



Clinical Report

Zoonotic transmission of canine sporotrichosis in northeastern Brazil

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ABSTRACT

Sporotrichosis is a subcutaneous mycosis, caused by the fungal complex *Sporothrix schenckii*, and composed of several species of the genus. Although diseased dogs show the minimal risk of infection to humans, such susceptibility is non-null and, therefore, should be considered. In the Northeast of Brazil, such mycosis has been reported in dogs but its role in local public health is still unknown. The objective of this study was to report the occurrence of canine sporotrichosis with transference capacity to humans, pointing a case in a Brazilian northeastern city. An 11-year-old male dachshund dog presenting skin lesions for two months. The dog was autochthonous to the city of Natal. The animal was referred for physical evaluation. Subcutaneous nodules were detected in the nasal and ventral-cervical regions. An incisional biopsy of the lesions was performed, subjecting the samples to histopathology. Itraconazole (10 mg/ kg, orally, every 24 hours) was prescribed. After a few days under physical evaluation, the guardian of the animal noticed alterations in the integument of her left upper limb. A clinical laboratory examination by a dermatologist detected sporotrichosis condition, being the animal caregiver submitted to a specialized therapy. The dermato-histopathology of the canine revealed the presence of *Sporothrix* spp., thus confirming the diagnosis of sporotrichosis. After the histopathological examination, itraconazole therapy was continued, achieving a complete lesion regression after 120 days. In dogs infected with the *S. schenckii* complex, transmission to humans should be considered regardless of the affected animal species, once sporotrichosis is an anthropozoonosis.

INTRODUCTION

Sporotrichosis is a cutaneous and subcutaneous dermatophytosis affecting humans and animals worldwide; it can also evolve to deep infections involving lymphatic vessels, fascia, muscles, cartilage, and bones (CHAKRABARTI et al., 2015). This disease has gained increasing importance and receiving the most attention over the years because of an emerging group of species able to trigger a pathological condition in the host species (RODRIGUES et al., 2016), added to changes in epidemiology, pathogen distribution and taxonomic evolution has unleashed several outbreaks in the last

two decades (CHAKRABARTI et al., 2015).

Initially, it was believed that sporotrichosis had only one causative agent, the *Sporothrix schenckii*. However, nowadays, the term "*S. schenckii* fungal complex" has been used routinely and precisely since phylogenetic analyses, which were based on genetic sequencing, morphology, physiology, and nutrition of the fungus, showed the existence of distinct species within this genus *Sporothrix*, corresponding to *S. schenckii*, *S. albicans*, *S. mexicana*, *S. luriei*, *S. globose*, and *S. brasiliensis*, among which some have already been reported in Brazil (CRUZ, 2013; GUTERRES et al., 2014;

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LÓPEZ-ROMERO et al., 2011; RODRIGUES; DE HOOG; DE CAMARGO, 2013). A high prevalence of *S. brasiliensis*, which is the most virulent species of the complex and is geographically restricted to that country, has been reported in cats (FERNANDES et al., 2013; RODRIGUES et al., 2013; RODRIGUES; DE HOOG; DE CAMARGO, 2013; RODRIGUES et al., 2014; ZHOU et al., 2014). In Brazil, this disease has become a key zoonosis, with domestic cats being the main source of infection to humans and other animals (RODRIGUES; DE HOOG; DE CAMARGO, 2013). Nevertheless, the number of cases in dogs has increased in some Brazilian regions, with the cutaneous form being the most common (MARTINS, 2012).

Sporotrichosis is highly transmissible from cats to humans if compared to other species; it is due to a high amount of tissue microorganisms with higher zoonotic capacity (CHOMEL, 2014). For dogs, transmission to humans is rare because of being an uncommon disease and showing small amounts of the microorganism in animal tissues and secretions (FILGUEIRA, 2009). In Northeastern Brazil, such mycosis case has been already reported in dogs but with unawareness of its importance

to public health (FILGUEIRA, 2009). In this sense, this study aimed to describe the sporotrichosis in canine species with zoonotic transmissibility, reporting a case in the Northeast of Brazil.

CASE REPORT

An 11-year-old male dachshund dog was assisted at a private veterinary clinic in the city of Natal, Rio Grande do Norte, Brazil. According to the caregiver, the animal had lesions on the right antimer of the face, with a two-month progress. A local bite of an unrestricted cat was suspected. The dog used to have sporadic access to the extra-household environment but with no contacts and no history of past skin diseases.

During clinical examination, the patient presented good general conditions, with normal vital parameters. However, nodules were noticed on the face, which merged forming ulcerated surface plaques and hemorrhagic crusts. The lesions extended across the nasal bridge and towards the right ventral cervical region (Figure 1).

Figure 1 – A and B: Skin lesions on nasal and on cervical areas, respectively.



Source: Author's collection.

A priori, leishmaniasis serology was requested as a complementary examination. This was carried out by immuno-enzymatic and indirect immunofluorescence assays (as a preventive measure), as such disease is endemic in dogs from Northeastern Brazil. The serological results were non-reactive by both techniques. Then, lesion cytology was performed by non-aspirating puncture using a fine needle. An inflammatory process was identified with a marked presence of macrophages and giant epithelioid cells, in addition to numerous neutrophils. Furthermore, no infectious agents or

neoplasia signs were observed. An incisional biopsy of the lesions was chosen, and samples directed to histopathological examination, using a routine staining (hematoxylin-eosin - HE) and histochemical techniques by periodic acid-Schiff (PAS) and Grocott's methenamine-silver nitrate (GMS), for the identification of fungal structures. The presumptive diagnosis of deep mycosis was established. Therefore, itraconazole was then orally administered at a dose of 10 mg/ kg, every 12 hours, until dermatohistopatology results.

Ten days after the treatment, the patient returned. Treatment response was satisfactory, which reinforced the suspicion of dermatomycosis. At the time, an ulcerated lesion with erythematous borders was observed on the caregiver's forearm, which was associated to a regional lymphadenomegaly, showing a fast progress in three days (Figure 2). When asked about the handling, the dog's owner reported that she had direct contact with the animal without using any personal protective equipment, such as procedure gloves.

Figure 2 – Skin lesion on the caregiver's forearm after zoonotic transmission. The circle highlights the regional lymphadenomegaly.



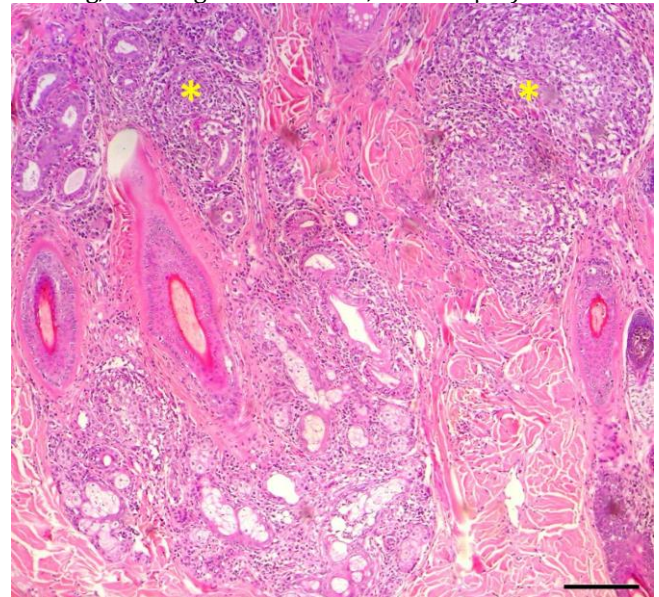
Source: Author's collection.

The dog's caregiver was referred to an infectious disease physician, who diagnosed sporotrichosis by means of serology (by detection of IgG for SsCBF antigen from *S. schenckii* cell wall), associated with a clinical examination. Once the diagnosis was confirmed, the woman was submitted to therapy with amphotericin B (0.3 mg/ kg, by slow intravenous infusion during at least two hours, every 24 hours, for one month) and with itraconazole (100 mg/ day, orally, for three months), showing then a complete lesion regression. After the therapy termination, there was no report of the affection recurrence.

The histopathological examination of the dog cutaneous tissue revealed a nodular pyogranulomatous inflammatory infiltrate of the dermis, affecting perianexial structures (Figure 3). Pyogranulomas showed neutrophils interspersed with a lot of epithelioid macrophages. The lymphoplasmocytic inflammatory

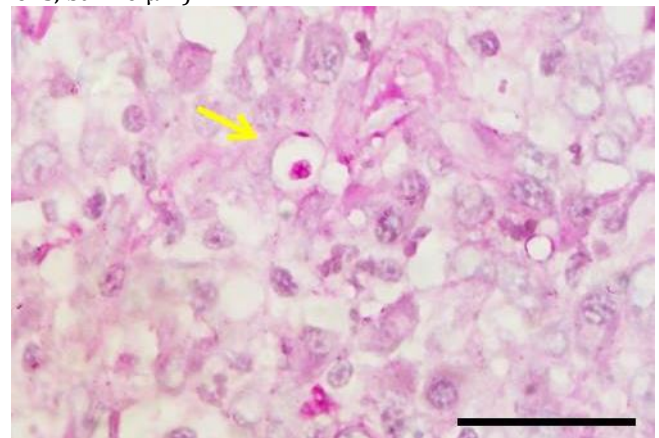
infiltrates and focal areas of necrosis were also observed from among the pyogranulomas. However, there were no signs of neoplastic transformation. PAS and GMS staining revealed rounded yeast-form structures. The morphologic features were consistent with nodular dermatitis with granulomas and suppurated center associated with an infection by yeast-form fungi, belonging to the genus *Sporothrix* spp. (Figure 4). The animal remained under treatment for four months, during which lesion was fully bypassed (Figure 5). To date, there was no recurrence of the disease.

Figure 3 – Photomicrography highlighting a few pyogranulomas (asterisks), in the deep skin (or reticular), bordering cutaneous attachments (HE staining, 10x magnification lens, bar 200 µm).



Source: Author's collection.

Figure 4 – Photomicrography highlighting a structure compatible with an agent of the *Sporothrix schenckii* complex (arrow) (col HE staining, 100x magnification lens, bar 20 µm).



Source: Author's collection.

Figure 5 – A and B: Full recovery of cutaneous lesions after therapy termination.



Source: Author's collection.

DISCUSSION

Among the endemic mycoses, sporotrichosis is distinct due to the high prevalence of zoonotic transmission (CHAKRABARTI et al., 2015). Felines are animals that show the greatest zoonotic potential of the disease. In dogs, such dermatophytosis is regularly associated with immunosuppression, especially for the disease severe form (MIRANDA et al., 2013). In the case described here, the attack of an unrestricted cat favored the dog's infection, even though this animal had shown to be immunocompetent.

The city of Natal, in Rio Grande do Norte state, where the canine sporotrichosis was diagnosed, is influenced by tropical climate, according to the agent epidemiology (FILGUEIRA, 2009). However, sporotrichosis cases in dogs are occasional and somewhat rare (LARSSON, 2011). Such a mention strengthened the unusual character of the current report.

Sporotrichosis is clinically featured by tegumental lesions, with random subcutaneous nodules and purulent secretion, tending to ulcerate, in addition to extensive crusting and border formation (DOS SANTOS et al., 2012). In cutaneous form, such changes commonly appear on the head, limbs, and tail base (LLORET et al., 2013). Therefore, these descriptions are in agreement with the topographic and clinical findings of the patient evaluated here.

Diagnosis of sporotrichosis in dogs is usually made through fungal culturing and/ or histopathological examination, being quite unusual the use of serological tests (LEDERER; SULLIVAN; CRUM-CIANFLONE, 2016). In dogs, sporotrichosis might present as differential diagnoses the eosinophilic granuloma complex, abscess, leishmaniasis, demodicidosis, scabiosis, actinomycosis, nocardiosis, tuberculosis, histoplasmosis, cryptococcosis,

foreign objects, and neoplasia (FILGUEIRA, 2009). In the described patient, clinical examination and cytopathology allowed the selection for diagnosis but solely dermohistopathology could provide a final confirmation of sporotrichosis, eliminating the other diseases included within the diagnostic distinction.

Despite being one of the exams of choice, *in vitro* cultivation may be negative, however, sporotrichosis cannot be rejected. In such cases, agent isolation possibility ranges from 34% to 94% of the cases. In the current case, a mycological culturing was not performed because of the lack of local specialized laboratories. Yet a histopathological examination allows the obtaining of an etiological diagnosis in 95% to 100% of the cases (LARSSON, 2011). In a histological analysis of canine sporotrichosis lesions, Miranda et al. (2009) verified that suppurative granulomatous inflammation was widespread (88.37%); these authors could identify the causal agent through specific staining for each fungus, such as using GMS. Such microscopic findings corroborate our report and aggregate value on the importance of histopathology in diagnosing sporotrichosis in dogs.

Drug toxicity and pathogen resistance to the available antifungal agents should be considered in a drug therapy (MARTINS, 2012). Currently, itraconazole is accounted as the first choice for treating cutaneous and lymphocutaneous forms of sporotrichosis in small animals. For this drug, doses ranging from 10 to 20 mg/kg are recommended every 24 hours, administering the medication continuously until the healing of lesions (GUTERRES et al., 2014; NUNES; ESCOTEGUY, 2005). These last statements were compatible with what was established for the dog under study.

Sporotrichosis is a subcutaneous infection (acute or chronic) with significant impact on public health

because, besides affecting some animal species, it also tackles humans (LÓPEZ-ROMERO et al., 2011; MADRID et al., 2012). Outbreaks caused by a fungus of the genus *Sporothrix* have often been reported in tropical, subtropical, or even temperate regions; recent advances in molecular taxonomy highlighted specific distributions for some fungal species which present different clinical behaviors (RODRIGUES et al., 2016; ZHOU et al., 2014). At the end of the century, a large outbreak of human sporotrichosis occurred in the city of Rio de Janeiro (Rio de Janeiro State, Brasil); in that moment, nearly 83.4% of the affected people mentioned having some sort of contact with ill cats (SCHUBACH; BARROS; WANKE, 2008). Currently, the metropolitan region of Rio de Janeiro is deemed as endemic for humans and cats (CRUZ, 2013). Some cities in the state of Rio Grande do Sul are also endemic for such disease (MADRID et al., 2012). Based on this background, our study showed the occurrence of this zoonotic disease in another federative unit of the country, as well as its occurrence in a different animal species.

Conventionally, sporotrichosis is a disease acquired through a traumatic installation of the fungus into subcutaneous tissue, by means of contact with any contaminated material (CRUZ, 2013). Humans are commonly infected after cutaneous inoculation of plant contents or contact with contaminated soil. However, zoonotic transmission is possible by scratching or biting of infected animals. Furthermore, while handling wounds of animals contaminated with *Sporothrix* spp., humans can be infected too (LEDERER; SULLIVAN; CRUM-CIANFLONE, 2016; NUNES; ESCOTEGUY, 2005). This last statement found in the literature corroborated what was seen here for the caregiver and the animal under study. Direct handling of the infected dog, i.e. without personal protective materials, provided the caregiver with zoonotic contamination. Therefore, we can infer that common sense of animal guardians and proper hygiene methods (also with the pet) are key elements to prevent sapro-anthropozoonosis risk of sporotrichosis (CHOMEL, 2014).

CONCLUSION

Canine sporotrichosis is a rare condition with little information. Therefore, it needs to be more studied, mainly regarding early diagnosis since a good prognosis promotes a satisfactory patient response to the existing treatments. For being a zoonosis, its role is even more emphasized because this is a public health problem. In addition, since this disease presents a wide differential diagnosis, eliminating diagnoses of infectious or non-infectious diseases that mimic the canine sporotrichosis is of fundamental importance.

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