



Otitis externa associated with *Demodex cati* – case report

[Otitite 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 feline, 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).

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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* ACTGTGCTAAGGTAGCGAAGTCA and *reverse primer* TCAAAAGCCAACATCGAG), 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%™, Ibasa, 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; Bouzara-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).

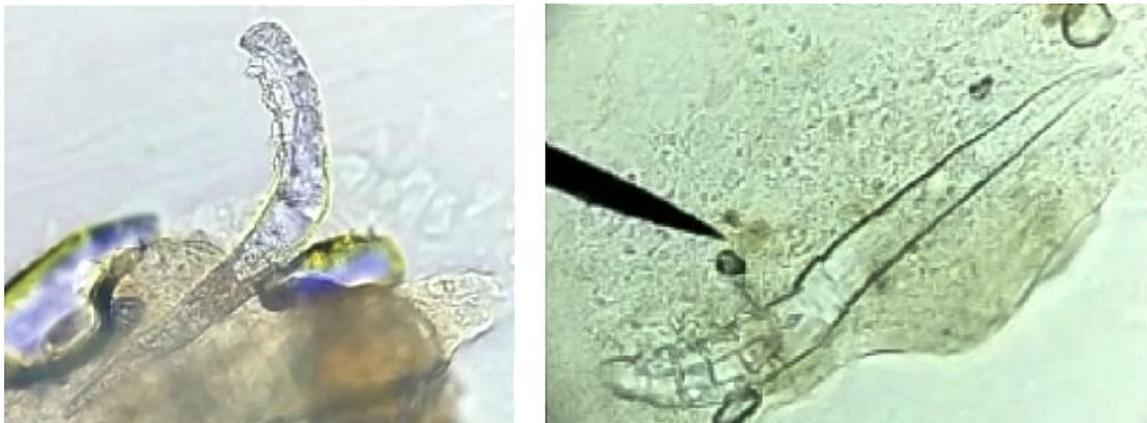


Figure 2. *Demodex cati* mites found in feline cerumen in optical microscopy in a 10× objective.

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). Macrocytic 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.

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