CLINICAL REPORT

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First case of cutaneous mycobacteriosis in a domestic feline in southern Brazil

Primeiro caso de micobacteriose cutânea em um felino doméstico no sul do Brasil

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ABSTRACT: Tegumentary mycobacteriosis in cats is not very common. Three manifestations of skin disease associated with mycobacteria are recognized in domestic cats: feline leprosy, cutaneous tuberculosis and atypical mycobacteriosis. This study aims to describe a case of feline pyogranulomatous panniculitis associated with *Mycobacterium* spp., diagnosed through histopathology and histochemistry. The case occurred in a domestic feline, three years old, five kg, male, of mixed breed, which, in the clinical-physical exam, presented multiple subcutaneous nodules without ulceration of the epidermis and of firm-elastic consistency in the axillary and pectoral regions. One of the axillary nodules was surgically removed, placed in 10% formalin and sent for anatomopathological examination. Histologically, severe, sometimes multifocal, marked focally extensive pyogranulomatous dermatitis and panniculitis were revealed. Amid pyogranulomatous panniculitis, there was the formation of extracellular lipid vacuoles, also called lipocysts, surrounded by numerous neutrophils and histiocytes and with a lumen displaying eosinophilic amorphous material with a granular appearance. Histological sections were submitted to special *Ziehl-Neelsen* staining to detect alcohol-acid-resistant bacillus (BAAR), revealing multiple extra and intra-histiocytic mycobacteria inside the lipocysts. Thus, the anatomopathological and histochemical findings found in the feline indicated that this was the first case of pyogranulomatous dermatitis and panniculitis associated with *Mycobacterium* spp. reported in southern Brazil.

KEYWORDS: Atypical mycobacteria; Panniculitis; Dermatitis; Cats.

RESUMO: As micobacterioses tegumentares em gatos não são comuns. Em felinos domésticos são reconhecidas três manifestações de doença de pele associada a micobactérias, sendo a hanseníase felina, a tuberculose cutânea e a micobacteriose atípica. Este estudo objetiva descrever um caso de paniculite piogranulomatosa em felino associada a *Mycobacterium* spp. diagnosticado através de histopatologia e histoquímica. O caso ocorreu em um felino doméstico, três anos, cinco kg, macho, sem raça definida, e que no exame clínico-físico apresentava múltiplos nódulos subcutâneos, sem ulceração da epiderme, e de consistência firme-elástica em região axilar e peitoral. Um dos nódulos axilares foi removido cirurgicamente, alocado em formalina 10% e enviado para exame anatomopatológico. Histologicamente foi revelada marcada dermatite e paniculite piogranulomatosas focalmente extensiva acentuada, por vezes multifocal. Em meio a paniculite piogranulomatosas havia formação de vacúolos lipídicos extracelulares, também chamados de lipocistos, circundados por numerosos neutrófilos e histiócitos, e com lúmen exibindo material amorfo eosinofílico de aspecto granular. Cortes histológicos foram submetidos a coloração especial de *Ziehl-Neelsen* para pesquisa de bacilos álcool-ácido resistentes (BAAR), revelando múltiplas micobactérias extra e intra-histiocíticas e no interior dos lipocistos. Assim, os achados anatomopatológicos e histoquímicos encontrados no felino indicaram tratar-se do primeiro caso de dermatite e paniculite piogranulomatosas associadas a *Mycobacterium* spp. relatado no Sul do Brasil.

PALAVRAS-CHAVE: Micobactéria atípica; Paniculite; Dermatite; Gatos.

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INTRODUCTION

Tegumentary mycobacterioses are uncommon in the clinical routine of domestic cats. However, several species of the genus *Mycobacterium* can affect the dermis and subcutaneous tissue of cats, including tuberculous mycobacteria (*M. Bovis* and *M. tuberculosis*), mycobacteria that cause leprosy (*M. lepraemurium*) and atypical mycobacteria (White *et al.*, 1983 ; Davies *et al.*, 2006). Atypical mycobacterioses are considered opportunistic or facultative and are commonly found in soil, water and decaying vegetation. Infections by these agents usually occur due to wound contamination or traumatic implantation (Malik *et al.*, 2000; Youssef *et al.*, 2002).

Furthermore, these mycobacteria have a predilection for tissues rich in lipids, and in domestic cats, lesions occur mainly in the subcutaneous tissue of the ventral abdomen and inguinal region, causing pyogranulomatous panniculitis (Vshkautsan *et al.*, 2016; De Sousa *et al.*, 2021). Animal-to-animal transmission is not reported, moreover, atypical mycobacteria are not considered zoonotic (Pekkarinen *et al.*, 2018; Apostolopoulos *et al.*, 2021). The present study aims to report the first pyogranulomatous dermatitis and panniculitis in a domestic feline associated with *Mycobacterium* spp. in southern Brazil.

CASE REPORT

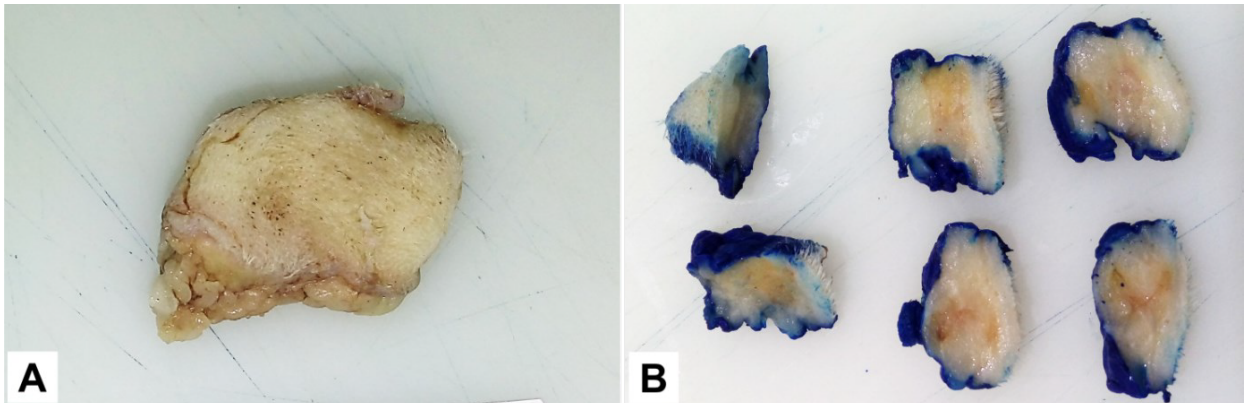
A cutaneous biopsy of a feline, 3 years old, 5 kg, male, mixed breed, was referred for anatomopathological examination. The lesion consisted of an irregular fragment of white-brown, rough and hairy skin, referred to as the axillary region of the right thoracic limb, measuring 2.5x1.7x1.5 cm (Figure 1A). When cut, the subcutaneous tissue showed a poorly delimited area of brownish-yellow color and soft consistency, measuring 1.2x1 cm (Figure 1B).

On histopathological examination, the deep dermis and adipose tissue showed accentuated focally extensive pyogranulomatous dermatitis and panniculitis, sometimes multifocal. The pyogranulomatous inflammatory infiltrate comprised numerous macrophages, epithelioid macrophages and neutrophils, sparse lymphocytes and plasma cells, rare mast cells and eosinophils, and occasional Langhans-type giant cells. There were also reactive fibroblasts and granulation tissue surrounding the foci of inflammation and distributed among the adipocytes of the adipose tissue with inflammation. In some areas, mild multifocal hemorrhage, fibrin deposition, cellular debris, and mild edema were observed. Amid pyogranulomatous panniculitis, there was the formation of extracellular lipid vacuoles (lipocysts) surrounded by numerous neutrophils and histiocytes, with the lumen showing amorphous eosinophilic material with a granular to filamentary appearance (Figure 2A).

Tissue sections were submitted to special *Ziehl-Neelsen* staining to detect alcohol-acid-resistant bacillus (AFB). In the analysis, the samples showed a positive colorimetric/histochemical reaction for sparse BAAR-compatible bacterial structures extra and intra-histiocytic and inside the lipocysts (Figure 2B). Tissue sections were also submitted to special *Grocott* staining and special Periodic Acid *Schiff* (PAS) staining to verify fungal structures, which were not evidenced. Thus, the anatomopathological and histochemical findings indicated that this was a feline pyogranulomatous panniculitis associated with *Mycobacterium* spp.

DISCUSSION

The feline in the report lived in an urban environment with sporadic access to the street, an epidemiologically favorable condition for infection through the traumatic implantation of atypical mycobacteria, especially in cases of animal interaction. After all, atypical mycobacteria are considered opportunistic pathogens or facultative pathogens and are commonly found in soil, water and decaying vegetation, such as the species *M. fortuitum, M. phlei, M. smegmatis, M. chelonae, M. abscessus, M. flavescens, M. thermoresistibile and M. xenopi* (White *et al.*, 1983; Malik *et al.*, 2000; Youssef *et al.*, 2002; Davies *et al.*, 2006).



Authors, 2023.

Figure 1. Cutaneous mycobacteriosis in a feline. **A)** Irregular skin fragment sent for anatomopathological examination. **B)** Cutaneous fragment showing subcutaneous tissue with an ill-defined area, yellow-brown in color and soft in consistency.

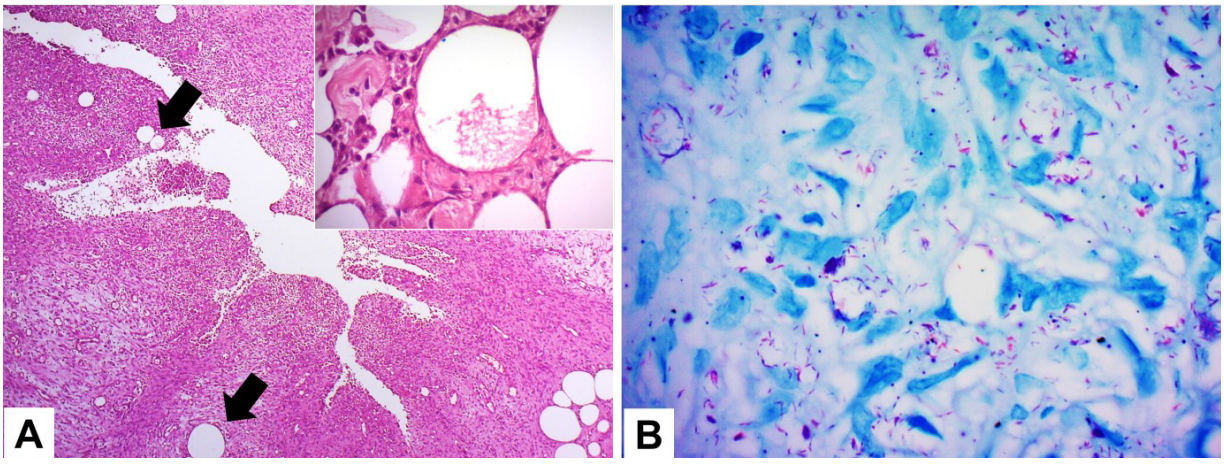


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Figure 2. Cutaneous mycobacteriosis in a feline. **A)** Pyogranulomatous panniculitis with the formation of extracellular lipid vacuoles (lipocysts) surrounded by histiocytes and neutrophils (arrows). HE, 100X. In detail, lipocyst with lumen showing eosinophilic amorphous material with a granular to filamentary appearance. HE, 400X. **B)** Pyogranulomatous panniculitis with multiple reddish-pink extra and intra-histiocytic mycobacteria inside the lipocysts. *Ziehl-Neelsen*, 1000X.

Atypical mycobacteria have a predilection for tissues rich in lipids, causing pyogranulomatous panniculitis. In felines, the lesions are observed mainly in the subcutaneous tissue of the ventral abdomen and inguinal region and appear as multiple nodules (Vishkautsan *et al.*, 2016; De Sousa *et al.*, 2021), as in the present case in which the subcutaneous nodules were detected in the feline axillary and pectoral region. The introduction of atypical alcohol-acid-fast bacillus (BAAR) into the adipose tissue facilitates their pathogenicity and rapid proliferation, as nutrients are abundant and the adipose tissue acts by protecting the AFB from the host's immune response (White *et al.*, 1983; Gunn-Moore, 2014; Pekkarinen *et al.*, 2018; Apostolopoulos *et al.*, 2021). Due to the predilection for tissues rich in lipids, obesity with accumulation of subcutaneous adipose tissue is considered a risk factor for the development of mycobacterial panniculitis, especially in domestic felines that have access to the street, as they have a greater risk of suffering traumatic injuries (Davies *et al.*, 2006; Gunn-Moore, 2014).

During the consultation, it was verified that the feline in the report was clinically well and that the other feline that lived with it did not present any clinical and/or cutaneous/subcutaneous alteration. Such findings corroborate the literature, which emphasizes that animal-to-animal transmission is uncommon and that cats affected by atypical cutaneous mycobacteriosis are generally not immunocompromised and/or exhibit comorbidities (Pekkarinen *et al.*, 2018; Apostolopoulos *et al.*, 2021). Regarding age and gender predisposition, studies point out that all affected cats were between 3 and 10 years old and were primarily females (Malik *et al.*, 2000; Davies *et al.*, 2006), while the feline reported this is a 3-year-old male.

Suspicion and clinical diagnosis are not easy tasks, especially when there are no superficial skin lesions, such as ulceration or alopecia, that would lead to the assumption of microbial involvement (Davies *et al.*, 2006; Gunn-Moore, 2014). Regarding subcutaneous masses/nodules, the primary diagnostic suspicion falls on soft tissue neoplasms, which are relatively common in cats (Dobromylskyj *et al.*, 2021). However, in the case of atypical cutaneous mycobacteriosis, the histopathological analysis rejects the hypothesis of neoplasia and indicates that it is a subcutaneous lesion of the pyogranulomatous type (Miller *et al.*, 1999). For this type of lesion, the presence of fungi should be considered and investigated using special *Grocott* and PAS staining and mycobacteria using special *Ziehl-Neelsen* staining (Davies *et al.*, 2006). In the case of ulcerated and/or purulent lesions, it is also recommended to collect material or tissue fragments from deeper portions for cytological examinations, microbiological culture (fungi and bacteria) or molecular analysis (Vishkautsan *et al.*, 2016; Apostolopoulos *et al.*, 2021). The use of PCR is of great value, as it allows the confirmation of the histological and histochemical diagnosis and the identification of the mycobacterial species (Apostolopoulos *et al.*, 2021). In the reported case, the diagnosis was confirmed through histopathological and histochemical analysis, which revealed pyogranulomatous dermatitis and panniculitis associated with *Mycobacterium* spp.

CONCLUSION

Through anatomopathological and histochemical analysis, it was elucidated that Mycobacterium spp. was the cause of dermatitis and pyogranulomatous panniculitis in the feline in question. The report warns of cutaneous mycobacteriosis in domestic cats in southern Brazil, this being the first reported case. The study also highlights the need for further epidemiological investigation of mycobacteriosis and understanding its pathogenesis in felines to develop strategies for early detection and safe treatment.

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