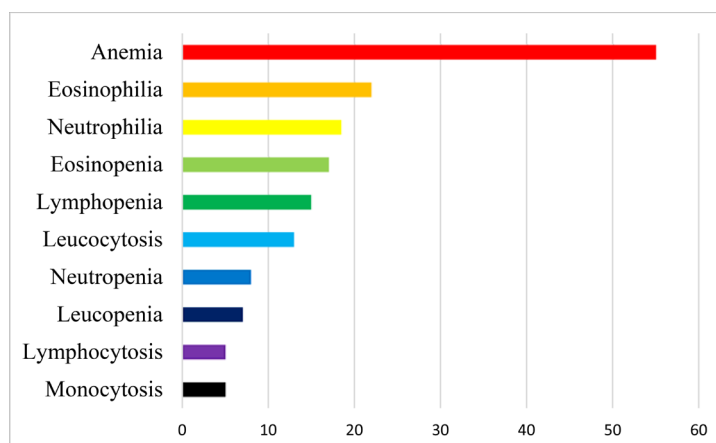
Immunohistochemistry, ELISA and PCR can also be used as an auxiliary method for the diagnosis of sporotrichosis in dogs. [19] [20] [21].

#### 5. Diferencial Diagnoses

*Cryptococcus neoformans*, *Histoplasma capsulatum*, *Leishmania* spp., *Toxoplasma gondii*, *Neospora caninum*, *Sarcocystis* spp. and *Blastomyces dermatitidis* are the main differential diagnoses of canine sporotrichosis [22] [23].

#### 6. Treatment and Control

The treatment and its duration are individual in terms of the severity of the



**Figure 1.** Frequency of haematological abnormalities [8] [15].

lesions and the patient's response to it, so it is necessary to be uninterrupted so that there is no recurrence of the condition [24].

Azole antifungals are used, in this case imidazoles (miconazole and clotrimazole) and triazoles (itraconazole and fluconazole), sodium and potassium iodides 20%, terbinafine, amphotericin B, local thermotherapy and surgical removal of lesions [25]. Itraconazole is the antifungal agent of choice for treatment, and it is considered superior in comparison to other antifungal drugs, and it is very often used in both cases of human involvement and in animals. Itraconazole therapy is carried out for a period of 60 days and should be maintained for approximately 30 days after clinical healing [4] [26]. Treatment is considered effective and can be completed only when the lesions are fully healed, and the results of the fungal cultures are negative [27].

For the control, awareness and understanding of the tutors about the disease, emphasizing the fact that this is an important zoonosis are necessary. Special care must also be taken, such as the use of gloves for handling animals that have suspected, confirmed lesions, and are undergoing treatment for sporotrichosis. Still, through research it is indicated to perform the castration of male dogs, reducing fights, exits, demarcation of territory, which would considerably minimize the risk of infection [28].

## 7. Conclusion

In contrast to sporotrichosis involving cats, sporotrichosis in dogs is considered to be of minimal zoonotic importance. Nevertheless, in regions where feline sporotrichosis is epidemic dogs with skin lesions should be treated carefully due to the risks of contamination. Moreover, infection with *Sporothrix* spp. should be considered in dogs with persistent cutaneous or subcutaneous nodular lesions, especially if they fail to respond to treatment. A history of exposure to environments or catfight should raise the index of suspicion. Azole antifungals are the drugs of choice for the treatment of the disease.

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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