Dermoscopy of Malignant Skin Tumours: What's New?

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Abstract

Dermoscopy represents a new and effective tool that assists dermatologists in improving the accuracy of clinical diagnosis in onco-dermatology. The aim of this article is to provide an overview of the latest and important dermoscopic progress and observations in this ever-evolving field of dermatology.

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Introduction

As it is well known, the most important purpose of dermoscopy is to improve early melanoma detection. However, the continuous descriptions of new dermoscopic patterns of cutaneous neoplasms make dermoscopy increasingly relevant and useful in the diagnosis of all pigmented and non-pigmented malignant skin tumours.

Melanoma

The combination of clinical examination with dermoscopy allows the recognition of approximately 80–90% of melanomas [1]. The remainder of them may escape at the first consultation, either because their morphology is not distinguishable from naevi or because of the clinical context of a patient having numerous atypical lesions. In adult patients with a single doubtful, although banal-appearing, lesion (Fig. 1), the best approach is excision. In contrast, in patients with multiple atypical moles (Fig. 2), excising all lesions is ineffective, and therefore total body skin photography, digital dermoscopic documentation, and periodic monitoring represent the correct approach. During the follow-up, asymmetrical growth could be a good indicator for the excision of a melanocytic lesion, although naevi can also continue to change in size throughout adulthood, showing both increases and decreases in size [2] (Fig. 3). The optimal schedule to assure patient compliance is to plan the first re-examination 3 months after the baseline visit, and the following visits at intervals of 6–12 months [3].

Fig. 1. Images of a melanoma in situ clinically presenting as a single banal-appearing doubtful lesion of the leg (**a**, **b**) and showing on dermoscopy a thickened asymmetrical network and a brownish structureless area (**c**).

In contrast to melanoma with a horizontal growth phase (slow-growing melanoma) detectable at follow-up, nodular melanoma (NM) arises as a rapidly changing neoplasm characterized by aggressive biological behaviour and a fast vertical growth phase [4–7]. For this reason, NM is frequently diagnosed at a late stage, resulting in a poor prognosis. The difficulty in the recognition of NM derives from its clinical presentation as a rather symmetric tumour in terms of shape and colour. Elevation above the cutaneous plane, firmness on palpation, and continuous growth for more than 1 month (“EFG” rule) could be useful in clinical practice to help the identification of this aggressive melanoma subtype [5].

Dermoscopically, the atypical vascular structures (including polymorphic vessels, milky red areas, and homogeneous red areas) and the simultaneous presence of blue and black areas (seen as dots, globules, blotches, or ulceration) involving at least 10% of the lesion surface have been significantly associated with NM [8, 9] (Fig. 4). Therefore, although NM often lacks the “classic” clinical-dermoscopic melanoma-specific criteria, the combination of the EFG rule with the aforementioned dermoscopic findings is often a helpful clue for its diagnosis.

Another challenging diagnosis for dermatologists is the amelanotic/hypopigmented melanoma (AHM), representing less than 2% of all cutaneous melanomas [10]. The clinical recognition of AHM is particularly difficult, since it can mimic several benign lesions (such as dermal

naevus, pyogenic granuloma, adnexal tumours, etc.), often resulting in a significant delay in diagnosis and subsequent poor prognosis [11–13]. The most frequent dermoscopic findings of AHM are negative network, white shiny structures, milky pink-red coloured areas, and a prominent irregular vascular pattern consisting of dotted and/or linear vessels (Fig. 5). Sometimes it is possible to recognize little areas of pigmentation (such as blue/greyish coloured areas or residual pigmented network or globules), often located at the periphery of the lesion. In addition, to minimize the risk of missing AHM, especially in the context of nodular tumours, we suggest excision of any lesion that cannot be confidently diagnosed as benign.

Another difficult diagnostic area is the recognition of facial melanoma (FM). This diagnostic difficulty is related to the fact that facial flat lesions, including FM in situ, pigmented actinic keratosis, solar lentigo/seborrheic keratosis, and lichenoid keratosis (or lichen planus-like keratosis), often display overlapping clinical and dermoscopic features [14, 15]. Several studies have suggested that FM is typified by the following main dermoscopic features: (1) a pseudo network background (a structureless diffuse brown pigmentation intermingled with non-pigmented follicular openings due to the dermo-epidermal junction chronically damaged by the sun); (2) a grey circle (asymmetric pigmented follicular openings); (3) a circle within the circle (grey dots in the follicular openings); (4) granular-annular structures (fine grey dots,

Fig. 2. a–i Dermoscopy of a number of pigmented lesions in a 55-year-old man with multiple atypical naevi. The comparative approach helps to identify the ‘ugly duckling’ melanoma (**h**).

globules, and streaks around the follicles); (5) rhomboidal structures (thick pigmented lines around appendageal openings due to melanocytes that surround or completely obliterate the follicular openings); and (6) black/grey blotches (diffuse brown-black pigmentation that obscure the recognition of other dermoscopic features) (Fig. 6).

Three simple rules may help to minimize the risk of inaccurate diagnosis and inappropriate management of FM: (1) the predominance of grey colour in facial pigmented macules represents an important alarming sign, because it reflects melanin deposition in the upper dermis and within hair follicles (Fig. 4); (2) biopsies of pigmented facial lesions should always be dermoscopy guided, and clinical, dermoscopic, and histopathological findings

should always be integrated (i.e., a histological result of a “junctional naevus” on the face of an elderly patient should be reviewed); and (3) ablative treatments (i.e., cryotherapy, laser therapy, etc.) should be avoided on equivocal facial lesions [14, 15].

Another recent rule (personal communication) for distinguishing FM in situ from other benign facial lesions consists of first searching for the following non-melanoma dermoscopic features: scales, white follicles or rosettes, erythema or reticular vessels, fingerprints, structureless brown colour, sharp demarcation, and classic seborrheic keratosis criteria. If the lesion shows no prevalent benign features, a biopsy or close follow-up might be recommended.

Fig. 3. Dermoscopy of a slow-growing melanoma discovered after long-term follow-up. The series of 6 images (a–f) were collected at 6-monthly intervals over 3 years.

Other melanomas difficult to diagnose are those of special locations including mucosal, acral, and nail apparatus melanoma. The dermoscopic discrimination between melanoma (parallel ridge pattern) and acral naevi (parallel furrow pattern) is almost always simple to do, especially focusing on the peripheral parts of the lesion. Although a parallel ridge pattern represents a highly specific finding, several melanomas lack this criterion. In order not to miss these melanomas, a more global morphological assessment should be applied, considering several additional criteria that have been summarized in a recently introduced algorithm named the BRAAFF checklist [16]: irregular blotches (+1), parallel ridge pattern (+3), asymmetry of structures (+1), asymmetry of colours (+1), parallel furrow pattern (–1), and fibrillar pattern (–1). Each criterion is given a partial score (as indicated in the brackets above). A total score of ≥ 1 is needed for a lesion to be considered suspicious.

Mucosal melanoma is an exceptional variant of melanoma, rarely described in the literature with primary sites of origin including the oral mucosa (55%), the anorectum (24%), and the genital region (18%) [17–19]. The oral mucosa and the anorectum are difficult to explore through

dermoscopic examination, and most data have been reported for genital melanoma.

Genital melanomas are often diagnosed at late stages. Main differential diagnoses are naevi and melanosis. Dermoscopically, the most common features reported in genital melanoma are blue, grey, or white colours with or without structureless areas and/or a whitish veil. In contrast, dermoscopy of melanosis shows a ring-like pattern, homogeneous or structureless pattern, and reticular and/or globular pattern, often with a light or slightly dark brown colouration [18, 19].

Nail apparatus melanoma is another challenge for the clinician. It clinically appears as a brown to black pigmented band that extends from the proximal fold to the distal end of the nail plate. At the early stage only a longitudinal melanonychia is seen, as it occurs in melanocytic naevi and benign melanocytic hyperplasia. Clinical criteria that lead to the suspicion of nail apparatus melanoma are the involvement of a single digit, onset in adulthood, history of enlargement over time, triangular shape (with basis on the proximal fold and the thinner top on the distal end reflecting the rapid growth at the matrix), and periungual pigmentation (Hutchinson's sign, different from pseudo-Hutchinson's sign, i.e., the pigmentation is

Fig. 4. Dermoscopy of a nodular melanoma of 4 mm Breslow thickness showing a blue-black colour and polymorphous/atypical vessels.

Fig. 5. Dermoscopy of a hypomelanotic melanoma of 4.3 mm Breslow thickness showing a pink colour, atypical vessels, and small foci of pigmentation located at the periphery of the lesion.

detectable through a translucent cuticle) [20]. The most relevant dermoscopic features include the presence of a black/multicolour pattern often associated with a brownish pigmentation of the background, and multiple bands of different thickness and irregularly spaced (Fig. 5)

Moreover, the involvement of two-thirds of the nail plate and the presence of grey or black colour together with irregular brown pigmentation, granular pigmentation, and nail dystrophy are predictive for nail apparatus melanoma.

Fig. 6. Dermoscopy of a facial melanoma in situ (lentigo maligna) that shows a grey colour arranged in annular and granular structures.

Basal Cell Carcinoma

The value of dermoscopy in improving the diagnosis of basal cell carcinoma (BCC) has been extensively demonstrated in recent decades. Recent studies suggest that dermoscopy significantly facilitates the accurate management of this tumour [21]. In detail, the dermoscopic criteria associated with non-pigmented BCC include fine telangiectasias with few ramifications and/or multiple small erosions for the superficial subtype, and classical arborizing vessels and large ulceration/s for the nodular subtype (Fig. 7). Pigmented BCC is dermoscopically typified by brown-coloured structures, including leaf-like areas, spoke wheel areas, or concentric structures, predictive of pigmented superficial BCC, and large blue-grey ovoid nests predictive of a non-superficial (i.e., invasive, nodular) subtype [22]. BCC with an infiltrative component often exhibits fine scattered telangiectasias and white/red structureless areas, whereas morphoeic (sclerodermaform) BCC frequently displays a whitish background, corresponding histologically to the underlying dermal fibrosis [21, 23].

In addition to predicting the histopathological subtype, dermoscopy may reveal morphological characteris-

tics of the tumor that are relevant for designing the treatment strategy. For example, the presence of multiple small erosions or ulcerations has been suggested to represent a predictor of favorable response to imiquimod [21], while the presence of pigmentation has been revealed to be a predictor of worse response to photodynamic therapy (PDT) [21]. When clinical and dermoscopic features of nodular, infiltrative, or morphoeic (sclerodermaform) BCC are encountered, surgical excision (including Mohs surgery for high risk tumours) represents the first choice to minimize the possibility of tumour recurrence. In conclusion, dermoscopy not only facilitates the clinical recognition of BCC but also provides additional clues to guide the correct management of the tumour.

Keratinocyte Carcinomas

The dermoscopic characteristics of keratinocyte carcinoma including actinic keratosis (AK), intraepidermal carcinoma (Bowen disease), and invasive squamous cell carcinoma (SCC) have been recently characterized by specific dermoscopic features.

Fig. 7. a Dermoscopy of a superficial basal cell carcinoma showing fine telangiectasia and multiple small erosions. **b** Dermoscopy of a nodular basal cell carcinoma that shows, in focus, classic arborizing vessels and relatively large ulcerations.

Fig. 8. a Dermoscopy of a well-differentiated invasive squamous cell carcinoma showing keratotic crusts in the centre of the lesion. At the periphery are structureless white areas and hairpin, dotted, and irregular linear vessels. **b** Dermoscopy in this poorly differentiated invasive squamous cell carcinoma shows irregular polymorphous vessels on a reddish background which surrounds a central structureless whitish area.

According to the clinical/dermoscopic classification of facial AK into 3 grades, a red pseudo-network typifies grade 1 AK, a “strawberry” pattern is characteristic of grade 2, and scaly, structureless white to yellow areas and keratotic follicular openings are usually seen in grade 3 lesions. Moreover, pigmented AK may additionally display

a superficial brown, “broken-up” pseudo-network surrounding the follicular openings [24, 25].

Dermoscopy of non-pigmented intraepidermal carcinoma (Bowen disease) reveals glomerular vessels that are arranged in clusters, along with “islands” of white to yellow scales. Pigmented Bowen disease may also display

Fig. 9. **a** Dermoscopy of a Merkel carcinoma showing poorly focused vessels, milky pink structureless areas, a whitish zone, and a central crust. **b** Dermoscopy of an atypical fibroxantoma showing reddish and whitish areas in combination with an atypical polymorphous vascular pattern. **c** Dermoscopy of a late dermatofibrosarcoma protuberans exhibiting milky-red areas, whitish linear structures, and a fine pigment network. **d** Dermoscopy of primary cutaneous B-cell lymphoma with a white circle, salmon-coloured background/area, scales, and arborizing vessels.

structureless brown areas, small brown globules, and brown dots with a linear arrangement frequently at the periphery of the lesion.

The dermoscopic pattern of invasive SCC has been shown to depend on the grade of histopathological differentiation [26]. In particular, well-differentiated SCC displays signs of keratinisation as opaque, yellow scales, a central mass of keratin, structureless white areas, and yellow keratotic follicular plugs surrounded by a white rim (white circle). Linear irregular and predominant hairpin vessels are also typically seen at the periphery of

the tumour, especially in the keratoacanthoma type. In contrast to well and moderately differentiated SCC, poorly differentiated subtypes commonly lack signs of keratinization, displaying a predominant red colour, which results from dense vascularity (Fig. 8). If pigmented, invasive SCC can reveal homogeneous pigmentation, irregular blue-grey granular structures, or dark brown to black crusts when ulcerated. In conclusion, dermoscopy is useful for diagnosing different stages of keratinocyte carcinoma, consequently optimizing tumour management.

Other Malignant Skin Tumours

Merkel Cell Carcinoma

Merkel cell carcinoma is a rare, highly aggressive cutaneous malignancy, whose diagnosis and treatment are often delayed, because of its not specific clinical presentation.

In recent years a few studies have defined useful significant dermoscopic features for the prompt recognition of Merkel cell carcinoma, such as linear irregular and polymorphous vessels, poorly focused vessels, milky pink areas, white areas, structureless areas, architectural disorder, and absence of pigmentation (Fig. 9a) [27–30].

Atypical Fibroxantoma

Atypical fibroxantoma is a rare low-grade tumour, clinically appearing as a rapidly enlarging, reddish, dome-shaped nodule, often with an eroded or crusted surface located on the head or neck of the elderly. Dermoscopically, atypical fibroxantoma reveals reddish and whitish areas in combination with an atypical polymorphous vascular pattern characterized by linear, dotted, hairpin, and highly tortuous vessels irregularly distributed over the surface of the lesion (Fig. 9b). Ulceration, crusting, and keratin masses may also be found. Rainbow pattern and blue-amber pattern have been occasionally reported [31–33].

Dermatofibrosarcoma Protuberans

Dermatofibrosarcoma protuberans (DFSP) is a relatively uncommon fibrohistiocytic tumour of intermediate malignancy. Early lesions can be difficult to diagnose and dermoscopy could be a useful tool for the diagnosis of both early and late DFSP. While early tumours show a reddish background colour in conjunction with fine linear vessels distributed all over the surface of the lesion, late DFSP usually present peripheral dilated vessels

forming a mesh-like pattern, milky-red areas, whitish linear structures, and a fine pigment network (Fig. 9c) [34–36].

Primary Cutaneous Lymphoma

Primary cutaneous lymphoma can be classified into the 2 main groups of primary T- and B-cell lymphomas. It is already known that dermoscopy could play a key role in the diagnosis of early-stage mycosis fungoides, which often represents a diagnostic challenge, as its clinical presentation may closely mimic inflammatory skin diseases, most commonly chronic dermatitis. Lallas et al. [37] described a repetitive dermoscopic pattern characterized by the association of fine short linear vessels and orange-yellowish patchy areas. Recently, dermoscopy has been found useful for the diagnosis of a variant of mycosis fungoides, namely poikilodermatous [38], revealing multiple polygonal structures consisting of lobules of white stori-form streaks with septa of pigmented dots. As with primary cutaneous B-cell lymphoma, latest observations have shown some quite specific dermoscopic features such as white circles with a salmon-coloured background/area, scales, and arborizing vessels (Fig. 9d) [39, 40].

Conclusion

In conclusion, from being a second-level technique to be applied for clinically doubtful pigmented lesions, dermoscopy is nowadays considered as a first-level diagnostic tool that is often helpful in the recognition of most benign and malignant, pigmented and non-pigmented, skin neoplasms.

Disclosure Statement

The authors have no conflicts of interest to disclose.

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Erratum

In the article by Russo et al., entitled “Dermoscopy of Malignant Skin Tumours: What’s New?” [Dermatology 2017;233:64–73, DOI: 10.1159/000472253], the fourth author’s family name was misspelt and should read Giacomel, starting with “Gi” instead of “J”.