

The Importance of Dermatoscopy for the Diagnosis of Melanonychia

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ABSTRACT: Melanonychia is the brown or black color of the finger or toe nail due to melanin deposition or melanocytes in the nail plate. The evidence of melanocytic disease is made by the dermatoscope, which allows to highlight the anomalies of the plate. The purpose of our study was to evaluate dermatoscopically the melanonychia, both in the form of stain and longitudinal on finger and/or toe nails in order to establish the type of nail hyperpigmentation. Materials and method: 33 patients with longitudinal and stain melanonychia were examined with 30x Molemax HD computerized dermatoscope between May 2017-septembre 2018 in this prospective study conducted in the Department of Dermatology of Medical Center Dr. Ianoși (Craiova, Romania). Clinical data included: type of melanonychia, number and name of involved fingers, the presence or absence of fungal infections, nail apparatus tumors or hemorrhage. Results: The most frequent nail diagnosis was fungal infection (onychomycosis) observed in 18 patients (54.54%), malignant melanoma was diagnosed in 1 patient (3.03%) and the junctional nevus in 4 patients (12.12%). In 18 patients which has longitudinal melanonychia, the most frequent involved finger was the big toe, and in 15 patients which has stain melanonychia, all of them (100%) had affected the big toe, 7 (46.66%) patients had affected the thumb and the same percent the forth finger. Conclusion: Nail dermatoscopy is an important method in establishing the diagnosis of melanonychia and allowed to avoid unnecessary biopsy for melanonychia.

KEYWORDS: Melanonychia, dermatoscopy, melanoma, onychomycosis

Introduction

Melanonychia is the deposition of melanin or melanocytes in the nail plate due to 2 different processes: melanocytic activation or melanocytic hyperplasia [1].

There are 3 patterns of melanonychia: longitudinal, transverse and diffuse (stain). A single nail plate can involve more than one pattern of melanonychia and several nails may be affected.

Dermatoscopy has demonstrated the efficiency and effectiveness of non-invasive diagnostic of cutaneous pigmented lesions [1,2].

More recently its application has been extended to inflammatory nonpigmented skin diseases and diseases of the cutaneous annexes such as hair (trichoscopy) and nails (onychoscopy) [1].

Onychoscopy or nail dermatoscopy is a non-invasive diagnostic technique that completes the clinical examination in the evaluation of numerous nail disorders: nail pigmentations, melanocytic and

non-melanocytic nail tumors, inflammatory, infectious or traumatic nail diseases [3,4].

Melanonychia could be an important sign for a variety of benign or malignant nail diseases, the most important being malignant melanoma.

Our study aimed the computerized dermatoscopic evaluation of nail hyperpigmentations in both the longitudinal and stain band of fingers and/or toes in order to examine the different aspects of melanonychia to ascertain the ethiology.

Materials and method

A total of 33 patients with longitudinal and stain melanonychia were examined with 30x Molemax HD computerized dermatoscope between May 2017-septembre 2018 in this prospective study conducted in the Department of Dermatology of Medical Center Dr. Ianoși (Craiova, Romania).

Written informed consent was obtained from each patient >18 years of age and parental informed consent for those <18 years was obtained.

The study was conducted in accordance with the World Medical Association Declaration of Helsinki (1975) and approved by the Institutional Ethics Committee of the Medical Center Dr. Ianosi (No. 256/22.04.2017).

Clinical data included: age, gender, type of melanonychia, number and name of involved fingers, the presence or absence of fungal infections, nail apparatus tumors or hemorrhage.

All patients underwent mycological examination of the nail plate to exclude a possible onychomycosis.

Statistical analysis

Quantitative variables were presented as mean±standard deviation (SD), and qualitative variables as frequency and percentage.

Analysis of variance (ANOVA) and Student t-test were used whenever appropriate. P value less than 0.05 was considered significant.

Results

A total of 33 patient records were reviewed in this study. Twenty of our patients were female (60.6%) and 13 were male (39.4%).

The mean age of the patients was 38.9 years old (± 17.0054), and their age range was between 10 and 67 years.

The most frequent nail diagnosis among them was fungal infection (onychomycosis) observed in 18 patients (54.54%) (Fig.1).

Malignant melanoma was diagnosed in 1 patient (3.03%) (Fig.2).



Fig.1. Right first toe, dermoscopy, Molemax HD, 30X: homogeneous light brown stain



Fig.2. Left hand fifth finger, dermoscopy, Molemax HD, 30X: light brown to brown non-homogeneous band formed by longitudinal, irregular, interrupted stripes

The junctional nevus was diagnosed in 4 patients (12.12%). The frequency of different pathological diagnoses of melanonychia based on the patients' gender and age have been

summarized in Table 1. There was difference between the two genders regarding the frequency of any of the diagnoses ($P < 0.001$).

Table 1. Frequency of different types of melanonychia (LM) based on patients' gender and age

Diagnosis	Mean age (SD) (year)	Male	Female	Total
Junctional nevi	15 (5.09)	0 (0%)	4 (12.12%)	4 (12.12%)
Melanoma	45 (0)	0 (0%)	1 (3.03%)	1 (3.03%)
Hemorrhage	46.42 (18.58)	3 (9.09%)	4 (12.12%)	7 (21.21%)
Fungal infection	43.22 (14.37)	10 (30.3%)	8 (24.24%)	18 (54.54%)
Lentigo	25.66 (2.51)	0 (0%)	3 (9.09%)	3 (9.09%)
Total	38.9 (17.0054)	13 (39.39%)	20 (60.6%)	33 (100%)

In 18 patients which has longitudinal melanonychia, 8 (44.44%) had affected the big toe, 7 (38.88%) had affected the thumb, 3 (16.67%) of them the forth finger and all of them had affected three fingers in the same time.

In 15 patients which has stain melanonychia, all of them (100%) had affected the big toe, 7 (46.66%) patients had affected the thumb and the same percent the forth finger. Seven of them had affected three fingers in the same time. Eight (53.33%) had affected just one finger.

Four patients (all of them females) were in the pediatric age group (18 years old or younger). All of them had affected three toes at the same time. Three of the patients (75%) was diagnosticated with junctional nevi and one patient had hemorrhage. No melanoma was found.

The mean age of patients who had longitudinal melanonychia (31 years old) was significantly lower than patients with stain melanonychia (44.79 years old) ($P = 0.005$).

The mean age of patients with hemorrhage (46.42 years old) was significantly higher than patients with junctional nevi (15 years old) ($P = 0.032$).

The frequency of the diagnostics is presented in Table 2.

The subungual junctional nevi were diagnosticated most frequent for pediatric age (Fig.3).

Lentigo was diagnosticated most frequent for age between 18-30 years and the hemorrhage was diagnosticated most frequent for the age between 50-60 years (Fig.4-5).

The type of melanonychia, longitudinal or stain, are not correlated with etiology.

Table 2. The frequency of the diagnostics based on patients' age

Age	≤18	18-30	30-40	50-60
No.	4	9	10	10
nevus	0.75	0.111111	0	0
lentigo	0	0.111111	0	0
hemorrhage	0.25	0.111111	0.2	0.3

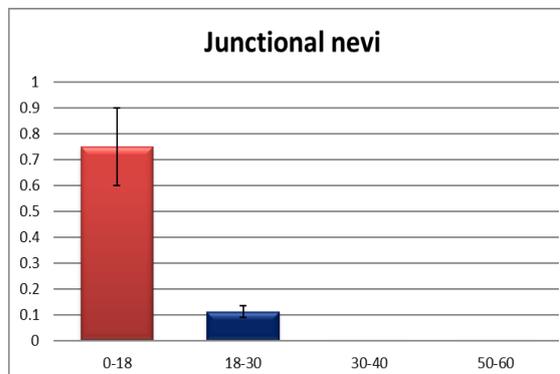


Fig.3. The frequency of the diagnostics based on patients' age for junctional nevi diagnostic

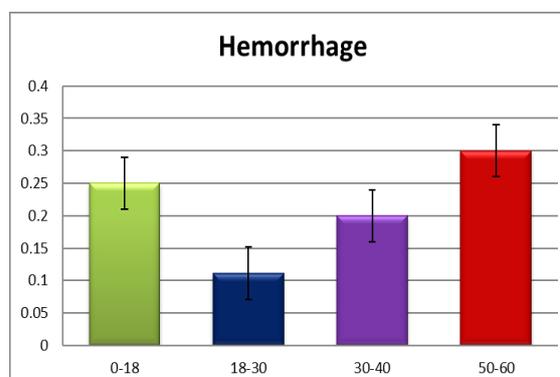


Fig.4. The frequency of the diagnostics based on patients' age for hemorrhage diagnostic

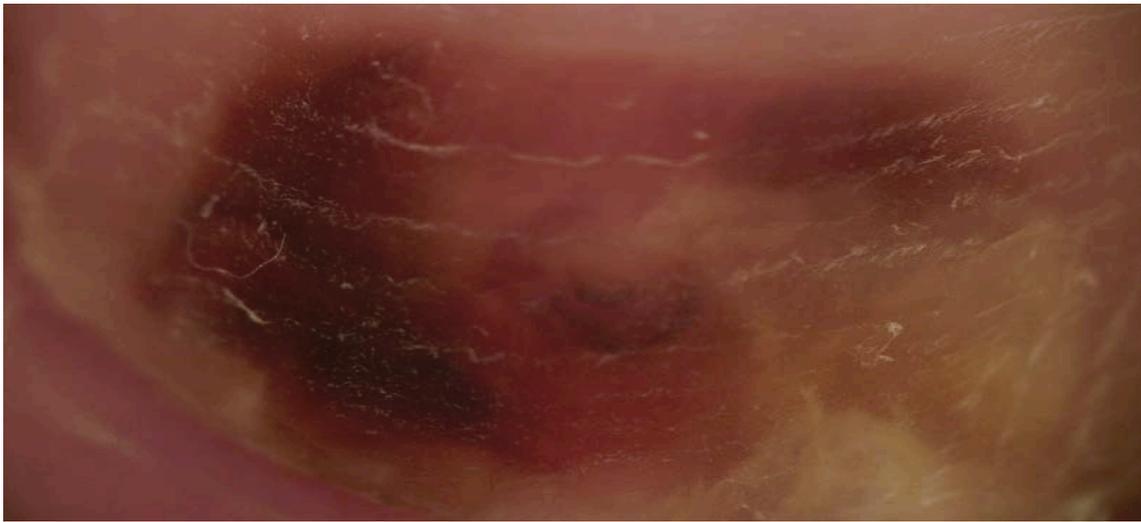


Fig.5. Left first toe, dermatoscopy, Molemax HD, 30X: red-violet stained blood subfusion

Discussion

Melanonychia results from the increase and deposition of melanin pigment (melanocytic activation) or melanocytes (melanocytic hyperplasia) within the nail matrix.

Melanocytic activation occurs most often due to increased melanin production by melanocytes in the nail cells (onychocytes).

Melanocytic hyperplasia represents the increased number of melanocytes in the nail plate and could be a benign or malignant process.

A healthy adult has about 200 melanocytes per mm² in the nail matrix, most of which remain dormant.

When these melanocytes are activated melanosomes filled with melanin are transferred into differentiated matrix cells that migrate distally and become nail plate onychocytes.

This results in a visible band of pigmentation in the nail plate [1,2].

Most common melanocytic syndrome occurs in elderly people, but can also occur in children. The number and band width increases with age.

The main causes and risk factors for melanonychia are [2,3]:

- physiological causes: pregnancy (multiple bands), racial melanonychia (multiple bands in African, Hispanic, Indian, Japanese);
- hyperplastic causes: melanoma, lentigo, melanocytic nevi;
- local and regional factors: trauma, tight shoes, onychotilomania, insect stings, carpal tunnel syndrome, subungual foreign body, radiotherapy, ultraviolet light, postinflammatory hyperpigmentation.

Dermatoscopy of the nail plate is a noninvasive, adjunct tool to add additional information for melanonychia [4]:

- Longitudinal homogeneous parallel lines of gray color, regular in spacing, thickness and color. It suggests racial origin;

- Longitudinal homogeneous parallel lines of brown color, regular in spacing, thickness, and color. It suggests melanocytic or lentigo nevus;

- Longitudinal homogeneous lines with breaks of parallel distribution of brown-to-black color, irregular in spacing, thickness and color.

It suggests melanoma. Brown-to-black pigmentation of proximal nail fold suggests melanoma, too (Hutchinson's sign).

According to epidemiological studies, benign longitudinal melanonychia is rare in Caucasians (1.4%); thumbs, index fingers and toes are most often involved [5].

There are 8 different types of melanonychia: Longitudinal melanonychia during pregnancy. During pregnancy, a number of vascular, endocrine, metabolic and immunological changes occur.

Hyperpigmentation occurs in more than 90% of pregnant women. Areolas, genital area, axilla, neck and thighs are affected. Occasionally, scars, freckles, and bruises become more pronounced. These changes are related to high concentrations of melanocyte stimulating hormone, estrogen and progesterone. A common finding in these patients seems to be longitudinal melanonychia [6].

Post-drug melanonychia. Numerous drugs (bleomycin, busulfan, cyclophosphamide, dacarbazine, daunorubicin, doxorubicin, etoposide, 5-fluorouracil, hydroxyurea,

methotrexate, arsenic, chloroquine, cyclins, fluticasone, gold salts, ibuprofen, ketoconazole, phenytoin, phenothiazine, psoralen, mercury, lamivudine, tetracycline, steroid, sulfonamide, timolol) have been associated with the appearance of nail changes, but only a limited number of drugs have been demonstrated as having a toxic effect on the nail matrix or nail fold.

These are retinoids (generation 1 or 2-acitretin, isotretinoin, etc.) and cytostatic agents (docetaxel-taxotere) [7,8,9,10].

Melanonychia and dermatological diseases. Some dermatological conditions such as psoriasis, lichen planus, scleroderma, chronic radiodermatitis, lupus erythematosus, subungual fungal infections, basal cell carcinoma, Bowen's disease, subungual fibrous histiocytoma, lichen striatus, mucosal cyst may cause melanonychia.

Inflammatory changes in the nail matrix induce the activation of melanocytes and implicitly increase melanin production. These patients typically have a single light brownish longitudinal band that occurs shortly after the resolution of the inflammatory process [11,12,13].

Melanonychia associated with Laugier-Hunziker syndromes, Peutz-Jeghers syndrome and Touraine syndrome. Typically, the lesions encountered are multiple longitudinal bands present at several nails and pigmented macules at the lip and oral cavity [12].

Melanonychia and systemic diseases. Melanonychia rarely occurs in systemic diseases: endocrine disorders, nutritional, HIV infection, hemosiderosis, alcaptonuria, hyperbilirubinemia, porphyria, gram-negative disease, malnutrition, vitamin B12 deficiency. Patients have multiple dark brown strips on toe and hand nails associated with pigmentary lesions on skin and mucosa [11].

Subungual haemorrhage. They are characterized by well-circumscribed dots or bags, red to red-black, but some cases may be difficult to distinguish between subungual melanoma. Dermoscopy has proven to be a useful non-invasive method in diagnosing pigmented lesions in nails; however, few dermoscopic studies of subungual hematoma have been reported.

Melanonychia due to melanocytic naevus (subungual nevus). Subungual nevus usually appear in children or young adults and appear in the form of longitudinal, uninterrupted, uniform lines along their entire length. The width of the pigment band in benign subungual nevus is

usually less than 3mm, without variations in thickness. The color of these lesions is variable (from light brown to dark brown or even black) but homogeneous throughout their length [14,15,16].

Invasive melanoma of nail unity. Epidemiological studies show that nail melanoma occurs with an increased frequency in people over 50, especially at the level of thumb and toe [17].

Only half of the patients with nail melanoma recall a local trauma in the past. The width of the nail pigment band is often greater than 5mm for the nail melanoma and can see lines of thickness, spacing and different colors-"chaos", but in the case of early melanomas, several (sometimes even all) of these criteria may be missing. In these cases, the detailed history of lesion evolution may cause the dermatologist to suggest that perform a nail matrix biopsy [17].

If a longitudinal melanonychia band has altered in shape, color, size or the appearance of local pain or ulceration suggest a diagnosis of malignant melanoma. Factors that show the possibility of malignant etiology of melanoma are: age (increased incidence in the fifth to seventh decade), brown/black band with a width of more than 3mm, morphology changes, extension of the pigment to the matrix, cuticle or lateral nail folds and family history of melanonychia [2,3]. Thumb are more affected than other fingers.

Monitoring melanonychia depends of cause that produced it. If melanonychia is secondary to a systemic and/or dermatological disease its treatment is helpful. If it is secondary to a drug interrupting treatment may lead to clearance. For in situ melanoma, full nail excision or Mohs micrograph surgery is indicated. In the case of invasive melanoma amputation of distal phalanges or Mohs surgery is practiced [18].

Patients with idiopathic longitudinal melanonychia who refuse biopsy should be monitored for changes [19].

Although there is still no solid evidence of the frequency of dermoscopic follow-up, we recommend checking suspicious longitudinal melanoma every 3 months. Furthermore, patients with longitudinal melanonychia should be required to be strictly monitored if the lesion shows obvious changes [19].

If there are noticeable changes to melanoma, a biopsy should be performed [20].

Most cases of primary melanonychia are benign with limited mortality and morbidity, but melanoma tends to have poor prognosis [21].

As we presented in our study, the majority of pigmented disturbances from the nails are due to fungal infections and/or subungual hematomas, that are benign lesions with esthetic injury only.

Fortunately, malignant melanoma was rare, only in 1 patient, and the subungual junctional nevus was diagnosed in 4 patients. The role of dermatoscopy in melanonychia diagnosis is essential, because allows to establish some etiological elements and also helps in dynamic evaluation of this disease. If in majority of cases these lesions are benign, there are some situations where computerized dermatoscopy diagnose malignant melanoma that is extremely aggressive in this location.

Conclusions

Currently, nail dermatoscopy is used as a routine measure because it provides important information on the dermatoscopic assessment criteria of nail pathology and allowed us to avoid unnecessary biopsy for melanonychia.

Any cases of melanonychia should be treated with caution in order to identify the etiology but the most important concern is to exclude a malignant melanoma.

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