

The dermoscopic manifestation of nail pigmentation

Hanar Ahmed Khidhir *
Mohammed Yousif Saeed **

Abstract

Background and objectives: Nail pigmentations are of diagnostic challenging for dermatologists, as they may be involved in many local and systemic diseases that difficult to diagnose clinically. Our aim is to assess the specific dermoscopic features of different pigmented nail lesions. **Methods:** In our cross-sectional descriptive study; the total number of 46 patients with different types of nail pigmentation from all age groups and both sexes were included.

Results: A total number of 46 patients, fungal melanonychia (n=14) was the commonest nail pigmentation found. In which the most common dermoscopic features were wide yellow streaks (100%). In drug-induced pigmentation (n=9) fine regular grey lines on a homogenous grey background were found. In Subungual hemorrhage (n=7) blood spots was the most common feature (100%). Lentigo (n=4) were associated with thin regular longitudinal grey lines on homogenous brown background. Nail melanocytic nevus (n=3) multiple, regular brown lines on the homogenous brown background was commonly found. In pseudomonal infection (n=5) bright green color mixed with dark green the most obvious feature. In nail-biting and in Laugier-Hunziker syndrome greyish coloration of background with thin longitudinal grey lines was the common feature. In melanoma (n=1) the dermoscopy showed the brown coloration of the nail plate background with irregular brown-black lines. **Conclusions:** Onychoscopy is a non-invasive device that collects much information that helping in the diagnosis of nail pigmentation.

Key words: Dermoscopy, Melanonychia, Nail pigmentation, Subungual hemorrhage.

Introduction

Nail pigmentation can exhibit many different colors and shades. Most of them are harmless but cosmetically embarrassing, others are potentially serious and may lead to death if not adequately diagnosed and treated, so they are of diagnostic challenging for dermatologists¹⁻².

Normally the nail is not pigmented because nail matrix melanocytes are quiescent and do not produce melanin²⁻³. Alteration of color occurred either due to deposition of pigment on the nail plate (exogenous), due to pigmentation of the nail bed, or due to the production of the pigment from the nail matrix⁴⁻⁵. Dermoscopy (onychoscopy) is a non-invasive, complementary tool which aids in the diagnosis of nail diseases⁶. It forms a link between the macroscopic clinical dermatology and microscopic dermatopathology. This sub-microscopic observation technique provides anew morphologic criteria for the differentiation of melanoma from other melanocytic and non-melanocytic pigmented lesions and also avoids time-consuming investigations such

as culture and biopsy^{2,7}.

With dermoscopy, the nail is visible as whole only at x10 magnification, but observation can be improved with magnifications ranging from x 20 to x70 moving the lens back and forth and transversally. Onychoscopy can be performed dry or with ultrasound gel. The most important rule is to use dry dermoscopy to study nail plate surface and to apply the gel as an interface when the evaluation includes nail pigmentation, onycholysis, and distal nail margin⁴. Dermoscopy (Onychoscopy) can be applied to all visible parts of the nail unit^{4,6}. During onychoscopic examination, the first and most important task necessary is to establish the pigmentation is it of melanocytic or non-melanocytic origin, then if it is of melanocytic origin is due to proliferation or activation of matrix melanocytes, and then if it is due to melanocytic proliferation is it benign or malignant⁴. Nail pigment of non-melanocytic origin includes exogenous pigmentation, subungual hemorrhage, fungal and bacterial infection⁸. Exogenous pigmentation includes different substances that adhere to the

* M.B.Ch.B. Hawler Medical University, College of Medicine.Erbil Dermatology Teaching Center.
Email: Hanar_ahmed124@yahoo.com

**M.B. Ch. B, FIBMS, ISDS, ESLDC. Assist. Prof. Head of Sulaimani Dermatology Teaching Center.
College of Medicine, University of Sulaimani.

nail plate. Among the most frequent causes are contacted with chemical agents, topical application of therapeutic agents, such as silver nitrate or, tobacco, potassium permanganate and cosmetics, such as henna and hair dyes^{5,8}. Fungal infection (fungal melanonychia) occurs when onychomycosis is due to melanoids variant of trichophyton rubrum (var. nigricans) or with dermatiaceous fungi such as *Scytalidium dimidiatum*⁹. Bacterial infection (*Pseudomonas aeruginosa*) produces green discoloration of the nail plate which may be associated with onycholysis or chronic paronychia⁹.

Nail pigmentations of melanocytic origin occur when the nail matrix melanocytes are activated or proliferated. In melanocytic activation the number of melanocytes is normal but they produce more melanin pigment, while in melanocytic proliferation the number of nail matrix melanocytes are increased. The most common causes of melanocytic activation are physiological, drug-induced, onychotillomania, nail-biting, Addison disease, Laugier-Hunziker syndrome and Bowen's disease^{8,10}. While conditions that are resulted from melanocytic proliferations are lentigo, nevus, and melanoma.

Generally, in cases with nail apparatus lentigo, there will be benign melanocytic hyperplasia, while in the nail apparatus nevus there is a benign proliferation of melanocytes and in melanoma, there is a malignant proliferation of melanocytes⁹. Melanonychia is more common in older individuals. In children, melanonychia is often caused by melanocytic nevus and subungual melanoma is very rare in children. Melanonychia affects males and females equally and is more common in dark skin individuals². There is no study concerning features of pigmented nail lesions in Erbil city, this study was conducted to overcome this gap and to provide baseline data for further studies on this subject in the future. The aim of the study is to describe the dermoscopic features of the different causes of nail disorders.

Patients and methods

A cross-sectional descriptive study conducted on 46 patients with different types of nail pigmentation who attended the out-patient department of Erbil Dermatology Teaching Center and Rizgari teaching hospital Oncology department in Erbil city during a period of 8 months (September 2018-April

2019). Written consent was taken from all participants of the study. Patients from all age groups and both male and females were included in the study, whereas those who received treatment for the nail pigmentation at the last 2 months were excluded. The diagnosis was established by two experienced Dermatologists. Each patient was subjected to a detailed socio-demographic history including (age, gender,), medical and dermatological history, this followed by complete general and skin examination, later dermoscopic evaluation was done for any affected nail using a handheld handy scope (fotofinder systems, Bad Birnbach, Germany) and (fotofinder system GmbH, Handicam1000). Ultrasound gel was used as a linkage between the nail plate and the contact plate of dermoscopy. At first, photos were taken by the ordinary camera then were examined with dry dermoscopy and later with a gel as an interface. All patients had been treated and followed accordingly during and after the period of the study. The study was accepted by the ethical committee of the Kurdistan Higher Council of Medical Specialties (KHCMS). Data were collected on a specially designed questionnaire and analyzed using statistical package for social science (SPSS) version (25.0). Continuous variables were expressed as means $\pm$ standard deviations (SD) and analyzed statistically using Students t-test, while qualitative (categorical) variables were expressed as frequencies and analyzed using Chi-square test and the level of statistical significance was set at $p\text{-value} \leq 0.05$.

Results

A total number of 46 patients 27 (58.7%) female and 19(41.3%) male were enrolled in our cross-sectional descriptive study. Ages ranging from (7- 60 years) with a mean age of patients were 33.08 ± 13.11 . Among all cases of nail pigmentation, Fungal melanonychia was the commonest presentations 14 patients (30.43%) of which 9 were females and 5 were males with a mean age of 32 ± 5.87 and 30 ± 6.76 years respectively. Chi-square test showed no statistically significant difference between age and sex of the patients ($p\text{-value}=0.374$). The second most common cause of nail pigmentation was drug-induced nail pigmentation 9 patients (19.56%) followed by subungual hematoma (15.21%) and others, Table (1) & Table (2).

Table 1: Number and percentage of patients with nail pigmentation.

Dermatological diagnosis	No	%
Fungal melanonychia	14	30.43
Drug-induced pigmentation	9	19.56
Subungual hematoma	7	15.21
Pseudomonal infection	5	10.86
Nail apparatus lentigo	4	8.68
Nail apparatus melanocytic nevus	3	6.52
Nail-biting induced pigmentation	2	4.34
Laugier-hunziker syndrome	1	2.17
Ungual melanoma	1	2.17
Total	46	100

Table 2: Distribution of fungal melanonychia by age and sex.

Gender	No	%	Mean age	p-value
Male	5	35.7	30 ± 6.76	0.374
Female	9	64.3	32 ± 5.87	
Total	14	100		

Among 14 patients with fungal melanonychia: 7 patients had only 1 involved nail, 3 patients had 2 involved nails, 2 patients had 4 affected nail and 2 of them had 5 affected nails. The most common dermoscopic feature was wide –yellow streaks were seen in all cases (100%), these wide yellow streaks were either on multicolor pigmentation of nail plate 50% or on brown-black coloration (28.57%). The second most common feature was the accumulation of scale and black pigment under the nail plate (92.85%), Figure (1). Other features explained in Table (3).

Table 3: Dermoscopic patterns and number of patients with fungal melanonychia.

Dermoscopic patterns	No	%
Wide -yellow streaks.	14	100
Accumulation of scale and black pigment under the nail plate.	13	92.85
Multi-color pigmentation	7	50
Homogenous brown-black coloration.	4	28.57
Matt black coloration with disrupted lines.	3	21.42

Nine patients had drug-induced melanonychia. In most of the cases, several fingers were affected, the four most frequently responsible drugs were hydroxyurea, gemcitabine, carboplatin, and amlodipine. The main dermoscopic features of these cases were a grayish coloration of the background and the presence of thin longitudinal grey lines with regular coloration and spacing that was seen in all cases (100%) Figure (2).

Seven patients had a subungual hemorrhage, 3 of them had recent hematoma and 4 of them with old hematoma, the most common dermoscopic feature was the presence of

blood spots 100%. These blood spots in cases with recent hematoma appeared as a well-circumscribed red-purple structure which was more rounds with blood globules and dots proximally and more streaked and linear distally, while in those with old hematoma the color is more red-black and surrounded by aggregates and dots of coagulated blood Figure (3). Five patients had a pseudomonal infection. Three of them were associated with subungual onycholysis and 2 of them had concurrent paronychia. Dermoscopy disclosed a bright green coloration mixed with dark green and black which gradually changes to yellow at the border of onycholysis

(100%) Figure (4). The green color is the result of a product (pyocyanin) by bacteria⁴. Regarding the Nail apparatus, lentigo 4 cases were included in our study. The most evident onychoscopic feature was multiple thin longitudinal grey lines on a brown background. Lines were parallel to each other and regular in color and width (100%) Figure (5).

Three patients had nail apparatus melanocytic nevus. They presented clinically with melanonychia striate. Their dermoscopic features were regular parallel brown lines with regular space and thickness on a brown background (100%). In 2 of the cases pseudo-Hutchinson sign was positive Figure (6). Two patients had a nail-biting habit induced melanonychia. Onychoscopy showed grey bands with longitudinal grey lines on a grey coloration background which it was seen in both cases. Regarding Laugier- Hunziker syndrome one case recorded in our study. He was a young

man presented with asymptomatic macular pigmentation of lower lip, tongue, both hands, and feet associated with longitudinal melanonychia of several fingers. The dermoscopic features of the nail showed multiple bands of dark grey longitudinal lines on a grey background.

About nail apparatus melanoma one case of melanoma was included in our study. She was 36 years old presented clinically with black coloration and destruction of the nail and positive Hutchinson sign. Onychoscopic examination showed the brown coloration of the nail plate background, with multiple irregular brown-black lines. Lines were irregular in color, width and space with disruption of parallelism, blood spots were seen in the center (subungual hemorrhage), and also melanin granules Figure (7).

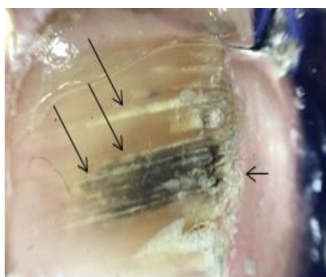


Figure 1: Fungal melanonychia. Note the wide yellow streaks (long arrow), black-brown coloration of background, subungual scale (short arrow).

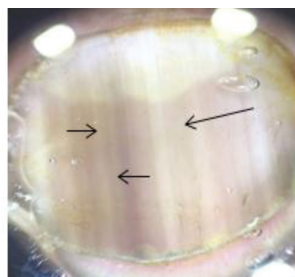


Figure 2: Drug-induced melanonychia. The patient had pancreatic carcinoma on Gemcitabin. Note the greyish background and thin regular grey lines.

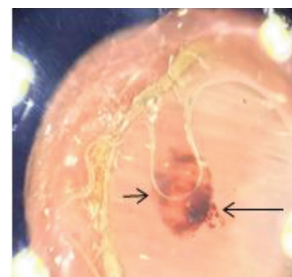


Figure 3: Subungual hematoma. Note the (blood spot) which is more rounded proximally (long arrow) and more streaked distally (short arrow).

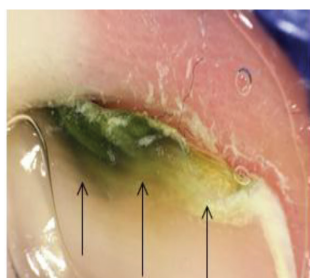


Figure 4: pseudomonal infection of the nail. Note the dark- green, bright green and yellow coloration.

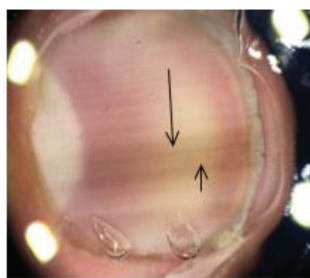


Figure 5: Nail apparatus Lentigo. Note the brown pigmentation of the background (short arrow), multiple grey lines (long arrow).

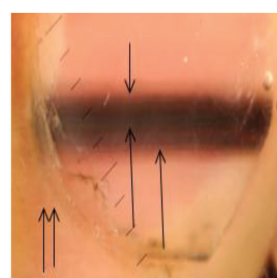


Figure 6: Nail apparatus nevus. Note the brown background (Short arrow). Regular brown lines (long arrow). Note the pseudo-hutchinson sign (double arrow).

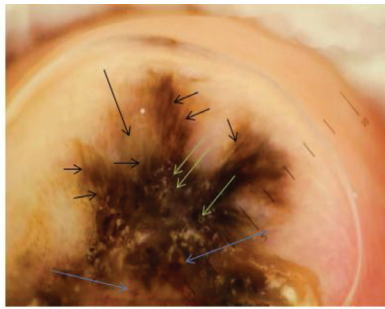


Figure 7: Subungual melanoma

Note the brown background (long arrow), Irregular brown lines (short arrows), Disruption of parallelism, blood spots (blue arrows) and Melanocytic granules (green arrows).

Discussion

Nail pigmentation usually is of diagnosing challenging as subungual melanoma is the most significant underlying cause which it cannot be diagnosed clinically and performing a biopsy for any case with nail pigmentation is impractical because nail matrix biopsy may lead to permanent nail damage. Dermoscopy is a link between clinical and histopathological dermatology.

According to the results achieved in our study the most common cause of nail pigmentation is fungal melanonychia (30.43%) and the most prominent dermoscopic pattern found was wide-yellow streaks which present in all cases (100%), subungual deposition of pigment and scale (92.58%), homogenous black brown discoloration of background, matt black pigmentation, multi-color pigmentation of the background), which are similar to other studies published by Lee SW et al¹² and Wang YJ et al¹³.

We didn't observe any case of fungal melanonychia with (reverse black triangle) pattern which was described by other study carried out by Kilink et al¹⁴. Chi-square test was done to evaluate the association of age and gender of patients with fungal melanonychia but was not significant (p-value= 0.374).

Other 7 onychoscopic patterns we found and established in our study were blood spots, brown coloration of the background, grey coloration of the background, regular grey lines, longitudinal brown regular lines, brown irregular lines, micro-Hutchinson sign) Which were similar to the previous studies conducted by Ronger et al¹¹ and Di Chiaccchio et al¹⁵. Among these dermoscopic patterns in our study: blood spots are highly associated with subungual hemorrhage which was present in all cases (100%), but also they are found in association with subungual melano-

ma as in our study, therefore, attention needed in a case of blood spots when it doesn't grow with growing nail plate and if it is not associated with history of trauma⁸. Grey coloration of the background and regular longitudinal grey lines were found with (drug-induced pigmentation 100%, nail-biting induced melanonychia 100%, Laugier-Hunziker syndrome). Brown colorations of the background with regular thin grey lines were present with all cases of ungual lentigo (100%). Brown coloration of the background with regular brown lines regular in (width, space, color) were detected in all cases of nail apparatus melanocytic nevus (100%).

Brown coloration of the background with irregular brown-black lines irregular in (width, space, color), blood spots were noted with our one case of (subungual melanoma). Pseudo-Hutchinson sign was detected in both of nail melanocytic nevus two of three cases and with a case ungual melanoma. Another dermoscopic feature we noticed in our study was (bright green, dark green and black) coloration of the nail plate background associated with onycholysis. These dermoscopic patterns were present in all cases with pseudomonal nail infection in our study.

Onychoscopy has a crucial role in evaluating of nail pigmentation. As we established in our study how dermoscopy displays specific features and patterns in different causes of nail pigmentation. It can easily differentiate the pigmentations is of melanocytic and non-melanocytic origin and it can differentiate melanocytic activation from melanocytic proliferation and benign from malignant proliferation.

Generally; the dermoscopic features of a non- melanocytic pigmentation (exogenous pigmentation, fungal and bacterial infection, and sub-ungual hemorrhage) are not forming bands or lines (but they distribute diffusely and they don't have melanocytic granules), while those that of melanocytic origin they appear as bands and lines and they show melanocytic granules^{4, 8- 9}. Melanin granules are tiny granules that can be easily identified as small granules of less than 0.1 mm in diameter under dermoscopy⁸.

In addition to the good dermoscopic examination, proper history and examination should be collected and correlated. Particularly in melanoma the duration usually is of short period and the single nail will be affected as we observed in our case of melanoma while in fungal infection, drugs,

nail-biting habit, and Laughir-Hunziker syndrome several nails were affected and longer duration. Despite the importance of dermoscopy in the management of nail pigmentation the histopathological examination should be performed in any suspicious lesions for a definite diagnosis.

The limitation of our study is the small sample size and the diagnosis not correlated with histopathological examination because of traumatic nail matrix biopsy most of the patients did not accept to do it and also it needs special experience.

Conclusions

The dermoscopy which is a non-invasive, easily applicable device is important in evaluating nail pigmentation by exhibiting specific feature in any cause of nail pigmentation and it easily can differentiate between blood and melanin and fungal infection. So dermoscopy should be used routinely in the management of any pigmented nail disorder.

References

1. Haneke E. Pigmentations of the nails. *JPD*. 2014; 1(5):136.
2. Goettmann-Bonvallot S, Andre J, Belaich S. Longitudinal melanonychia in children: a clinical and histopathological study of 430 cases. *J Am Acad Dermatol*.1999; 41:17-22.
3. Wolff K, Goldsmith L, Katz S, et al. *Fitzpatrick's Dermatology in General Medicine*.8thed. New York: McGraw-Hill; 2011.Chapter 89: the biology of nails and nail disorders; 1009-11.
4. Piraccini BM, Bruni F, Strace M. Dermoscopy of non-skin cancer nail disorders. *Dermatol Ther* .2012; 25:594-602.
5. Ronger S, Touzet S, Ligeron C, et al. Dermoscopic examination of nail pigmentation. *Arch Dermatol*. 2002; 138: 1369 -70.
6. Rathod D, Makhencha MB, Chatterjee M, Singh T, Neema S. Across sectional descriptive study of dermoscopy of various Nail diseases at a Tertiary Care Center. *Int J Dermoscop*.2017;1(1) :11-19.
7. Bhat YJ, Mir MA, Keen A, Hassan I. Onychoscopy: an observational study in 237 patients from the Kashmir Valley of North India. *Dermatol Pract Concept*. 2018; 8(4):283-291.
8. Marghoob A, Malvey J, Braun R. *Atlas of dermoscopy*, 2nd ed. London: Informa healthcare; 2012.Chapter 9; 268-71.
9. Rubin A, Jellinek N, Daniel III C, Scher. *Scher and Daniel's nails*, 4th ed. Switzerland: Springer; 2018.Chapter 31: Nail dermoscopy; 512-20.
10. Andre J, Lateur N. Pigmented Nail Disorders. *Dermatologic Clinics*.2006; 24(3):329-39.
11. Ronger S, Touzet S, Ligeron C, et al. Dermoscopic examination of nail pigmentation. *Arch Dermatol*. 2002; 138(10):1327-33.
12. Lee SW, Kim YC, Kim DK, et al. Fungal melanonychia. *J Dermatol*. 2004; 31: 904-09.
13. Wang YJ, Sun PL. Fungal melanonychia caused by *Trichophyton rubrum* and the value of dermoscopy. *Cutis*. 2014; 94(3): E5–6.
14. Kilinc K, Acar A, Aytur D, et al. Dermoscopic features in fungal melanonychia. *Clin Exp Dermatol*. 2015; 40(3):271–80.
15. Di Chiacchio N, Cadore de Farias D, Maria Piraccini B, et al. Consensus on melanonychia nail plate dermoscopy.*An Bras Dermatol*.2013; 88(2):309-13.