Original Article

Intra-Operative Dermoscopy in Assessment of Melanonychia and as a Guide for Biopsy

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Abstract

Background and Aims: Melanonychia can be a manifestation of benign or malignant pathology and often poses a diagnostic challenge on clinical examination. Even with distinguishing dermoscopic features (nail plate), it can be quite difficult to determine the nature of pigmentation as complete assessment of nail bed and matrix is still not possible. Intraoperative dermoscopy (IOD) can serve as a useful tool to appreciate the bed and matrix changes. The aim here is to study the intraoperative dermoscopic features in patients with melanonychia and correlate with histopathology. **Methods:** 20 consecutive patients with melanonychia were recruited. Inclusion criteria was melanonychia of sudden onset, progressive nature, irregular width/color/symmetry on dermoscopy, positive Hutchinson sign, solitary nail involvement or associated nail dystrophy. Preoperative dermoscopy was performed and recorded. Patients were planned for nail matrix biopsy, during which IOD was performed over nail matrix and bed after removal of the nail plate. Images were recorded and analyzed and correlated with the histopathology. **Results:** Out of 20 patients, 12 were females and 8 males. On IOD-histopathological correlation, 2 patients were found to have melanoma of the nail unit, 5had nail lichen planus, 9 had benign melanocytic nevi, and 4 had fungal melanonychia. IOD revealed fine, parallel and regular lines of pigmentation localized to proximal nail bed and matrix in all patients with benign melanonychia, while dark thick bands with irregular borders, dots, globules, streaks and structureless areas in the two patients with melanoma. Fungal melanonychia revealed an unremarkable nail bed and matrix on IOD. **Conclusion:** Intraoperative dermoscopycan help in determining the nature of melanonychia and obviate the need to perform biopsy in certain cases. It can also aid in delineating the most suitable site for biopsy, along with grossly assessing the extent of involvement in case of malignancy.

Keywords: *Dermatoscope, dermoscope, longitudinal pigmentary band, melanoma, melanonychia, nail, onychomycosis*

Background

A longitudinal melanonychia or pigmentary band (LPB), on naked eye examination, can be a diagnostic challenge. It can either arise from benign pathology or malignancy. Subungual melanoma—though very rare in Indian population—needs to be ruled out in suspicious cases. Dermoscopy of the nail plate can be a useful auxiliary tool in determining the nature of melanonychia. A brown background with regular lines of uniform color, spacing and width suggests a benign lesion. On the other hand, variability in hues of pigmentation or irregularity in spacing or width along its length is considered suspicious of melanoma.[1,2] While these features can assist in determining the nature of pigmentation, sometimes dermoscopy may be inconclusive due to inability to assess deeper structure through the nail plate. Early stage melanoma may present with fine and regular lines.On the other hand, irregular lines may normally be seen in children and some adults. In a very dark colored band of melanonychia, this irregular pattern of melanoma may not be appreciable even on dermoscopic evaluation. Hence, it is useful to perform dermoscopy beyond the nail plate.Intraoperative dermoscopy, after the removal of nail plate, is a newer advancement in the diagnostic armamentarium of nail melanonychia.[3-5] It can help in allaying the need for histopathology which has a potential of scarring and takes longer time to report. This technique proves to be a useful guide for site for biopsy in cases

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where the features of nail bed/matrix are not well-defined or invisible to naked eye.

We present an Indian pilot study of patients with melanonychia with its preoperative (nail plate) as well as intraoperative (nail bed and matrix) dermoscopic features and histopathological correlation.

Methods

Patient selection

20 consecutive patients with melanonychia were recruited in this prospective study. Inclusion criteria was melanonychia with any of the following features: sudden onset, progressive nature, irregular width/color/symmetry on dermoscopy, positive Hutchinson sign, solitary nail involvement, associated nail dystrophy or personal/family history of melanoma. Pregnancy, lactation and patient not giving consent were the exclusion criteria. Proper history and examination including lymph node evaluation was done and preoperative dermoscopy (low magnification) under polarizing mode with immersion oil as interface medium was performed and recorded (USB dermatoscope, AMZT73915 Edge 3.0). Hematological, biochemical and radiological investigations were done for all the patients.

Intraoperative dermoscopy

Nail matrix biopsy was planned where the nail plate was separated from the proximal and lateral nail folds exposing the nail bed and matrix with the help of stay sutures. Thereafter, dermoscopy (intraoperative) was performed on the exposed nail bed and matrix under polarizing mode, at low magnification, with the same dermatoscope. The cap of the dermatoscope used was thoroughly washed and placed in Cidex (glutaraldehyde) solution overnight, before and after the procedure to maintain the aseptic environment. No interface medium was utilized. Images were recorded and analysed for the nature of pigmentation and the most suitable site for biopsy. A punch biopsy (3 mm) was obtained from the delineated part of the nail matrix. Half of the nail plate was sent for PAS stain and fungal culture, and rest of the nail plate along with the entire matrix specimen was sent for hematoxylin and eosin stain and immunohistochemical (IHC) markers for melanoma (S-100, HMB-45).Preoperative and intraoperative dermoscopic features were then correlated with the histopathological findings.

Results

Demographic profile

Out of 20 patients, 12 were females and 8 males. Mean age of the patients was 35.6 years, with mean duration of melanonychia as 7.11months. Table 1 depicts the clinical, preoperative and intraoperative dermoscopic features of the subjects along with histopathological findings and diagnosis. On IOD-histopathological correlation, 2 patients were found to have malignant melanoma of the nail unit, 14 patients had benign melanonychia– which included 5 patients who had nail lichen planus, 9 patients who had benign melanocytic nevi. 4 patients had fungal melanonychia secondary to *Trichophytonrubrum* [Table 2].

Intraoperative dermoscopy

IOD in the both the patients with nail unit melanoma revealed dark thick pigmented bands with irregular borders along with dots, globules, streaks and structureless areas. These patients revealed nests of malignant melanocytes which stained positive for IHC markers like S-100 and HMB-45 as shown in Figures 1a-d and 2a-c.

Patients with benign melanonychia included 5 patients with nail lichen planus revealing interface dermatitis and hypergranulosis on histopathology and 9 patients with benign melanocytic nevi revealing benign melanocytes and unremarkable dermis on histopathology. IHC markers for melanoma were negative in all 14 patients. All 14 patients showed very fine, parallel and regular lines of pigmentation on IOD, which were localized to only the most proximal part of the nail bed and nail matrix and hardly visible to the naked eye. It was only on IOD that the features were appreciated and site of biopsy could be delineated [Figure 3a-f].

All 4 patients of fungal melanonychia revealed an unremarkable nail bed and matrix on naked eye examination but also on IOD indicating the pigment restriction to the nail plate only [Figure 4a-c]. Culture was positive for *Trichophytonrubrum* (a common cause of

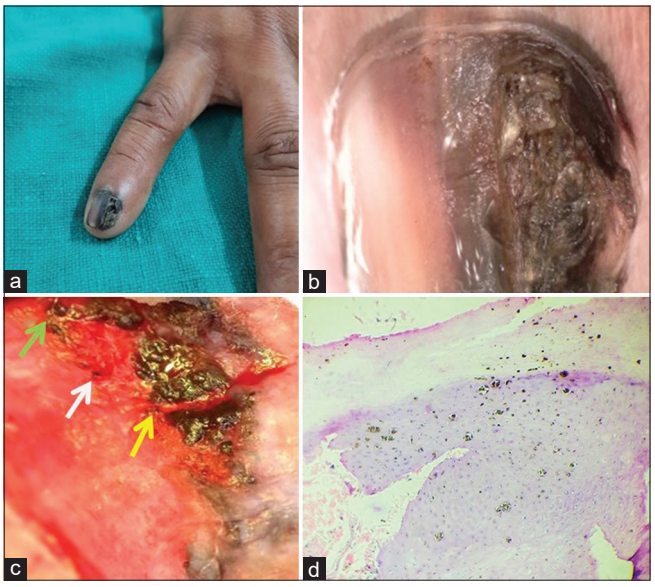

Figure 1: Little finger-nail of right hand showing melanonychia along with dystrophy (a), Pre-operative dermoscopy (Non-contact, Polarised mode, 50x) showing irregularity in color and width of the bands with microhutchinson sign (b), Intra-operative dermoscopy showing a single thick, dark irregular band with dots (white arrow), globules (green arrow), streaks and structureless areas (yellow arrow) (c), Histopathology confirming the diagnosis of melanoma (d)

Table 1: Pre-operative and intra-operative dermoscopic features and histopathological findings of the patients

No.	Age/ Sex	Duration (months)	Pre-operative dermoscopy	Intra-operative dermoscopy	Histopathology/Culture	Diagnosis
1.	45/M	4 months	Microhutchinson Sign - negative Regular bands of melanonychia.	Very fine, parallel and regular light brown lines localised to proximal bed and matrix.	Increased melanin in the basal layer. HMB-45 negative.	Benign Melanocytic nevi
2.	50/F	5 months	Irregular and thick dark band of melanonychia. Microhutchinson Sign - positive. Nail dystrophy with splitting.	Single thick band of dark brown-black pigmentation with dots, globules, streaks and structureless areas.	Malignant melanocytes present. HMB-45-positive	Melanoma
3.	25/M	8 months	Pseudohutchinson Sign - positive. Regular bands of melanonychia	Very fine, parallel and regular lines of light brown pigmentation.	Increased melanin in the basal layer. HMB-45 - Negative	Benign Melanocytic nevi
4.	26/M	1 year	Regular bands of melanonychia, longitudinal ridging with subungual hyperkeratosis.	Very fine, parallel and regular lines of light brown pigmentation localised to proximal bed and matrix.	Basal cell degeneration, interface dermatitis, increased melanin in basal layer.	Nail Lichen Planus
5.	35/M	7 months	Microhutchinson Sign - positive Irregular bands of melanonychia in width, color and spacing.	Single thick band of dark brown-black pigmentation, dots, globules, streaks and structureless areas.	Malignant melanocytes present. HMB-45-positive	Melanoma
6.	25/F	1 year	Increased pigmentation and scaling over proximal nail fold. Irregular bands of melanonychia with yellowish discoloration and *aurora borealis*	No significant finding	PAS stain positive, Culture-*T. rubrum*	Fungal Melanonychia
7.	30/F	4 months	Microhutchinson Sign - negative Regular bands of melanonychia.	Very fine, parallel and regular lines of light brown pigmentation. localised to proximal bed and matrix	Increased melanin in the basal layer. HMB-45 - Negative	Benign Melanocytic nevi
8.	29/F	9 months	Pseudohutchinson Sign - positive Regular bands of melanonychia with subungual hyperkeratosis	Very fine, parallel and regular lines of light brown pigmentation localised to proximal bed and matrix.	Hypergranulosis, basal cell degeneration, increased melanin in the basal layer.	Nail Lichen Planus
9.	37/F	4 months	Microhutchinson Sign - negative Regular bands of melanonychia	Very fine, parallel and regular lines of light brown pigmentation.	Increased melanin in the basal layer. HMB-45 - Negative	Benign Melanocytic nevi
10.	39/M	5 months	Hyperpigmentation over proximal nail fold. Irregular bands of melanonychia with yellowish discoloration.	No significant finding	PAS stain positive, Culture - *T. rubrum*	Fungal Melanonychia
11.	29/F	9 months	Irregular bands of melanonychia, dyschromia, distal onycholysis with subungual hyperkeratosis.	Very fine, parallel and regular lines of light brown pigmentation localised to proximal bed and matrix.	Hypergranulosis, basal cell degeneration, increased melanin in the basal layer.	Nail Lichen Planus
12.	36/f	9 months	Irregular bands of melanonychia with yellowish discoloration.	No significant finding	PAS stain positive, Culture - *T. rubrum*	Fungal Melanonychia
13.	46/F	1 month	Regular bands of melanonychia, longitudinal ridging, distal splitting, distal onycholysis with subungual hyperkeratosis.	Regular, parallel and fine lines of light brown pigmentation localised to proximal bed and matrix.	Hypergranulosisis, interface dermatitis, Increased melanin in basal layer.	Nail Lichen Planus
14.	58/F	7 months	Microhutchinson Sign - negative Regular bands of melanonychia	Very fine, parallel and regular lines of light brown pigmentation localised to proximal bed and matrix	Increased melanin in the basal layer. HMB-45 - Negative	Benign Melanocytic nevi
15.	32/M	8 months	Regular bands of melanonychia, longitudinal ridging, distal splitting, Pseudohutchinson Sign - positive	Very fine, parallel and regular lines of light brown pigmentation. localised to proximal bed and matrix	Hypergranulosis, basal cell degeneration with interface dermatitis.	Nail Lichen Planus

Contd...

Table 1: Contd...

No.	Age/ Sex	Duration (months)	Pre-operative dermoscopy	Intra-operative dermoscopy	Histopathology/Culture	Diagnosis
16.	42/F	8 months	Pseudohutchinson Sign - Positive. Regular bands of melanonychia	Very fine, parallel and regular lines of light brown pigmentation localised to proximal bed and matrix	Increased melanin in the basal layer. HMB-45 - Negative	Benign Melanocytic nevi
17.	37/F	18 months	Microhutchinson Sign - negative Irregular bands of melanonychia in width and color.	Very fine, parallel and regular lines of light brown pigmentation localised to proximal bed and matrix	Increased melanin in the basal layer. HMB-45 - Negative	Benign Melanocytic nevi
18.	45/F	9 months	Irregular bands of melanonychia with yellowish discoloration and *aurora borealis*	No significant finding	PAS stain positive, Culture - *T. rubrum*	Fungal Melanonychia
19	30/M	12 months	Regular bands of melanonychia, distal splitting.	Very fine, parallel and regular lines of light brown pigmentation	Increased melanin in the basal layer. HMB-45 - Negative	Benign Melanocytic nevi
20.	50/M	4 months	Microhutchinson Sign - negative Irregular bands of melanonychia in width and color.	Very fine, parallel and regular lines of light brown pigmentation localised to proximal bed and matrix	Increased melanin in the basal layer. HMB-45 - Negative	Benign Melanocytic nevi

Table 2: Pre-operative and intra-operative dermoscopic features and histopathological findingsof the patients

Diagnosis	Preoperative Dermoscopy	Intraoperative Dermoscopy	Histopathology
Melanoma (2 patients)	Microhutchinson Sign - positive (100%). Dystrophy of nail plate (50%). Irregular bands of melanonychia in width, color and spacing (100%).	Single thick band of dark brown-black pigmentation with dots, globules, streaks and structureless areas (100%).	Malignant melanocytes present. HMB-45-positive
Nail Lichen Planus (5 patients)	Microhutchinson Sign - positive (40%). Regular bands of melanonychia with subungual hyperkeratosis (100%).	Very fine, parallel and regular lines of light brown pigmentation.localised to proximal bed and matrix (100%).	Hypergranulosisis, basal cell degeneration with lymphocytic infiltration, increased melanin in the basal layer.
Benign nevi (9 patients)	Microhutchinson Sign - positive (44.4%). Regular bands of melanonychia (100%).	Very fine, parallel and regular lines of light brown pigmentation (100%).	Increased melanin in the basal layer. HMB-45 - Negative
Fungal Melanonychia (4 patients)	Microhutchinson Sign-negative (100%). Increased pigmentation and scaling over proximal nail fold (4). Irregular bands of melanonychia (100%) with yellowish discoloration and *aurora borealis* (75%).	No significant finding (100%).	PAS stain positive, Culture-*T. rubrum*

fungal melanonychia) and plate stained positive with PAS stain which confirmed the diagnosis of onychomycosis. Itraconzole pulse therapy and ciclopirox (8%) lacquer for 6 weeks showed significant improvement.

Discussion

Melanonychia can arise secondary to melanocyte activation (ethnic or drug induced) or melanocyte proliferation (benign or malignant). Clinical examination alone is sometimes insufficient to conclusively determine the etiology. Also, naked eye examination is limited to the evaluation of pigment that is deposited over the nail plate and/or nail folds. Dermoscopy of nail (onychoscopy) has evolved as a useful diagnostic tool and has a proven role in cases of diagnostic dilemma.[1,2] However, in the evaluation of LPB, dermoscopy is limited to assessment of features of nail plate and superficial layers of nail bed making the differentiation between the nature and origin of pigmentation difficult. Onychoscopy alone sometimes fail to completely assess the nail bed and matrix, which urges the need for nail matrix biopsy. Nail matrix biopsy may scare away the patient and is rarely associated with scarring and dystrophy.[3-4]

During the procedure of nail matrix biopsy, after nail plate removal, dermoscopy can be performed to assess the involvement of nail bed and matrix which was not earlier visible through the nail plate. This can narrow down the cause/nature of pigmentation. In addition it can guide for the most suitable site for biopsy and assess extent of involvement.[3-4]

In 2005, Hirata *et al*. performed intraoperative dermoscopy of nail bed and matrix in two patients with LPB. One of these patients was diagnosed with melanoma which showed streaks, globules, dots, structureless areas, brown-black pigmentationwhile the other case had benign melanonychia. The technique helped in finding the correct site for biopsy and delineating surgical margins.[4] In 2006, Hirata

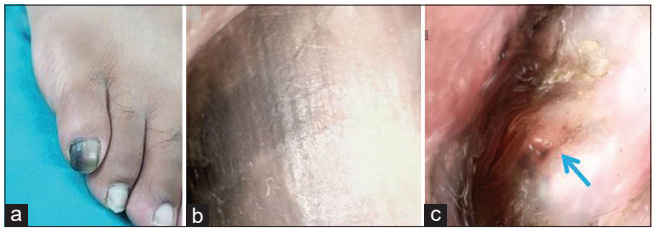

Figure 2: Right little toe nail showing longitudinal melanonychia (a), Pre-operative dermoscopy (Non-contact, Polarised mode, 50x) showing multiple bands with irregular color, spacing and width (b), Intra-operative dermoscopy showing single thick, dark, irregular band with dots, globules, streaks (blue arrow) and structureless areas (c)

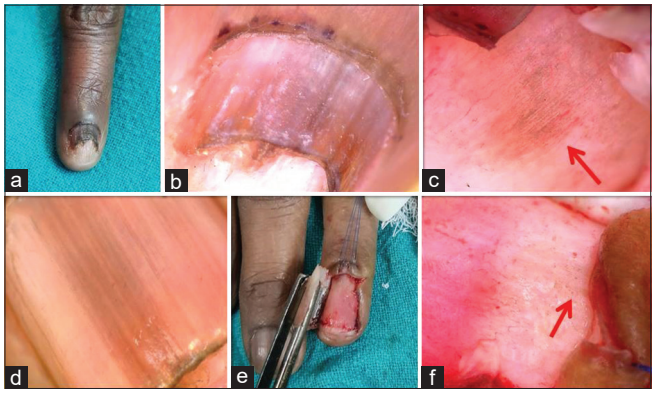

Figure 3: Little finger nail of right hand showing longitudinal melanonychia with subungual hyperkeratosis. Hutchison sign is positive (a), Pre-operative dermoscopy (Non-contact, Polarised mode, 50x) showing uniform pattern of melanonychia in color as well as width with micro-hutchinson sign (b), Intra-operative dermoscopy showing uniform linear fines lines of pigmentation of same color and width, parallel to each other and limited to the proximal most part of nail bed and nail matrix (c). Pre-operative dermoscopy showing uniform bands of melanonychia (d), lack of any significant findings on naked eye examination of nail bed and matrix (e), Intra-operative dermoscopy showing very fine light pigmentary lines with parallelism, localized to proximal part of nail bed and matrix (red arrow) (f)

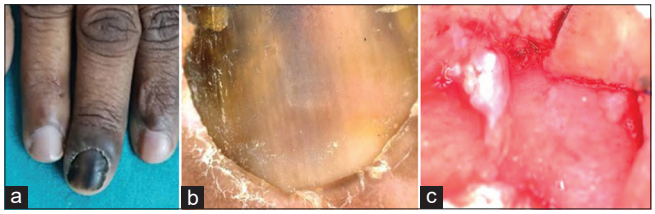

Figure 4: Middle finger nail showing total melanonychia with paronychia (a), Pre-operative dermoscopy (Non-contact, Polarised mode, 50x) showing multiple irregular bands and yellowish brown discoloration with *aurora borealis* with proximal nail fold showing scaling and ragged cuticles (b), Intra-operative dermoscopy showing no significant changes in nail bed or matrix (c)

et al. performed the same technique in ten patients with benign melanonychia includingfour patients with typical melanocytic hyperplasia which showed streaks, one with junctional melanocytic nevus showing globules, one with typical melanocytic hyperplasia showing streaks and pigment network, three with constitutional pigmentation showing homogenous pigmentation and the lastonewithonychomycosis without any dermoscopic features.[5]

In 2011, intraoperative nail matrix dermatoscopy was performed in 100 consecutive bands of LPB that were excised and confirmed with histopathology. They identified 4 dermatoscopic patterns: regular gray pattern (hypermelanosis), regular brown pattern (benign melanocytic hyperplasia), regular brown pattern with globules or blotch (melanocytic nevi), and irregular pattern (melanoma).[6] Goktay *et al*., in 2015, reported 5 cases of benign melanonychia showing regular brown lines with/without dots and globules on dermoscopy of nail bed and matrix. They correlated the feature of globules with presence of melanophages on histopathology.[7]

We report 2 cases of malignant melanonychia with dermoscopic features of the nail bed and nail matrix. In both the cases, more than 2/3rd of the nail plate was involved on clinical as well as pre-operative dermoscopy. However, intra-operative dermoscopy revealed involvement of less than 1/4th of the nail matrix and nail bed which guided for the site for biopsy. There was a remarkable difference in the dermoscopic findings of the nail plate (pre-operative) as compared to that of the nail matrix and bed. In malignant melanoma, the bands of pigmentation are very dark with ill-defined borders and associated with dots, globules, streaks and structureless areas.Fungal Melanonychia (4 patients) revealed lack of any significant finding on intraoperative dermoscopy that suggested that the pathology was restricted to the nail plate while nail bed and matrix were preserved. Benign melanonychia (5 patients with nail lichen planus and 9 with benign nevi) revealed very fine bands of light brown pigmentation that were localized to proximal most part of nail bed and nail matrix. These fine lines were hardly visible through the naked eye and could only be appreciated through dermoscope that guided in determining the site for biopsy. The localized and well-defined nature of these bands to proximal nail bed and matrixwas found to be characteristic of benign melaonychia in our study.

Although histopathology remains the gold standard investigation in diagnosing melanoma, intraoperative dermoscopy can aid in deciding for an appropriate site of biopsy which can't be assessedby simple dermoscopy through the nail plate. More such reports of dermoscopic assessment with histopathological correlation would be required in order to facilitate better understanding and for the standardization of the intraoperative dermoscopy of pigmented nail lesions.

Conclusion

Subungual melanoma is an uncommon form of acral melanoma that arises within the nail matrix. Even with conventional dermoscopy, differentiation of benign LPB from a malignant LPB can be a diagnostic challenge. In such cases, intraoperative dermoscopy can be performed before biopsy, which reveals the subtle features of nail bed and matrix. It can also aid in delineating the most suitable site for biopsy –along with grossly assessing the extent of involvement in case of malignancy.

Limitation of the study

A small sample size was the limitation of the study. A large scale study with more number of patients with nail unit melanoma would be required to further strengthen these results.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Starace M, Dika E, Fanti PA, Patrizi A, Misciali C, Alessandrini A, *et al*. Nail apparatus melanoma: Dermoscopic and histopathologiccorrelations on a series of 23 patients from a single centre. J EurAcadDermatolVenereol 2018;32:164-73.
2. Di Chiacchio ND, Farias DC, Piraccini BM, Hirata SH, Richert B, Zaiac M, *et al*. Consensus on melanonychia nail plate dermoscopy.An Bras Dermatol 2013;88:309-13.
3. Di Chiacchio N, Bet DL, Di Chiacchio NG. Dermoscopy of the nail plate, nail matrix, and nail bed. In: Di Chiacchio N, Tosti A, editors. Melanonychias. 1st ed. Cham: Springer; 2017.p. 25-43.
4. Hirata SH, Yamada S, Almeida FA, Tomomori-Yamashita J, Enokihara MY, Paschoal FM, *et al*. Dermoscopy of the nail bed and matrix to assess melanonychiastriata. J Am AcadDermatol 2005;53:884-6.
5. Hirata SH, Yamada S, Almeida FA, Enokihara MY, Rosa IP, Enokihara MM, *et al*. Dermoscopic examination of the nail bed and matrix. Int J Dermatol 2006;45:28-30.
6. Hirata SH, Yamada S, Enokihara MY, Di Chiacchio N, de Almeida FA, Enokihara MM, *et al*. Patterns of nail matrix and bed of longitudinal melanonychia by intraoperative dermatoscopy. J Am AcadDermatol 2011;65:297-303.
7. Göktay F, Güneş P, Yaşar Ş, Güder H, Aytekin S. New observations of intraoperative dermoscopic features of the nail matrix and bed in longitudinal melanonychia. Int J Dermatol 2015;54:1157-62.