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Case Report

Feline Dermatophytic Pseudomycetoma (*Microsporum canis*) Infection with *Actinobactoer ursingii* in a British Shorthair Cat: A Case Report in Thailand

Ratchanon Kusolsongkhrokul[1] and Natapol Pumipuntu[2,3]

[1]*Pluto House Animal Clinic, Chachoengsao, Thailand*
[2]*One Health Research Unit, Mahasarakham University, Maha Sarakham, Thailand*
[3]*Faculty of Veterinary Sciences, Mahasarakham University, Maha Sarakham, Thailand*

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Corresponding Author:
Natapol Pumipuntu
Faculty of Veterinary Sciences,
Mahasarakham University,
Maha Sarakham, Thailand
Email: natapol.p@msu.ac.th

Abstract: Dermatophytic pseudomycetoma is a rare, invasive fungal infection characterized by deep dermal and subcutaneous involvement of dermatophytes, uncommonly reported in cats. A 10-month-old, 2.8 kg, sexually intact female British Shorthair cat presented to a veterinary clinic with multiple abscessed nodules on the body, legs, and tail. Lesions contained yellow purulent discharge with granular material resembling fungal grains. Hematological and biochemical analyses revealed values within normal reference ranges. Bacterial culture and antimicrobial susceptibility testing identified *Acinetobacter ursingii*. Histopathological examination of skin biopsy revealed multifocal to coalescing granulomatous inflammation within fibrotic dermis. Granulomas contained central necrosis with large arthroconidia morphologically consistent with *Microsporum canis*. Fungal culture remained negative after 14 days of incubation. The cat was treated with surgical excision of nodular lesions, followed by oral antifungal (itraconazole) and antimicrobial therapy. No recurrence of pseudomycetoma was observed during a two-month follow-up period. This case report highlights the clinical, histopathological, and microbiological features of rare *M. canis*-associated dermatophytic pseudomycetoma with concurrent *A. ursingii* infection in a cat in Thailand, emphasizing diagnostic challenges and successful management strategies.

Keywords: Dermatophytic Pseudomycetoma, *Microsporum canis*, *Acinetobacter ursingii*, Feline Dermatology, Invasive Fungal Infection, Mycetoma, Cat, Thailand

Introduction

Dermatophytosis is a zoonotic fungal infection transmitted through direct contact with infected animals or indirect exposure to contaminated environments and fomites. The most common etiological agents in animals are species within the genera *Microsporum* and *Trichophyton*. In cases of dermatophytic pseudomycetoma, gross lesions present as deep granulomatous nodular dermal and subcutaneous masses containing distorted fungal hyphae (James, 2017).

Dermatophytic pseudomycetoma, also termed pseudomycetoma or pseudomaduromycosis, is a chronic inflammatory skin condition in veterinary dermatology involving both cutaneous and subcutaneous tissues (Duangkaew *et al*., 2017; Moraes *et al.,* 2025). Clinically, it is characterized by nodular lesions, sinus tract formation, and purulent discharge, resembling true mycetoma, a fungal infection frequently encountered in veterinary practice (Black *et al*., 2001). However, in contrast to true mycetoma which is caused by invasive fungal or bacterial pathogens, pseudomycetoma is generally considered a reactive inflammatory response to dermatophytes or possibly foreign bodies, reflecting a distinct pathophysiological mechanism (Chang *et al.,* 2011).

In clinical veterinary dermatopathology, dermatophytic pseudomycetoma most frequently affects appendicular extremities. The condition shows a particular predilection for the pedal regions and distal limbs (Barrs *et al*., 2024; Hobi *et al*., 2024). However, cases involving other

anatomical sites have also been reported (Chermette *et al*., 2008). Clinically, the lesions manifest as slowly enlarging, painless nodules that may eventually develop sinus tracts. These tracts often exude granular discharge, defining characteristics that closely resemble the characteristic "grains" which is observed in true mycetoma (Black *et al*., 2001). The anatomical distribution and morphological features of pseudomycetoma can vary widely among affected animals. Therefore, a thorough and precise diagnostic approach is essential in veterinary medicine to differentiate it from other granulomatous skin diseases (Ferro *et al*., 2008).

The diagnosis of pseudomycetoma can be challenging due to its phenotypic resemblance to true mycetoma and other granulomatous dermatoses (Gross *et al*., 2005). A comprehensive diagnostic approach includes history taking, clinical examination, imaging (e.g., radiography or ultrasonography), and, crucially, histopathology is essential for distinguishing pseudomycetoma from other differential diagnoses (Barrs *et al*., 2024; Cho *et al.,* 2024). In most cases, a definitive diagnosis requires histopathological examination of biopsy samples (Zimmerman *et al*., 2003). Histological findings typically include chronic inflammatory infiltrates and foreign body reactions, with a notable absence of fungal or bacterial organisms (Gross *et al*., 2005; Nardoni *et al*., 2007). These diagnostic challenges highlight the significant for a systematic and multidisciplinary approach to accurately identify and manage pseudomycetoma in veterinary practice.

The treatment of pseudomycetoma primarily involves surgical excision of nodules and sinus tracts to remove foreign material and inflamed tissues (Nobre *et al*., 2010). In some cases, reconstructive surgery may be necessary to restore the affected anatomical structures. Because pseudomycetoma is non-infectious in etiology, conventional antifungal or antibiotic therapy is generally ineffective (Sudjaidee *et al*., 2019; John *et al*., 2020). Therefore, an accurate surgical approach as complete surgical remove combined with appropriate post-operative care are essential for optimal clinical outcomes in affected animals (John *et al*., 2020).

Although pseudomycetoma in cats is infrequently reported, it seems to be clinical significance in veterinary microbiology due to its distinct pathophysiology and diagnostic challenges. When pseudomycetoma is suspected or specific health concerns are identified, a comprehensive and proactive clinical evaluation is crucial. Accurate diagnosis requires a thorough understanding of its etiology, despite the absence of a microbial causative agent, as well as the implementation of appropriate diagnostic techniques. This highlights the importance of integrating clinical, histopathological, and imaging modalities to ensure precise differentiation from other granulomatous skin conditions. A comprehensive understanding of pseudomycetoma is crucial for effective diagnosis and management within veterinary clinical practice (Nobre *et al*., 2010).

This report describes the diagnosis and successful management of dermatophytic pseudomycetoma in a British Shorthair cat complicated by concurrent *Actinobacter ursingii* infection. The case was managed using a combination of wide-margin surgical excision and antibiotic therapy. The report details the clinical presentation, diagnostic approach, and treatment strategy, describing the interaction between the cat, *Microsporum canis*, and the combined surgical and therapeutic interventions approach. Our case report provides detailed insights into this treatment approach, which may serve as a valuable option and useful guideline for veterinarians managing comparable dermatophytic pseudomycetoma cases in clinical practice.

Case Presentation

A 10-month-old, 2.8 kg, unspayed female British Shorthair cat and maintained in a strictly indoor housing, was brought to the veterinary clinic with a history of recurrent skin lesions. The cat had completed its core vaccination program, and screening tests for Feline Immunodeficiency Virus (FIV) and Feline Leukemia Virus (FeLV) using rapid test kits were negative. From the history taking, the cat had been treated for a bite wound on the right forelimb and a concurrent fungal infection for 4 months. From the external appearance, the cat exhibited multiple nodular skin lesions with abscess formation and yellow granular discharge (grains-like) distributed across the body, legs, and its tail which are shown in Fig. 1. Physical examination further revealed the location of the skin lesions on the cat (Fig. 2). Screening diagnostic examination using Wood's lamp fluorescence testing showed negative results. A direct smear of the nodular and purulent material, stained with methylene blue, revealed the presence of hairs and yellowish tissue.

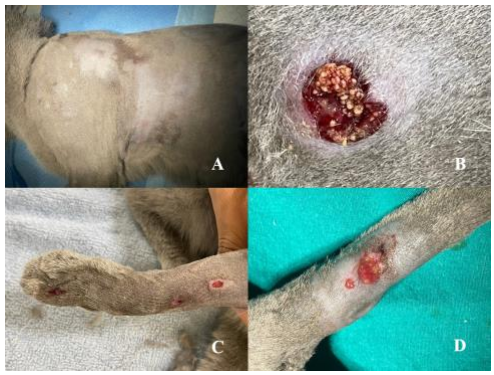

Fig. 1: The wound abscess and multinodular (A) with yellow discharge a granular material (grains) on body (B), legs (C) and tail (D)

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Fig. 2: The location of the skin lesion on physical examination

Blood sample was taken from the femoral veins for hematological and biochemical profiling with are shown in Table 1. Local anesthesia was administered using lidocaine infiltration around the nodule prior to biopsy. Local anesthesia was administered using lidocaine infiltration around the nodule. The site was prepped with antiseptic solution, sterile draping was applied, and sterile instruments were used throughout. A deep tissue biopsy was then collected to avoid superficial contamination and ensure representative sampling of the lesion. The tissue samples were submitted to a veterinary central laboratory for microbial identification, antimicrobial susceptibility testing (MIC), and fungal culture.

The cat was initially treated with cefazolin (Cefazillin®) at a dosage of 20 mg/kg and tolfenamic acid (Tonamic®) at 4 mg/kg via the subcutaneous route for antimicrobial and anti-inflammatory management, respectively. Additionally, oral cefalexin (Teplexin®) was prescribed at a dosage of 25 mg/kg twice daily for seven days. Although the cat was undergoing treatment, the nodular lesions continued to spread across the body while awaiting diagnostic results.

Histopathological examination of the skin biopsy revealed non-encapsulated, multifocal to coalescing fungal granulomas extensively distributed throughout the fibrotic dermis. Each granuloma displayed central necrosis with a dense accumulation of large *Microsporum canis* arthrospores and numerous fungal hyphae. The inflammatory response included infiltration of segmented neutrophils, foamy macrophages, lymphocytes, and multinucleated giant cells as shown in Fig. 3. Certain areas demonstrated moderate necrosis and hemorrhage accompanied by fibrosis. In addition, bacterial identification and antimicrobial susceptibility testing (MIC) indicated the presence of Acinetobacter ursingii, as determined using the VITEK®2 Compact system (bioMérieux, France). Fungal culture showed no visible growth following 14 days of incubation under standard laboratory conditions.

Table 1: Hematological and biochemical profiling of the cat

Parameter	Day 1	Day 9
HCT (%)	33.7	30.1
RBC (10^{12}/L)	8.61	7.63
HGB (g/dL)	11.9	10.5
WBC (10^9/L)	5.51	9.43
Neutrophil (10^9/L)	3.341	6.280
Lymphocyte (10^9/L)	0.894	0.841
Eosinophil (10^9/L)	0.944	1.992
Basophil (10^9/L)	0.028	0.067
Monocyte (10^9/L)	0.303	0.250
ALP (U/L)	35	-
ALT (U/L)	172	89
Glucose (mg/dL)	88	-
Total protein (g/dL)	6.8	-
Creatinine (mg/dL)	1.00	1.07
BUN (mg/dL)	16.3	-

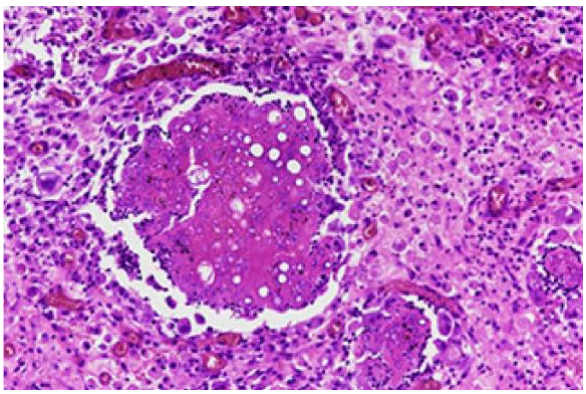

Fig. 3: Histopathological findings from the skin biopsy. A 1.5×1.5 cm firm tissue section was obtained from the cranial dorsal thoracic region. The biopsy revealed non-encapsulated, multifocal to coalescing fungal granulomas extensively distributed throughout the fibrotic dermis. Each granuloma exhibited central necrosis with a dense accumulation of large *Microsporum canis* arthrospores and numerous fungal hyphae. Inflammatory infiltrates consisted of segmented neutrophils, foamy macrophages, lymphocytes, and multinucleated giant cells

In addition, bacterial identification indicated the presence of Acinetobacter ursingii (biomumber 0000000300200000) as determined using the VITEK®2 (GN-lot number 2412246503) Compact system (bioMérieux, France) with 99% probability and excellent identification confidence (analysis time 7.97 hours). Antimicrobial susceptibility testing (MIC) employed VITEK®2 (AST-GN97-lot number 6872282403), MICs were interpreted according to CLSI VET01S/Ed5E (2020). The resistant phenotypes reported as per VITEK AES (advanced expert system) were documented and analyzed (analysis time 18.22 hours). Fungal culture showed no visible growth following 14 days of incubation under standard laboratory conditions.

After confirming the diagnostic test results, a treatment plan was implemented. Surgical excision of the multinodular lesions was performed to remove the affected tissue. Adjunctive medical therapy consisted of oral itraconazole at a dosage of 10 mg/kg once daily for one month as antifungal treatment. Additionally, marbofloxacin (Marbocyl®) was administered at 10 mg/kg orally once daily for one week, while robenacoxib (Onsior™) was prescribed for anti-inflammatory management at a once-daily oral dose for three days.

Follow-up evaluation over a six-month period demonstrated no evidence of lesion recurrence, indicating a favorable treatment outcome. However, post-therapeutic hematological and biochemical monitoring was not conducted, as the owner declined further testing. Consequently, potential systemic adverse effects associated with the administered medications could not be evaluated.

Discussion

Dermatophytic pseudomycetoma is hypothesized to develop when fungal elements infiltrate the subcutaneous tissue, often through infected hair follicles. This process triggers a localized inflammatory response, leading to granulomatous lesion formation. An alternative pathogenic mechanism involves the direct introduction of fungal spores into the subcutaneous tissue following traumatic injuries, such as bite wounds sustained during feline altercations. This mode of transmission allows fungal elements to bypass the epidermal barrier, facilitating deep-tissue colonization (Cho *et al*., 2024). In both endogenous and exogenous cases, the development of pseudomycetoma is closely associated with a pre-existing *Microsporum canis* infection. Exogenous infections may occur when *M. canis* infected claws introduce fungal elements into deeper tissues during aggressive animal fighting (Thian *et al*., 2008). In contrast, true mycetoma develops following penetrating injuries that introduce environmental fungi into the subcutaneous tissue. These fungi, which are often derived from plant debris or soil, establish persistent infections at the site of inoculation. This process subsequently triggers a chronic granulomatous inflammatory response, leading to progressive tissue involvement (Stanley *et al*., 2008)

Dermatophytic pseudomycetoma is most frequently reported in Persian cats, likely due to a combination of genetic predisposition and breed-specific anatomical traits (Thian *et al*., 2008). Recent studies have identified an ancestral haplotype in Persian cats associated with mutations in genes encoding antimicrobial peptides, such as *S100A9*, which may compromise cutaneous immune defense and predispose these individuals to more severe forms of dermatophytosis (Myers *et al*., 2022). Although infrequently reported in other breeds, occurrences in cats such as the British Shorthair suggest that the development of pseudomycetoma may not be limited to specific breeds. This suggests that the pathogenesis of pseudomycetoma may be influenced by a multifactorial interplay of genetic, immunological, and environmental factors (Hobi *et al*., 2024).

This British Shorthair cat presented with a wound abscess and multiple nodular lesions exuding yellow granular discharge. The cat had a history of outdoor exposure, increasing its susceptibility to accidental injuries and territorial conflicts. Notably, Wood's lamp examination did not reveal fluorescence in the cat's coat. However, the absence of fluorescence does not definitively rule out *M. canis* infection. It is important to recognize that a negative Wood's lamp examination does not definitively exclude *M. canis* infection, as fluorescence may not be present in all infected hairs throughout the duration of infection cycle (Cho *et al,* 2024). The production of water-soluble fluorescent material is strain-dependent and varies among different dermatophyte strains. As a result, a pre-existing *M. canis* infection may have been present alongside the pseudomycetoma at the time of examination. This underscores the limitations of using Wood's lamp examination as the sole diagnostic tool (Zafrany *et al.*, 2014). Dermatophytic pseudomycetoma may clinically resemble neoplasia or chronic abscesses, leading to misdiagnosis, especially in general practice where the condition is uncommon. Accurate diagnosis requires combined histopathological and microbiological evaluation.

Identification of *Acinetobacter ursingii* in this case was performed using the VITEK®2 Compact system (bioMérieux, France), an automated biochemical platform commonly employed in clinical microbiology laboratories for bacterial identification. The organism was isolated from purulent exudate and yielded a high-confidence match to *A. ursingii* based on the system's database. Although the VITEK®2 system provides reliable identification for frequently encountered species within the Acinetobacter genus, its discriminatory capacity diminishes when evaluating uncommon or phylogenetically related taxa, such as members of the *Acinetobacter calcoaceticus–baumannii* complex (Bagudo *et al.*, 2020). Accordingly, confirmatory molecular diagnostics such as 16S rRNA gene sequencing, supplemented by Internal Transcribed Spacer (ITS) region analysis, can be used for analyzing definitive species-level identification (Chiu *et al.*, 2015; Bagudo *et al.*, 2020). However, this is a limitation of our study. Nonetheless, the organism was identified with high confidence using the available resources, and clinical decisions were guided accordingly. Future studies should incorporate molecular techniques to enhance diagnostic

accuracy and further elucidate the clinical relevance of unusual isolates such as *Acinetobacter ursingii* in veterinary cases.

16S rRNA and 16S–23S rRNA internal

transcribed spacer sequence analysis.

Although fungal culture is traditionally considered the gold standard for diagnosing dermatophytosis, its diagnostic utility is limited by extended incubation periods, reduced sensitivity in low-burden infections, and susceptibility to interference from sample degradation, prior antifungal therapy, or microbial contamination (Moriello *et al*., 2017; Moskaluk and VandeWoude, 2022). In the present case, fungal culture remained negative after 14 days of incubation despite histopathological evidence consistent with *M. canis*. This discordance suggests compromised fungal viability at the time of collection or overgrowth by contaminating organisms. In such situations, histopathology serves as a critical diagnostic modality, particularly when fungal elements such as hyphae and arthrospores are observed within keratinized tissues. The application of special stains, including Periodic Acid Schiff (PAS) and Gomori Methenamine Silver (GMS), enhances visualization of fungal structures by improving contrast and morphological definition (Sudjaidee *et al*., 2019). When culture results are inconclusive, molecular diagnostic assays, notably Polymerase Chain Reaction (PCR), should be employed to improve diagnostic accuracy. PCR has demonstrated superior sensitivity, specificity, and reliability in detecting dermatophytes, particularly when fungal burden is minimal or sample integrity is compromised (Mendonça *et al.,* 2022; Mendes *et al*., 2024). These molecular tools are particularly advantageous in high-risk environments such as animal shelters or multi-animal facilities where rapid diagnosis and intervention are essential (Moskaluk and VandeWoude, 2022). Integrating histopathology, fungal culture, and molecular diagnostics allows for a comprehensive diagnostic approach that enhances accuracy, reduces diagnostic delays, and supports appropriate clinical management in suspected dermatophytic infections.

While the primary focus of the case was the identification and characterization of dermatophytic pseudomycetoma, microbiological evaluation also uncovered an unusual bacterial isolate, introducing an additional dimension to the case. An important and unusual aspect of this case was the concurrent isolation of *A. ursingii*, an uncommon and opportunistic bacterium rarely associated with cutaneous infections in feline patients. *A. ursingii* has primarily been identified as an opportunistic pathogen in humans, particularly in immunocompromised individuals (Loubinoux *et al.,* 2003). In canine species, this organism has been isolated from the urinary tract. However, previous studies have demonstrated that phenotypic methods may not reliably differentiate this species from other members of the *Acinetobacter* genus (Salavati *et al*., 2017).

A. ursingii was isolated in pure, heavy growth from a deep tissue biopsy obtained aseptically, with neutrophil-rich suppurative inflammation on cytology. Identification by VITEK®2 Compact yielded a 99% probability with excellent confidence; MICs were interpreted per CLSI VET01S/Ed5E. Clinical signs improved rapidly with MIC-guided therapy, supporting causality rather than contamination. To minimize the risk of contamination, samples were collected under sterile conditions (skin preparation, sterile instruments, sterile containers) and processed promptly. Where available, repeat cultures from independent specimens yielded concordant A. ursingii results. Although Acinetobacter *spp*. can be environmental opportunists, the site of isolation (deep lesion), inflammatory context, and treatment response collectively support true infection.

Although the clinical significance of *A. ursingii* in this case remains uncertain, it is plausible that the bacterium functioned as a secondary invader following disruption of the skin barrier due to fungal infection. This potential bacterial-fungal co-infection may have exacerbated the severity and persistence of the lesion. From our knowledge, this is the first report of *A. ursingii* isolated in co-infection with dermatophytic pseudomycetoma in a veterinary context, highlighting the need for further investigation into the role of bacterial co-pathogens in deep mycotic infections.

The comprehensive treatment of pseudomycetomata has been infrequently described in published studies. The initial therapeutic approach with cefazolin and cefalexin was based on the assumption that the abscess-like lesion was of bacterial origin. However, after identifying *M. canis* and a bacterial infection, itraconazole and marbofloxacin were chosen as the antifungal and antibiotic treatments, respectively, due to the results of identification and antimicrobial susceptibility testing (MIC). Pseudomycetomata have been rarely reported in feline populations in Thailand. However, unrecognized or unreported cases may still occur. If a cat presents with a non-painful, granular lesion that does not respond to antibiotic or antifungal treatments, further investigation is needed. A biopsy of the lesion should be strongly considered. This will help to evaluate pseudomycetoma as a potential differential diagnosis.

Dermatophytic pseudomycetoma and *A. ursingii* have not been confirmed as a zoonotic infection, unlike superficial dermatophytosis. However, due to the zoonotic potential of *M. canis*, implementing preventive

measures is recommended. In multi-cat households, strict isolation of affected animals during the treatment period is essential to minimize the risk of transmission. Thorough environmental decontamination should also be carried out to reduce pathogen persistence in the environment. In addition, implementing appropriate hygiene protocols and regularly monitoring animals in contact with the infected individual are recommended to safeguard both animal and human health.

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Author's Contributions

Both the authors have equally contributed to this manuscript.

Ethics

Ethical approval was not required for the case report in accordance with institutional requirements. Informed consent was obtained from the pet owners prior to data collection. Additionally, written informed consent was provided by the owner for the publication of this case report.

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