

Monitoring the Treatment of Tinea Capitis With Trichoscopy - Are There Signs of Trichoscopic Cure?

Theodosia Gkentsidi¹, Konstantinos Kampouridis², Katerina Bakirtzi¹,
Angeliki Panagopoulou¹, Aimilios Lallas¹, Eleni Sotiriou¹

1 1st Dermatology Department, Medical School of Aristotle University of Thessaloniki, Hospital of Skin and Venereal Diseases, Thessaloniki, Greece

2 Mycological Laboratory, 1st Dermatology Department, Medical School of Aristotle University of Thessaloniki, Hospital of Skin and Venereal Diseases, Thessaloniki, Greece

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Corresponding Author: Theodosia Gkentsidi, 124 Delfon Street, Thessaloniki 54643, Greece, tel. 0030213308860, Email: tgkentsidi@gmail.com

Introduction

Tinea Capitis (TC) is a dermatophytic infection of the hair whose diagnosis is based on clinical examination and direct microscopy and is established with fungal culture [1]. Nonetheless, direct microscopy is not always available in daily clinical practice and fungal culture is a time-consuming process. Several trichoscopic features have been associated with TC, such as comma, corkscrew, zig-zag, morse-code and broken hairs, black dots and scaling [2-4]. However, scarce evidence exists on whether the persistence or disappearance of these findings reliably predict the final result of the fungal culture in TC treatment monitoring [5,6].

Case Presentation

The aim of this prospective clinical study is to investigate which trichoscopic criteria predict the persistence or

resolution of TC after treatment and assess whether trichoscopy can be used to confirm a definite cure, without requiring a culture. Inclusion criteria were the presence of clinical and trichoscopic findings of TC and positive direct microscopy and fungal culture. Trichoscopic images were captured at baseline and in every sequential visit using a camera with an attached dermoscopic lens (DermLite photosystem, 3Gen) at 10-fold magnification (Figure 1). Patients were evaluated trichoscopically and mycologically at baseline and subsequently every four weeks until negative mycological examination was attained. All patients received itraconazole or terbinafine and topically isoconazole cream and ketoconazole shampoo until negative culture was achieved. When clinical presentation was highly suggestive of TC and direct microscopy was positive, systematic treatment was initiated right away, before the results of the fungal culture. The trichoscopic images were evaluated by 2 independent investigators, blinded to the result of the culture. A third

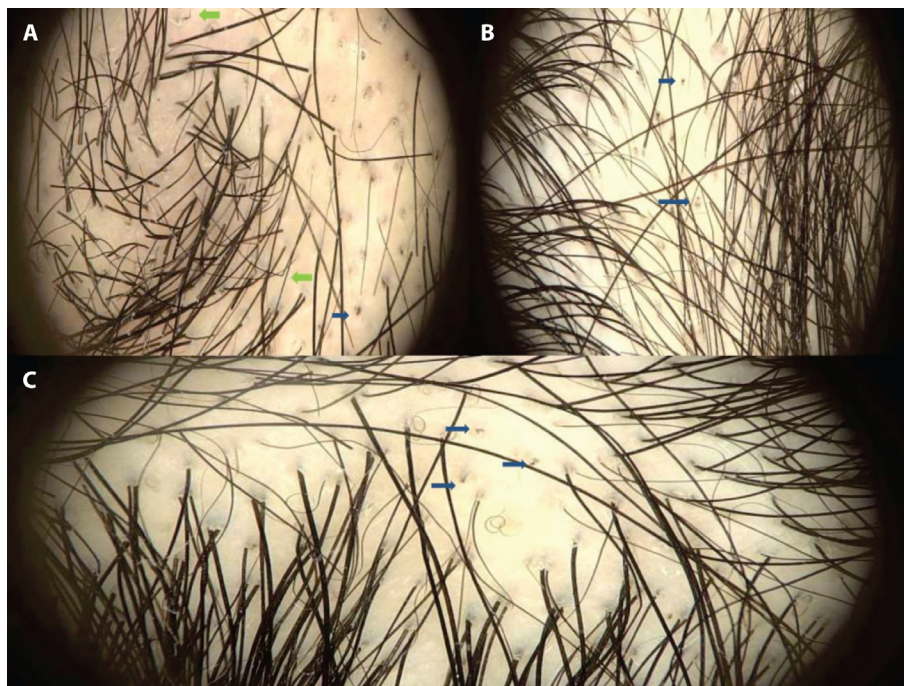


Figure 1. Trichoscopic image of Tinea Capitis caused by *Trichophyton tonsurans*. (A) At baseline the trichoscopic findings are: black dots (blue arrow), comma and zig-zag hairs (green arrows), broken hairs and scaling. (B) At week 8, after two months of systematic treatment with terbinafin, direct examination and fungal culture are negative and the remaining trichoscopic findings are black dots (blue arrows) and mild scaling. (C) At week 12, one month after discontinuation of treatment, direct examination and fungal culture are negative and trichoscopy reveals only black dots.

investigator was involved in case of disagreement. The evaluated criteria included comma, corkscrew, zig-zag, morse-code and broken hairs, black dots, erythema and scaling. Sensitivity (%), specificity (%), positive predictive value (PPV; %) and negative predictive value (NPV; %) were calculated for each trichoscopic criterion, using the result of the fungal culture as reference. Overall, 23 patients with a mean age of 14.6 years (range: 5-32) were included in the study. The most commonly isolated dermatophyte was *Microsporum canis* (61.0%) followed by *Trichophyton mentagrophytes* (26.0%) and *Trichophyton tonsurans* (13.0%), optimally corresponding to the result of direct examination (61% ectoparasitic and 39% endoparasitic infection). The results of the dermoscopic examinations at baseline and follow up visits are shown in Figure 2. Table 1 shows the sensitivity, specificity, PPV and NPV of each dermoscopic criterion to predict the result of the fungal culture. The features with the highest sensitivity were erythema (95.45%), black dots (93.94%) and broken hairs (87.88%), indicating that these features are usually present when the culture was positive. Comma, corkscrew, zig-zag, morse-code and broken hairs had a 100% PPV, suggesting that the trichoscopic persistence of these features in the follow up during treatment is highly predictive of positive fungal culture and should warrant treatment continuation. The features with the highest NPV were broken

hairs (89.74%), erythema (88.89%), black dots (88.24%) and morse-code hairs (85.19%). Therefore, the gradual resolution of these features is highly suggestive of negative fungal culture and disease cure. Moreover, this study indicates that the dermoscopic maintenance of black dots, erythema and scaling, because of their low specificity and moderate PPV, when observed with no other trichoscopic findings, are not sufficient to predict residual disease.

Limitations of our study are the relatively small size, the collection of fungal culture under systematic treatment and the fact that we included only Caucasian patients, which does not allow the generalization of our findings to other populations with different skin types.

Conclusions

In conclusion, our results indicate that trichoscopy can facilitate TC treatment monitoring and a “trichoscopic cure” might accurately predict a negative fungal culture.

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The patients in this manuscript have given written informed consent to the publication of their case details.

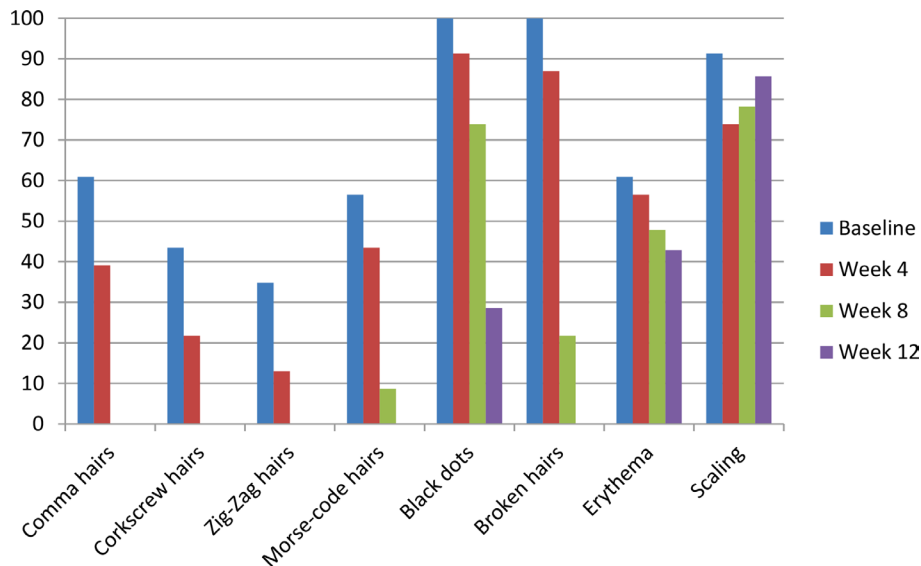


Figure 2. Results of The Dermoscopic Examinations at Baseline and Follow up Visits. At baseline, the percentage of Morse code hairs, typical of ectoparasitic infection (microspora), is higher than Corkscrew hairs which are associated with endoparasitic infection (trichophyta), in line with the results of the fungal cultures and direct examinations with KOH. Moreover, Morse code hairs seem to resolve later than Corkscrew hairs along the treatment timeline, indicating that ectoparasitic infections are more persistent. At week 12, when all fungal cultures are negative, the only remaining trichoscopic findings are scaling, erythema, and black dots.

Table 1. Statistical Results for Each Trichoscopic Feature After Treatment.

STATISTIC	COMMA HAIRS	CORKSCREW HAIRS	ZIG-ZAG HAIRS	MORSE-CODE HAIRS	BLACK DOTS	BROKEN HAIRS	ERYTHEMA	SCALING
SENSITIVITY (%) (95% CI)	47,62% (25.71%-70.22%)	38,46% (13.86%-68.42%)	33,33% (7.49%-70.07%)	80,95% (58.09%-94.55%)	93,94% (79.77%-99.26%)	87,88% (71.80%-96.60%)	95,45% (77.16%-99.88%)	86,67% (69.28%-96.24%)
SPECIFICITY (%) (95% CI)	100% (85.18%-100.00%)	100% (75.29%-100.00%)	100% (76.84%-100.00%)	100% (85.18%-100.00%)	42,86% (26.32%-60.65%)	100% (90.00%-100.00%)	40% (19.12%-63.95%)	18,18% (6.98%-35.46%)
PPV (%) (95% CI)	100% (0.00%-0.00%)	100% (0.00%-0.00%)	100% (0.00%-0.00%)	100% (0.00%-0.00%)	60,78% (53.46%-67.66%)	100% (0.00%-0.00%)	63,64% (54.74%-71.69%)	49,06% (43.75%-54.38%)
NPV (%) (95% CI)	67,65% (58.17%-75.87%)	61,90% (51.39%-71.41%)	70% (59.52%-78.74%)	85,19% (70.42%-93.28%)	88,24% (64.98%-96.81%)	89,74% (77.74%-95.64%)	88,89% (52.27%-98.32%)	60% (31.88%-82.78%)

CI = confidence interval; NPV = negative predictive value; PPV = positive predictive value.

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