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Beyond the surface: an uncommon case of *Microsporum gypseum* subcutaneous mycosis induced by an insect bite

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Consent for publication: the patient gave her written consent to use her personal data for the publication of this case report and any accompanying images.

Abstract

Deep cutaneous and subcutaneous infections caused by dermatophytes are exceptionally uncommon, typically occurring through traumatic inoculation.

This clinical report details the complex dermatological journey of a young, immunocompetent 24-year-old girl who reported a rare case of a subcutaneous mycosis caused by *Microsporum gypseum*. The patient presented with an annular erythematous plaque with centered papules on her left hand, which she referred to as stemming from an insect bite. Initial evaluation at another hospital included a biopsy, which resulted in a preliminary diagnosis of pyoderma gangrenosum. Appropriate treatment with topical steroids and later oral cyclosporine provided no response, leading clinicians to perform a new biopsy and cultural examination; the patient was diagnosed with epidermomycosis and pustular folliculitis caused by *Microsporum gypseum*, a geophilic dermatophyte.

In our patient's case, terbinafine proved effective, resulting in complete remission. This article aims to emphasize the importance of considering rare conditions such as subcutaneous epidermomycosis when the patient's medical history provides suggestive clues, particularly if the clinical manifestation aligns with the hypothesis.

Introduction

Epidermomycosis refers to a fungal skin infection caused by dermatophytes, a group of fungi that commonly infect the skin, hair, and nails. *Microsporum gypseum*, a wild geophilic dermatophyte that primarily derives its infection source from the environment, can infect humans and various animals, predominantly resulting in skin diseases.[1]

While infrequently responsible for human infections, this fungus has been implicated in skin and hair infections, particularly in *tinea barbae*. Research on dermatophytoses across various global regions indicates that *M. gypseum* infections are uncommon compared to those caused by *T. rubrum, T. mentagrophytes*, and *M. canis*.[2-4]

Dermatophytes typically target the keratinized layer of skin, hair, and nails, with their growth confined to the outermost dead zones. Nonetheless, in cases of mechanical skin breakage due to scratching or trauma, fungi can penetrate the dermis. Deep cutaneous and subcutaneous infections caused by dermatophytes are exceptionally uncommon and typically occur in immunosuppressed individuals.[5,6]

Invasive fungal infections following insect bites may be linked to toxin release. Alternatively, bites from arthropods inducing pruritic reactions may lead to patient-driven inoculation through rubbing, facilitating spore and hyphae penetration. Understanding these mechanisms is crucial for effective diagnosis and management of such infections.[7]

The clinical presentation commonly includes localized lesions, nodules, or ulcers. In some cases, the infection may spread to deeper tissues, causing inflammation, abscess formation, and tissue destruction.

In diagnosing subcutaneous mycosis, clinicians should consider conditions with similar clinical features, including bacterial infections (cellulitis, abscesses), mycobacterial infections, parasitic infections (cutaneous leishmaniasis), and tumors (nodular melanoma, basal cell carcinoma). Rheumatoid nodules, granulomatous disorders, pyoderma gangrenosum, and other fungal infections should also be considered. Accurate identification involves biopsy, culture from appropriately sampled tissue, and collaboration with healthcare professionals.

In this report, we present a case of atypical invasion of the dermis by *M. gypseum*, initially misdiagnosed as pyoderma gangrenosum.[5]

Case Report

A 24-year-old girl sought medical attention in June 2020 for the onset of an annular erythematous lesion with swollen borders and central papular grouped lesions with a lighter hue on her left hand and wrist that she referred to as stemming from an insect bite (Figure 1).

She referred to a dermatology center, where a punch biopsy was performed, resulting in a diagnosis of pyoderma gangrenosum. This led to treatments with topical steroids, topical antibiotics, and systemic steroids, which provided temporary and modest relief. In September 2020, she presented to our dermatology division, showing a significant worsening of her condition, with subcutaneous nodules and pustules that had risen in the center of the lesion, surrounded by a white hue and peripheral red, swollen borders (Figure 2).

Clinically, the lesion did not exhibit characteristics consistent with pyoderma gangrenosum; however, relying on the gold standard for dermatological diagnosis, which is biopsy, therapy with oral cyclosporine was started at a dosage of 200 mg/day for a month. Unfortunately, this intervention did not yield the expected improvement, and the lesions had extended up to the wrist and the forearm (Figure 3).

Consequently, we opted for admission to our hospital in October 2020. A biopsy was repeated during hospitalization in November 2020; it revealed epidermomycosis and pustular folliculitis. PAS (periodic acid-Schiff) coloration exhibited the presence of hyphae and fungal spores, with mycological examination by culture identifying *Microsporum gypseum*. We started with empirical antibiotic therapy with azithromycin and rifampin while awaiting the results of the microbiological analysis and concurrent antibiotic sensitivity test (antibiogram). Encouragingly, the lesions showed partial improvement with a reduction in erythema and pustules. When culture of the pustules revealed

positive for *M. gypseum*, appropriate therapy with terbinafine was executed at a dosage of 250 mg orally.

The patient experienced significant improvement with no recurrence from January 2021, leading to complete remission by February 2022 (Figure 4).

Discussion

This case underscores the diagnostic challenges in dermatology, emphasized by the initial misdiagnosis of pyoderma gangrenosum. Within the existing medical literature, subcutaneous mycosis caused by *M. gypseum* has only been described once, in 2012, when the point of entry was identified as a splinter injury. In the present case, however, transmission transpired through an insect bite.

The subsequent identification of epidermomycosis and pustular folliculitis, confirmed by histological and mycological findings, prompted a tailored therapeutic approach. The use of oral terbinafine, along with continuous monitoring, played a pivotal role in achieving sustained clinical improvement.

The case emphasizes the importance of flexibility in diagnostic reasoning, treatment plans, and collaboration between medical professionals in managing complex dermatological conditions.

Conclusions

In conclusion, the present case highlights the complexity of dermatological diagnosis, emphasizing the crucial role of biopsy as a diagnostic tool. However, it is imperative to acknowledge that biopsy findings should not be the sole determinant of a diagnosis, as they may be influenced by the pathologist's interpretation or may originate from a non-representative area of the lesion. Therefore, the repetition of biopsies, integrated with other useful diagnostic tools, such as cultures, becomes essential, as shown by this case. While biopsy results are significant, clinical evaluation remains equally paramount. It is vital not only to rely on a biopsy but also to consider the broader clinical context.

When common diagnostic hypotheses are excluded, exploration of rare instances becomes imperative. Subcutaneous epidermomycosis caused by *Microsporum gypseum* is rare; however, the diagnosis of deep epidermomycosis should be considered when there is a history of potential inoculation.

The journey towards accurate and timely diagnoses begins with a willingness to consider the extraordinary, especially when the patient's history and clinical presentation suggest the possibility of conditions that may initially appear uncommon or elusive. Furthermore, the response to therapy serves not only to cure the patient but also to deepen our understanding of the lesion. Our patient's

journey underscores the need for a comprehensive and dynamic approach to dermatological cases, integrating clinical acumen with diagnostic tools for optimal patient care.

References

1. Ma X, Liu Z, Yu Y, et al. Microsporum gypseum Isolated from Ailuropoda melanoleuca Provokes Inflammation and Triggers Th17 Adaptive Immunity Response. Int J Mol Sci 2022;23:12037.
2. Gordon MA. The occurrence of the dermatophyte, Microsporum gypseum, as a saprophyte in soil. J Invest Dermatol 1953;20:201-6.
3. García-Martos P, Ruiz-Aragón J, García-Agudo L, Linares M. Dermatophytoses due to Microsporum gypseum: report of eight cases and literature review. Rev Iberoam Micol 2004;21:147-9.
4. Ajello L. The dermatophyte, Microsporum gypseum, as a saprophyte and parasite. J Invest Dermatol 1953;21:157-71.
5. Fernández-Torres B, Mayayo E, Boronat J, Guarro J. Subcutaneous infection by Microsporum gypseum. Br J Dermatol 2002;146:311-3.
6. Carrasco-Zuber JE, Navarrete-Dechent C, Bonifaz A, et al. Cutaneous Involvement in the Deep Mycoses: A Literature Review. Part I—Subcutaneous Mycoses. Actas Dermosifiliogr 2016;107:806-15.
7. Maronese CA, Pimentel MA, Li MM, et al. Pyoderma Gangrenosum: An Updated Literature Review on Established and Emerging Pharmacological Treatments. Am J Clin Dermatol 2022;23:615-34.

Figure 1. Annular erythematous lesion with swollen borders and central papular grouped lesions with a lighter hue on left hand and wrist.

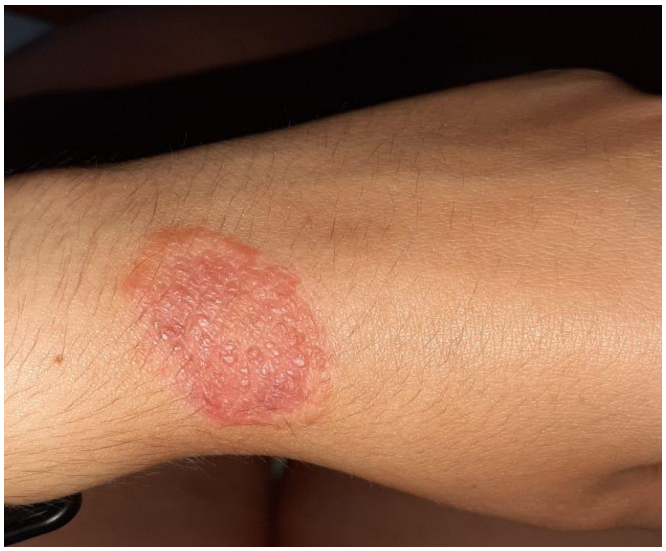

Figure 2. Subcutaneous nodules and pustules in the center of the lesion, surrounded by a white hue and peripheral red, swollen borders.

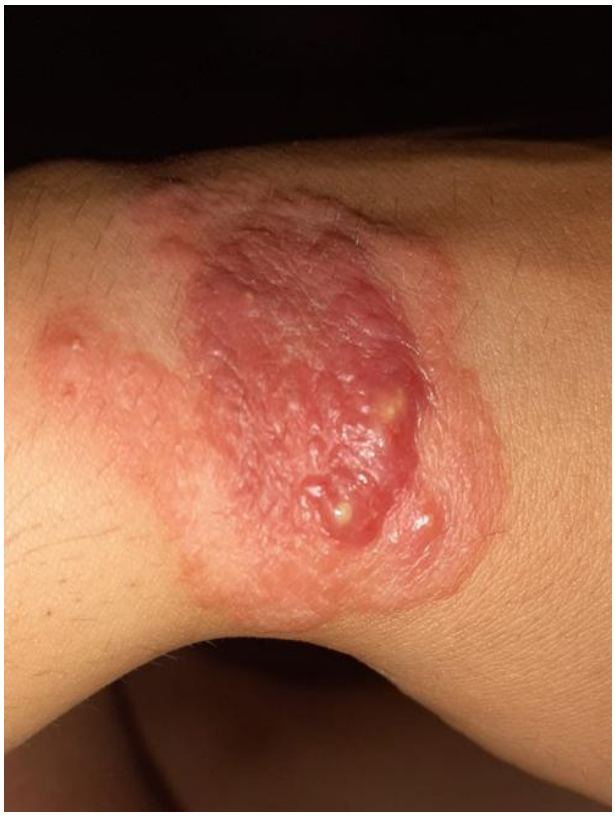

Figure 3. Lesions extended up to the wrist and the forearm.

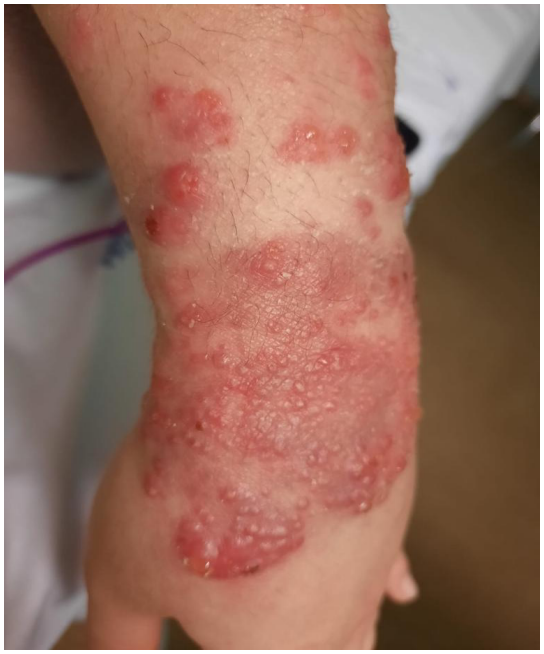

Figure 4. Complete remission (February 2022).