ORIGINAL ARTICLE

Dermoscopic patterns of fungal melanonychia: A comparative study with other causes of melanonychia

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Background: Diagnosing fungal melanonychia (FM) is often difficult because it mimics melanonychia caused by other factors. Dermoscopy is helpful in the setting of nail pigmentation. However, the diagnostic characteristics of FM on dermoscopy are not fully elucidated.

Objective: We sought to determine the dermoscopic characteristics of FM.

Methods: We evaluated the dermoscopic patterns of FM diagnosed at 2 university hospitals from January 2010 to February 2016. We included nail matrix melanocytic activation, nail matrix nevi, and nail unit malignant melanomas as control groups for comparison.

Results: In all, 18 FM, 24 melanocytic activation of the nail matrix, 27 nail matrix nevi, and 11 malignant melanoma cases were analyzed. Statistical analysis revealed that yellow color, multicolor pattern, nonlongitudinal homogenous pattern, reverse triangular pattern, subungual keratosis, white or yellow streaks, and scales on the nail were more frequent in FM. However, gray color, longitudinal pattern, and pseudo-Hutchinson sign were less frequent in FM than in controls.

Limitations: This was a retrospective study from 2 university hospitals, with a small sample size.

Conclusion: The results revealed distinctive dermoscopic patterns for FM. Therefore, dermoscopy can be a useful ancillary tool for diagnosing FM. (J Am Acad Dermatol http://dx.doi.org/10.1016/j.jaad.2016.08.013.)

Key words: dermoscopy; fungal melanonychia; malignant melanoma; melanonychia; nail matrix nevus; onychomycosis; onychoscopy.

Melanonychia is defined as nail plate pigmentation. The various causes of melanonychia include exogenous materials, nail matrix nevus (NMN), malignant melanoma (MM), and melanocytic activation of the nail matrix, such as drug or systemic disease. Fungal melanonychia (FM) is a rare nail disorder that demonstrates nail pigmentation caused by fungal infection. The diagnosis of FM is often challenging because it can mimic other melanocyte-associated melanonychias. Therefore, the diagnosis of FM is often delayed.

Abbreviations used:

FM:	fungal melanonychia
KOH:	potassium hydroxide
MM:	malignant melanoma
NMN:	nail matrix nevus

Although melanocyte-associated melanonychias are managed with observation or surgical treatment, FM can be cured with appropriate antifungal medication. When left untreated, it can spread and

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certainly would not improve. In this respect, correct diagnosis of FM is crucial.

Dermoscopy improves the accuracy of diagnosing pigmented nails.[1-8] The dermoscopic patterns of FM were reported recently in the literature.[8-12] However, these studies were limited by a small number of cases or lack of a control group, making it difficult to decide which patterns have notable significance for diagnosing FM. In this study, we compared the dermoscopic findings of FM with those of melanonychia of other causes: NMN, melanocytic activation of the nail matrix, and MM. The aim of this study was to determine the distinguishing dermoscopic characteristics of FM that enable differentiating it from NMN, melanocytic activation of the nail matrix, and MM.

CAPSULE SUMMARY

- Information about the characteristic patterns of fungal melanonychia is limited.
- The presence (eg, yellow color, white/yellow streaks, subungual keratosis) and absence (eg, longitudinal patterns, pseudo-Hutchinson sign) of certain dermoscopic patterns are associated with fungal melanonychia.
- Dermoscopy can be a useful supplemental tool for diagnosing fungal melanonychia.

METHODS

Data were collected from Seoul National University Hospital, Seoul, Korea, and Chonbuk National University Hospital, Jeonju, Korea, from January 2010 to February 2016. FM cases with available clinical and dermoscopic photographs (DermLite DL2 Pro or DermLite DL3, 3Gen LLC, Dana Point, CA) were included in this study. The diagnosis of FM was made based on clinical manifestation and mycological examination. Potassium hydroxide (KOH) smear was performed in all cases. In cases with a negative KOH test result, histopathologic analysis of the nail plate was performed with Grocott methenamine silver and periodic acid–Schiff staining. Fungal culture was not routinely performed because of its low sensitivity and long incubation time.[13]

We included melanonychia as a result of other causes, such as melanocytic activation of the nail matrix, NMN, and MM, with available clinical and dermoscopic photographs as control groups for comparative analysis. The diagnosis of NMN and melanocytic activation of the nail matrix were made based on history and typical clinical and dermoscopic findings. In uncertain cases, histopathologic examination was performed. Pathologic examinations were done in 5 cases of NMN and 4 cases of melanocytic activation of the nail matrix to confirm the diagnosis. In all cases of MM, the diagnosis was established on the basis of histopathologic findings. The institutional review board of Seoul National University Hospital approved this study (C-1603-121-750).

Analysis of dermoscopic findings

Dermoscopic characteristics, such as color, longitudinal pattern, reverse triangular pattern, subungual hyperkeratosis, scales on the nail surface, and white or yellow streaks were investigated. The color of the pigmentation was categorized into black, dark brown, light brown, yellow, gray, and red. We also evaluated MM-associated patterns: Hutchinson sign, pseudo-Hutchinson sign, irregular pattern, nail plate destruction, triangular sign, dots/globules, and ulceration. The investigated dermoscopic variables are detailed in Supplemental Table I (available at http://www.jaad.org). The dermoscopic images were independently evaluated by 2 dermatologists with dermoscopy expertise (J. O. and J-H. M.) who were blinded to the diagnosis. Any disagreement was resolved through a consensus meeting.

Statistical analysis

The dermoscopic findings of FM were compared with those of other causal melanonychias such as melanocytic activation of the nail matrix, NMN, and MM. Statistical analysis was performed by using Pearson's χ^2 test or Fisher's exact test (for <5 cells expected in software [SPSS 20.0, IBM Corp, Armonk, NY]). Odds ratios and corresponding 95% confidence intervals were calculated by using univariate analysis. All statistical calculations were made with software (SPSS 20.0, IBM Corp). Interobserver agreement was examined by using Cohen kappa. *P* values less than .05 were considered statistically significant.

RESULTS

A total of 80 pigmented nails from 72 patients (27 male, 45 female; mean age 41.95 ± 19.97 years) were evaluated. Among these cases, 18 nails showed FM (9 male, 6 female; mean age 54.87 ± 11.60 years), 27 NMN (12 male, 15 female; mean age 30.37 ± 20.16 years), 11 MM (3 male, 8 female; mean age 52.64 ± 19.20 years), and 24 melanocytic activation of the nail matrix (3 male, 16 female; mean age 42.05 ± 15.05 years). When compared with

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