

Clinical Consequences of Delayed Treatment for Tinea Capitis (Ringworm of the Scalp): A Case Report

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A 6-year-old Hispanic patient presented with a 1-month history of pruritic patches on her scalp, characterized by hair loss, black dots, and dandruff-like scales. The patient was seen by her primary care physician, who prescribed ketoconazole 2% shampoo. This provided little relief for her symptoms, which prompted her admission to nearby hospital, where fluconazole was administered intravenously and mometasone lotion applied. The patient was discharged and instructed to use the ketoconazole shampoo and mometasone lotion. The previously prescribed medications failed to improve her now enlarged, inflamed, scaly, pustule-speckled lesions. Given her condition, she was admitted to the University Pediatric Hospital in San Juan, where the Dermatology Department was consulted. Cultures were taken from the lesions, revealing the presence of *Trichophyton tonsurans*, which led to the diagnosis of tinea capitis (ringworm of the scalp) with kerion formation. In addition, multiple nits and adult lice characteristic of *Pediculus humanus capitis* were observed. A 6-week course of griseofulvin, a 1-week course of permethrin solution, and a 5-day course of oral prednisolone were started, effectively cleared the patient's inflammation and fungal infection. This case highlights how there exist areas of improvement in terms of interprofessional communication between physicians, as well a need to increase awareness of the proper treatment for this common pediatric skin condition. We postulate that in doing so, similar cases could be spared the unfortunate results of untreated tinea capitis, that is, kerion formation and the possible scarring this lesion can produce.

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Tinea capitis (ringworm of the scalp) is a common pediatric condition in which dermatophytes infect the skin superficially (1). Misdiagnoses between practitioners in different subspecialties have led to an apparent increase in the complications seen in tinea capitis cases, mainly in pediatric patients (2). Tinea capitis is a common skin condition among youths, with approximately 19.4% of school-aged children having had this infection (3). The successful and timely treatment of tinea capitis results in a decreased risk of complications such as pustulation, papule formation, pruritus, and kerion formation. The latter is a delayed hypersensitivity reaction associated with untreated tinea capitis, characterized by increased inflammatory and purulent secretions observed in the resulting lesions (4). Kerion development is associated with scarring alopecia that, depending on the severity of scarring on the scalp, can remain throughout the patient's life. The use of the correct diagnostic tools, such as fungal cultures, microscopic analysis under KOH preparation, physical examination, and woods lamp use (4), remains a hallmark in avoiding the misdiagnosis of tinea capitis and thus preventing its associated complications. This case study of a Hispanic pediatric patient presents an instance of delayed treatment for tinea capitis that resulted in severe kerion formation and hospital admission. Improved interprofessional communication is recommended for the earlier detection and management of these cases.

Case report

We present the case of a 6-year-old Hispanic patient that had a 1-month history of pruritic patches on her scalp with minimal hair loss. Her mother noted that as the girl's hair continued to shed, black dots appeared where the hair was lost, along with scaly, dandruff-like flakes that became more prominent as time went on. This prompted a visit to her primary care physician (PCP), who started her on ketoconazole 2% shampoo. Four weeks later, her symptoms continued to worsen, which prompted her to seek aid at a nearby hospital. At this time, the patient's mother described her daughter's scalp lesions as oozing pus, for which the attending pediatrician started her on intravenous fluconazole, mometasone lotion, and 2% ketoconazole shampoo. These medications did little to ameliorate the patient's condition, leading to a second hospital admission, this time at the University Pediatric Hospital in San

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Juan, to reduce her still ongoing symptoms. Upon hospitalization, the Dermatology Department was consulted.

A physical examination showed thick, tender, inflamed, and erythematous plaques studded with pustules on her fronto-occipital and left temporal scalp and along her crown, with multiple nits and adult lice characteristic of *Pediculus humanus capitis* (Figure 1) also being seen. Cultures were taken of the lesion prior to therapeutic intervention, and *Trichophyton tonsurans* was found to be present. A diagnosis of tinea capitis with kerion formation and additional coinfection with head lice was made. The attending dermatologist started her on a 6-week course of daily griseofulvin at a dosage of 10 mg/kg and a 5-day oral course of 20 mg prednisolone, the latter of which was prescribed to alleviate her prominent inflammation. As part of her follow-up treatment, the patient was referred to an outpatient dermatology clinic 2 weeks after the initial dermatology consult in the hospital. At the clinic, she showed markedly decreased erythema and decreased number of pustules; however, her adult lice was still present. At this time, the medical team started the patient on permethrin 1% solution (to be used on the scalp), with instructions to complete the remaining 4 weeks of her griseofulvin treatment.

Four weeks after the previously described visit, she showed marked improvement with regards to inflammation, scaling, tenderness, and lesion thickness (Figure 2). Hair regrowth was also seen throughout the plaques; however, significant scarring was observed. Additionally, no evidence of adult head lice was observed on her scalp or in her hair, and the patient's mother did not mention any pruritus being present during or prior to that day's appointment.

Discussion

It is worth stating that the medical team of the Dermatology Department was not provided with the specific quantities or dosing regimens of the patient's previous courses of treatment before her visit to the University Pediatric Hospital in San Juan. Thus, we can discuss only the types of medications that were given to this patient at prior health care facilities and not the specifics of their usage. Firstly, significant errors were made in the initial management of this patient. The patient's presentation during her first consult was characterized by pruritic patches on her scalp, black dot alopecia, and dandruff-like flaking that had persisted for approximately a month. Given this constellation of symptoms and her age, the most common diagnosis would be tinea capitis. That being the case, we postulate that both her PCP and the attending physician for her first hospital visit correctly identified a fungal

Figure 1. 1A/1B: Patient presented with subcutaneous boggy tender erythematous alopecic plaques studded with pustules.



infection of the scalp, given that she was prescribed antifungals. However, they were erroneous in thinking that the adequate course of treatment for tinea capitis was 2% ketoconazole shampoo, which was given at her visit to her PCP, or the subsequent administration of intravenous fluconazole and application of mometasone lotion as well as another prescription for 2% ketoconazole shampoo, the latter of which was also given at her first hospital visit.

The widely accepted and established courses of treatment for tinea capitis, for both pediatric and adult cases, are either oral doses of griseofulvin or of terbinafine (5). Topical agents are ineffective against tinea capitis, as the fungal infection is of the hair follicle; thus, only systemic agents, such as griseofulvin or terbinafine, have been proven to penetrate the affected follicle effectively and remove the causative organism (5). The mometasone lotion and 2% ketoconazole shampoo given to our patient proved futile in the attempt to cure her infection and ultimately caused her to acquire a kerion.

Additionally, a single intravenous dose of fluconazole has not been proven to be effective at eradicating a tinea capitis infection, and, if this medication is chosen as the treatment, should be given in either short (3-week) or long (6-week) oral courses (5). In this case, the administration of a 6-week course of griseofulvin and a

5-day course of prednisone cured her dermatophytic infection and treated her inflammation, respectively; however, prominent scarring interspersed with scarce hair growth was left in its place. The concurrent *Pediculus humanus capitis* infection was treated after her initial dermatology consult, given that the treatment of her kerion was a higher priority.

A retrospective study found that tinea capitis is commonly misdiagnosed among pediatric patients; the study found that of approximately 100 patients, pediatric patients (mean age of 5.82 years) represented 63.29% of the misdiagnosed cases of tinea capitis (2). The mean time to reach a correct diagnosis was 64 days after the initial medical visit, with pediatricians being the most prevalent group of physicians to misdiagnose the condition (2). Scarring alopecia, ulceration, and inflammation were the prevailing complications resulting from misdiagnosis (2). Bacterial infection was the most common misdiagnosis in this group (that is, pediatricians), and antibiotics were the most prescribed medication (2). In the case of our patient, bacterial infection was not a diagnosis that was made, but the correct treatment was nevertheless not administered. Moreover, the patient sought help from 2 physicians who failed to prescribe the established treatment for tinea capitis and was only cured of her infection after having been evaluated by a dermatologist. This occurrence is of utmost concern, as this disease process is not unusual and should be treated suitably to avoid kerion formation.

The importance of following the established guidelines for treatment is imperative. Fundamentally, the right course of treatment must be followed to successfully cure the disease. This is done to avoid complications, such as the previously mentioned kerion formation, which our patient unfortunately suffered. Kerion formation adds another layer of complexity to treatment as the increased inflammatory response poses the risk of irreversible scarring if left untreated. It has been shown that a decrease in the efficacy of treatment of a kerion is directly proportional to the amount of scarring and damage acquired at the hair follicle, which in turn impairs the hair-regrowth prognosis and may impact the patient's self-esteem (6). Thus, to maintain optimal patient outcomes, preserve aesthetics, and avoid the complications associated with untreated tinea capitis, interprofessional communication should be implemented and adequate education regarding treatment plans imparted.

Resumen

Una paciente hispana de 6 años presentó con parchos pruríticos de un mes de duración, caracterizados por pérdida de pelo,

puntos negros y descamaciones en su cuero cabelludo. La paciente recibió cuidado de su médico primario, quien le recetó un champú de ketoconazol 2%. Esto no le proveyó mejoría a su condición, lo cual llevó a la paciente acudir a un hospital circundante donde se le administró fluconazol intravenoso y mometasona tópica. Los medicamentos mencionados no les suministraron alivio a sus síntomas; las lesiones evolucionaron y se mostraban altamente inflamadas, escamosas y cubiertas en pústulas. Posteriormente, la paciente fue admitida al Hospital Pediátrico Universitario en San Juan, donde se le consulta al Departamento de Dermatología. Cultivos de las lesiones revelaron la presencia de *Trichophyton tonsurans*, lo que condujo al diagnóstico de tinea capitis (tiña del cuero cabelludo) con formación de querión. Además, se observaron liendres y cuerpos característicos de *Pediculus humanus capitis*. Un curso de tratamiento de griseofulvina de 6 semanas, un curso de prednisolona oral de 5 días y solución de permetrina de 1 semana fue comenzado, produjo una mejoría significativa. Este caso destaca como existen áreas de mejoramiento en la comunicación interprofesional entre médicos doctores y el conocimiento de cómo tratar esta condición. Al poder efectuar el tratamiento adecuado, casos similares pudiesen evitar la formación de un querión y la cicatrización que este pudiese conllevar.

Figure 2. 2A/2B/2C: Alopecic plaque demonstrating significant decrease in inflammation and pustule formation and increased hair growth after treatment.



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