

Ocular sporotrichosis in veterinary medicine professionals: case reports and a warning for zoonotic transmission

Esporotricose oftálmica em profissionais da medicina veterinária: relatos de casos e um alerta para a transmissão zoonótica

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ABSTRACT: Sporotrichosis is a dermal zoonosis caused by the fungus of the *Sporothrix* genus, naturally found in the soil. However, the most relevant transmission, currently, occurs through scratching, biting and contact with the lesions discharge of infected felines, therefore, veterinary doctors, nurses and veterinary medicine students are part of the most affected group by the disease. In humans, the most observed clinical form is the cutaneous lymphatic, yet, reports of other unusual presentations in patients without comorbidities, for example, mucosal and conjunctival involvement, were made. In the present study, two cases of extracutaneous ophthalmic sporotrichosis in humans with the development of sequels were described. This clinical presentation is usually related to the inhalation of spores, but it does not seem to have occurred in any of the cases. It is crucial to elucidate the accidents during the work of veterinarians and the importance of biosafety protocols for these professionals.

KEYWORDS: Fungal disease; unusual presentation; veterinarians; biosafety.

RESUMO: A esporotricose é uma dermatozoonose causada pelo fungo do gênero *Sporothrix*, naturalmente encontrado no solo. No entanto, a forma de transmissão mais relevante, atualmente, ocorre através de arranhadura, mordedura e contato com a secreção de lesões de felinos infectados, portanto, médicos veterinários, enfermeiros e estudantes de medicina veterinária fazem parte do grupo mais afetado pela doença. Em humanos, a forma clínica mais observada é a cutâneo linfática, contudo, relatos de outras apresentações atípicas em pacientes sem comorbidades, por exemplo, com envolvimento de mucosa e conjuntiva, foram realizados. No presente estudo, dois casos de esporotricose oftálmica extracutânea em humanos com o desenvolvimento de sequelas foram descritos. Esta apresentação clínica é geralmente relatada em casos de inalação de esporos, todavia não pareceu ocorrer em nenhum dos casos. É crucial elucidar os acidentes durante o trabalho de veterinários e a importância dos protocolos de biossegurança para estes profissionais.

PALAVRAS-CHAVE: Doença fúngica; apresentação atípica; médicos veterinários; biossegurança.

INTRODUCTION

Sporotrichosis is a dermal zoonosis caused by the fungus of the *Sporothrix* genus. Currently, the most isolated species in human and animal cases is the *S. brasiliensis*, the most virulent and responsible for severe cases and atypical presentations of the disease (Almeida-Paes et al., 2014; Rodrigues et al., 2020).

The fungus is naturally found in the soil, and transmission occurs through the inoculation of the fungus on the skin, usually associated with scratching, biting, and contact with the lesions discharge of infected felines. Domestic felines are

the most affected species, with exacerbated fungal load and yeasts in the oral and nasal cavities and nails, becoming an important source of infection, compared to dogs, which have significantly fewer case reports of the disease and transmission (Barros; Almeida-Paes; Schubach, 2011; Macêdo-Sales et al., 2018; Schubach et al., 2004; Viana et al., 2018).

The relevant role of domestic felines in zoonotic transmission should be a source of concern since the species *S. brasiliensis* was isolated in this species and human samples. Therefore, in the hyperendemic established in Rio de Janeiro,

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the feline is very important (Barros; Almeida-Paes; Schubach, 2011; Gremião et al., 2017; Rabello et al., 2022a).

In humans, although the most observed clinical form is the cutaneous lymphatic, reports of unusual presentations, for example, the disseminated form of the disease in patients without comorbidities, conjunctival and mucosal involvement, and hypersensitivity reactions, were made (Almeida-Paes et al., 2014). Initially, the most affected groups passed through a change from men over 50 years old to middle-aged women, as they are responsible for the care of feline patients (Barros et al., 2008; Pereira et al., 2020). At this time, veterinary doctors, nurses, and veterinary medicine students are part of the group most affected by the zoonosis (Silva et al., 2012a; Xavier et al., 2021).

Other forms of the disease in humans are described as localized and disseminated cutaneous and extracutaneous, mucosal, bone, ocular, joint, and visceral involvement. In the most reported form, the cutaneous lymphatic, the involvement of hands and forearms in adults is more frequent, while in children is the face, characterized by the appearance of a papule or nodule at the site of the lesion, with or without ulceration of this initial lesion, and progression of more nodules in an ascending chain in the limb (Almeida et al., 2019; Barraza et al., 2019; Sampaio et al., 1954; Lacaz, Almeida et al., 2019; Xavier et al., 2004).

The most affected mucosa is the eye, and lesions in this tissue can be primarily due to direct inoculation of the fungus, called primary mucosal sporotrichosis, or secondary to the disseminated form. Some symptoms associated with the involvement of the ocular mucosa are episcleritis, uveitis, chorioiditis, retrobulbar lesion, and conjunctivitis, which, when related to regional lymphadenopathy, is called Parinaud's oculoglandular syndrome (Orofino-Costa et al., 2017).

Although the disease is reported in humans and, in most cases, exclusively affects the skin, sporotrichosis is responsible for deaths and hospitalizations throughout Brazil, mainly in Rio de Janeiro, São Paulo, and Goiás. In some regions, feline outbreaks have been associated with increased human cases (Barros; Almeida-Paes, Schubach, 2011; Falcão et al., 2019; Lecca et al., 2020).

The purpose is to report two cases of extracutaneous ophthalmic sporotrichosis in humans with the development of sequelae. This clinical presentation is characterized by rarity and difficult diagnosis, and its report is important for the exposure of an unusual form of the disease. It is essential to elucidate the accidents during the work of veterinarians and the need for biosafety protocols for these professionals, as well as to warn about the importance of zoonotic transmission of sporotrichosis.

CASE REPORTS

Case 1 – A 41 years-old female patient, an undergraduate student in veterinary medicine. In May 2021, the patient was in

service to assist with a laser therapy session of a cat with confirmed sporotrichosis after fungal culture, which had abundantly exudative lesions on the face and nose. During the entire service, she was wearing a face shield. However, she removed the personal protective equipment to accommodate the animal in its transport box, and a droplet from the discharge of the cat's sneeze came into contact with the mucosa of her right eye. The patient noticed clinical signs 20 days after the incident and sought medical attention. Facial asymmetry, ocular edema, and palpable ganglia were observed behind the ear and close to the occipital bone. There was no evolution to a skin or mucosal lesion, but pain due to ocular edema and inflammation of the conjunctiva did occur (Figure 1).

The laboratory test was performed to confirm the disease. An ophthalmic swab was collected to perform a fungal culture, which demonstrated colonies compatible with *Sporothrix*. One week after the onset of symptoms, retro auricular ganglia appeared up to the region behind the neck, forming a rosary, characterizing Parinaud's syndrome. The treatment of choice was itraconazole for 120 days. In the first 30 days, 200 mg per day was administered and in the subsequent 90 days, 100 mg per day.

Feline from case 1 - The feline did not show improvement, even with the association of conventional and complementary treatment, with the appearance of new lesions, even with the treatment for more than one year, thus indicating the animal's euthanasia. According to the patient responsible for the feline's clinical follow-up, the guardian constantly changed the medication brand and did not follow the protocol properly, using a dose of potassium iodide different from the prescribed one.

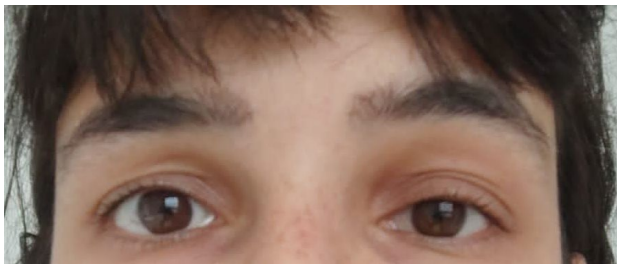
Case 2 – A 32 years-old female patient, Veterinarian. In November 2021, the patient was treating a rescued feline with several skin lesions spread over the body, with part of the tail necrotic. During this visit, the material was collected from



Source: Personal Archive.

Figure 1. Case 1 patient presenting ocular edema and inflammation of the conjunctiva.

the lesions with swabs for fungal culture, direct microscopy, and blood for blood count and biochemistry. The patient was bitten on the middle finger of the right hand by the feline, which was later diagnosed with sporotrichosis with visualization of yeasts on direct microscopy and blood smear, and growth compatible with *Sporothrix sp.* in the culture. Just a few days later, the patient participated in an ozone therapy session, where a wash with ozonized saline from another feline diagnosed with sporotrichosis through fungal culture and direct microscopy was performed, presenting lesions on the head and ears, and resistant to treatment with itraconazole and potassium iodide for approximately six months. Personal protective equipment, face-shield, and protective glasses were not used during the session. During the washing, droplets were dispersed as the feline shook its head. These droplets reached both eyes of the patient. Eight days after the accidents, the patient noticed the clinical signs, a skin lesion on the middle finger, facial asymmetry (Figure 2) and a slightly swollen and painful preauricular lymph node. The left eye had a granulomatous lesion on the conjunctiva and was very itchy (Figure 3). The finger injury became swollen and subsequently very painful. Medical care was provided and a sample of the lesion on the middle finger



Source: Personal Archive.

Figure 2. Case 2 patient presenting facial asymmetry.



Source: Personal Archive.

Figure 3. Case 2 patient presenting a granulomatous lesion on the conjunctiva of the left eye.

collected to perform a fungal culture, which was positive for *Sporothrix*. An ophthalmic sample, using a swab, was collected to perform a fungal culture, which demonstrated colonies compatible with *Sporothrix*. Thus, itraconazole 200 mg once a day was prescribed. The treatment time was two months, evolving with the resolution of the lesions.

Feline from case 2 - The feline resisting the treatment and participating in the dispersion of droplets to the eyes did not improve, even with the association of conventional treatment and ozone therapy, thus being submitted to euthanasia.

DISCUSSION

It is currently known that transmission through contact with sick felines is significantly more relevant for sporotrichosis outbreaks in Brazil since places with a higher prevalence of feline cases also have more human cases. Despite the presence of the *S. brasiliensis* species in the environment, there is no statistically significant relationship between environmental variables, for example, vases and plants, and a positive diagnosis for the disease (Lecca et al., 2020; Rabello et al., 2022b). Transmission to humans is four times higher among patients who came into contact with domestic cats (Almeida et al., 2019; Barros et al., 2008), which is consistent with the finding in this study, since both patients had contact with felines with sporotrichosis before the onset of lesions.

In this report, the patients are of age compatible with that demonstrated by other studies. Almeida et al. (2019) reported the involvement of patients with professions without a critical risk factor, such as students, teachers, lawyers, physiotherapists, social workers, and salespeople, highlighting the importance of contact with the infected feline for disease transmission at this time. Veterinarians, nurses, and veterinary trainees are also a significant risk group (Xavier et al., 2021), a fact corroborated by the study since one of the patients is a veterinary doctor, and the other is a student in this same program.

In adults, lesions in the upper limbs and hands are frequent, together with the lymphatic cord, observed in 59.1% of patients diagnosed with sporotrichosis (Almeida et al., 2019), as stated in case 2 of this report. The lymphatic cord is characteristic of the most prevalent presentation of sporotrichosis in humans, the cutaneous lymphatic, observed in 75% of cases (Barros; Almeida-Paes; Schubach, 2011). However, in this study, sporotrichosis was presented in its extracutaneous form, in the eye mucosa of the patients, which is described as rare in immunocompetent patients or without ocular trauma before the appearance of clinical signs (Freitas et al., 2014).

According to studies, bone involvement represents 80% of extracutaneous cases of sporotrichosis. It is classified as a clinical presentation of rare sporotrichosis, and the diagnosis is difficult due to the lack of skin lesions. The cases of infection are related to the inhalation of the fungus and dissemination

via the hematogenous route in humans with immunosuppressive conditions (Orofino-Costa et al., 2017; Schechtman, 2010). In both patients studied in this report, there were no comorbidities, and inhalation did not seem to occur, as both were wearing masks at the possible time of contamination. However, the hematogenic dissemination occurred, resulting in the lymphatic cord, and increased lymph nodes behind the ears and close to the occipital bone. Transmission occurred, in fact, through contact with discharge from the lesion of sick felines, through sneezing, in the first case, and droplets from the face of the feline after washing with ozonated saline solution, corroborated by the study by Lemes et al. (2021) and Ribeiro et al. (2020) in which sneezing was a source of infection for patients diagnosed with ocular sporotrichosis, and some denied any trauma, including ocular trauma. Still, all had sick cats in the home environment.

According to Orofino-Costa et al. (2017), the mucosa can be primarily affected, known as primary mucosal sporotrichosis, or secondarily to a disseminated presentation, the former being the most commonly reported. According to the literature, the patients had primary mucosal sporotrichosis in the ocular mucosa, the most affected. Clinical signs such as episcleritis, uveitis, choroiditis, retrobulbar lesion, and Parinaud's oculoglandular syndrome which is characterized by granulomatous conjunctivitis accompanied by preauricular and submandibular lymphadenopathy and usually related to *Bartonella henselae* infection. However, other causing agents have been identified, for example, viruses, fungi, parasites, and mycobacteria (Ferreira et al., 2014; Orofino-Costa et al., 2017; Ribeiro, Bisel, Menezes, 2010).

Parinaud's syndrome, probably caused by the fungus *Sporothrix sp.*, was observed in the first patient but without severe evolution due to the early initiation of treatment. This syndrome is becoming more common, with the description of four patients with this clinical sign under study (Ribeiro et al., 2020).

The disseminated presentation of sporotrichosis did not occur in the patients. This presentation is related to alcoholism, diabetes mellitus, sarcoidosis, tuberculosis, transplants, malignancy, immunosuppressive therapies and HIV, all immunosuppressive disorders (Schechtman, 2010). However, cases of immunocompetent patients who developed the disseminated cutaneous presentation of sporotrichosis have already been reported (Queiroz-Telles et al., 2022).

For veterinary doctors, attention and care when handling felines in clinical and emergency care, including those without skin or mucosal lesions, and using personal protective equipment is extremely important due to the high zoonotic potential of the fungus that causes sporotrichosis (Xavier et al., 2021). Therefore, disposable latex gloves, disposable long-sleeved aprons, masks, and protective glasses are essential for care services, especially in endemic areas for sporotrichosis and at feline consultations (Silva et al., 2012b). Other reports of

ocular sporotrichosis acquired through contact with sick felines also occurred (Lemes et al., 2021; Yamagata et al., 2017).

The first-choice treatment for sporotrichosis in humans is itraconazole at 100 mg to 200 mg per day for three to six months. Terbinafine is effective and safe for cases where it cannot be prescribed (Ribeiro et al., 2020; Yamagata et al., 2017). The saturated potassium iodide solution can also be an alternative for refractory cases (Lyra et al., 2021). For disseminated presentations, amphotericin B appears to be effective (Fichman et al., 2022). Despite the extracutaneous presentation, the chosen therapy was the administration of itraconazole for both patients. A favorable prognosis or successful treatment depends on diagnosis and initiation of treatment as soon as possible, according to Fichman et al. (2022).

The importance of treating sick felines, the most relevant species for zoonotic transmission, and preventing sporotrichosis is demonstrated in a study carried out by Miranda et al. (2018), as treated cats had a reduced or non-existent fungal load, even in cats with persistent wounds, which would reduce the chance of human infection. The animal's isolation is also essential to control and prevent new cases of the disease (Barros; Almeida-Paes; Schubach, 2011; Lecca et al., 2020) and cats that die must be incinerated (Lecca et al., 2020).

In addition, the work of health agencies is essential, with the action of veterinary and dermatologist doctors for an early diagnosis and initiation of treatment. Schechtman et al. (2022) also show the relevance of teledermatology at the beginning of treatment, especially in the situation of the pandemic by SARS-CoV-2, and guidance for physicians on patient management.

Despite the zoonotic transmission be more relevant, currently, in Brasil, the sporotrichosis can be transmitted through lesions caused by spines or contact with contaminated soil, since the causative fungus is geophilic. Therefore, the One Health concept, which correlates animal and human health with the environment in which they coexist, needs to be applied (Cabañes, 2020). According to Cabañes (2020), 60% of the pathogenic agents that infect humans come from domestic or wild animals, ergo, the veterinarian is essential to keep animals and humans healthy, together with doctors and other health professionals.

At the clinical assistance of animals, veterinarians should inform the tutors about zoonosis, the infection risks, treatment and control and prevention measures, helping to reduce new cases. The cleaning measures where the animal resides and the use of personal protective equipment when handling them, especially cats with sporotrichosis, should also be informed to avoid the contamination of the environment and of the tutor (Silva et al., 2012b).

During the cats attendance, the guidelines based on the Cat-Friendly Practices® ideology, which aim to maintain the animal calm during the handling, helping to avoid scratches and bites (Rodan et al., 2011).

In addition to working in the clinic, the veterinarian must act in the health defense, in the verification of products of animal origin, research and implementation of production technologies, study of new public health measures in relation to zoonoses and must be added to the basic care in the Centers of Family Health Support (NASF), as its focus is on diseases related to public health and their impact on the environment, therefore covering family health (Miranda, 2018).

The sporotrichosis is a neglected disease, therefore funding for research, therapeutic and prevention are scarce and populations of precarious socioeconomic condition are affected (Neglected Tropical Diseases, 2022). Ergo, the public power must invest in control and prevention measures of zoonoses.

CONCLUSION

The most reported clinical presentation of sporotrichosis is the cutaneous lymphatic. However, other manifestations occur, and the absence of a skin or mucosal lesion in human patients should not rule out sporotrichosis as a possible diagnosis; hence, reports of the different clinical forms are obligatory. The extracutaneous presentation involving the mucosa without fungus inhalation should be considered by health professionals, especially veterinarians, who have constant contact with felines. The use of personal protective equipment during the clinical care of felines becomes necessary, given the reported forms of transmission through droplets of secretion from lesions and sneezing of sick felines.

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