DERMATOLOGY PRACTICAL & CONCEPTUAL
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When all you have is a dermatoscope—start looking at the nails

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Keywords: nail unit, dermatoscopy, melanoma, nevus, melanonychia striata, acral pigmentation, nail alteration

Citation: Haenssle HA, Blum A, Hofmann-Wellenhof R, Kreusch J, Stolz W, Argenziano G, Zalaudek I, Brehmer F. When all you have is a dermatoscope—start looking at the nails. Dermatol Pract Concept. 2014;4(4):2. http://dx.doi.org/10.5826/dpc.0404a02.

Received: May 4, 2014; **Accepted:** May 16, 2014; **Published:** October 31, 2014

Funding: None.

Competing interests: The authors have no conflicts of interest to disclose.

All authors have contributed significantly to this publication.

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ABSTRACT

Pigmented and non-pigmented nail alterations are a frequent challenge for dermatologists. A profound knowledge of clinical and dermatoscopic features of nail disorders is crucial because a range of differential diagnoses and even potentially life-threatening diseases are possible underlying causes. Nail matrix melanocytes of unaffected individuals are in a dormant state, and, therefore, fingernails and toenails physiologically are non-pigmented. The formation of continuous, longitudinal pigmented streaks (longitudinal melanonychia) may either be caused by a benign activation of matrix melanocytes (e.g., as a result of trauma, inflammation, or adverse drug reactions) or by a true melanocytic proliferation (e.g., in a nevus or melanoma). In general, non-continuous nail alterations, affecting only limited parts of the nail apparatus, are most frequently of non-melanocytic origin. Important and common differential diagnoses in these cases are subungual hemorrhage or onychomycosis. In addition, foreign bodies, bacterial infections, traumatic injuries, or artificial discolorations of the nail unit may less frequently cause non-continuous nail alterations. Many systemic diseases that may also show involvement of the nails (e.g., psoriasis, atopic dermatitis, lichen planus, alopecia areata) tend to induce alterations in numerous if not all nails of the hands and feet. A similar extensive and generalized alteration of nails has been reported after treatment with a number of systemic drugs, especially antibiotics and cytostatics. Benign or malignant neoplasms that may also affect the nail unit include glomus tumor, Bowen's disease, squamous cell carcinoma, and rare collision tumors. This review aims to assist clinicians in correctly evaluating and diagnosing nail disorders with the help of dermatoscopy.

Introduction

The clinical and dermatoscopic evaluation of nail alterations is often a diagnostic challenge for dermatologists in their daily practice. Regarding the variety of different patterns, it is helpful to follow a standardized diagnostic algorithm (Figure 1A) and to memorize the dermatoscopic features of the most frequent nail disorders as depicted by the schematic icons in Figure 1B [1]. In agreement with the evaluation of pigmented lesions elsewhere on the skin, a multi-step diagnostic procedure has proven to be successful [2]. A first step is dedicated to the differentiation of a melanocytic origin (longitudinal melanonychia) from a non-melanocytic origin of the nail pigmentation (non-continuous discoloration).

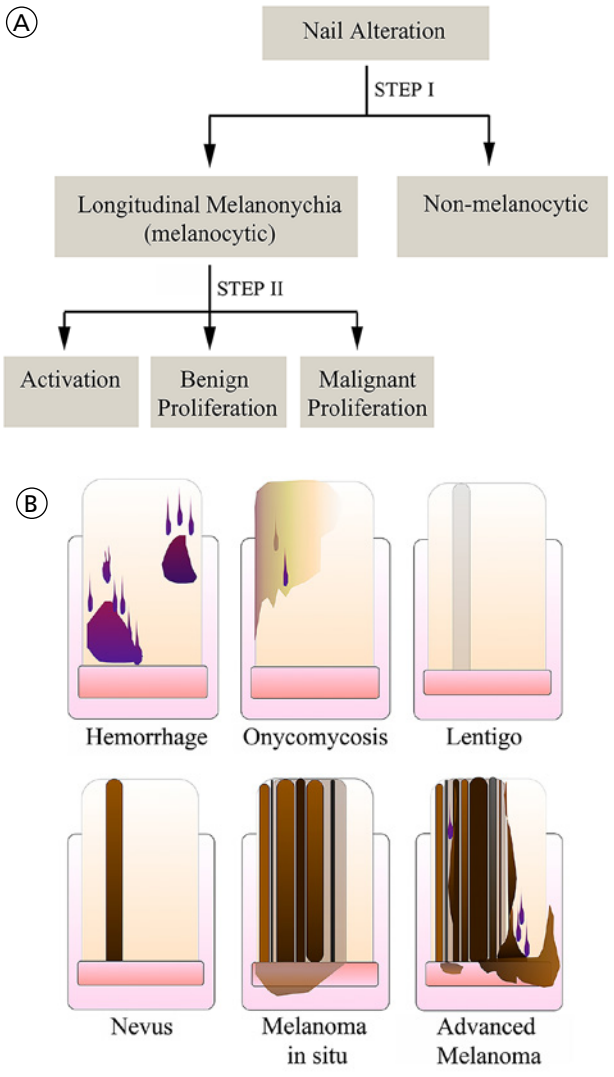

Figure 1. (**A**) Algorithm for the dermatoscopic evaluation on the nail unit. In a first step, a differentiation between melanocytic and non-melanocytic alterations is made. In a second step, the alterations of melanocytic origin, that normally present as longitudinal melanonychia, need to be separated into benign (activation or proliferation) or malignant lesions. (**B**) The icons depict the most common dermatoscopic criteria of six frequent nail alterations in a much simplified manner. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

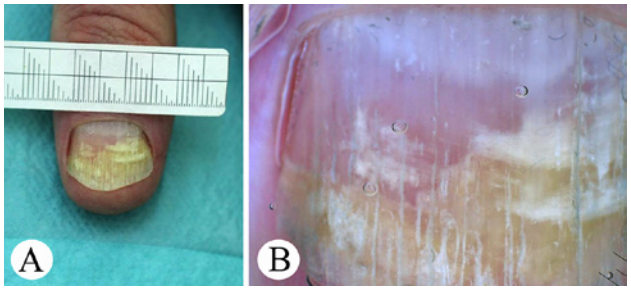

Figure 2. Onychomycosis, disto-lateral pattern of the left thumb of a 40 year-old male. (**A**) Overview. (**B**) Dermoscopy. The whitish brightening with parallel striation, proximal jags, and nail discolorations with yellow colors are dermatoscopically detectable. (Copyright: ©2014 Haenssle et al.)

For all non-melanocytic nail disorders, a diagnosis should be made based on typical dermatoscopic criteria (Figure 1B, e.g., subungual hematoma). In most of these cases, the clinical picture and dermatoscopic criteria will lead to a final diagnosis and further diagnostic measures will not be necessary [3-5]. However, a follow-up examination with comparison of clinical/dermatoscopic findings to baseline images may be useful to safely confirm the initial diagnosis [1]. In case of a longitudinal melanonychia, the distinction between a benign activation of melanocytes (Figure 1B, lentigo, mostly grayish background with longitudinal homogeneous gray lines) and a true melanocytic proliferation ensues in a second step. If a melanocytic proliferation is present, the differentiation between nevus and melanoma is required (Figure 1B) [6,7]. The confident diagnosis of melanoma in situ or early invasive melanoma by clinical appearance and dermatoscopy may especially cause difficulties, and a biopsy of the nail matrix should be performed in any case of doubt [8]. The solid surface of the nail unit with its convexities and concavities may prevent the exact optical attachment of the dermoscope to the nail by immersion oil or disinfectant agents. We recommend the use of ultrasound gel as a contact medium or the use of dermatoscopes with polarized light in the nail region.

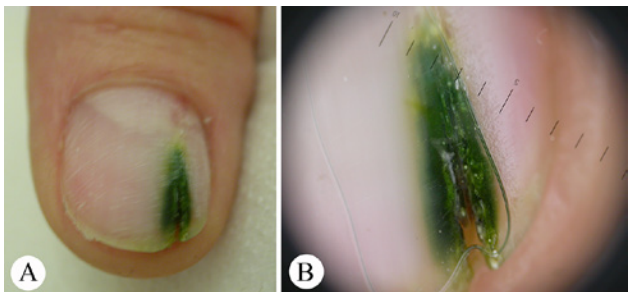

Figure 3. Mycotic/traumatic-impaired nail with secondary pseudomonas superinfection. (**A**) Overview. (**B**) Dermatoscopy. An intense green color of the nail neighboring a fissure is seen dermatoscopically. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

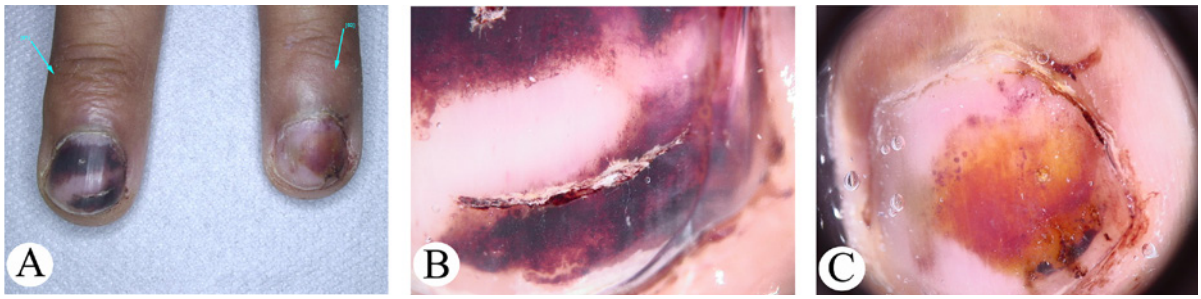

Figure 4. Subungual hematoma after trauma. (**A**) Overview. (**B-C**) Dermatoscopy. The characteristic red-blue to blue-black homogeneous color, numerous satellite droplets towards the distal nail edge and the jagged margins are depicted. (Copyright: ©2014 Haenssle et al.)

Non-continuous (non-melanocytic) nail alterations

Onychomycosis

The most common clinical form of onychomycosis shows a distolateral pattern that often involves the nails of the first and/or fifth toe. Dermatoscopic examination typically reveals: (i) a whitish discoloration of the nail, (ii) superimposed longitudinal parallel striation, and (iii) jagged proximal edges with spikes (Figure 2A, B). Moreover, small splinter hemorrhages and various nail discolorations (chromonychia) with green, yellow or brown colors may occur [5,9]. Of note, an intense green color of the nail plate severely affected by a mycotic infection often indicates a secondary infection with *Pseudomonas* species (Figure 3A, B). After a clinical and dermatoscopic examination the causative dermatophytes (mostly *Trichophyton rubrum*, *Epidermophyton* or *Microsporum* species) may be differentiated by cultural techniques.

Subungual hemorrhage/subungual hematoma

In addition to the subcorneal hemorrhage, the subungual hemorrhage (also called subungual hematoma) is one of the most frequent differential diagnoses of acral pigmented lesions. A detailed documentation of the lesion history should give first evidences for the causes of the subungual hemorrhage (e.g., trauma, anticoagulation). It usually appears as a reddish-blue to blue-black pigmentation that does not longitudinally involve the whole nail. The characteristic dermatoscopic findings of subungual hemorrhage are homogeneous or globular patterns, streaks, peripheral fading and also periungual hemorrhages of adjacent skin [10]. Moreover, small, globular blood dots directed towards the distal end of the nail plate are a highly characteristic dermatoscopic feature that often leads to the correct diagnosis (Figure 4A-C). Importantly, a proximal subungual hematoma may be visible through the widely transparent cuticula; this should not be confused with the (micro-) Hutchinson sign characterizing a subungual melanoma. Subungual hemorrhage will continuously be transferred towards the distal edge of the nail at the speed of the nail growth. Sequential digital dermatoscopy follow-up may confidently be used to document the progressive "growing-out" of a subungual hemorrhage. Any subungual hemorrhage that persists and eventually forms a longitudinal pigmentation involving the complete nail apparatus requires further diagnostic procedures including biopsy.

Systemic diseases involving the nail unit

Nail psoriasis with pitted and thickened nails, onycholysis and psoriatic crumbling of the nail plate can easily be inspected with the naked eye. Dermatoscopy can be helpful for the diagnosis when the typical clinical features are absent or subtle. In patients with psoriatic onycholysis, dermatoscopy helps to visualize the inflammatory, erythematous border surrounding the distal edge of the detached nail plate [4]. The accuracy of the evaluation of psoriatic splinter hemorrhages and subungual hyper-/parakeratosis is increased. Similar to nail psoriasis, patients with atopic diathesis or manifest atopic dermatitis may have pitted nails without further characteristics (Figure 5A, B).

Onychopapilloma and subungual viral wart

Onychopapilloma is a benign neoplasms, that originates from the distal nail matrix and/or the nail bed [11,12]. It typically presents with longitudinal leukonychia or longitudinal erythronychia that does not continuously involve the whole nail, but that leaves an unaffected interval at the proximal nail matrix. Importantly, cases of onychopapilloma presenting as longitudinal melanonychia of grayish color have been

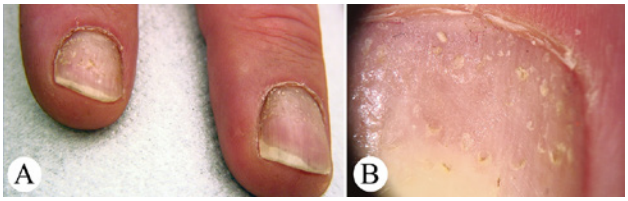

Figure 5. Pitted nails in a patient with atopic eczema. (**A**) Overview. (**B**) Dermatoscopy. Dermatoscopically, small, circular punctate depressions within the nail plate are discernable. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

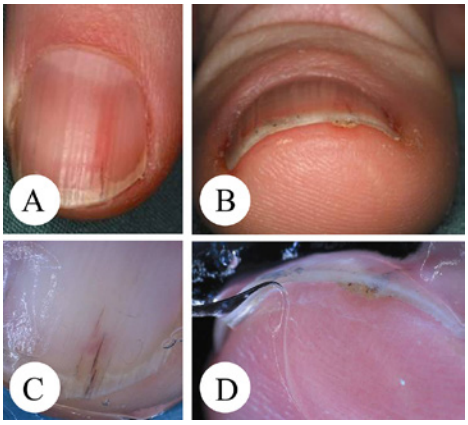

Figure 6. Onychopapilloma. (**A-B**) Overview. (**C-D**) Dermatoscopy. Longitudinal erythronychia that does not continuously involve the whole nail but that leaves an unaffected interval at the proximal nail matrix. Few reddish-black streaks represent hemorrhages and serous inclusions with yellowish background pigmentation. Dermatoscopy of the distal nail margin reveals the typical rough verrucous surface of a wedge-shaped notch with red-black dots. (Copyright: ©2014 Haenssle et al.)

reported [13]. The dermatoscopic view from the free distal margin of the nail plate typically reveals a wedge-shaped hyperkeratotic notch (Figure 6A-D).

The diagnosis of acral viral warts is often easily made by a clinical inspection. However, dermatoscopic examination may be useful for the diagnosis of small, subclinical or subungual warts or for the assessment of the therapeutic success after treatment. A yellowish, rough-verrucous surface with multiple, brown-red dots and/or streaks, which correspond to dilated capillaries and small hemorrhages are characteristic dermatoscopic criteria [14,15]. A decrease of the capillary density within viral warts is often observed in lesions responding to treatment.

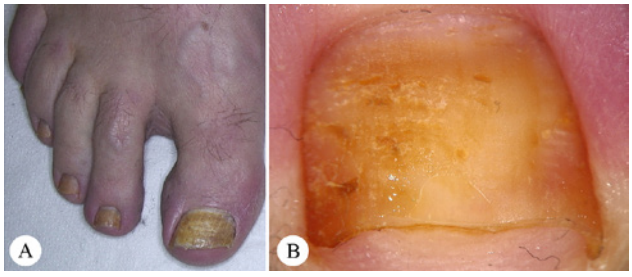

Figure 8. Artificial discolorations of all toenails after repetitive application of self-tanning lotion. (**A**) Overview. (**B**) Dermatoscopy. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

Artifacts and foreign bodies of the nail unit

Artificial changes of the nail unit occasionally arise and may be quite worrisome for patients. In the summer, moist leather of shoes may cause irregular dark-brown discolorations of some toenails, which can easily be removed mechanically (Figure 7A-E). Additionally, the use of self-tanning lotions or tanning showers may lead to a homogeneous yellow-brownish discoloration of all nails (Figure 8A, B). Occasionally, foreign body injuries of the nail unit, accompanied by subungual hemorrhage, subungual serum- and air-inclusions may be observed, especially in patients walking barefoot (Figure 9A, B).

Other neoplasms of the nail unit

Glomus tumor

Glomus tumors represent approximately 1 to 5% of the soft tissue tumors of the hand. They are a subtype of benign venous malformations characterized by rows of glomus cells that surround distorted, thin-walled vascular channels.

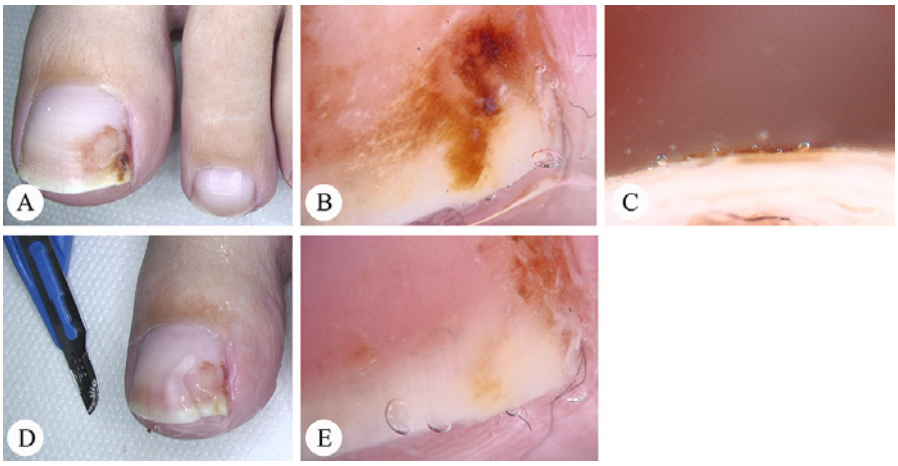

Figure 7. Artificial discoloration of the nail by staining of moist leather shoes. (**A**) Overview. (**B-C**) Dermatoscopy. The dermatoscopic examination of the distal free nail edge in (**C**) clearly shows the superficial location of the pigment. (**D-E**) Artificial nail discolorations may usually be easily removed with a scalpel. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

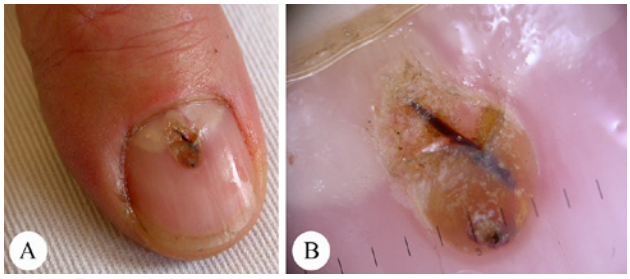

Figure 9. Splinter injury with insertion of a foreign body. (**A**) Overview. (**B**) Dermatoscopy. A subungual hemorrhage with subungual inclusions of serum and air are detectable. No remnants of a foreign body are visible. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

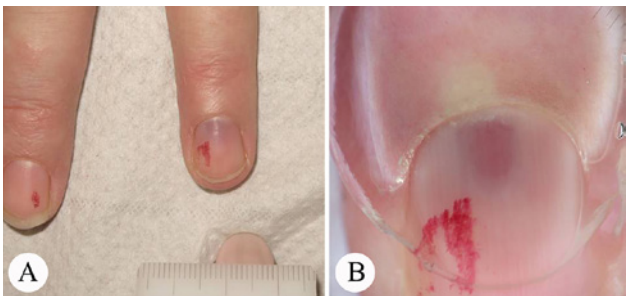

Figure 10. Glomus tumor of the proximal nail unit (diffuse red-blue color, artifact: bright-red residues of nail polish. (**A**) Overview. (**B**) Dermatoscopy shows an oval, homogeneous red-blue tumor. The patient complains of tenderness especially to pressure and sensitivity to cold temperatures. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

Glomus tumors of the nail unit are painful, vascular proliferations with an increased sensitivity to cold temperatures and pressure. They arise from myoarterial structures (Hoyer-Grossersche organs) of the nail unit [16]. Nearly two-thirds of glomus tumors are localized on the hands, particularly the subungual region. In addition to numerous clinical tests that examine the painfulness and the increased sensitivity to cold, the use of dermatoscopy helps to localize the tumors and to visualize the vascular pattern of the lesion. Furthermore, the use of dermatoscopy facilitates the delimitation of surgical margins before treatment (Figure 10A, B) [16].

Bowen's disease and squamous cell carcinoma

In the aging population tumors with increasing incidences (Bowen's disease, squamous cell carcinoma) may also arise in less common localizations including the nail bed or the skin below the distal nail plate. The clinical presentation of these tumors is often atypical and they are usually non-pigmented; therefore, their diagnosis is often missed or delayed. Moreover, these tumors may be misinterpreted as other benign conditions such as verruca vulgaris, onychomycosis or trauma-induced nail dystrophy [14]. Dermatoscopically, the characteristic pattern of pigmented Bowen's disease with its typical brownish dots along imaginary lines can frequently

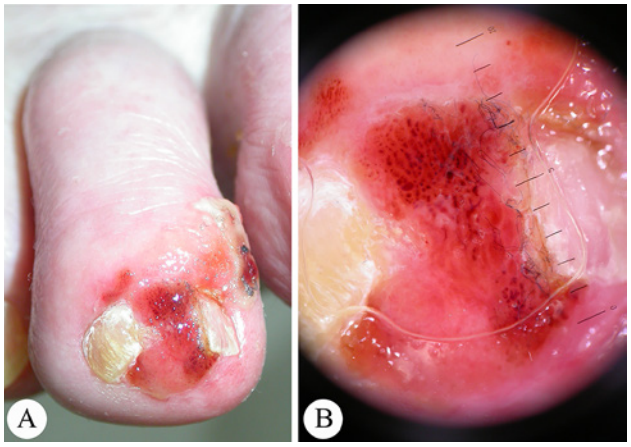

Figure 11. Advanced Bowen carcinoma of the nail unit. (**A**) Overview. (**B**) Dermatoscopy. The nail unit is widely destroyed. Dermatoscopically the "dots along lines," that are characteristic of pigmented Bowen's disease are clearly observable. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

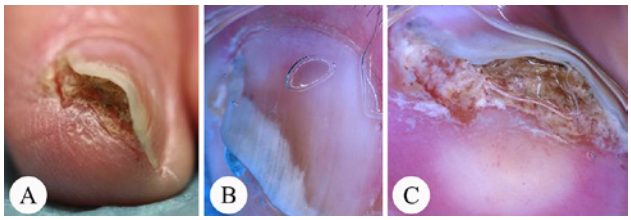

Figure 12. Bowen's disease beneath the distal nail margin with accumulation of parakeratotic material. (**A**) Overview. (**B**) Dermatoscopy of the nail surface and (**C**) the distal nail edge. In this slightly pigmented keratotic tumor distal onycholysis and subungual hemorrhage are visible. Differentiation from verruca vulgaris is very difficult since a number of characteristic criteria are present (yellowish, rough to verrucous surface with brown-red streaky hemorrhages). (Copyright: ©2014 Haenssle et al.)

be observed (Figure 11A, B) [17]. In contrast, non-pigmented Bowen's disease or squamous cell carcinoma may often show dot-like to glomerular vessels clustering in groups (up to vascular polymorphism) [18]. The potential risk of misdiagnosing subungual bowenoid squamous cell carcinoma as verruca vulgaris is exemplified in Figure 12 (Figure 12A-C) and 13 (Figure 13A, B).

Collision tumors (squamomelanocytic tumor)

A collision tumor is a cutaneous proliferation composed of closely intermingled cells of two independent tumor entities at the same location, e.g., of a melanoma and a squamous cell carcinoma. A squamomelanocytic tumor is such a collision tumor that mostly occurs in sun-exposed skin of the face and neck area of older patients [19,20]. Recently, a first squamomelanocytic tumor of the nail unit has been reported [21]. The clinical and dermatoscopic examination revealed an advanced dystrophy of the nail plate with brown to slate-gray periungual pigmentation (corresponding to invasive melanocytes of the melanoma) and several keratin cysts of the

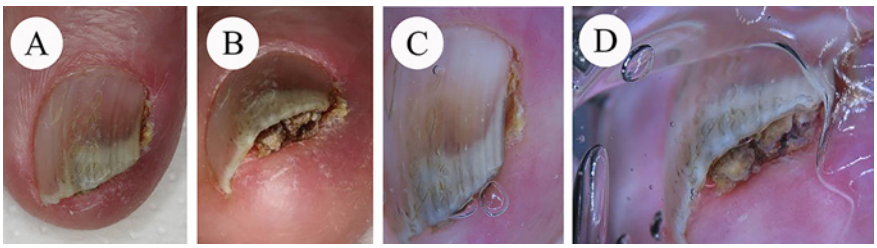

Figure 13. Invasive subungual Bowen carcinoma with profound accumulation of parakeratotic material. (**A-B**) Overview. (**C**) Dermatoscopy of the nail surface and (**D**) the distal nail edge. Again, as already visualized in Figure 12, a slightly pigmented keratotic tumor causes a distal onycholysis and deformation of the nail plate. The history of a long-standing nail alteration with progressive growth pattern should raise suspicion of a malignant tumor, namely, subungual squamous cell carcinoma or Bowen carcinoma. (Copyright: ©2014 Haenssle et al.)

adjacent skin (corresponding to areas of keratinization of the squamous cell carcinoma) (Figure 14 A, B).

Continuous (melanocytic) nail alterations (longitudinal melanonychia)

In contrast to the direct inspection of a localized melanocytic proliferation in case of a nevus or melanoma on the skin, the site of melanocytic proliferation within the nail matrix or proximal nail bed is not accessible for a direct dermatoscopic inspection. This means that the examination of longitudinal melanonychia is limited to the inspection of pigment that was deposited in the nail plate weeks to months earlier [22]. Continuous longitudinal pigmented bands within the nail plate may represent melanocytic nevus, lentigo, racial/ethnic melanonychia, drug-induced hyperpigmentation, or malignant melanoma [6]. Benign longitudinal melanonychia is rare in Caucasians—only 1.4% of the population is affected. Interestingly, the thumb, followed by the great toe and the index are involved most frequently [6].

Drug-induced melanocytic activation

A range of drugs has been associated with the formation of nail alterations. However, only a few drugs are regularly responsible for toxic effects on the nail matrix, the nail bed or the periungual skin [23]. These drugs predominantly include retinoids and chemotherapeutics like docetaxel (taxotere) (Figure 15A, B) [24]. Besides diffuse dark pigmentations of all nails and Beau's lines (lines appearing as horizontal and deep grooves of all fingernails), subungual hemorrhage, orange discolorations, acute painful paronychias, onycholysis, subungual hyperkeratosis and transverse loss of the nail plate are described for docetaxel, in which the type of nail alteration is related to the number of administered cycles. Additionally, minocycline was repeatedly associated with gray-blue longitudinal melanonychias that are clinically very similar to ethnic subungual lentigo [25,26]. Pigmentations usually occur after prolonged minocycline treatment, however, not always in a dose-dependent manner and mostly after treatment intervals of more than a few years, and may coincide with other pigmented sites.

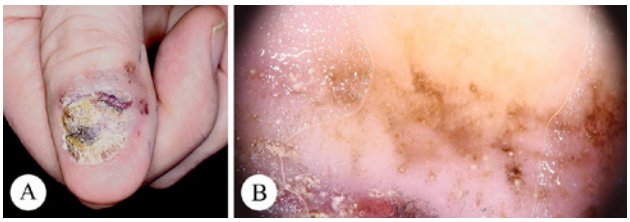

Figure 14. Squamomelanocytic tumor of the nail unit as a genuine collision tumor of a squamous cell carcinoma and melanoma. (**A**) Overview. (**B**) Dermatoscopy. The nail unit is completely destroyed and shows yellowish keratotic as well as reddish erosive areas. Plugs of keratin (similar to the keratotic pseudocysts of a seborrheic keratosis) in the periungual skin may be considered a marker of a keratinizing tumor. The irregular gray-brown discoloration of the periungual skin corresponded to invasive melanoma cells in the histopathological evaluation. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

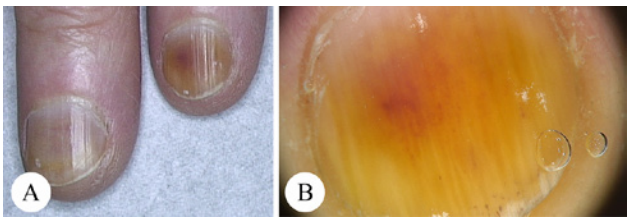

Figure 15. Nail alteration after chemotherapy with docetaxel. (**A**) Overview. (**B**) Dermatoscopy. The dermatoscopic view reveals a diffuse yellow-red discoloration of multiple nails indicative of an increased vascularization of the nail matrix and a diffuse transient extravasation of erythrocytes. Multiple dot-shaped hemorrhages (distal nail edge) are a further marker of toxic changes of the nail unit. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

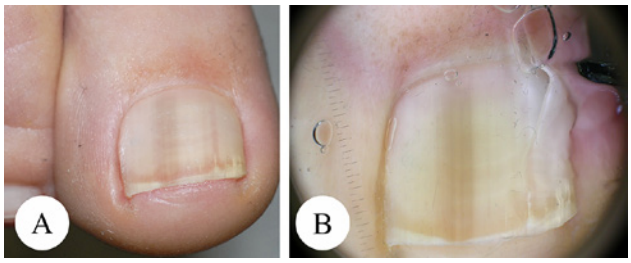

Figure 16. Ethnic lentigo of the right great toenail. (**A**) Overview. (**B**) Dermatoscopy. Dermatoscopically there is a homogeneous grayish-pale longitudinal melanonychia affecting the whole nail with a slightly diffuse demarcation of the lateral margin. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

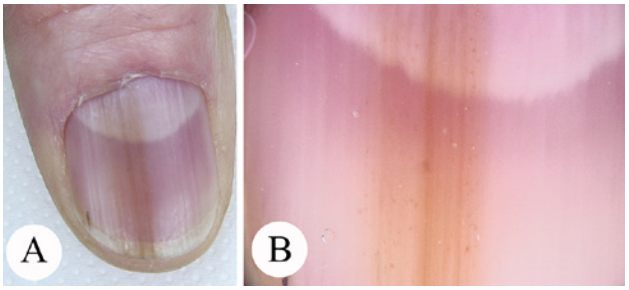

Figure 17. Benign nevus of left index finger after multiple years of digital monitoring and matrix biopsy. (**A**) Overview. (**B**) Dermatoscopy reveals a pigmented band composed of multiple light brown parallel lines and light brown dots. The pigmented band measures four millimeters and affects the whole nail (longitudinal melanonychia). (Copyright: ©2014 Haenssle et al.)

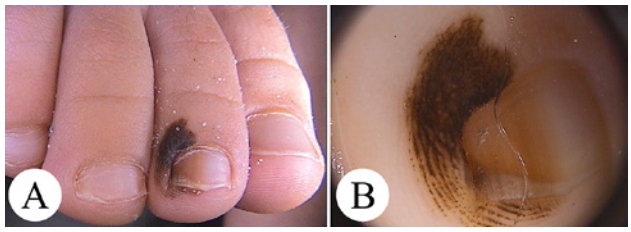

Figure 18. Benign congenital nevus involving plantar acral skin and the nail of the right second toe in a 4-year-old girl. (**A**) Overview. (**B**) Dermatoscopy reveals a double dotted parallel furrow pattern in acral skin and a homogeneous brown pigmented band continuously affecting half of the nail width (longitudinal melanonychia). (Copyright: ©2014 Haenssle et al.)

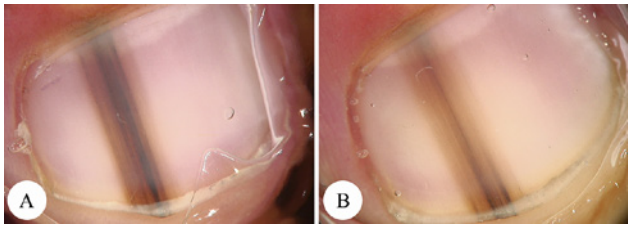

Figure 19. Benign nevus over the course of time (interval of approximately six months). (**A**) Overview. (**B**) Dermatoscopy. Due to an irregular, intensive brownish striation a digital dermatoscopic follow-up examination was performed. The follow-up image reveals a decrease in pigmentation that may vary with the level of sun-exposure and a constant width of the longitudinal melanonychia. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

Ethnic-type nail pigmentation (nevoid lentigo of the nail unit)

The ethnic subungual lentigo predominantly occurs in humans with a darker skin type categorized according to Fitzpatrick skin classification (e.g., Indian skin type, skin type V). Multiple nails are frequently affected and the color is homogeneous gray-brown. The thin longitudinal lines that might be discriminated within the pigmented band are regular in their coloration, thickness and spacing (Figure 16A, B) [7,8]. The lateral margin of pigmentation is often diffuse. Occasionally, the pigmented band of a subungual ethical lentigo is very subtle and pale and therefore may be difficult to separate from the uninvolved nail-plate in a clinical-dermatoscopic examination.

Benign nevus of the nail unit

Characteristics for subungual benign nevi are their appearance in children and young adults and their regular pattern of the longitudinal lines. The width of the pigmented band of subungual nevi is rather low (normally ≤3 mm) and regular in thickness and spacing of striation. The color of different subungual nevi varies from light brown to dark brown to black [3]. The pigmentation within one lesion is mostly homogeneous or is composed of evenly distributed thinner lines of the same color (Figure 17A, B). Congenital acral nevi may also involve an increased melanocytic pigmentation of the nail unit (Figure 18A, B). Many congenital nevi at acral sites may clinically look suspicious at first sight and should thoroughly be inspected by using dermatoscopy. The double dotted parallel furrow pattern depicted in Figure 18 was described as a typical acral volar skin pattern in younger individuals [27]. Over the course of time when examined by sequential digital dermatoscopy the degree of pigmentation of the longitudinal line may increase or decrease depending on the UV exposure, whereas the width of the lesion should remain unchanged (Figure19A, B) [28].

Early and late invasive melanoma of the nail unit

In epidemiological studies, melanoma of the nail unit frequently appeared in patients older than 50 years and, interestingly, was mostly localized at the nail unit of the thumb or the great toe. Approximately 50% of patients with nail melanoma recollect a preceding trauma [3]. The width of the longitudinal pigmentation in melanoma in situ or early invasive melanoma frequently measures more than 5 mm and shows lines of variable thicknesses, spacing, and coloration

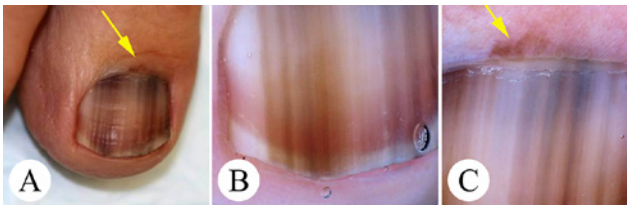

Figure 20. Subungual melanoma in situ. (**A**) Overview. (**B**) Dermatoscopy. The whole nail unit is affected by a continuous pigmentation composed of parallel lines showing an inhomogeneous color (brown to blue-gray) and pigment intensity (unpigmented followed by heavily pigmented streaks). A Hutchinson sign, being indicative of an invasion of melanoma cells into the periungual skin, is better visualized by dermatoscopy (arrows at proximal nail fold). (Copyright: ©2014 Haenssle et al.)

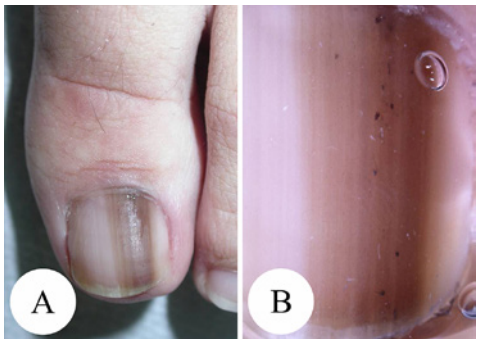

Figure 21. Early invasive subungual melanoma, thickness 0.2 mm. (**A**) Overview. (**B**) Dermatoscopy. Dermatoscopically, a homogeneous gray-brown band is visible, measuring approximately 6 mm across and continuously affecting the whole nail (longitudinal melanonychia). Sharply demarcated globular structures correspond to drop-like subungual hemorrhage. The macro-Hutchinson sign, being indicative of an invasion of melanoma cells into the periungual skin, is (still) negative (proximal nail fold). (Copyright: ©2014 Haenssle et al.)

[3,7,8]. A feature significantly associated with the diagnosis of subungual melanoma is the micro- or macro-Hutchinson sign defined by the visibility of a pigmentation of the periungual cuticula only by dermatoscopy or by naked eye inspection respectively (Figure 20A, B) [29]. Of note, in a number of early invasive subungual melanomas specific criteria may still be absent. In these cases a thorough investigation of the lesional evolution may raise enough suspicion to schedule a matrix biopsy (Figure 21A, B). For other cases, sequential digital dermatoscopy may help to detect dynamic changes in color as well as an increase in width of the whole longitudinal pigmentation over the course of time.

In far advanced invasive melanomas of the nail unit, the diagnosis may be easily made by naked eye examination. The nail unit then often reveals a severe dystrophy of the nail apparatus with ulceration, hemorrhage, or even loss of the overall nail plate. Further criteria for a late invasive melanoma of the nail unit are loss of parallelism, multiple colors and localized invasion of malignant melanoma cells into the adjacent skin (Figure 22A-D, 23A, B). The listed criteria

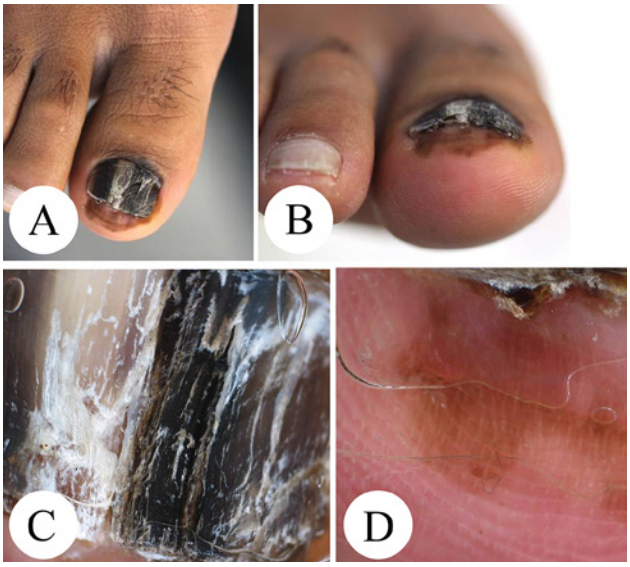

Figure 22. Advanced subungual melanoma in a 30-year old male with skin type V (Indian skin type). (**A-B**) Overview. (**C-D**) Dermatoscopy. The complete nail unit and also the adjacent skin are heavily pigmented with black-brown colors. The nail plate shows a severe onychorrhexis with multiple longitudinal fissures and ridges. The macro-Hutchinson sign is positive at the proximal nail fold as well as at the distal tip of the toe. (**D**) Dermatoscopy of the distal tip of the toe reveals the typical parallel ridge pattern of acral melanoma. (Copyright: ©2014 Haenssle et al.)

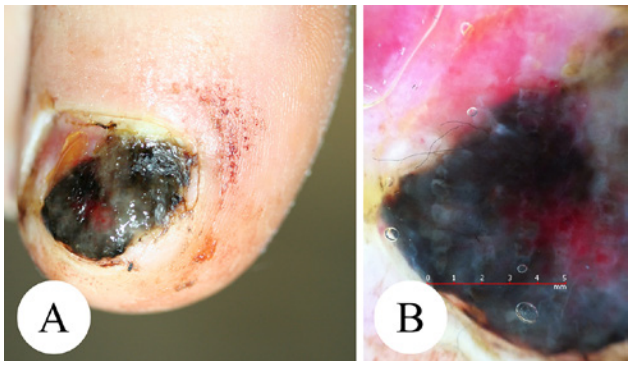

Figure 23. Far advanced subungual melanoma of the right great toe. (**A**) Overview. (**B**) Dermatoscopy. The complete nail unit is destroyed by a black to pink colored, ulcerated melanoma. Dermatoscopy reveals black-blue to red colors with a cloud-like texture. (Copyright: ©2014 Haenssle et al.)

should prompt the clinician to take at least one biopsy of the nail matrix without further delay.

The prognosis of nail matrix melanoma is generally less favorable than for melanoma in other sites due to the frequent delay in diagnosis.

Further indications for dermatoscopy of the nails

Another useful indication for dermatoscopy of nails is the examination of the nail fold capillaries in patients with connective tissue diseases like systemic sclerosis (Figure 24A-B) [30]. In patients suffering from sclerodactyly, the evaluation

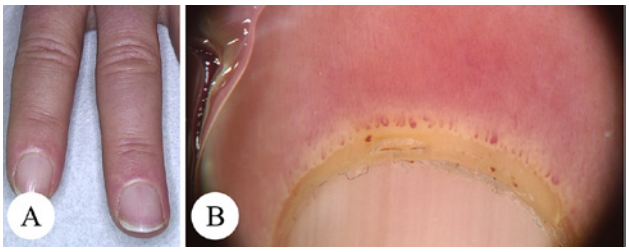

Figure 24. Capillaroscopy with a dermatoscope. Dilated capillaries of the proximal nail fold and small hemorrhages of the cuticula (Ehring's rhexis bleeding) in a young woman with mild sclerodactyly and suspected CREST syndrome. (**A**) Overview. (**B**) Dermatoscopy. (Copyright: ©2014 Haenssle et al.; first published in *Der Hautarzt, 2014, 65(4):301-11.)*

of nail fold capillaries should include the degree of dilated capillaries, the extent of nail fold hemorrhage as well as avascular areas. The dermatoscopic documentation of dilated capillaries and/or nail fold hemorrhage is a sensitive and specific strategy for the diagnosis of systemic sclerosis [30].

Summary

Besides the clinical examination, dermatoscopy plays an important role in the evaluation of nail disorders. The dermatoscopic criteria for a valid diagnosis have been developed and assessed in numerous clinical trials. In all nail alterations that are suspicious or potentially malignant, a surgical intervention with subsequent histopathological evaluation should be performed. Despite the investment of huge amounts of money for the development of diagnostic medical devices that should help clinicians to diagnose cutaneous melanoma with higher sensitivity and specificity, there is no such device suitable for the application in the case of nail pigmentations. Quite the contrary, numerous manufacturers (e.g., MelaFind®/MelaSciences, Nevisense®/SciBase) explicitly exclude the usage of their devices for the nail unit. Therefore, an extensive training of clinicians in dermatoscopy for lesions in the nail region is essential.

International Dermoscopy Society (IDS)

The International Dermoscopy Society (IDS) offers a valuable panel for further education in this important technique for all colleagues that are interested in dermatoscopy. After registration (free of cost) on the IDS homepage (http://www.dermoscopy-ids.org), a range of tutorials and presentations of cases from all over the world are available. In the discussion forum, the user can upload digital images of uncertain cases and will receive comments from the most prestigious international experts of dermatoscopy within a few days.

Note: A version of this manuscript was published in the German language in Der Hautarzt, 2014;65(4):301-11.

References

1. Tosti A, Argenziano G. Dermoscopy allows better management of nail pigmentation. Arch Dermatol. 2002;138(10):1369-70.
2. Argenziano G, Soyer HP, Chimenti S, et al. Dermoscopy of pigmented skin lesions: results of a consensus meeting via the Internet. J Am Acad Dermatol. 2003;48(5):679-93.
3. Braun RP, Baran R, Le Gal FA, et al. Diagnosis and management of nail pigmentations. J Am Acad Dermatol. 2007;56(5):835-47.
4. Piraccini BM, Bruni F, Starace M. Dermoscopy of non-skin cancer nail disorders. Dermatol Ther. 2012;25(6):594-602.
5. Piraccini BM, Balestri R, Starace M, et al. Nail digital dermoscopy (onychoscopy) in the diagnosis of onychomycosis. J Eur Acad Dermatol Venereol. 2013;27(4):509-13.
6. Koga H, Saida T, Uhara H. Key point in dermoscopic differentiation between early nail apparatus melanoma and benign longitudinal melanonychia. J Dermatol. 2011;38(1):45-52.
7. Ronger S, Touzet S, Ligeron C, et al. Dermoscopic examination of nail pigmentation. Arch Dermatol. 2002;138(10):1327-33.
8. Adigun CG, Scher RK. Longitudinal melanonychia: when to biopsy and is dermoscopy helpful? Dermatol Ther. 2012;25(6):491-7.
9. Nakamura RC, Costa MC. Dermatoscopic findings in the most frequent onychopathies: descriptive analysis of 500 cases. Int J Dermatol. 2012;51(4):483-5.
10. Mun JH, Kim GW, Jwa SW, et al. Dermoscopy of subungual haemorrhage: its usefulness in differential diagnosis from nail-unit melanoma. Br J Dermatol. 2013;168(6):1224-9.
11. Criscione V, Telang G, Jellinek NJ. Onychopapilloma presenting as longitudinal leukonychia. J Am Acad Dermatol. 2010;63(3):541-2.
12. Jellinek NJ. Longitudinal erythronychia: suggestions for evaluation and management. J Am Acad Dermatol. 2011;64(1):167-11.
13. Miteva M, Fanti PA, Romanelli P, et al. Onychopapilloma presenting as longitudinal melanonychia. J Am Acad Dermatol. 2012;66(6):e242-e243.
14. Bae JM, Kang H, Kim HO, et al. Differential diagnosis of plantar wart from corn, callus and healed wart with the aid of dermoscopy. Br J Dermatol. 2009;160(1):220-2.
15. Lee DY, Park JH, Lee JH, et al. The use of dermoscopy for the diagnosis of plantar wart. J Eur Acad Dermatol Venereol. 2009;23(6):726-7.
16. Maehara LS, Ohe EM, Enokihara MY, et al. Diagnosis of glomus tumor by nail bed and matrix dermoscopy. An Bras Dermatol. 2010;85(2):236-8.
17. Cameron A, Rosendahl C, Tschandl P, et al. Dermatoscopy of pigmented Bowen's disease. J Am Acad Dermatol. 2010;62(4):597-604.
18. Zalaudek I, Argenziano G, Leinweber B, et al. Dermoscopy of Bowen's disease. Br J Dermatol. 2004;150(6):1112-6.
19. Pool SE, Manieei F, Clark WH, Jr., et al. Dermal squamo-melanocytic tumor: a unique biphenotypic neoplasm of uncertain biological potential. Hum Pathol. 1999;30(5):525-529.
20. Rosen LB, Williams WD, Benson J, et al. A malignant neoplasm with features of both squamous cell carcinoma and malignant melanoma. Am J Dermatopathol. 1984;6 Suppl 213-9.
21. Haenssle HA, Buhl T, Holzkamp R, et al. Squamomelanocytic tumor of the nail unit metastasizing to a sentinel lymph node:

a dermoscopic and histologic investigation. Dermatology. 2012;225(2):127-30.
22. Hirata SH, Yamada S, Almeida FA, et al. Dermoscopy of the nail bed and matrix to assess melanonychia striata. J Am Acad Dermatol. 2005;53(5):884-886.
23. Piraccini BM, Iorizzo M. Drug reactions affecting the nail unit: diagnosis and management. Dermatol Clin. 2007;25(2):215-21, vii.
24. Correia O, Azevedo C, Pinto FE, et al. Nail changes secondary to docetaxel (Taxotere). Dermatology. 1999;198(3):288-90.
25. Ban M, Kitajima Y. Nail discoloration occurring after 8 weeks of minocycline therapy. J Dermatol. 2007;34(10):699-701.
26. Tavares J, Leung WW. Discoloration of nail beds and skin from minocycline. CMAJ. 2011;183(2):224.
27. Suzaki R, Ishizaki S, Iyatomi H, et al. Age-related prevalence of dermatoscopic patterns of acral melanocytic nevi. Dermatol Pract Concept. 2014;4(1):53-57.
28. Haenssle HA, Krueger U, Vente C, et al. Results from an observational trial: digital epiluminescence microscopy follow-up of atypical nevi increases the sensitivity and the chance of success of conventional dermoscopy in detecting melanoma. J Invest Dermatol. 2006;126(5):980-5.
29. Sladden MJ, Mortimer NJ, Osborne JE. Longitudinal melanonychia and pseudo-Hutchinson sign associated with amlodipine. Br J Dermatol. 2005;153(1):219-20.
30. Ohtsuka T. Dermoscopic detection of nail fold capillary abnormality in patients with systemic sclerosis. J Dermatol. 2012;39(4):331-5.