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Dermoscopic features of amelanotic cutaneous melanoma metastases: evidence from four cases

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Abstract

Cutaneous metastases of malignant melanoma (MM) are relatively common, occurring in 2-20% of cases. These metastases typically present as pigmented papules or nodules but can occasionally manifest in unusual forms, such as amelanotic cutaneous melanoma metastases (ACMMs). Due to their relative rarity (less than one-third of cutaneous metastases of MM), definitive dermoscopic characterization of ACMMs remains elusive. This case series investigates the dermoscopic features of four ACMM cases, all of which exhibited vascular patterns. Consolidating our findings with existing literature, polymorphic vessels and linear irregular/serpentine vessels emerge as the predominant patterns in ACMMs. Notably, in one case, the primary melanoma was initially unrecognized, with metastases appearing as the initial manifestation of the disease. This series underscores the need to establish precise dermoscopic criteria for ACMMs.

Introduction

Cutaneous metastases of malignant melanoma (MM) are relatively frequent, with a reported frequency that ranges from 2% up to 20%.¹⁻³ Recent studies have more clearly defined the incidence of cutaneous metastases in melanoma patients, estimating it at 10-17%, with evidence suggesting a steadily increasing trend.⁴

Typically, they develop in the context of an MM follow-up; however, they may also represent the first clinical manifestation of the disease (2-8% of cases).⁵

Cutaneous metastases from melanoma are classified based on their distance from the primary tumor: satellite metastases occur within 2 cm of the primary lesion; in-transit metastases (ITM) are located between 2 cm from the primary site and the regional draining lymph node; and distant cutaneous metastases appear at any skin site beyond this region.⁶ Among these, satellitosis has been reported with an incidence of approximately 16%, whereas in-transit metastases show a more variable but overall lower frequency, ranging from 3.6% to 19%, depending on the anatomical location of the primary tumor.⁷ Regarding sex differences, it has been reported that a significantly higher proportion of women (29.2%) compared to men (18.7%) present satellite and/or in-transit metastases as the first metastatic manifestation following the diagnosis of the primary tumor.⁸ Moreover, the average time to onset of locoregional cutaneous metastases from melanoma is relatively short, approximately 16 months from initial diagnosis. Finally, patients who develop cutaneous melanoma metastases tend to cluster in the fifth to seventh decade of life, with a median age ranging from 59 to 64 years.^{9,10} The sites of onset for satellite and in-transit metastases are generally correlated with the location of the primary melanoma. However, it is important to note

that certain subtypes, such as acral lentiginous melanoma and lentigo maligna, have been associated with a higher risk of cutaneous recurrence.¹¹

Cutaneous metastases of MM usually present as pigmented papules or nodules that progressively increase in number and size. However, they may appear in an unusual fashion: the literature has described a wide morphological spectrum of clinical presentations, including amelanotic cutaneous melanoma metastases (ACMMs),^{3,12,13} retrieved in about one third of cases.

Dermoscopy features associated with cutaneous melanoma metastases have not yet been clearly codified. Nevertheless, several patterns – although rarely pathognomonic – have been described in the literature.⁵ The most frequently reported include homogeneous, sacular, polymorphic, and amelanotic patterns,^{5,14} some of which are observed in pigmented lesions with varying coloration.

Although these patterns can also be found in benign or non-melanoma lesions, they are generally reported in the literature as occurring alongside additional features characteristic of those other entities. For instance, Bono *et al.* note that the homogeneous pattern is also seen in blue naevi – even though in such cases the blue color predominates. The same authors conclude that the presence of both a vascular pattern and a pigmentary halo is a strong indicator of cutaneous melanoma metastases.¹⁴

Although several dermoscopic features have been referred to ACMMs, a precise pattern has not yet been clearly identified, and the frequency of different features has not been consistently defined.

Indeed, only a few case reports have been published,¹⁵⁻¹⁷ and more structured studies have not distinguished between melanotic and amelanotic lesions when assessing the relative frequency of various dermoscopic features, including their vascular patterns.^{14,18}

A notable exception is a recent study that observed the white structureless pattern and linear serpentine vessels as the most frequent characteristics in non-pigmented cutaneous metastases. However, this study did not distinguish between amelanotic melanoma metastases and those originating from other primary tumors and indeed concluded that there was no significant difference in presentation between these groups.¹⁰ Furthermore, the study did not report the frequencies of other vascular morphologies, thereby precluding evaluation of the presence of a polymorphic vascular pattern. To the best of our knowledge, the only comprehensive study about the dermoscopic characteristics of ACMMs collected data from 18 patients (with some of them exhibiting multiple lesions), dating back to 2012.¹⁹

The aim of this case series is to describe the dermoscopic structures of four cases of ACMM and to compare them with the previous literature. It should be emphasized that the four cases reported below came to our attention within a short period, between September 2022 and January 2025. This may raise concerns about the underdiagnosis of amelanotic metastases of MM.

In our cases, imaging was performed using polarized dermoscopy (PD), which offers advantages over non-polarized dermoscopy (NPD) in detecting cutaneous malignancies. Although PD and NPD generally produce similar images for most pigmented and non-pigmented skin lesions, notable differences exist between the two modalities. As PD does not require liquid interface and direct skin contact and since it preferentially captures the backscattered light from the deeper layers of the skin, PD provides enhanced visualization of vascular structures – including blood vessels and vascular blush associated with increased blood volume – as well as white shiny areas and melanin pigmentation in various shades of brown and blue.²⁰

Case Reports

Case 1

Multiple small reddish palpable lesions were detected on the right leg of a 63-year-old woman (Figure 1b). They were asymptomatic, and their insurgence was reported 5 months before our first examination. The histological evaluation revealed cutaneous melanoma metastases (*BRAF* wild-type). The primary lesion was not identified. The patient underwent complete excision of the involved area and subsequent healing by secondary intention. We also performed a sentinel lymph node biopsy, which returned a negative result.

The dermoscopic evaluation carried out with a polarized dermoscope revealed erosion, milky red areas, polymorphous vascular pattern exhibiting glomerular vessels, hairpin vessels, linear irregular and serpentine vessels, corkscrew vessels, and crystalline structures (Figure 1a).

Case 2

We report the case of a 52-year-old woman with a history of MM localized on the right cheek (nodular, Breslow 7.3 mm, not pigmented and not ulcerated, *BRAF* V600E), treated with radical excision, followed by radicalization extending to 2 cm, sentinel lymph node biopsy (negative), and subsequent reconstruction with a rotation flap. Four years after the first diagnosis, the patient developed multiple translucent pink papules on the right cheek (Figure 2a). We performed a biopsy for histopathologic examination, which confirmed the suspected diagnosis of ACMM (*BRAF* V600E). Polarized dermoscopy showed polymorphous vessels, linear irregular and serpentine vessels, corkscrew vessels, lacunar vessels, hairpin vessels, and crystalline structures (Figure 2).

Case 3

A 38-year-old woman with a recent history (8 months prior) of MM (nodular, Breslow 6.5 mm, not pigmented and not ulcerated, *BRAF* wild-type) localized on the left leg progressively developed

multiple translucent pink papules on the left thigh (Figure 2b). Histological examination confirmed the suspected diagnosis of ACMMs (*BRAF* wild-type). Polarized dermoscopy of the lesions showed the presence of corkscrew vessels, glomerular vessels, linear irregular/serpentine vessels, and polymorphic vessels (Figure 2b).

Case 4

We describe the case of a 79-year-old man diagnosed with MM (superficial spreading with a vertical growth phase, Breslow 14 mm, lightly pigmented and not ulcerated, *BRAF* wild-type) on the skin of the abdominal region. Approximately three months after diagnosis, lymph node involvement was observed, along with the development of multiple erythematous papular lesions in the periscarring area (Figure 3a). Histological examination confirmed these as secondary lesions (*BRAF* wild-type). Upon polarized dermoscopic evaluation, the lesions displayed (Figure 3, upper panel) erosions and polymorphic vessels, including serpentine vessels, glomerular vessels, and lacunar vessels.

Discussion

Despite several papers attempting to describe the different patterns of cutaneous MM metastases,²¹ ACMMs remain poorly characterized. Bono *et al.* first described dermoscopic features of cutaneous melanoma metastases and underlined the importance of vascular structures in both pigmented and amelanotic variants, as we found in our cases of ACMMs.¹⁴

With the aim of placing our cases within the broader context of existing literature and contributing more structurally to the development of evidence, a literature search was conducted to identify case reports, case series, and reviews describing dermoscopic features of cutaneous melanoma metastases, particularly amelanotic variants (ACMMs). We searched PubMed/MEDLINE and Google Scholar using the following search terms and Boolean operators: (“cutaneous melanoma metastasis” OR “skin metastasis melanoma”) AND (“dermoscopy” OR “dermatoscopy” OR “dermoscopic features” OR “amelanotic”). The search was limited to articles published in English between 2004 and 2024. The inclusion criteria were case reports, case series, or reviews describing dermoscopic features of ACMMs. Articles describing both amelanotic and pigmented variants were also included.

In total, we collected information on 25 patients with at least one ACMM lesion. Our analysis suggests that the two most frequent vascular aspects are by far polymorphic vessels (22% of cases) and linear irregular/serpentine vessels (17%), followed by glomerular and hairpin vessels, which are present in 11% and 10% of patients, respectively. By contrast, milky red areas exhibit the lowest

frequency in our sample. Including our cases in the analysis, we note a strong increase in the frequency of the linear irregular/serpentine pattern. Interestingly, the latter is precisely the most frequently reported in a recent large study on cutaneous metastases.¹⁰

Our cases revealed peculiar insights. First, two cases showed clearly distinguishable crystalline structures. Notably, all reported cases did not describe this feature. In this regard, it is important to notice that the previous literature may have underreported such structures, as a number of cases were reported using nonpolarized dermoscopy.¹⁹ Second, our first case of ACMMs reports a first clinical manifestation of MM.

Indeed, all previous case studies reported ACMM lesions discovered during MM follow-up,¹⁵⁻¹⁷ while larger dermoscopic studies did not specify whether ACMMs were detected before or after the MM diagnosis.^{10,14,19}

Conclusions

Our case series underlines the importance of obtaining a clear-cut mapping of the most frequent features of ACMMs to facilitate a correct diagnosis, even in those cases wherein previous clinical manifestations of MM are not retrieved.

Finally, we emphasize that the study by Todorovic and coauthors mentioned above also showed that amelanotic cutaneous metastases are often characterized by linear serpentine vessels and a white structureless pattern, with no significant dermoscopic differences between melanoma metastases and those from other primary tumors.¹⁰

This overlap in dermoscopic features – and the absence of reliable distinguishing markers – underscores the importance of interpreting dermoscopic findings in the context of the patient's clinical history, with histological confirmation remaining essential. Nevertheless, we believe this does not diminish the value of recognizing dermoscopic patterns that may raise suspicion of metastasis, even in patients without a known cancer history. Such recognition is especially critical when benign-specific features are absent, given the potential prognostic consequences of an undiagnosed metastatic lesion.

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Figure 1. Polarized contact dermoscopy image of Case 1 demonstrating erosion (asterisk), glomerular vessels (square), and crystalline structures (arrowhead). **a)** Polarized contact dermoscopy image of Case 1 demonstrating milky red areas (star), polymorphous vessels, glomerular vessels (square), hairpin vessels (thin arrow), corkscrew vessels (thick arrow), and crystalline structures (arrowhead). **b)** Clinical image of multiple palpable reddish lesions on the right leg.

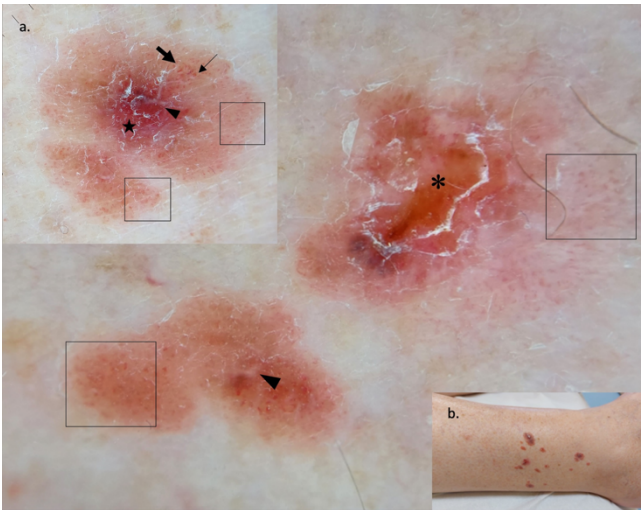


Figure 2. Polarized contact dermoscopy image of Case 2 demonstrating polymorphous vessels, linear irregular vessels and serpentine vessels (circles), corkscrew vessels (tick arrow), lacunar vessels (dotted circle), hairpin vessels (thin arrow), and crystalline structures (arrowhead). **a)** Case 2, clinical image of multiple translucent pink papules on the right cheek. **b)** Clinical image of Case 3 and polarized contact dermoscopy image of one lesion demonstrating linear irregular and serpentine vessels (circle).



Figure 3. Upper panel: polarized contact dermoscopy image of Case 4 demonstrating erosion (asterisk), polymorphous vessels, linear irregular and serpentine vessels (circle), glomerular vessels (square), and lacunar vessels (dotted circle). **a)** Clinical image of periscarring papules in Case 4. Lower panel: frequency of dermoscopy features of ACMM cases, combining data from the literature and the four cases reported in the present case series. Data from Jaimes *et al.*¹⁹ have been converted at the patient level by assuming an average number of lesions for each case.

