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The Role of Dermoscopy in the Diagnosis of Onychomycosis

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Abstract

Onychomycosis is a fungal infection of the fingernails or toenails that causes discoloration, thickening, and separation from the nail bed. In the diagnosis of onychomycosis, dermoscopy can help to improve the diagnostic sensitivity and to differentiate from other different diseases. Dermoscopy can enable the visualization not only nail plate, but also nail folds, nail matrix, nail bed, and the fine structure and vessels of the free margin of the nail.

We report a case of a 48 years old female patient, presented in outpatient clinic, with complains of hyperpigmentation on the edge of her big toe nail. On the dermoscopy examination, the hyperpigmentation area of the nail revealed a homogeneous dark brown- yellow band and proximal hyperkeratosis. No visible melanin inclusions were observed. Fungal melanonychia is rare and may simulate longitudinal melanonychia caused by melanocytic lesions. Dermoscopy appears to be a rapid and quite useful examination. We suggest and emphasize that this quick, non-invasive and highly effective examination should be considered as the first step in the diagnosis of onychomycosis followed by a direct microscopy and fungal culture as a gold standard for correct diagnosis.

Keywords: dermoscopy, onychomycosis, hyperpigmentation, melanonychia striata, melanoma

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INTRODUCTION

Dermoscopy is a noninvasive in vivo technique primarily used for the examination of pigmented skin lesions; however, it can also assist observers in assessing lesions with little to no pigment. (1) The basic principle of dermoscopy is trans illumination of a lesion and studying it with a high magnification to visualize subtle features barely visible to the human eye. (2) First dermoscopy was used to examine and follow up the nevus or skin carcinomas. Actually, we use dermoscopy to diagnose either different skin diseases and hair diseases as: psoriasis, lichen, alopecia, infectious diseases.

Nail dermoscopy has initially been used for the assessment of nail pigmentation, but its utilization has expanded for the diagnosis of all nail disorders; it became a routine diagnostic instrument, as its reveals helpful information. (3) In the diagnosis of onychomycosis, dermoscopy can help to improve the diagnostic sensitivity because dermoscopy can enable the visualization of not only nail plate, but also nail folds, nail matrix, nail bed, and the fine structure and vessels of the free margin of the nail. (4) The whole nail can be seen only at 10 × magnification, but the observation data and accuracy is improved with the increase in magnification from 20 × to 70 times. (5)

Dermoscopy appears to be a rapid and useful tool in the diagnosis of onychomycosis and differentiating it from other nail diseases, as demonstrated in our case.

CASE REPORT

Patient 48 years old, female, presented in outpatient clinic, with complaints about a hyperpigmentation on the edge of her big toe nail which continued for a long time. The patient denied any history of trauma and confirmed not receiving any sort of medication previously. Patient was worried regarding the hyperpigmentation and the possibility of melanoma. She has been working in high humidity conditions. Also, there is no family or personal history regarding any disease.

On conducting physical examination, the big toe nail showed a longitudinal dark brown pigmentation on the medial side, strikes and white patches around it. The second toenail also revealed white strikes (Figure 1).

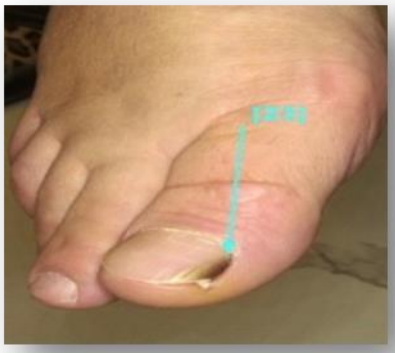

Figure 1. Clinical view of toe hyperpigmentation

With a pre-evaluation of such examination, we can conclude on this differentiated diagnosis:

I. Onychomycosis.

II. Subungual hemorrhage,

III. Pseudomonas aeruginosa infection,

IV. Melanoma.

We performed a dermoscopy examination to the hyperpigmentation area of the nail which revealed a homogeneous dark brown- yellow band and proximal hyperkeratosis. No visible melanin inclusions were observed.

At this point dermoscopy helps us to make the differential diagnosis within the above-mentioned diagnoses (Figure 2).

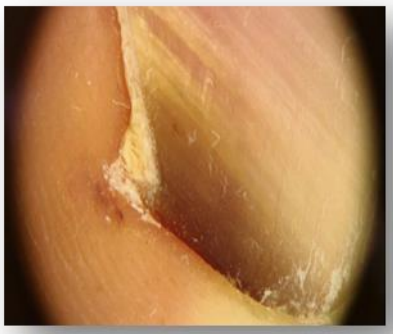

Figure 2. Dermoscopic view of the hyperpigmentation of the toe

These dermoscopy findings were suggestive of fungal infection and for this reason we perform direct microscopy and fungal culture.

In our case, direct microscopy confirmed the diagnosis of Tinea ungium (Onychomycosis, fungal melanonychia) and Trichophyton Rubrum was isolated in the culture.

The patient was treated with Itraconazole pulse therapy for 3 months and topical treatment with Ciclopirox 8% solution for 6 months. A good response to antifungal agents was noticed after the treatment.

DISCUSSION

Onychomycosis is a fungal infection of the fingernails or toenails that causes discoloration, thickening, and separation from the nail bed. Onychomycosis occurs in 10% of the general population but is more common in older adults; the prevalence is 20% in those older than 60 years and 50% in those older than 70 years. (6)

The species that most often cause onychomycosis in North America and parts of Europe are *T. rubrum, T. mentagrophytes*, *and Epidermophyton floccosum*: the first two species are much more often implicated in affecting the toe onychomycosis than *E. floccosum*. (7)

The clinical presentation of dystrophic nails and hyperpigmentation should orientate the clinician to the possibility of onychomycosis; however, because fungi cause only about half of all nail dystrophies (8), the use of appropriate diagnostic techniques including direct microscopy and fungal culture is important to ensure correct diagnosis and treatment. The direct microscopy and culture remain the gold standard for the diagnosis of Tinea unguium. The clinical appearance of the nail and the patient's history-anamnesis will help differentiate fungal from nonfungal etiologies of nail dystrophies. Predisposing factors for onychomycosis include diabetes mellitus, older age, hyperhidrosis, onychogryphosis, nail trauma, poor peripheral circulation, and immunosuppression (9).

In the presence of subungual hyperkeratosis, yellow-brown discoloration, and onycholysis, onychomycosis is likely to be present. Mostly if the patient has been diagnosed with Tinea pedis (hyperkeratotic subtype) the coinfection of the nail plate is frequent. (9)

On the other hand, nail dermoscopy – onychoscopy is becoming more popular among dermatologists using it in the assessment of nail diseases (10). Dermoscopy is cost-effective and non-invasive, allowing clinicians to discern microscopic features of onychomycosis and fungal melanonychia (11). It helps a lot to minimize the number of nail biopsies for differentiate diagnosis. Nail biopsy is rarely conducted specially to diagnose a melanoma or different tumors localized in the nail plate or around. Biopsy as a surgical procedure is very traumatic, either with local anesthesia, may leave a scar, and is psychologically hard to be performed in children when sometimes is necessary.

Nail hyperpigmentation can have various causes: (14-17)

- Exogenous pigment caused by silver nitrate, tobacco, henna use.
- Ethnic pigmentation (people with phenotype V, VI).
- Inflammatory skin disease (lichen planus).
- Trauma (subungual hematoma, nail biting, friction from shoes, radiotherapy).
- Infections (paronychia, onychomycosis especially when due to molds and pigmentation in these cases is nonmelanocytic cause, viral warts).
- Drug reactions (hydroxyurea, antiretrovirals, antimalarials, metals).
- Endocrine disease (Addison disease, Cushing syndrome).
- Nonmelanocytic tumors (squamous cell carcinoma in situ, onychomatricoma, myxoid cyst).
- Melanocytic nevus of nail matrix (Melanonychia striata).
- Lentigo / benign melanocytic hyperplasia.
- Malignant melanoma.

The most often differential diagnosis of Fungal Melanonychia is Melanocytic naevus of the nail apparatus especially in children and adolescents. If a pigmented band is less than one-third the width of the nail plate, brown in color, and demonstrates homogeneity in thickness, color, parallelism, and spacing, the lesion is likely benign. However, the following findings would be predictive of the lesion representing a melanoma: width of the pigmented band greater than two-thirds of the nail plate, band that is grey and black in color, pigmented lines that are irregular (in thickness, parallelism, and/or color), presence of the Hutchinson and micro-Hutchinson signs, associated finding of nail dystrophy (thinning, splitting, partial or total absence of plate), and identification of granular pigmentation (fine to light-brown granularity) within the band. (12) Melanoma should be considered for differentiated diagnosis if

pigmentation affects a single nail, especially if it is of recent origin in an adult.

Hematoma is the most common cause of nail brown-black pigmentation. It can be either acute (following single heavy trauma) or chronic (repeated, micro trauma). While acute subungual hematoma has a deep red/purple band and do not reach the free margin of the nail, chronic subungual hematoma has a red brown, elliptical shape mimicking a longitudinal streak. A true longitudinal band is seen very rarely. Small, round blood globules are seen at the periphery of hematoma on dermoscopy. (13) A dermatologist and dermoscopists must be careful to take in consideration either the repeated trauma of the nail, so the hyperpigmentation of the nail will not change with time. Always another disease that we have to differentiate is a tumor that can cause a trauma and hematoma in the nail plate.

Ethnic type hyperpigmentation - The resulting melanonychia in dermoscopy is characterized by homogeneous longitudinal thin grey lines and light brown to dark grey background color. Benign melanonychia due to epithelial melanin may affect multiple nails, particularly in individuals with skin phototype V or VI. They are more often observed on fingernails than toenails. (16)

Dermoscopic findings in onychomycosis are the following: jagged proximal edge with spikes of the onycholytic area, longitudinal streaks and patches, subungual hyperkeratosis, leukonychia, brown-black pigmentation. (18)

Onychomycosis can also present with longitudinal melanonychia (fungal melanonychia). In such cases, white or yellow streaks, non-longitudinal homogenous pattern, yellow coloration, reverse triangular pattern, subungual hyperkeratosis, multicolor pattern and nail scaling are positive predictors of fungal melanonychia compared to nail matrix naevi or subungual melanomas. (19)

As nail dermoscopy is quick, non-invasive and inexpensive, it has the potential to help physicians identify onychomycosis by the bedside and decide whether to proceed to mycological assessment. (20)

In our case report, dermoscopy examination revealed a homogeneous dark brown- yellow band and proximal hyperkeratosis, suggesting fungal melanonychia, which was further confirmed with direct microscopy and fungal culture.

Bacterial infection of the nail (mostly due to Pseudomonas aeruginosa) is characterized by predominating green color, homogeneous and no other structures are evident. (17)

CONCLUSIONS

Our case report demonstrates the value of dermoscopy in evaluating onychomycosis.

It has a big role on excluding some important diagnoses, therefore avoiding unnecessary nail biopsies.

Over the years, collective global experience on dermoscopy has grown. Dermoscopy has added new dimensions to the diagnosis of a countless

number of diseases. We suggest that this quick, non-invasive and highly effective tool should be considered as the first step in the diagnosis of onychomycosis followed by a direct microscopy and fungal culture as a gold standard for correct diagnosis.

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