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Case report

Successful treatment of kerion with itraconazole and ALA-PDT: A case report

Jiejie Lu[a,1], Wen Li[a,1], Wen'ai Zheng[b,2], Ruiye Huang[a,2], Weiwei Wu[a,*]

[a] Department of Dermatology, the Fifth People's Hospital of Hainan Province, 33, Southern Road of Longkun, Qiongshan District, Haikou, 570206, Hainan, China
[b] Department of Laboratory Medicine, the Fifth People's Hospital of Hainan Province, 33, Southern Road of Longkun, Qiongshan District, Haikou, 570206, Hainan, China

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ABSTRACT

Kerion refers to the severe inflammatory reaction which occurs in some cases of fungal infection of the hair or hair follicles. Successful treatment is a challenge for the small number of kerion patients who show poor efficacy of oral antifungal agents. In recent years, photodynamic therapy (PDT) has been proven to be a useful treatment for a variety of fungal infections. In this case report, a 9-year-old Chinese girl presented with erythema, pustular and tender plaques on her scalp for 2 month. The diagnosis of kerion was made based on clinical features and positive mycological findings. After the disease relapsed with oral administration of itraconazole for 6 weeks, she was successfully cured by three sessions of ALA-PDT combined with itraconazole. This case report suggests that ALA-PDT provides a good alternative and adjutant choice for kerion with safety, less side effects, and good repeatability.

1. Introduction

Tinea capitis is one of the most common cutaneous fungal infection in pre-pubertal children around the world. As a subset of inflammatory tinea capitis with a hypersensitivity reaction against dermatophytes, kerion can result in permanent alopecia and scarring [1]. Although oral administration of antifungal agents are effective for most cases, a small number of patients show poor efficacy [2]. Therefore, treatment options for these patients are a challenge. In recent years, photodynamic therapy (PDT) has been proven to be effective for both superficial and deep cutaneous mycoses [3]. However, a clinical case of tinea capitis treated with PDT has not been reported. In this report, we presented a kerion patient, who failed with oral terbinafine and itraconazole treatment at first. However, the patient was successfully cured with 5-aminolevulinic acid (ALA)-PDT combined with itraconazole.

2. Case report

In November 2018, a 9-year-old Chinese girl visited our department presented with erythema, pustular and tender plaques on her scalp for 2 months. Initially, the lesions appeared as multiple circular patches of hair loss on her scalp. Then, it progressed into multiple inflammatory mass and tender plaques despite the use of systemic and topical antibacterial drugs for one month in a local clinic. Around the same time, her sister developed a milder scalp lesion with alopecia. The two sisters frequently played with rabbits at house. The patient's temperature upon presentation was 38.0°C, and physical examination showed multiple erythematous and tender plaques covered with broken hairs and purulent discharge on her scalp with bilateral cervical lymphadenopathy (Fig. 1A). There were no other remarkable signs on examination. Laboratory evaluation showed evidence of an elevated inflammatory response signified by a white blood cell count of 11.33×10^9 (63.1% neutrophils) and a C-reactive protein (CRP) level of 15 mg/L. Potassium hydroxide preparation of the hair roots from the patient's lesion showed fungal hyphae (Fig. 1B). However, fungal culture was constantly negative from three tests. Kerion was diagnosed based on clinical manifestation and positive mycological findings.

In our clinic, the patient was treated with terbinafine 125 mg/day per os for 2 weeks. Her lesion was improved slightly. Then we stopped terbinafine and used itraconazole 100 mg/day per os for 6 weeks. Disease activity was gradually controlled (Fig. 1C). In January 2019, without obvious inducement, the disease relapsed with numerous pustule on the involved area (Fig. 1D). Direct microscopic examination of the hair roots showed numerous small spores, and fungal culture was negative. Whereafter, ALA-PDT treatment was simultaneously conducted in the following therapeutic procedure: 20% 5-aminolevulinic

* Corresponding author.
E-mail addresses: lujiejie677@163.com (J. Lu), 1595069041@qq.com (W. Li), wenai@163.com (W. Zheng), 463587186@qq.com (R. Huang), vigorwu@126.com (W. Wu).
[1] These authors have contributed equally to this work.
[2] Other co-authors.

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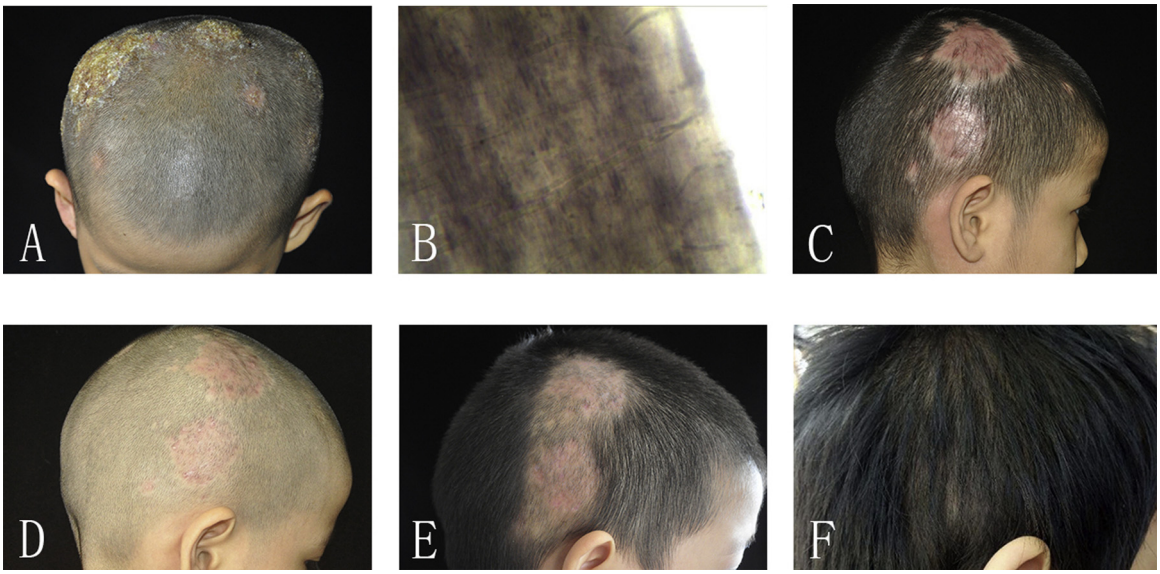

Fig. 1. (A) Clinical images on the patient's scalp before treatment; (B) Positive mycological findings of the hair roots from the patient's lesion; (C) Disease activity was gradually controlled with itraconazole 100 mg/ day per os for 6 weeks; (D) The disease relapsed with numerous pustule on the involved area; (E) 1 month after three sessions of ALA-PDT; (F) 3 months after three sessions of ALA-PDT.

acid (Shanghai Fudan Zhangjiang Bio-pharmaceutical Co. Ltd, Shanghai, China) was applied topically to the involved area and sealed with an occlusive dressing for 3 h, followed by irradiation with a 630-nm LED light (80 J/cm^2) for 20 min (LED-I B, Wuhan Yage Optic and Electronic Technique Co.Ltd, Hubei, China). Three ALA-PDT sessions was performed at 1-week interval with the same procedure. ALA-PDT treatment was well tolerated. Burning sensation was reported during irradiation. Temporary edema, erythema, itch and stinging were reported on the treated area up to 1 week after therapy, but swelling or blistering did not develop. Seven days after the last session of ALA-PDT, all treatments discontinued because the patient's symptoms completely resolved. No recurrence was reported during 3 months of follow-up (Fig. 1E, F). The negative results of direct microscopic examination and fungal culture from hair samples were confirmed for three times.

3. Discussion

Oral antifungal medications are considered the standard therapy for tinea capitis. However, many factors limited the use of traditional antifungal therapies, including the emergence of resistant strains, high cost for long treatment period, and possible adverse events. The growing difficulties in the treatment of fungal infection by conventional antifungal therapy has renewed the search for safer, more efficient, easily achievable and cost-effective alternative treatment approaches.

Since topical photodynamic therapy (PDT) has the above-mentioned advantages, topical PDT seems like a promising treatment for fungal infectious disease. PDT is composed of of a photosensitizing drug and light, which promotes phototoxic response on the target cells, leading to cell death mainly via reactive oxygen (ROS) and reactive nitrogen species oxidative damage [4]. PDT causes demise both in metabolically active cells, such as yeast and hyphae, as well as in resistant forms, such as conidia [5]. In vitro combination therapy using antifungal drugs and PDT led to enhanced fungicidal effect [6]. Therefore, the combination of antifungal drug and PDT seems to represent an attractive alternative to the current antifungal therapies.

Previously, a few clinical trials also demonstrated that PDT combined with antifungal drugs therapy achieved good results after sole antifungal drugs therapy failed. Hu et al. reported one case of chromoblastomycosis by ALA-PDT irradiation combined with terbinafine. At first, terbinafine 500 mg/day was orally administered for 4 weeks, but no significant improvement was observed. Then, ALA-PDT (totally eighteen times) was adopted combined with terbinafine 250 mg/day orally. One year later, the plaque disappeared and just left some hypopigmentation [7]. In the case here, we reported kerion was successfully cured with three sessions of ALA-PDT and itraconazole under the circumstances that kerion recurred after oral administration of itraconazole alone for 6 weeks.

In conclusion, PDT could be a good alternative and adjutant choice for kerion with the advantages of safety, less side effects, and good repeatability. However, further researches should be encouraged to standardize optimal treatment protocols and to compare the efficacy with conventional treatment modalities.

Author role

Each author can access the data. All authors contributed to the manuscript.

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Declaration of Competing Interest

None of the authors has any conflict of interest to be disclosed.

Conflict of interest statement

This manuscript has been read and approved in final form by all authors and the authors declare no conflicts of interest.

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