Case Report: Extensive Tinea Corporis and Inflammatory Tinea Capitis Caused by the Anthropophilic Dermatophyte *Trichophyton tonsurans*

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Abstract. *Trichophyton tonsurans* is an anthropophilic dermatophyte with a worldwide distribution and is responsible for superficial mycosis with a wide range of clinical manifestations. We report two atypical cases of tinea due to *T. tonsurans* in two children: a case of extensive tinea corporis and a case of inflammatory tinea capitis.

INTRODUCTION

Trichophyton tonsurans is an anthropophilic dermatophyte, associated primarily with tinea capitis, the most common superficial mycosis in school-age children, and also is the causative agent of tinea corporis and scarcely tinea unguium. *Trichophyton tonsurans* has a worldwide distribution, but its prevalence differs considerably depending on geographical region. It is the first etiological agent of tinea capitis in North America since the 1980s¹ and the first dermatophyte responsible for tinea corporis among wrestling and judo practitioners in Japan since the 2000s,² posing a serious public health issue. In Europe, the prevalence of *T. tonsurans* has progressively increased over the last two decades, particularly in urban areas, such as London in the United Kingdom³ and the Parisian region in France, with an increasing number of epidemics in children's collectivities.⁴

Trichophyton tonsurans infections have highly diverse clinical manifestations, in localization and in the degree of inflammation, ranging from carrier-state to severe dermatophytosis with heavy inflammation.¹ Inflammatory tinea capitis (kerion celsi) is a result of hypersensitivity reaction to a dermatophytic infection, caused mainly by zoophilic (e.g., *Microsporum canis* and *Microsporum verrucosum*) or exceptionally geophilic (e.g., *Microsporum gypseum*) species rather than anthropophilic ones. However, some cases of inflammatory tinea capitis or tinea corporis due to *T. tonsurans* have been occasionally reported.^{5,6} We describe herein two cases of tinea corporis and tinea capitis caused by *T. tonsurans*, with unusual clinical presentations.

CASE PRESENTATION

Case 1. A 14-year-old boy who lives with his family in the northern suburbs of Paris was referred to the Parasitology-Mycology Department of Avicenne Hospital for a suspected fungal infection, in November 2018. His parents are from Algeria, where he goes regularly during school holidays. His last stay took place in Algeria from July 10 to August 31, 2018. Among five members of his family, he together with his brother (15 years old) referred because of pruritic lesions on their bodies, which appeared at the end of their holidays in Algeria, in particular on the neck, nose, cheek, eyelids, thorax, shoulder, and arm (Figure 1A). The principal clinical manifestations

were composed of numerous and extensive lesions, which grew centrifugally with peripheral erythematous scaly border and healed center. Suspected lesions on glabrous skin were sampled by scraping and swabbing. Direct microscopic examination of the scalp was performed in sodium sulfide with 0.1% Blankophor staining, using fluorescent microscopy, and showed the presence of numerous fungal filaments. Afterward, the samples were inoculated on Sabouraud–chloramphenicol–gentamicin agar slants, with or without cycloheximide adjunction, and incubated at 30°C. On the eighth day, the cultures were examined macro- and microscopically, which resulted in the identification of the anthropophilic dermatophyte *T. tonsurans*. This identification was confirmed using the online matrix assisted laser desorption ionization - time of flight (MALDI-TOF) mass spectrometry identification (MSI) fungal database (<https://biological-mass-spectrometry-identification.com/msi/>). For treatment, a couple of oral griseofulvin (20 mg/kg/day) and topical econazole (1% cream) were recommended for 4 weeks. His brother was also infected by *T. tonsurans* and treated consequently the same way. The evolution was favorable for both brothers in a few weeks.

Case 2. An 8-year-old schoolboy, living in northern suburbs of Paris, was referred by his school to the same department because of multiple scalp lesions, in March 2019. His father, originally from Guadeloupe Island in the West Indies, stated that the lesions began at the end of December 2018 with a small crusty lesion of the scalp. Few weeks before clinical presentation, the area on the scalp grew in size, becoming a tender nodule with yellow purulent discharge. The previous contact with a cat was also reported. His 9-month-old sister and their parents did not present any skin or scalp lesion. Results of the clinical examination noted a 6-cm tender yellow nodule on the right occipital scalp and multiple erythematous and scaly patches on the left side of the nodule (Figure 1B). The nodule had a boggy consistency and thick yellow crust and was draining yellow material. There was no hair within this area on the scalp. Examination of the scalp lesions under ultraviolet (UV) light showed no fluorescence. A significant cervical right lymphadenopathy was noted, but the general condition of the patient was good. Multiple swab samples were taken from the large nodule, and peripheral scaly lesions were scraped and swabbed for mycological and bacterial analyses. Direct microscopic examination of the scalp and hair in sodium sulfide with 0.1% Blankophor staining, using fluorescent microscopy, showed numerous fungal spores and endothrix parasitism of the hair. The boy was treated with oral griseofulvin 20 mg/kg/day for 8 weeks and 1% econazole shampoo twice a week for 4 weeks. Oral pyostacine 50 mg/kg twice a day was prescribed for 5 days. Bacterial direct

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FIGURE 1. Extensive tinea corporis (A) and inflammatory tinea capitis (B) caused by the anthropophilic dermatophyte *Trichophyton tonsurans*.

examination and 5 days of bacterial cultures retrieved no bacteria. After 9 days of incubation at 30°C, mycological cultures showed the dermatophyte *T. tonsurans* identified by morphological examination, as well as by MALDI-TOF mass spectrometry, using an online MSI platform. Two weeks post-evaluation revealed the resolution of drainage and decreased size of the nodule.

DISCUSSION

The clinical manifestations caused by *T. tonsurans* can be highly variable. Unlike other dermatophytes, the clinical features of *T. tonsurans* infection are not initially very apparent. “Black dot” tinea capitis is a classical form of infection due to *T. tonsurans*, in which patches of alopecia are found with weakened hair that break at or below the surface of the scalp. The acute, pustular, and suppurative appearance of the scalp is known as the kerion celsi form. In the seborrheic type of *T. tonsurans* tinea capitis, a minimal hair loss with or without scalp erythema, scale, and pruritus is observed. Tinea corporis due to *T. tonsurans* is the second most common clinical feature characterized by small, pink, flaky plaques, often measuring only 1–2 cm in diameter with no central clearing, which is similar in appearance to eczema.²

However, there is a wide variation in clinical symptoms due to *T. tonsurans*, ranging from asymptomatic carriers to strong inflammatory manifestations. Atypical cases of *T. tonsurans* infection have been previously reported. Indeed, *T. tonsurans* can cause inflammatory tinea capitis with uncommon presentations, often leading to misdiagnoses of impetigo, folliculitis, pyoderma, or dissecting cellulitis of the scalp.^{5,7–9} Here, we report a case of kerion celsi, looking like an infection caused by a zoophilic dermatophyte such as *M. canis*, especially because a previous contact with a cat was noted. Thus, *T. tonsurans* was not expected although the UV examination of the scalp was not fluorescent.

The accurate and timely diagnosis of kerion celsi is crucial. Sampling from a scalp lesion can be consequently helpful for avoiding misdiagnosis. Indeed, failure in an accurate diagnosis of a kerion may result in permanent scarring, alopecia, or unnecessary incision or drainage. Moreover, improper treatment of this inflammatory lesion with topical corticosteroids, topical antibiotics, or topical antifungals alone may result in the progression of lesions.

Unusual disseminated skin reactions may also occur with *T. tonsurans*, although it is an anthropophilic species. Atypical disseminated erythematous papular eruptions have been described in a child and a young man in Poland.¹⁰ In Japan, a case of chronically recurrent and disseminated tinea faciei and tinea corporis has been documented in an immunocompetent 12-year-old girl.¹¹ The unusual cases reported here are extensive tinea corporis and tinea faciei in two adolescent brothers, returning from Algeria, where *T. tonsurans* is not a species of dermatophyte that is routinely tested,¹² and epidemiological data about dermatophyte infections are limited in Algeria.

This report emphasizes that *T. tonsurans* can give rise to atypically extensive cutaneous lesions and inflammatory tinea capitis, which are not common for anthropophilic dermatophytes. As kerion celsi is often unrecognized or misdiagnosed, a mycological analysis of a scalp lesion should be performed for accurate and timely diagnosis and treatment.

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