



Sporotrichosis in guinea pig (*Cavia porcellus*) – case report]

[*Esporotriose em porquinho da índia (Cavia porcellus) – relato de caso*]

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ABSTRACT

The guinea pig is a South American rodent with a docile behavior that has been gaining popularity as a pet, increasing the search for specialized veterinary care for the species. In the clinical casuistry, about half of the visits are due to dermatological changes, among which fungal infections are uncommon. Sporotrichosis is a zoonosis caused by the fungus of the genus *Sporothrix*, widely distributed in nature, which contaminates the host from the inoculation of the agent in lesions and mucous membranes and has been reported in several species of animals. Felines with access to the street are the main disseminators of the agent due to the behaviors of the species and can contaminate other animals and humans. The most evident clinical signs are crusted, exudative and difficult to heal lesions, requiring complementary tests such as PCR and culture to confirm the diagnosis. The specific treatment is time-consuming, using antifungal drugs such as itraconazole, which can be associated with topical treatment to aid healing. Given the difficulty of finding references about this zoonosis, it is difficult to obtain reliable data on the epidemiology of this disease. The present work describes the first report of sporotrichosis in guinea pig in Brazil, the complementary examinations that resulted in the definitive diagnosis and the effective therapeutic response, to contribute to possible work and research.

Keywords: *Sporothrix schenckii*, zoonosis, rodent, PCR, itraconazole

RESUMO

O porquinho-da-índia é um roedor sul-americano de comportamento dócil que vem ganhando popularidade como pet, aumentando a busca por atendimento veterinário especializado para a espécie. Na casuística clínica, cerca da metade dos atendimentos ocorre em razão de alterações dermatológicas, entre as quais são comuns as infecções fúngicas. A esporotricose é uma zoonose causada pelo fungo do gênero Sporothrix, distribuído amplamente na natureza, que contamina o hospedeiro a partir da inoculação do agente em lesões e mucosas e foi relatado em várias espécies de animais. Felinos com acesso à rua são os principais disseminadores do agente devido aos comportamentos da espécie, podendo contaminar outros animais e os seres humanos. Os sinais clínicos mais evidentes são lesões crostosas, exsudativas e de difícil cicatrização, sendo necessária a realização de exames complementares, como PCR e cultura, para a confirmação do diagnóstico. O tratamento específico é demorado, utilizando-se antifúngico como o itraconazol, o qual ser associado a tratamento tópico para auxiliar na cicatrização. Diante da dificuldade de achar referências a respeito dessa zoonose, torna-se difícil a obtenção de dados confiáveis acerca da epidemiologia dessa doença. O presente trabalho descreve o primeiro relato de ocorrência de esporotricose em porquinho-da-índia no Brasil, os exames complementares que resultaram no diagnóstico definitivo e a obtenção da resposta terapêutica eficaz, a fim de contribuir para eventuais trabalhos e pesquisas.

Palavras-chave: *Sporothrix schenckii*, zoonose, roedor, PCR, itraconazol

INTRODUCTION

Native to South America, the guinea pig or cavy (*Cavia porcellus*) is a rodent whose popularity as a pet has grown in various parts of the world, especially due to its good interaction with humans, often docile behavior, and its size, which can reach up to 1200 g in adult males. Consequently, there is an increased demand for specialized veterinary care for these animals (Pritt, 2012; Teixeira, 2014; Pignon and Mayer, 2021).

Around half of the clinical consultations for guinea pigs are related to dermatological conditions. However, cutaneous fungal infections are uncommon for the species and may be associated with the exacerbated growth of microorganisms present in the natural microbiota, resulting from organic imbalances, or they may have an exogenous origin from the environment or contact with contaminated animals (White *et al.*, 2016; Seyedmousavi *et al.*, 2018).

Sporotrichosis is a fungal disease caused by microorganisms of the genus *Sporothrix*, mainly by the species *Sporothrix schenckii*, which is widely distributed worldwide and can be found in soil, plants, wood, and decomposing organic materials (Bonifaz and Tirado-Sánchez, 2017; Kume *et al.*, 2021). In nature or *in vitro* at 25°C, *S. schenckii* has saprophytic activity, feeding on organic matter and presenting in a filamentous form. On the other hand, it assumes a yeast-like appearance and acts as a parasite when cultivated in controlled medium at 37 degrees or isolated from mammalian lesions (Rodrigues *et al.*, 2016; Gremião *et al.*, 2017; Gonçalves *et al.*, 2019).

The host can acquire the etiological agent through direct inoculation into lesions or mucous membranes, resulting from contact with contaminated soil and plants, or through bites or scratches from infected animals, mostly cats (Gremião *et al.*, 2017; Gonçalves *et al.*, 2019). The occurrence of the fungus responsible for sporotrichosis has been reported in humans and various animals, including primates, felines, canines, bovines, swine, horses, and camels (Nobre *et al.*, 2002; Schubach *et al.*, 2006; Caus, 2013; Almeida *et al.*, 2018). Cats, especially uncastrated ones with access to the outdoors, are more prone to become infected and disseminate

the fungus due to their inherent behaviors, such as digging and covering feces, climbing, sharpening claws, and territorialism, resulting in conflicts with other animals (Barr and Bowman, 2006; Pires, 2017).

Clinically, the disease can manifest in fixed cutaneous, disseminated, lymphocutaneous, extracutaneous, and systemic forms. In felines, the incidence of fixed cutaneous and disseminated forms is more common, where lesions may present crusty and nodular appearance with purulent exudate and difficult healing, potentially evolving to necrotic conditions with bone-muscular exposure (Schubach and Schubach, 2000; Schubach *et al.*, 2012; Moura, 2020).

Information obtained from the patient's history, coupled with observed clinical signs and complementary tests such as fungal culture, polymerase chain reaction (PCR), cytology, serology, and histopathology, are essential for the diagnosis of sporotrichosis (Larsson, 2010; Orofino-Costa *et al.*, 2017; Almeida *et al.*, 2018; Santos *et al.*, 2022). Performing a differential diagnosis for diseases that cause cutaneous lesions, including bacterial dermatitis, cryptococcosis, leishmaniasis, histoplasmosis, and neoplasia, is crucial given the macroscopic similarities of the manifestations (Berocal and Gomes, 2020; Santos *et al.*, 2022).

The therapeutic approach for treating cutaneous lesions resulting from the infection consists of systemic administration of antifungal drugs, with itraconazole being the drug of choice. The medication should be used for up to one month after symptom remission (Rosa *et al.*, 2018; Ribeiro, 2021). Other drugs can also be used in treatment, such as amphotericin B, fluconazole, terbinafine, sodium and potassium iodide (Lloret *et al.*, 2013; Pires, 2017).

According to Gonçalves *et al.* (2019), the lack of information about this zoonosis in certain species, coupled with the fact that it is not compulsorily reported in all states, results in underreporting of cases, inadequate diagnoses, and the lack of preparedness of healthcare professionals about the disease, making it difficult to obtain reliable data regarding the epidemiology of sporotrichosis (Ribeiro, 2021). Therefore, this study aims to report, for the first

time, the occurrence of sporotrichosis in guinea pigs (*Cavia porcellus*) in Brazil, as well as the definitive diagnosis and clinical improvement after effective specific treatment.

CASUISTRY

A guinea pig (*Cavia porcellus*), aged 2 years and 9 months and weighing 584g, was treated in a veterinary clinic of exotic animals. During the service, the guardian reported that the animal had itching and skin lesions in the dorsal region for approximately four months, shared the enclosure with another specimen of the same species, which had no clinical changes. In addition to this, 5 cats also lived in the residence and had free access to the street, as well as to the environment that the rodents inhabited. As a substrate, the hygienic carpet was used, and the animals' diet consisted of food, hay, carrots, and cucumbers. Cleaning and application of ozonized sunflower oil to the lesions was prescribed every 24 hours for 10 days.

Twenty days after the first visit, the patient still had areas of alopecia near the lesions and a decrease in pruritus was reported. Therefore, it was indicated to continue the application of ozonized oil in the injured area until complete healing. However, approximately forty-five days after the first return, the rodent presented recurrence of pruritus, demonstrating that the protocol initially instituted did not obtain the expected result. Thus, the guardian was advised about the performance of complementary tests and authorized the procedure of collecting material for cytology and PCR, through skin scraping.

The cytologic analysis of the lesions revealed rare, rounded structures compatible with yeasts, some of them budding in macrophages, scattered on the slide. As a differential diagnosis, PCR was requested for *Cryptococcus spp.* and *Sporothrix spp.* with negative results for *Cryptococcus neoformans* and positive for *Sporothrix schenckii*, confirming the diagnosis of sporotrichosis.

In view of the results obtained, specific antifungal therapy was instituted using itraconazole, at a dose of 5mg/kg VO every 24 hours, for 45 days. To reduce pruritus, the intermediate-acting steroidal anti-inflammatory drug prednisolone was prescribed, with an initial

dose of 2mg/kg VO every 12 hours for 7 days. Subsequently, the frequency of administration was reduced to 1 dose every 24 hours for 5 days. Weaning was completed by decreasing the dose to 1mg/kg every 24 hours for 3 days, totaling 15 days of glucocorticoid treatment.

For topical use, ozonized sunflower oil was maintained every 12 hours until complete healing of the lesions. In view of the zoonotic capacity of the fungus and the possibility of affecting other domestic animals, the use of gloves was recommended during the handling of the patient and the application of medications, in addition to the isolation of the patient until the end of the established therapy. After treatment, there was significant clinical improvement, absence of pruritus and complete healing of the lesions (Fig. 1).

DISCUSSION

After the patient's first care, the use of ozonized sunflower oil was prescribed as topical therapy due to its bactericidal and fungicidal effects. Additionally, the oil also helps in the treatment of extensive ulcerative wounds, as well as promotes healing and regeneration of injured tissues that are difficult to recover (Travagli *et al.*, 2010, Moura, 2020).

However, no satisfactory result was obtained from the initial protocol. Due to the history of interaction with felines and because it was a difficult-to-heal lesion that had a crusty, moist appearance, with the production of reddish-brown exudate, a fungal infection was suspected (Ettinger and Feldman, 2004; Pires, 2017). However, Greene (2015) and Ribeiro (2021) reported that parasitic diseases, bacterial infections, and neoplasia can show similarity in lesions, requiring complementary tests.

Although fungal culture is considered the gold standard for the diagnosis of fungal diseases due to its high sensitivity and specificity, the test requires about 30 days to provide results (Gonsales *et al.*, 2019; Nakasu *et al.*, 2021; Ribeiro, 2021). Because of this, material was collected for the cytological study which, according to Silva *et al.* (2018b) and Ribeiro (2021), is a fast and inexpensive method, used as a screening for diagnosis, directing the next steps of care.

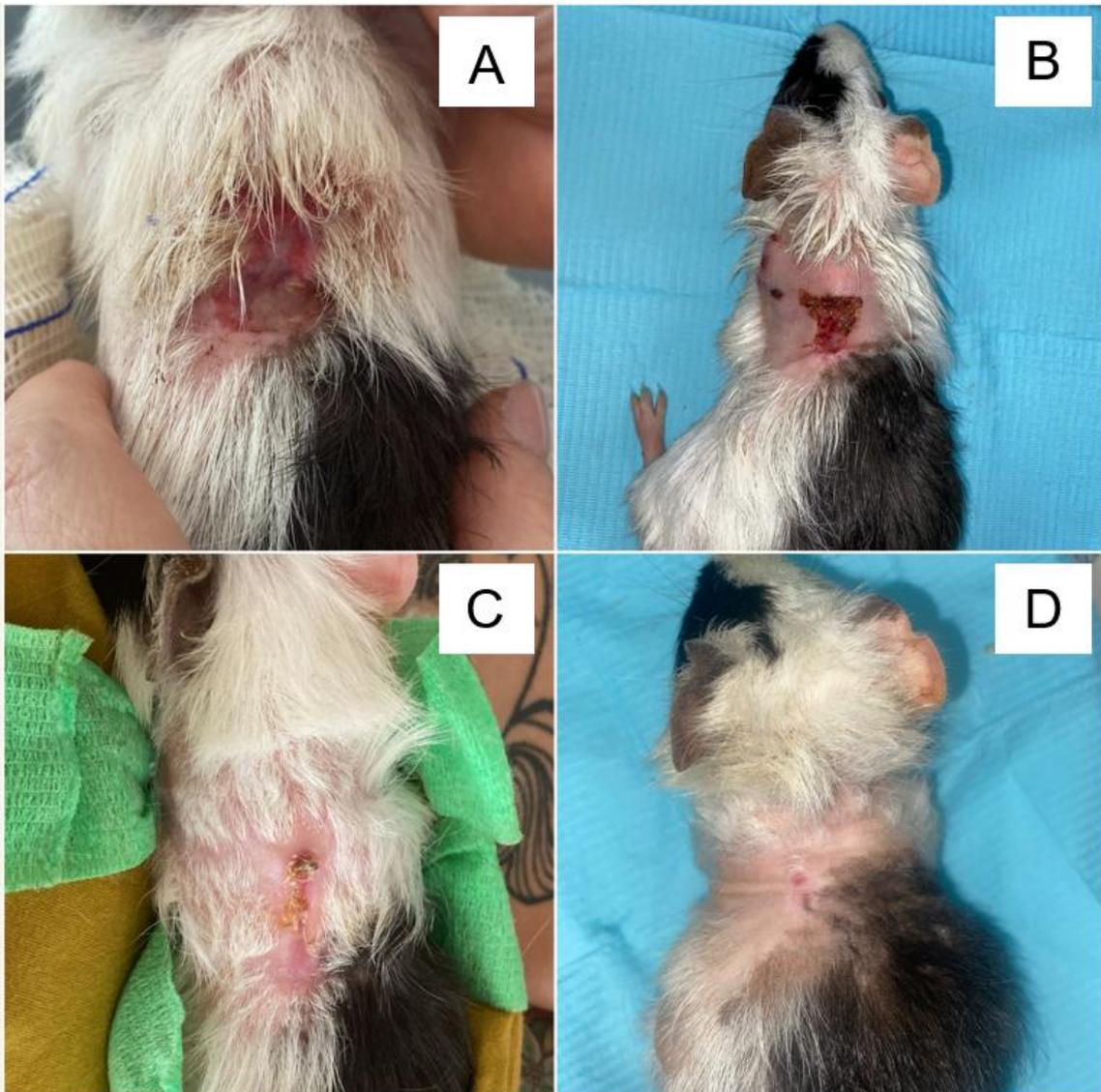


Figure 1. Healing process evolution: A) Initial appearance of the lesion before specific treatment with itraconazole and ozonized sunflower oil. B) After 1 week of treatment. C) After 2 weeks of treatment. D) After 1 and a half months of treatment.

Silva (2011) and Ribeiro (2021) state that cytological analysis allows the evaluation of cell morphology, allowing the differentiation between infectious, proliferative, and neoplastic diseases. Among the main disadvantages of performing cytology in fungal lesions when compared to culture, Sales-Macêdo *et al.* (2018) and Ribeiro (2021) describe the low sensitivity and lack of specificity in identifying the agent, factors that increase the chance of confusion between possible pathogens involved.

Evaluation of the sample from the lesion of the patient in question revealed rounded structures compatible with yeasts, some budding, scattered on the slide, suggesting the presence of fungal infection. Therefore, more specific tests were recommended to confirm the microorganism present in the sample.

After the cytological result, samples of the lesion were collected for PCR, which is a laboratory technique capable of confirming and identifying fungal species, even in low amounts in the analyzed sample, of rapid diagnosis, presenting

good results when compared to fungal culture, being an alternative diagnostic technique (Gonsales *et al.*, 2020; Ribeiro, 2021). Due to the high cost of this test, molecular analysis was requested only for *Cryptococcus spp.* and *Sporothrix spp.* thus confirming the presence of *Sporothrix schenckii*.

Due to the well-established climatic aspects of high temperature and humidity, the southern and southeastern regions have the highest number of sporotrichosis cases reported in Brazil (Silva *et al.*, 2013; Silva *et al.*, 2018a; Gonçalves *et al.*, 2019). However, Silva *et al.* (2018a) and França *et al.* (2022) report that, over the last few years, the number of confirmed occurrences has been increasing in the Northeast region of the country. In Alagoas, the first reported case of zoonotic transmission occurred through the scratching of a contaminated cat on its guardian (Marques-Melo *et al.*, 2014; França *et al.* 2022). Therefore, the present work reports the first case of sporotrichosis in guinea pig in Brazil and in the state of Alagoas.

Cats (*Felis catus*) are considered the main source of transmission of sporotrichosis, due to the behavioral characteristics inherent to the species, being more affected the males, adults, not castrated, with access to the street, being able to spread the fungal agent to other animals (Barros *et al.*, 2004; Pereira *et al.*, 2014; Gonçalves *et al.*, 2019). Due to the behavior and history of felines in the family environment, with free access to the street and to the enclosure of the piglets, occurring interaction between the animals and eventual licking and aggression, it can be assumed, therefore, the origin of the infection in the reported patient.

In the literature, there is little information about the involvement of *S. schenckii* in *Cavia porcellus*. In 1979, Kwon-Chung compared the temperature sensitivity and morphology of the agent after intradermal inoculation in guinea pigs of the species. Animals that were inoculated with colonies growing at 37°C developed lesions that included subcutaneous abscesses, lymphangitic lesions, as well as bone and joint involvement. However, during the literature search, no reports of sporotrichosis by natural infection in guinea pigs were found.

The specific treatment of choice was itraconazole, as it is a safe and efficient drug (Lloret *et al.*, 2013; Pires, 2017). However, Moura (2020) reports that the use of the systemic drug alone in a feline patient did not generate satisfactory results, making it necessary to associate it with topical ozone therapy to promote rapid healing and give the patient a better quality of life.

From the association between systemic therapy with antifungal drugs and topical ozone therapy, remission of the clinical picture was obtained after 45 days of treatment, corroborating the report by Nakasu *et al.* (2021) and Ribeiro (2021), who state that affected felines can show clinical improvement in weeks. This fact is contrary to the studies by Almeida *et al.* (2018) and Santos *et al.* (2022), in which it is shown that most cases require long antifungal therapy, for a period of 4 to 6 months, to show significant improvement.

Due to the immunosuppression caused, Barros *et al.* (2010) and Pires (2017) advise against the use of glucocorticoids during the treatment of sporotrichosis. However, it is known that the use of this class of drugs acts quickly and effectively in reducing pruritus and reducing the lesions caused by itching (Deboer, 2004; Salzo, 2016; Paiva and Pietroluongo, 2018). In view of this, due to the intense pruritus manifested by the patient, it was necessary to include prednisolone in the protocol with the aim of reducing the occurrence of this clinical sign, obtaining a rapid response after the start of drug administration.

In view of the zoonotic capacity of the fungus, Jericó *et al.* (2015) and Santos (2022) indicate the use of gloves during the handling of the infected, in addition to the isolation of contacts, until there is a clinical cure of the patient. Thus, the appropriate guidelines were passed on to the person responsible for the animal regarding the management of the affected patient, to reduce the chances of transmission to humans and other domestic animals that inhabit the residence.

CONCLUSIONS

The present work reported the first occurrence of *Sporothrix schenckii* infection in guinea pigs in Brazil, using cytology and PCR tests to provide a definitive diagnosis quickly, and then start the

specific treatment to alleviate the patient's suffering. The associated treatment of itraconazole and ozonized sunflower oil showed good results, providing remission of clinical signs after 45 days of use. Although references on this zoonosis are scarce, this report provides data that may assist in future publications on the epidemiology of the disease. Reinforcing the role of the veterinarian in public health, in guiding guardians about this zoonosis and raising animals responsibly to avoid new occurrences.

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