How to diagnose nonpigmented skin tumors: A review of vascular structures seen with dermoscopy

Part I. Melanocytic skin tumors

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Dermoscopy is a noninvasive tool that can be helpful in the diagnosis of nonpigmented skin tumors. This is because dermoscopy permits the visualization of key vascular structures that are usually not visible to the naked eye. Much work has concentrated on the identification of specific morphologic types of vessels that allow a classification into melanocytic versus nonmelanocytic and benign versus malignant nonpigmented skin tumors. Among a broad spectrum of different types of vascular patterns, six main morphologies can be identified. These are comma-like, dotted, linear-irregular, hairpin, glomerular, and arborizing vessels. With some exceptions, comma, dotted, and linear irregular vessels are associated with melanocytic tumors, while the latter three vascular types are generally indicative of keratinocytic tumors. Aside from vascular morphology, the architectural arrangement of vessels within the tumor and the presence of additional dermoscopic clues are equally important for the diagnosis. This article provides a general overview of the dermoscopic evaluation of nonpigmented skin tumors and is divided into two parts. Part I discusses the dermoscopic vascular patterns of benign and malignant melanocytic skin tumors. Part II discusses the dermoscopic vascular patterns of benign and malignant nonmelanocytic nonpigmented skin tumors. In each part, additional special management guidelines for melanocytic and nonmelanocytic nonpigmented skin tumors, respectively, will be discussed. (J Am Acad Dermatol 2010;63:361-74.)

Learning objectives: After completing this learning activity, participants should be able to categorize different vascular structures and the architectural arrangement of vessels within tumors and additional dermoscopic clues of nonpigmented skin tumors, recognize the diagnostic significance of vessels associated with nevi and melanoma, and appropriately manage nonpigmented melanocytic skin tumors.

Key words: amelanotic melanoma; Clark nevus; dermal nevus; dermoscopy; hypomelanotic melanoma; Spitz nevus; Spitz tumor; vessels.

Dermoscopy is a noninvasive technique that has gained great popularity for the diagnosis of pigmented skin tumors (PSTs) because it improves diagnostic accuracy compared to examination with the naked eye.[1-3] Dermatoscopes are modified magnifying devices that permit the visualization of pigmented structures or vessels in the epidermis and superficial dermis. Because most dermoscopic structures correspond to specific histopathologic correlates, dermoscopy can be regarded as a link between clinical (macroscopic) and histopathologic (microscopic) morphology.[4]

In contrast to the traditional liquid or gel-immersion (contact) dermatoscopes, newer generations of handheld skin surface microscopes use cross-polarized light to visualize cutaneous structures.[5] Both systems are commercially available and generally operate at 10-fold magnification.[6] Polarized light dermatoscopes have the advantage that direct physical contact between the glass plate and the skin

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is not required. Conversely, a disadvantage of nonpolarized instruments is that contact of the optical glass plate can exert pressure on the tumor surface, compressing surface capillaries and making them difficult to visualize. While this is of limited diagnostic disadvantage in the evaluation of PSTs, vessels may be the only dermoscopic features observable in nonpigmented skin tumors (NPSTs) and they are therefore a valuable key for diagnosis.

Given that NPSTs represent a diagnostic challenge for the clinician, much work has concentrated on the identification of vascular patterns that may aid their correct recognition. [7-12] An overview of the dermoscopic vascular patterns is provided in this article, and key points and diagnostic clues for the management of the most common NPSTs are provided.

CAPSULE SUMMARY

- Dermoscopy improves the diagnosis of nonpigmented skin tumors because it allows the visualization of vascular patterns and residual pigmentation that are not visible to the naked eye.
- The dermoscopic diagnosis of a nonpigmented skin tumor is based on a three-step algorithm that considers vascular morphology, the architectural arrangement of vessels, and additional clues.
- The predominant vascular pattern of amelanotic/hypomelanotic melanoma strongly depends on the tumor thickness.
- Comma, dotted, and linear irregular vessels are suggestive of melanocytic skin tumors.
- Histopathologic diagnosis should always be obtained for lesions displaying dotted, linear irregular, or polymorphous vessels, milky red color or globules, or those that have a nonspecific dermoscopic appearance.

BASIC ASPECTS TO VIEW VESSELS BY DERMOSCOPY

The visualization of vascular structures strongly depends on the optical device (contact or noncontact dermatoscope) and the technique of dermoscopic examination.[6,7] When using contact dermatoscopes, the contact glass plate of these instruments must be set carefully on the tumoral surface, applying minimal downward pressure. Liquids of low viscosity, such as alcohol or immersion oil, are sometimes used as contact media, but are best avoided in contact dermoscopy. This is because they require excessive downward pressure to be exerted by the instrument onto the tumor in order to obtain complete optical contact. In most dermatology offices, translucent ultrasound gel is an effective contact medium because of its high viscosity. Moreover, a practical tip for using contact dermoscopy in the examination of NPSTs is to apply a sufficiently generous dollop of ultrasound gel onto the lesion, which allows the glass plate to be softly dipped into the gel.

Although noncontact dermoscopy does not require a liquid interphase between the lens and the skin, very dry or scaly lesions may cause significant reflection, which can limit visualization of underlying vascular structures. In such cases, the application of liquids (water, alcohol, immersion oil, or ultrasound gel) onto the lesion often helps to diminish this surface reflection and improves the visualization of vessels.

A THREE-STEP DIAGNOSTIC ALGORITHM FOR THE DIAGNOSIS OF NONPIGMENTED SKIN TUMORS

Key points

- **Before beginning the dermoscopic evaluation of a given nonpigmented skin lesion, it is necessary to establish whether the lesion is a tumor or belongs to the spectrum of inflammatory or infectious skin diseases, because the vascular pattern between these two categories may overlap**
- **The dermoscopic examination of a NPST should follow a stepwise algorithm assessing the morphology of the vascular pattern, the architectural arrangement of vessels in the tumor, and the presence of additional dermoscopic criteria**

The accurate diagnosis of NPST is clinically difficult given the wide spectrum of possible differential diagnoses, which vary from benign inflammatory to highly aggressive malignant skin tumors, such as amelanotic melanoma or Merkel cell carcinoma.

Vascular patterns of NPSTs may overlap with those of inflammatory skin disorders, so it is critical to establish whether the lesion is a tumor or represents an inflammatory or infectious process.[12] When a nonpigmented skin lesion (NPSL) is clinically classified as a tumor (taking into consideration lesion size, number, distribution, clinical features, and history), the dermoscopic examination should follow a stepwise algorithm assessing first the morphology of the vascular pattern, second the architectural arrangement of vessels in the tumor and, third the presence of additional dermoscopic criteria that