Otitis externa associated with *Demodex cati* – case report

[Otitis externa associada a *Demodex cati* – relato de caso]

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ABSTRACT

Feline demodicosis caused by *Demodex cati* is a rare parasitic disease, characterized by local or generalized dermatitis and less commonly by otitis. A male, castrated, mixed breed, 11 years old, presented progressive cervical pruritus with alopecia in the caudolateral region of the right ear and mild erythema, abrasions, brownish ceruminous secretion and otopodal reflex. He had a history of feline immunodeficiency virus (FIV) infection and feline gingivitis stomatitis complex (GSC), in addition to continuous use of prednisolone. In the parasitological examination of the cerumen, different stages of *Demodex* sp. were found. Genetic sequencing revealed 99.33% homology for *D. cati*. Therapy with imidacloprid and moxidectin in spot-on formulation, in two doses at 30-day intervals, promoted remission of clinical signs and elimination of the mite.

Keywords: otodemodicosis, external ear, cat

RESUMO

A demodicose felina por *Demodex cati* é uma doença parasitária rara, caracterizada por dermatite local ou generalizada e menos comumente por otite. Felino, macho, castrado, sem raça definida, de 11 anos, apresentou prurido cervical progressivo com alopecia em região caudolateral à orelha direita e eritema leve, escoriações, secreção ceruminosa amarronzada e reflexo otopodal. Apresentava histórico de infecção pelo vírus da imunodeficiência felina (FIV) e complexo gengivite-estomatite felina (CGEF), além de uso contínuo de prednisolona. No exame parasitológico do cerúmen, foram encontrados diferentes estágios de *Demodex* sp. O sequenciamento genético revelou 99.33% de homologia para *D. cati*. A terapia com imidacloprida e moxidectina em formulação spot-on, em duas doses, com intervalos de 30 dias, promoveu a remissão dos sinais clínicos e a eliminação do ácaro.

Palavras-chave: otodemodicose, orelha externa, gato

INTRODUCTION

Feline demodicosis is an inflammatory parasitic disease caused by the mites *Demodex cati* and *D. gatoi*, and by a third species already discovered, but not yet named (Silbermayr et al., 2015; Gondim, 2019). *D. cati* is a follicular mite considered long, with a thin and long abdomen, which can measure between 150 and 290μm, with a morphology similar to *D. canis*. It is found in the dermis, most frequently in the pilosebaceous region (fur follicle, gland, and sebaceous ducts), in the periocular regions, face, ears, and neck (Beale, 2012; Bouza-Rapti et al., 2022).

Feline demodicosis by *D. cati* is rare and represents about 3.4% of feline parasitic dermatopathies (Scott et al., 2013; Bouza-Rapti et al., 2022), being mainly associated with immunosuppressive events, which may cause a local or generalized dermatitis, with alopecia or hypotrichosis, erythema, scales, and crusts (Mueller et al., 2020). In otodemodicosis, a brownish ceruminous secretion is observed and can occur alone or in association with dermatitis (Mueller et al., 2020, Simpson, 2021; Bouza-Rapti et al., 2022). When pruritus occurs, the intensity is variable, and may even be intense in some cases (Mueller et al., 2020).
The definitive diagnosis of demodicosis is made by identifying the mite in the parasitological examination, in the deep skin scraping or in the cerumen (Gondim, 2019). Other diagnostic methods include histopathology (tegumentary biopsy), “Scotch tape” test (through acetate strips) or direct examination of exudative secretions (from pustules or abscesses) (Mueller et al., 2020). The Polymerase Chain Reaction (PCR) is useful, mainly for species differentiation (Ferreira et al., 2015).

The focal form of demodicosis can have spontaneous resolution, being described as self-limiting in many cases, while the generalized form requires therapeutic intervention. Avermectins are options for the treatment of demodicosis, both for D. gatoi and D. cati; among them, moxidectin associated with imidacloprid (Mueller et al., 2020).

This report aims to describe a case of otodemodicosis by D. cati in a domestic cat, described for the first time in Cuiabá – Mato Grosso, diagnosed by direct visualization in parasitological examination and confirmation of the species by PCR and genetic sequencing, with clinical remission to imidacloprid and moxidectin.

CASUISTRY

An 11-year-old male, castrated, mixed-breed, short-haired feline was treated with a chief complaint of progressive cervical pruritus for about 20 days. The owner reported a history of infection with feline immunodeficiency virus (FIV) and feline gingivitis stomatitis complex (GSC), in addition to bacterial otitis externa for about eight months before the consultation, with clinical remission after topical treatment, in addition to continuous oral use of gabapentin and prednisolone (weekly). The feline had alopecia in the cervical region, caudal to the right ear with mild erythema, abrasions (Fig. 1), otopodal reflex, in addition to brownish ceruminous secretion in the auditory canal, more pronounced on the right side. While the physiological parameters were found within the reference values for the species.

The parasitological examination of the skin scraping of the lesion did not show mites, however different stages (adults and eggs) of Demodex sp. were seen in the cerumen. Otological cytology showed cocci bilaterally. In fungal fur culture the species Microsporum sp., Cladosporium sp. and Aspergillus sp. were isolated, and in bacterial culture of otologic secretion, Staphylococcus spp. and Bacillus cereus.

Figure 1 (A) and (B) - On the left, patient on the day of initial consultation, presenting alopecia with erythema and excoriations in the right lateral cervical region. On the right, lateral cervical region 72 days after completion of the proposed therapeutic protocol.
Additionally, a complete blood count was performed, showing the formation of rouleaux in red blood cells and an increase in total plasma proteins (9.2g/dL, reference range 6.0-8.0g/dL); serum biochemistry, with an increase in the serum concentration of the enzymes alanine aminotransferase (ALT = 176UI/L; reference range 6-83UI/L) and gamma glutamyltransferase (GGT = 13UI/L; reference range 1.3-5.1UI/L); while the urinalysis showed proteinuria and rare granular and hyaline casts and rare squamous cells.

To confirm the *Demodex* species, DNA extraction from the cerumen was performed using the phenol chloroform method (Sambrook and Russel, 2001). DNA integrity and absence of inhibitors was confirmed with endogenous genes. PCR was performed using specific *primers for Demodex* sp. (forward primer ACTGTGCTAAGGTAACCGAAGTCA and reverse primer TCAAAGGCAACATCGAG), which amplified a 330pb fragment of the 16SrRNA gene (Milosevic et al., 2013). The amplified fragments were submitted to sequencing by the Sanger method in an automatic sequencer (ABI-3500™, Applied Biosystems, Foster City, CA, USA). Sequences were aligned with related entries in public databases using the BLASCTN National Center for Biotechnology Information (NCBI) algorithm. Sequencing of the amplified products revealed 99.33% homology with *Demodex cati* (GenBank accession number JX193759.2).

The treatment instituted was imidacloprid 40mg and moxidectin 4mg (Advocate™ 4kg, Elanco, USA) in spot-on administration, with reinforcement every 30 days for 60 days. In addition, local treatment of the cervical lesion was performed with 2% ketoconazole spray (Cetoconazol spray 2%, Ibas, Brazil), twice a day, for 15 days initially, in addition to otological treatment with a ceruminolytic cleaning solution (Surosolve™, Elanco, USA), and topical solution based on neomycin, thiabendazole, dexamethasone and lidocaine hydrochloride (Otodem Plus™, CEVA, France). After 21 days, an improvement in the patient's clinical condition was observed, with a reduction in pruritus, partial fur growth, with a small area of alopecia. In the parasitological examination of the cerumen, evolutionary forms of *D. cati* were not visualized. After 35 days, the pruritus had ceased and there was already a considerable reduction in alopecia. Again, parasitological examinations of cerumen and cytology were performed, with the following findings: rare cocci and absence of evolutionary forms of the mite. In the clinical reassessments on days 57 and 72 after starting treatment, no mites were seen in the parasitological examination of the cerumen.

**DISCUSSION**

Demodicosis due to *D. cati* does not show a predilection for sex, and although there are no studies that confirm the correlation with age, the majority appears to occur in middle-aged to elderly cats, as reported by Gondim (2019). Recent reports described the disease in seven-year-old (Bouza-Rapti et al., 2022), eight-year-old (Bernstein et al., 2014), and ten-year-old felines (Simpson, 2021). Regarding racial predisposition, cats of the Siamese and Burmese breeds had a higher prevalence of generalized cases (Gondim, 2019).

In the present case, the mite was observed in the cerumen of the right ear, even though it was not found in the skin scraping. Although not in the usual location, Simpson (2021) identified *D. cati* infestation in a feline ear with similar clinical signs, including auricular pruritus, ceruminous discharge and otopodal reflex. Simpson (2021) also reported the presence of otitis externa in 20% of cats infested with *D. cati*. Scott et al. (2013) reported the presence of otitis externa in six out of seven cases of feline demodicosis caused by *D. cati*, among a total number of 1407 cases of feline dermatopathies.

In addition to the clinical signs of otitis in feline demodicosis, the following are described: erythema, hypotrichosis or alopecia, scaling or crusting (Mueller et al., 2020; Bouza-Rapti et al., 2022), in addition to papules, seborrhea, comedones and erosions/ ulcerations (Beale, 2012; Ferreira et al., 2015). In the present case, excoriations were seen, possibly due to self-trauma, mild erythema, desquamation, alopecia, brownish ceruminous secretion and otopodal reflex.

Demodicosis may be associated with bacterial infections, mainly by *Staphylococcus* sp. (Mueller et al., 2020), similar to the case
Described. Therefore, *D. cati* infestation may have been the primary factor that triggered the otitis, since, according to Mueller et al. (2020), the finding of more than one mite in the parasitological examination already indicates a clinically relevant demodicosis. Furthermore, despite being considered a commensal mite of feline skin, Frank et al. (2013) reported not having found *D. cati* mites or their DNA in skin scrapings from healthy felines. This data converges with the study by Ferreira et al. (2015), who described *D. cati* DNA in only 3% of healthy felines. FIV infection, in addition to the chronic use of corticosteroids for GSC, may have predisposed the proliferation of *D. cati* mite and the appearance of otodemodicosis, since the disease is associated with comorbidities, such as FIV, feline leukemia (FeLV), diabetes mellitus, and immunosuppressive therapies (Beale, 2012; Frank et al., 2013; Mueller et al., 2020; Bouza-Rapti et al., 2022).

*Demodex cati* is a follicular mite with a thin and long abdomen (Fig. 2) and can be differentiated from *D. gatoi* by morphometry or molecular techniques (Beale, 2012; Frank et al., 2013). In this case, in addition to observing the mite in the parasitological examination, PCR followed by genetic sequencing was used to identify the species, since distinguishing the species can change the clinical approach (Ferreira et al., 2015). PCR using specific primers and genetic sequencing has been successfully associated with the identification of *Demodex* species in dogs (Bernstein et al., 2014; Ferreira et al., 2015; Silbermayr et al., 2015), as well as in cats (Milosevic et al., 2013; Frank et al., 2013; Bernstein et al., 2014).

![Figure 2. Demodex cati mites found in feline cerumen in optical microscopy in a 10x objective.](image)

The treatment of feline demodicosis depends on the clinical picture presented. In the localized form, some animals may present spontaneous resolution, while in the generalized form there is always a need for therapeutic intervention (Mueller et al., 2020). Due to the scarcity of clinical case reports, a standardized protocol for the treatment of feline otodemodicosis has not yet been established (Simpson, 2021). Macroyclic lactones are a good therapeutic option, such as ivermectin and doramectin (Gondim, 2019). Mueller et al. (2020) reported that the combination of moxidectin with the neocotinoid imidacloprid in a weekly dose, via spot-on, may be an easier alternative for the treatment of feline demodicosis. In addition, both are principles known to be effective against canine demodicosis, in addition to acting on other feline parasitic diseases (Mueller et al., 2020). In the present case, the established protocol was with the use of imidacloprid and moxidectin in spot-on use at intervals of 30 days.

Despite the treatment having proved to be effective, further studies are needed with a greater number of cats treated with this protocol and followed for longer periods, to fully elucidate its effectiveness and confirm the non-recurrence of clinical signs, since it can be a therapeutic option with fewer long-term adverse effects.
CONCLUSION

Although considered rare, demodicosis is a parasitic disease that must be included in the differential diagnoses in domestic felines with dermatological and otological alterations. Genetic sequencing identified *D. cati*, not yet described in cats in Cuiabá – Mato Grosso. Therapy with imidacloprid and moxidectin, in two doses with intervals of 30 days, promoted remission of clinical signs and elimination of the mite.

REFERENCES


