

Cryptic deep dermatophytosis in a renal transplant recipient with hidradenitis suppurativa



Alan Snyder, MSCR,^a Ahmad Aleisa, MD,^{a,b} Jessica Lewis, MD,^c Joni Mazza-McCrann, MD,^a and Jessica A. Forcucci, MD^d
Charleston, South Carolina and Riyadh, Saudi Arabia

Key words: chronic infection; deep dermatophytosis; fungus; hidradenitis suppurativa; renal transplant.

INTRODUCTION

Anthropophilic dermatophyte infection is one of the most commonly encountered skin and nail pathologies. Invasive disease occurs in immunocompromised individuals through follicular invasion, traumatic infiltration, or localized infiltration in pathologies inducing epithelial barrier disruption. It typically presents as purplish ulcerated nodules of the lower extremities, but corporal manifestations vary in extent and appearance, ranging from scaly nodules and plaques to tumor-like pseudocysts, vegetative nodules, coalesced pink-purple plaques, or papulopustular lesions with or without pain.¹

Mimicking disease states or infections can blur differential diagnosis, but their concomitant presence is seldom described. We report a unique case of *Trichophyton rubrum* deep dermatophytosis in an immunocompromised host with a previous diagnosis of hidradenitis suppurativa (HS).

CASE DESCRIPTION

A 61-year-old man with a history of kidney transplantation, onychomycosis, gout, tinea cruris and pedis, and diabetes presented for a violaceous and purulent nodule on the inguinal aspect of the right thigh. The lesion was asymptomatic, and there were no signs of systemic infection. Of note, similarly appearing, relapsing lesions of the groin and thigh progressively worsened over the past 4 months despite the use of ketoconazole cream, topical chlorhexidine, and clindamycin swabs as well as

Abbreviations used:

GMS: grocott methenamine silver
 H&E: hematoxylin-eosin-stain
 HS: hidradenitis suppurativa

numerous courses of antibiotics for *Escherichia coli* urinary tract infections and bacteremia. Culture of drainage from an inguinal nodule produced scant colonies of *Corynebacterium* and sterile white mold, presumed to be contaminants. A biopsy of this inguinal nodule revealed perifollicular suppurative and granulomatous inflammation suggestive of HS on hematoxylin-eosin-stain (H&E). Additional staining was not performed. This diagnosis, failure of medical treatment, and the development of additional purulent papules and nodules with scarring tracts in the groin, prompted referral to plastic surgery for excision. Histopathology of the inguinal excision displayed abscesses, scars, candida pseudohyphae, and inflammation on H&E, and numerous yeast and hyphae on Grocott methenamine silver (GMS), again being consistent with HS. Intraoperatively, a purulent papule of the ankle, similar to the inguinal and groin lesions, was noted and subsequent punch biopsy also demonstrated a dermal abscess with yeast and hyphal forms assumed to be a contaminant. No cultures were performed.

By the time of his post-operative visit 3 weeks later, no groin nodules had returned, but the patient's

From the Department of Dermatology and Dermatologic Surgery, Medical University of South Carolina^a; Department of Dermatology, King Saud Medical City^b; Department of Medicine, Division of Infectious Diseases, Medical University of South Carolina^c; and Department of Pathology and Laboratory Medicine, Medical University of South Carolina.^d

Funding sources: None.

Correspondence to: Alan Snyder, MSCR, 135 Rutledge Avenue, RT 1149 MSC578 Charleston, South Carolina. E-mail: snydeala@musc.edu.

JAAD Case Reports 2021;9:86-9.

2352-5126

© 2021 by the American Academy of Dermatology, Inc. Published by Elsevier, Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.jcdr.2021.01.017>



Fig 1. Facial deep dermatophytosis. Clinical photograph of asymmetrically dispersed draining nodules on the face.

ankle lesion had developed into a large and purulent mass. Also since the time of surgery, he developed a new eruption of nodules on the left side of his face. The patient denied fever or chills and remained compliant with his post-transplant regimen of tacrolimus, mycophenolate, and prednisone.

Physical examination revealed well-healed scars in the groin, several draining nodules on the face (Fig 1), and the previously biopsied large, painless, and purulent tumor on the right ankle (Fig 2). Repeat biopsy and culture of the face and ankle were performed (Fig 3). Laboratory evaluation revealed a normal white blood cell count and beta-D-glucan levels greater than 500 pg/mL, raising concern for deep fungal infection. Other fungal antigen tests were negative. Microscopic inspection revealed pseudoepitheliomatous hyperplasia with suppurative inflammation, and GMS highlighted deep dermal branching hyphae, with some organisms demonstrating asymmetrical walls, which could be suggestive of *Blastomyces*.

Fungal culture ultimately grew *T. rubrum* sensitive to itraconazole, and the patient was diagnosed with *T. rubrum* deep dermatophytosis in the setting of immunosuppression. The patient experienced significant clinical improvement after 2 months of itraconazole, with complete resolution of facial nodules and decrease in size and purulence of the ankle lesion.

DISCUSSION

Less than 100 cases of invasive *T. rubrum* have been reported in the literature since its description by Majocchi et al. in 1883.² The disease has 4 distinct clinical manifestations: Majocchi granuloma, deep dermatophytosis, disseminated dermatophytosis, and (pseudo)mycetoma (Table 1). In the context of immunosuppression and active tinea without systemic antifungal treatment, it is likely that our patient insidiously progressed from superficial to



Fig 2. Deep dermatophytosis tumor. Clinical photograph of purulent, exophytic posterior ankle tumor exhibiting pinpoint hemorrhages.

superimposed deep dermatophytosis while being treated for HS. Moreover, it is possible that the epithelial compromise induced by his uncontrolled HS hastened deep fungal infections in areas of active superficial tinea.

The association between HS and infectious disease has not been fully elucidated; significant dysbiosis, increased inflammatory cytokines, inhibited notch signaling, and anti-microbial peptide synthesis³ may play a role in self-perpetuation of the condition. However, it is well known that terminal follicle hyperkeratosis and subsequent follicular rupture results in expulsion of epithelial components and bacteria into the dermis, where acute and chronic infection exacerbate the disease. Immunodysregulation and epithelial barrier disruption foster higher rates of all-cause infection; HS is associated with a more than three-fold increased risk of fungal infection.⁴ This overlap between auto-inflammatory and chronic infectious pathologies, in which suppuration, abscesses, and scarring are abundant, can significantly complicate the clinical and microscopic examination. Although biopsy and culture of the patient's ankle mass would prompt the final diagnosis of deep dermatophytosis, a history of prolonged granulomatous inflammation, suppurative nodules, and associated sinus tracts in his groin, previously diagnosed as HS, initially obscured any infectious etiology.

On histopathologic examination, deep dermatophytosis is characterized by extrafollicular granulomas and hyphal invasion of the dermis and subcutis without follicular involvement.¹ This presents a diagnostic challenge, as *T. rubrum* often displays atypical morphology in deeper tissue

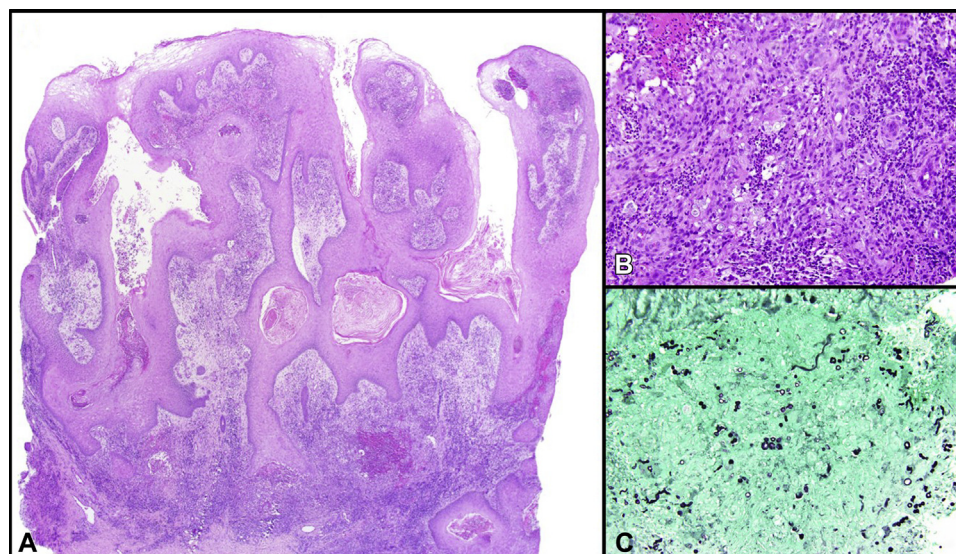


Fig 3. Histopathology of ankle biopsy. **A**, pseudoepitheliomatous hyperplasia with suppurative inflammation (H&E; magnification, 4×). **B**, suppurative inflammation with scattered fungal elements (H&E; magnification, 40×). **C**, Numerous fungal hyphae as revealed by GMS stain (magnification, 40×). *H&E*, Hematoxylin-eosin-stain; *GMS*, Grocott methenamine silver.

Table I. Variants and presentations of invasive dermatophyte infections^{1,9,10}

Variant	Presentation
Majocchi granuloma	<ul style="list-style-type: none"> - Localized suppurative folliculitis near trauma-exposed area with pre-existing superficial dermatophytosis in immunocompetent patient - Generalized nodular granulomatous perifolliculitis due to chronic follicular invasion in immunocompromised patient
Deep dermatophytosis	<ul style="list-style-type: none"> - Large (>1 cm) purple nodules or plaques, often on the extremities, with suppurative, non-follicular abscesses caused by fungal organisms in the deep dermis or subcutis in immunocompromised patient
Disseminated dermatophytosis (Pseudo)mycetoma	<ul style="list-style-type: none"> - Systemic disease involving vascular or lymphatic spread to internal organs - Clusters of fungal organisms or associated pyogranulomatous reactions develop chronic sinus tracts

sections, as observed in our case.⁵ It is hypothesized that the diminished innate immune system and alkaline environment of the dermis facilitate uninhibited differentiation required for adaptation. Histologically, pleomorphic features including chlamydoconidium, arthroconidium, pseudobudding, branching hyphae, and broad-based budding have been reported in this population, suggesting a broad variety of possible fungal infections.^{2,5,6} Tissue section plane, hyphal orientation, and tissue viability also influence the histological appearance of these structures.⁷ Therefore, polymerase chain reaction or culture are often required to determine the causative organism.

In the solid organ transplant population, renal transplant recipients have the highest incidence of invasive dermatophytosis. It is a late complication, and the majority of immunosuppressed patients who

develop dermatophytosis have concurrent superficial infection, which predisposes them to self-infection.⁸ Clinical suspicion in combination with histological findings of hyphae in the dermis warrants prompt treatment with appropriate antifungal therapy.

This case highlights the atypical nature of dermal *T. rubrum* in patients with a diminished immune system, and its potential for invasive infection underscores the importance of treating superficial dermatophytoses in solid organ transplant patients. It also brings to attention the importance of ruling out infectious processes in patients with HS, and the difficulty in differentiating superinfections from infections mimicking HS.

The authors would like to thank Dr. Dan Lopez for helping prepare the images for this manuscript.

Conflicts of interest

None disclosed.

REFERENCES

1. Kershenovich R, Sherman S, Reiter O, et al. A unique clinicopathological manifestation of fungal infection: a case series of deep dermatophytosis in immunosuppressed patients. *Am J Clin Dermatol*. 2017;18:697-704.
2. Talebi-Liasi F, Shinohara MM. Invasive *Trichophyton rubrum* mimicking blastomycosis in a patient with solid organ transplant. *J Cutan Pathol*. 2017;44:798-800.
3. Prens E, Deckers I. Pathophysiology of hidradenitis suppurativa: an update. *J Am Acad Dermatol*. 2015;73(5 Suppl 1):S8-S11.
4. Lee HH, Patel KR, Singam V, Rastogi S, Silverberg JI. Associations of cutaneous and extracutaneous infections with hidradenitis suppurativa in U.S. children and adults. *Br J Dermatol*. 2020;182:327-334.
5. Seçkin D, Arikan S, Haberal M. Deep dermatophytosis caused by *Trichophyton rubrum* with concomitant disseminated nocardiosis in a renal transplant recipient. *J Am Acad Dermatol*. 2004;51(5 Suppl):S173-S176.
6. Lillis JV, Dawson ES, Chang R, White CR Jr. Disseminated dermal *Trichophyton rubrum* infection - an expression of dermatophyte dimorphism? *J Cutan Pathol*. 2010;37:1168-1169.
7. Sangoi AR, Rogers WM, Longacre TA, Montoya JG, Baron EJ, Banaei N. Challenges and pitfalls of morphologic identification of fungal infections in histologic and cytologic specimens: a ten-year retrospective review at a single institution. *Am J Clin Pathol*. 2009;131:364-375.
8. Rouzaud C, Chosidow O, Brocard A, et al. Severe dermatophytosis in solid organ transplant recipients: a French retrospective series and literature review. *Transpl Infect Dis*. 2018;20:10.
9. Su H, Li L, Cheng B, et al. *Trichophyton rubrum* infection characterized by Majocchi's granuloma and deeper dermatophytosis: case report and review of published literature. *Mycopathologia*. 2017;182:549-554.
10. Dai Y, Xia X, Shen H. Multiple abscesses in the lower extremities caused by *Trichophyton rubrum*. *BMC Infect Dis*. 2019;19:271.